NCARB

2012 NCARB Practice Analysis of Architecture

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FOREWORD

The *2012 NCARB Practice Analysis of Architecture* is unique in many ways compared to previous practice analyses of the profession. This significant and greatly expanded study was planned deliberately and methodically to:

DRIVE the test specification of the Architect Registration Examination® (ARE®),

INFORM the future of the Intern Development Program (IDP), and

GUIDE NCARB's Contribution to the NAAB 2013 Accreditation Review Conference (ARC), as well as future continuing education policies.

The survey yielded a great deal of data for review and analysis by four NCARB committees: Education, Internship, Examination, and Continuing Education, as well as the Council's Board of Directors. The findings will be used to shape our programs and policies over the coming years and inform important discussions within the profession related to the path to licensure.

The *2012 NCARB Practice Analysis of Architecture* report includes the full set of previously published reports that focused on education, internship, examination, and continuing education.

The NCARB Practice Analysis of Architecture is an important example of the many ways the Council is reaching out and soliciting feedback from across the profession as we collectively consider and shape the future of practice. For example, the prestigious NCARB Award is supporting innovation in education; our newly inaugurated Intern Think Tank is giving interns a greater voice in the future of the IDP; our ARE research efforts are informed by ongoing feedback from architect volunteers and our Member Boards as we prepare for the next generation of the examination; and our efforts to increase collaboration with the architectural collaterals is helping drive positive change in the profession.

The Council extends its thanks and gratitude to those involved in the development of the Practice Analysis as well as to every individual who took the time to complete the survey. Your support of the profession throughout this important endeavor is greatly valued and appreciated.

Michael J. Armstrong
Chief Executive Officer
National Council of Architectural Registration Boards

INTRODUCTION

PURPOSE

A practice analysis is conducted with practitioners of a profession in order to define the knowledge/skills they must possess and the tasks they must be able to perform at the time of licensure. These studies are carefully designed according to strict standards and are used to ensure that the body of knowledge necessary to practice reflects the current state of the profession and the needs of practitioners. Practice analyses are not limited to the profession of architecture; they are conducted on behalf of a wide variety of professions, occupations, and vocations, and play an important role in licensure and certification programs all over the world. Through its long history and experience, NCARB has determined that surveying every five to seven years most appropriately responds to the needs of the architecture profession.

Findings from practice analyses are typically used to update specifications for professional licensure exams, such as NCARB's Architect Registration Examination® (ARE®); however, the scope of the *2012 NCARB Practice Analysis of Architecture* was intentionally expanded to gather additional information to strategically support the Council's education, internship, and continuing education initiatives. This comprehensive study included multiple surveys designed to engage architects—the most appropriate representatives of the profession—in the evaluation of tasks and knowledge/skills required of an independent practitioner. Practitioners' responses were supplemented with those from interns and educators to allow for deeper analysis and broader application of findings.

As part of the 2012 Practice Analysis survey, architects, supervisors, mentors, interns, and educators were asked to express their opinions and respond to specific questions related to architectural education, internship, examination, and continuing education. The eleven comprehensive surveys, comprised of 24 research questions, addressed the knowledge, skills, and tasks directly related to the competent, independent practice of architecture. The profession's overall response rate, 10.6 percent, provided a substantive basis for summarizing the needs and expectations of practitioners and serves as a solid foundation for the evolution of NCARB's important programs and services.

KEY FINDINGS

EDUCATION

Recently licensed architects, interns, and educators responded to four surveys related to architectural education. When comparing the responses of similar questions posed to these survey populations, differences in perceptions emerged regarding when the various knowledge/skills were acquired and the level to which tasks were performed by completion of education.

Practitioners have high expectations of architectural education and indicated that a majority of knowledge/skills necessary for practice should be acquired before completion of an accredited degree program. Encouragingly, interns currently completing the IDP and recently licensed architects reported that they acquired many of these important knowledge/skills during education and internship when compared to the responses of architects licensed more than five years.

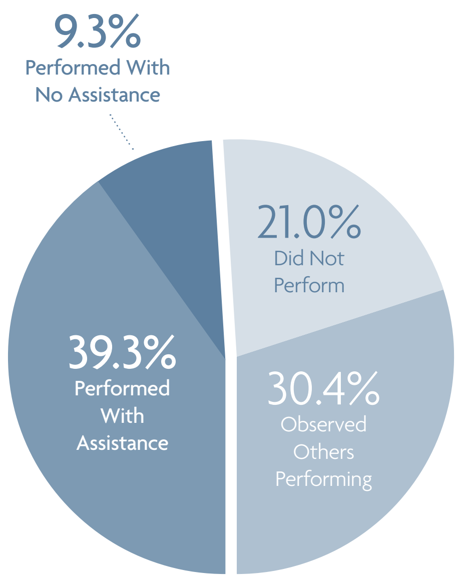
Through further analysis of the education data, eight areas were identified as needing greater focus and reinforcement prior to completion of accredited education: communication, collaboration, professional conduct, practice/project management, site design, constructability, sustainability, and technology.

INTERNSHIP

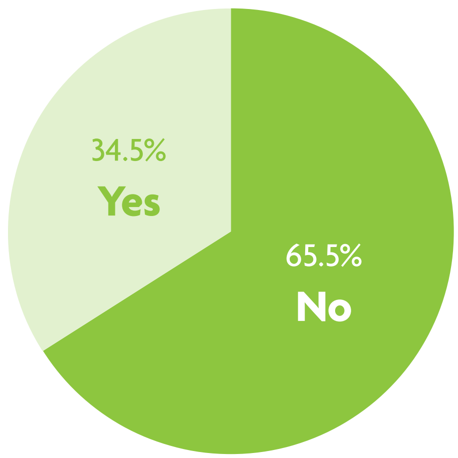
Supervisors, mentors, and interns—all recently engaged in the IDP—completed three surveys directly related to internship and the Intern Development Program.

Two surprising findings resulted from the analysis of the data. The pie chart above on the right shares mean response rates of supervisors and mentors when asked about intern performance of tasks by completion of the IDP. The expectation of the IDP is that interns are able to perform tasks without assistance by the completion of the program. According to survey responses, the vast majority of interns performed tasks with assistance, observed others performing the tasks, or did not perform the tasks. Only 9.3 percent of responses from supervisors and mentors indicated tasks were being performed with no assistance, revealing a significant gap between program expectations and intern performance.

Another important finding is related to supplemental experience, a key component of the existing IDP framework. When asked whether they view supplemental education/experience as acceptable in lieu of on-the-job performance of tasks during internship, most architects, supervisors, and mentors said no, as indicated by the pie chart on the lower right. This information will play an important role in the future evolution of internship.



TASK PERFORMANCE



SUPPLEMENTAL EXPERIENCE

EXAMINATION

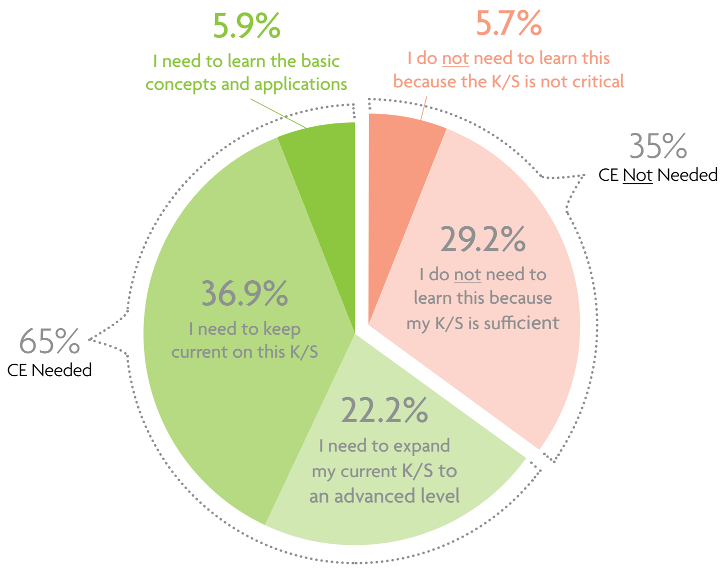
Licensed architects of varying levels of experience completed three separate examination-related surveys. Two surveys asked questions regarding the level of importance of knowledge/skills and tasks and the point of acquisition of knowledge/skills—questions typically included in a practice analysis study. New rating scales related to level of knowledge/skill use and frequency of task performance were added to the 2012 survey for the first time.

Nearly 98 percent of knowledge/skills and 96 percent of tasks included in the survey were rated as being "*important*" or greater for competent performance by a recently licensed architect practicing independently. Many of those rated "*very important*" or "*critically important*" are related to building codes, regulatory requirements, and professional ethics—all of which are directly connected to the protection of the public health, safety, and welfare.

Fifteen knowledge/skills that were rated "*important*" or greater were also identified as being acquired after licensure. This gap points to a need for greater exposure and experience in many important areas during education and internship. The majority of these knowledge/skills are related to practice and project management issues, echoing similar findings from the education-related surveys.

CONTINUING EDUCATION

Most architects see the value in lifelong learning in order to keep current with practice and expand existing knowledge/skills. The introduction of new building materials and systems, changes in building codes and contract documents, as well as ongoing advancements in technology require additional education, training, and renewal. According to the survey data, 65 percent of responses from architects indicated the need for continuing education in order to learn the basics, keep current, or expand their knowledge to a more advanced level.



LEVEL OF CE NEED

CONCLUSION

The data collected during the 2012 Practice Analysis survey provides a comprehensive and rich set of information from a broad and representative sample of architects, interns, and educators. The initial analysis completed by various NCARB committees and staff will support both the immediate and long-term needs of the Council's programs by:

- Serving as a significant contribution to the 2013 NAAB Accreditation Review Conference;
- Supporting accredited architectural education's important role in the path to licensure;
- Allowing the IDP to continue as a valuable step in the development of the next generation of practitioners;
- Ensuring that the ARE remains relevant to the current practice of architecture, psychometrically justifiable, and legally defensible; and
- Supporting and refining existing continuing education efforts while also enabling the Council to better engage with broader efforts to respond to architects' CE needs.

It is our hope that the *2012 NCARB Practice Analysis of Architecture* will stimulate and deepen the dialogue among the academy, related collateral organizations, the Council's Member Boards, and individual students, interns, and practitioners, as we collectively shape the future of our amazing profession.

SURVEY DEVELOPMENT

The primary goal of previous NCARB practice analysis studies was to gather data for purposes of maintaining a current and valid ARE test specification. The Council expanded the scope of the 2012 study so that all Council programs could directly benefit from the Practice Analysis findings. As a result, the survey design, data collection, data analysis, and application processes were significantly revamped.

As in the past, the *2012 NCARB Practice Analysis of Architecture* was designed to be consistent with the Standards for Educational and Psychological Testing (1999) set forth by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education (the Standards). The Standards serve as the universally recognized benchmark for design, construction, standard setting/cut score, test administration, score reporting, and test scoring of all examinations, including those related to education, personnel selection, licensure, and certification. The three key Standards that served as foundational references for NCARB's 2012 Practice Analysis are:

Standard 14.8 "Evidence of validity based on test content requires a thorough and explicit definition of the content domain of interest." (p. 160)

Standard 14.10 "When evidence of validity based on test content is presented, the rationale for defining and describing a specific job content domain in a particular way (e.g., in terms of tasks to be performed or knowledge, skills, abilities, and other personal characteristics) should be stated clearly." (p. 160)

Standard 14.14 "The content domain to be covered by a credentialing test should be defined clearly and justified in terms of the importance of content for credential-worthy performance in an occupation or profession. A rationale should be provided to support a claim that the knowledge or skills being assessed are required for credential-worthy performance in an occupation and are consistent with the purpose for which the licensing or certification program was instituted." (p. 161)

SURVEY DESIGN

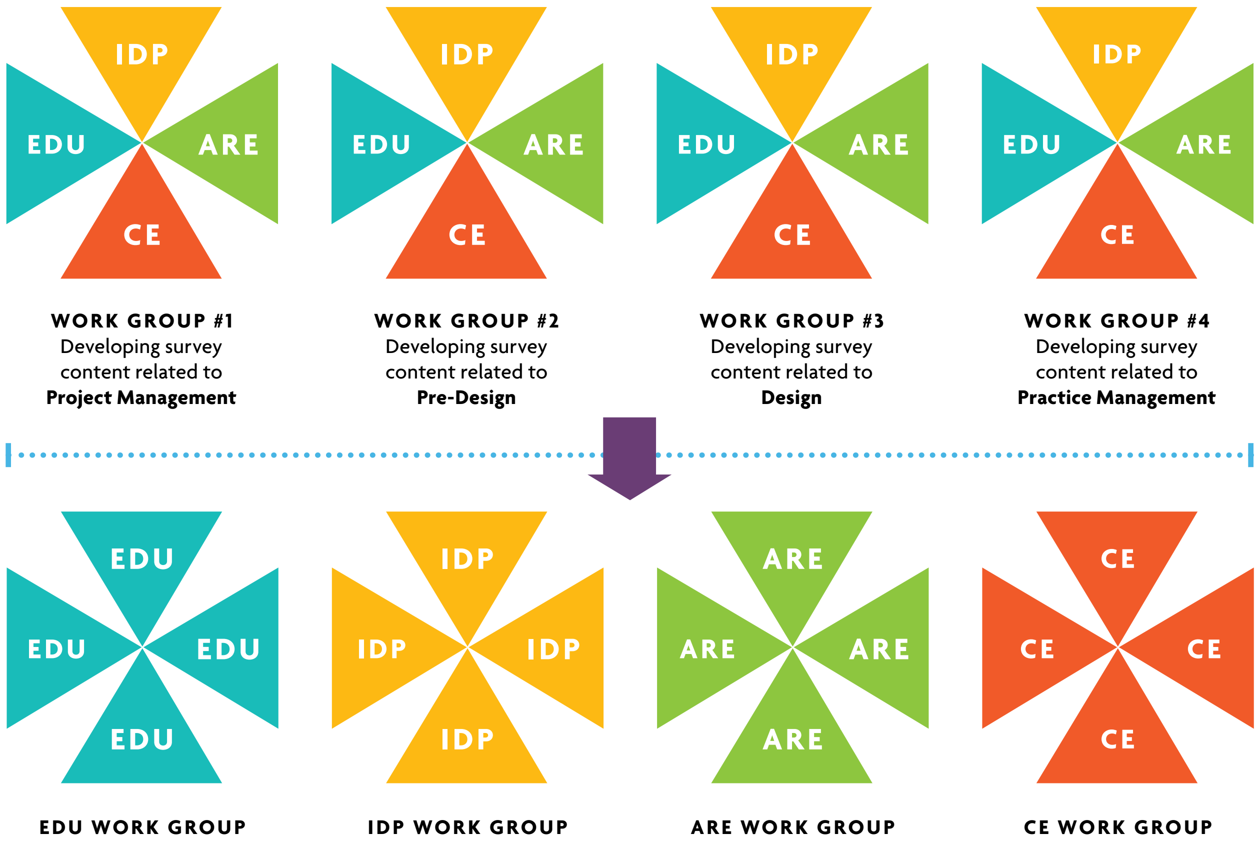
The 2012 Practice Analysis was designed under the guidance and review of the Practice Analysis Steering Committee (PASC), which served as the oversight body responsible for planning and implementing the new multi-disciplinary approach. The 11-member PASC included representatives from NCARB's Education Committee, Internship Committee, Examination Committee, Continuing Education Committee, Board of Directors, and staff. Additionally, for the first time, the PASC included leaders from the Association of Collegiate Schools of Architecture (ACSA), the American Institute of Architects (AIA), the American Institute of Architecture Students (AIAS), and the National Architectural Accrediting Board (NAAB), in order to gain their input and foster support of the survey and its findings.

A larger working group, the Practice Analysis Task Force (PATF), consisting of over 40 architects and subject-matter experts from across NCARB's Member Boards, was convened to assemble a comprehensive list of tasks and knowledge/skills (K/S) representing the competencies necessary to practice architecture. Those competencies were categorized into four main program areas of interest—education (EDU), internship (IDP), examination (ARE), and continuing education (CE)—and combined with extensive ratings scales to serve as the Practice Analysis Survey.

The PATF was separated into four work groups in order to gain diverse perspectives on the types of tasks and K/S that architects utilize. Each work group consisted of eight subject-matter experts (SMEs) representing the Education, Internship, Examination, and Continuing Education Committees. An NCARB staff member managed the process, with discussions facilitated by the survey consultant, PSI Services, LLC. Each group was charged with developing task and K/S statements for one of four domains: pre-design, design, project management, and practice management.

After the initial list of task and K/S statements was developed, facilitators compared the new list of statements to the statements from the 2007 practice analysis. The work groups reviewed the comparative data and incorporated appropriate revisions.

Next, the four multi-program work groups were re-organized into four program-specific work groups as illustrated below. Multiple webinars were scheduled in order for the EDU, IDP, ARE, and CE work groups to review the lists of task and K/S statements and ensure the statements holistically represented the needs of each specific program area.



With the comprehensive lists of tasks and K/S compiled, the work of the task force was returned to the steering committee. The PASC then finalized the list of task and K/S statements, reviewed the multiple ratings scales, and finalized the background information questions. The chart to the right indicates the total number of task and K/S statements identified for each of the four program area surveys.

The four program surveys were then subdivided into a total of 11 separate surveys in order to decrease the amount of time required to complete the survey and to help ensure that a sufficient number of responses would be obtained. A master sampling plan was developed to direct each of the segmented surveys to the appropriate target audience and to allow for the best response rates possible.

PROGRAM AREA	SURVEY	STATEMENT TYPE	NUMBER OF STATEMENTS
Education	**EDU**	Task	104
		Knowledge/Skill	122
Internship	**IDP**	Task	136
Examination	**ARE**	Task	110
		Knowledge/Skill	132
Continuing Education	**CE**	Knowledge/Skill	127

PROGRAM AREA	NUMBER OF SURVEYS
Education (EDU)	4
Internship (IDP)	3
Examination (ARE)	3
Continuing Education (CE)	1

New rating scales were also introduced in the 2012 Practice Analysis. These scales were developed to answer various research questions pertinent to NCARB's four key program areas, and went beyond the traditional importance and acquisition scales typically used in a practice analysis.

PILOT SURVEY

Prior to releasing the main survey, a pilot survey was launched to gather feedback regarding the comprehensive nature of the task and K/S statements as well as the functionality and design of the survey. A total of 1,338 e-mail invitations was sent and 218 individuals participated. Several refinements to the surveys, the background information questions (BIQs), and the survey instructions were made based on the pilot survey results.

SUPPLEMENTAL STUDIES

In addition to the main survey, three supplemental studies were conducted in order to support the Practice Analysis: a multi-faceted focus group study, a survey of students, and a crosswalk study.

Nine focus groups were conducted with individuals who regularly work with architects. These groups participated through surveys, individual telephone interviews, and facilitated web conferences to identify their perception regarding current issues, challenges, and future opportunities for the Council. The focus group participants included:

- Clients of architects
- Civil/geotechnical consultants and landscape architects
- Structural, mechanical, and electrical engineers
- Interior designers and other specialty consultants
- General contractors and construction managers
- Senior building officials
- CAD technology delivery groups and product manufacturers
- Liability carriers, lending institutions, and attorneys
- Futurists and visionaries

Students attending the December 2011 AIAS Forum were invited to take part in a modified practice analysis survey to further inform the development of the final survey. These surveys were developed using the same task and K/S statements along with slightly different rating scales. The primary focus of the student survey was to provide supplemental information in support of the Council's education and internship programs; the survey data also helped inform the development of the 2012 Practice Analysis Survey.

The Crosswalk Study compared the tasks and K/S identified in NCARB's *2007 Practice Analysis of Architecture* with those identified for the 2012 Practice Analysis Survey prior to its national administration. Approximately half of the tasks and K/S in the 2012 survey were found to be aligned with the tasks and K/S included in the 2007 survey.

DATA COLLECTION

The best source for identifying the requisite body of knowledge for any profession is practitioners themselves. Active practitioners serve as the most reliable resource to establish the current trends of practice and identify the future needs of the profession. Three groups of architects were the primary contributors of the data collected for the *2012 NCARB Practice Analysis of Architecture*:

- architects licensed in the past year (who completed the IDP in the past two years),
- architects who have been licensed between two and 10 years, and
- architects licensed more than 10 years.

Another group of architects—those who recently served as IDP supervisors and/or mentors—were specifically identified to participate in the Internship (IDP) survey to better inform the future of the IDP.

NCARB also engaged other important constituencies in order to gain as much insight as possible. Educators were once again invited to participate in the Practice Analysis survey. A select group of interns was also invited to complete the survey—those who completed the IDP within the past year and those who completed the IDP within the past two years but <u>not</u> the ARE. Even though educators and interns represented a small part of the overall survey sample, the important input they provided will be used to guide and inform the Council's education and internship perspectives.

In order to reach as many practitioners, educators, and interns as possible, a substantial e-mail database was compiled from various NCARB, ACSA, AIA, and AIA component databases. Two separate e-mail campaigns were conducted and a supplemental open link to the survey was placed on NCARB's website to promote participation. Several additional communications were issued to describe the study and its importance to the profession. NCARB's Member Boards, each collateral organization, and the AIA's components were successfully encouraged to disseminate the information as well.

The survey was launched on 2 April 2012 and closed on 6 May 2012. Reminder e-mails were sent on a weekly basis to encourage completion of the survey. As an incentive to participate, 100 respondents who completed the survey were randomly selected to receive a $50 gift card.

Collectively, NCARB drew upon a wide spectrum of those engaged with the practice of architecture—both directly and indirectly—to ensure that the data collected will have both an immediate and long-term impact on the Council's education, internship, examination, and continuing education programs and policies.

DATA ANALYSIS

Complete files that included both the background information question (BIQ) response data and the task and K/S statement data were compiled for each of the surveys and extensively examined for quality control purposes prior to data analysis. New matrix sampling technologies were employed to improve the representativeness of survey results. By using matrix-sampling methods, the size of the samples better represents the population at large.

Participants who responded to at least 90 percent of the items in the survey were included in the final analysis; however, if a participant completed the same survey twice, their second response was not included. Duplicate responses by the same participants were detected by a repeating BIQ ID number. Also, anomalies in a participant's response patterns were identified and their responses to the open-ended questions were examined. In a small number of cases, respondents' data was excluded for the following possible reasons: based on response patterns and comments stating that respondents had randomly selected any answer; that they did not belong to the particular survey population; or that they had been mistakenly routed to the wrong survey.

SURVEY RESPONSE RATE AND STATISTICS

SURVEY RESPONSE RATE

A total of 15,620 surveys were returned (21.0 percent) from the 74,387 surveys that were successfully delivered via e-mail plus those submitted through a link on NCARB's website. These responses were screened to ensure that the respondents met the study criteria with respect to population segment and experience level, as well as survey completeness. After applying rigorous quality control standards, a total of 7,867 surveys were retained in the final analysis sample, comprising a 10.6 percent response rate. NCARB's Practice Analysis consultant, PSI Services LLC, indicates that the data resulting from the survey sample provides a substantive basis for summarizing professional practice through its representativeness, precision, and breadth of information.

REPRESENTATIVENESS OF THE SAMPLE

Overall, the analysis sample represents a wide range of experience levels, employment settings, organization sizes, and geographic regions, thereby supporting the validity of the survey data. It reflects a diverse and representative sample of architects, interns, and educators.

PRECISION OF THE SURVEY STATISTICS

The survey sample size is sufficiently large to support the calculation of summary descriptive statistics, such as the mean rating and percentage of respondents choosing a rating scale category. Overall, there is a good degree of precision in the statistics for their intended use. In most cases of interest where the number of respondents exceeds 100, the Standard Error (SE) of the task and K/S ratings is less than 5 percent. The EDU, IDP, ARE, and CE survey sub-samples ranged from 147 to 1,152; therefore, the precision of the statistics was higher (i.e., SE was lower).

BREADTH OF INFORMATION

The breadth of the information provided by the survey participants is unprecedented for a survey yielding information germane to architecture education, training, and assessment. **The respondents used a total of 24 rating scales to provide information regarding the task and K/S statements, generating over 21 million quality-screened data points for analysis.**

Details regarding the derivation of the final analysis sample are summarized below.

- Survey invitations delivered: Of the 82,985 survey invitations sent, 74,387 were successfully delivered to a valid e-mail address.
- Surveys submitted: A total of 15,620 surveys (21.0 percent) were submitted, including those completed through a survey link on NCARB's website.
- Surveys qualified: A total of 2,543 respondents were disqualified from taking the survey because they were not licensed and had participated in the IDP more than two years ago. As a result, 13,077 (17.6 percent) qualified surveys were retained for further quality screening.
- Surveys qualified for analysis: Surveys were retained for analysis if respondents completed 90 percent or more of the survey items. A total of 7,867 (10.6 percent) surveys met this criterion.

Comprised of multiple questions, these surveys yielded over 21 million data points. The table to the right identifies combined response rates for the surveys in each of the four program areas.

PROGRAM AREA	RESPONSES RECEIVED	RESPONSES INCLUDED IN DATA ANALYSIS	PERCENTAGE INCLUDED IN DATA ANALYSIS
Education (EDU)	2,935	2,015	69%
Internship (IDP)	3,438	2,302	67%
Examination (ARE)	3,974	2,695	68%
Continuing Education (CE)	1,232	855	69%

RESPONDENT DEMOGRAPHICS

Nineteen (19) background information questions (BIQs) delivered at the beginning of each survey were designed to collect demographic information about the respondents. Responses to the BIQs were also used to direct the respondent to the most appropriate survey as identified by the master sampling plan. The sampling plan was developed to decrease the amount of time required to complete the survey and to help ensure that a sufficient number of responses would be obtained.

PROFILE

The profile of the typical survey respondent is an individual who:

- Received a Bachelor of Architecture degree (B. Arch) in the United States
- Has been licensed for more than 20 years in the United States or Canada
- Is a white male
- Works full-time as a principal in an equity position
- Has not served as an IDP supervisor/mentor

Optional demographic questions included gender, age, and ethnicity.

GENDER	
Male	80%
Female	20%

AGE	
20-29	4%
30-39	19%
40-49	19%
50-59	28%
60-69	23%
70+	7%

Over 83 percent of the respondents described themselves as "white."

SELF-REPORTED ETHNICITY	NUMBER OF RESPONSES (N)	PERCENT
White	6,015	83.93%
Black or African American	117	1.63%
American Indian or Alaskan Native	8	0.11%
Asian Indian	38	0.53%
Japanese	42	0.59%
Native Hawaiian	4	0.06%
Chinese	116	1.62%
Korean	37	0.52%
Guamanian or Chamorro	4	0.06%
Filipino	26	0.36%
Vietnamese	5	0.07%
Samoan	0	0.00%
Other Asian	29	0.40%
Other Pacific Islander	0	0.00%
Other race	163	2.27%
Multiple Selected	120	1.67%
None Selected	443	6.18%
TOTAL	7,167	100.00%

Approximately 95 percent of the respondents who responded to the ethnicity question indicated that they were not of Hispanic, Latino, or Spanish origin.

HISPANIC, LATINO, OR SPANISH ORIGIN	NUMBER OF RESPONSES (N)	PERCENT
No, not of Hispanic, Latino, or Spanish origin	6,408	94.65%
Yes, Mexican, Mexican American, Chicano	90	1.33%
Yes, Puerto Rican	52	0.77%
Yes, Cuban	65	0.96%
Yes, another Hispanic, Latino, or Spanish origin	155	2.29%
TOTAL	6,770	100.00%

Additional data points regarding the overall Practice Analysis Survey respondents include:

EDUCATION

96% educated in the United States

47% completed a B.Arch

71% graduated from a NAAB-accredited program (B.Arch, M.Arch, or D.Arch)

INTERNSHIP

50% completed IDP

41% served as an IDP supervisor and/or mentor

LICENSURE

92% are currently licensed in a U.S. or Canadian jurisdiction

21% of respondents have been licensed 2-10 years

14% of respondents have been licensed 11-19 years

56% of respondents have been licensed 20 or more years

82% are employed full time

63% work in an architecture firm

39% serve as a principal in an equity position

31% serve as project architects + project managers

JOB AND FIRM TYPE

The survey respondents included practitioners from a wide range of professional settings, including:

- Architecture firms
- Architecture/engineering firms
- University/academic institutions
- Government/public sectors
- Construction and design/build firms
- Specialty consulting firms

Organizational sizes ranged from sole practitioner to more than 100 employees. The respondents ranged in experience (two-thirds were licensed for more than 10 years while nearly 10 percent had been licensed for a year or less) and included a variety of job titles such as:

- Principal
- Project architect
- Design architect
- Production architect
- Project manager
- Facilities manager/owner's representative
- Intern
- Educator

REGIONAL REPRESENTATION

The sample of respondents represented all geographic regions in the United States, with a small percentage received from Canada and other international locations.

NCARB REGION OR INTERNATIONAL LOCATION	PERCENT
REGION 1: NEW ENGLAND Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont	6%
REGION 2: MIDDLE-ATLANTIC Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania, Virginia, West Virginia	20%
REGION 3: SOUTHERN Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Puerto Rico, South Carolina, Tennessee, Texas, U.S. Virgin Islands	24%
REGION 4: MID-CENTRAL Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Ohio, Wisconsin	18%
REGION 5: CENTRAL STATES Kansas, Montana, Nebraska, North Dakota, Oklahoma, South Dakota, Wyoming	4%
REGION 6: WESTERN Alaska, Arizona, California, Colorado, Guam, Hawaii, Idaho, Nevada, New Mexico, Oregon, Utah, Washington	26%
Canada	1%
Other International	1%
TOTAL	100%

EDUCATION REPORT

EXECUTIVE SUMMARY

THE EDUCATION SURVEY

This *Education Report* encompasses extensive data collected from the four education-specific surveys and provides important insights relevant to architectural education.

EDUCATION A Survey
In this survey, educators were asked to indicate whether specific tasks were covered in their architecture programs and the extent to which students perform each task by completion of architecture education.

EDUCATION B Survey
Both interns and architects were asked to indicate the extent to which they performed specific tasks by completion of their architecture degree program.

EDUCATION C Survey
Both educators and architects were asked to indicate when specific knowledge/skills should first be acquired, and to what extent each knowledge/skill should be acquired within the years of an accredited degree program.

EDUCATION D Survey
Both interns and architects were asked to indicate when they acquired specific knowledge/skills and to what extent each knowledge/skill is typically used.

KEY FINDINGS

Several key similarities and differences emerged among the responses of architects, interns, and educators related to the introduction or coverage of specific tasks, the level of acquisition of knowledge/skills, and their point of acquisition. Interns and architects were typically more closely aligned in their responses when compared to educators. While a gap in perception between practitioners and educators will likely always be present, it readily identifies a disconnect between the profession and the academy that must be addressed.

- **Coverage** – Of the 104 tasks included on the Education Survey, educators identified only nine as "*not covered*" in their architecture program, while interns and recently licensed architects identified an additional 35 tasks as "*not introduced*" during their education. Even when acknowledging this rather significant difference, it is encouraging to note that nearly 40 percent of the tasks included in the Education Survey were rated as "*covered*" or "*introduced*" during architectural education by more than half of the architects, interns, and educators responding to the survey.
- **Level of Acquisition** – When looking collectively at the 122 knowledge/skills rated in the surveys, architects and educators were in general agreement when asked to identify the level ("*understand*," "*apply*," or "*evaluate*") at which the knowledge/skills should be acquired by completion of an accredited program. However, that agreement diminished when the ratings were compared at the individual level.
- **Point of Acquisition** – Practitioners overwhelmingly responded that a vast majority of the 122 knowledge/skills surveyed should be acquired before completion of an accredited program. While that is not surprising, it is encouraging to note that recently licensed architects and current interns report that they are acquiring many important knowledge/skills during education and internship when compared to architects licensed for five to 10 years. Improvements in both education and internship programs over the past decade may be contributing toward this trend.

Through further analysis, eight areas were identified as needing greater focus and reinforcement prior to completion of accredited education:

- **Communication** – Data indicated that communication through graphic means is clearly covered in accredited education; however, students do not possess an equal command of basic written and oral presentation skills.
- **Collaboration** – Collaboration with others is essential to a successful practitioner. A majority of educators indicated that collaboration is covered in their program, yet there is a difference in perception between educators and interns/architects on whether this task is actually performed by completion of an accredited program.
- **Professional Conduct** – An overwhelming number of practitioners reported that professional conduct and compliance with regulations is critically important, is performed daily, and should be further incorporated in the foundations of an accredited program.
- **Practice Management** and **Project Management** – Architects licensed more than 10 years reported that they acquired many important practice and project management-related knowledge/skills after licensure, with more recently licensed architects and interns reporting acquisition during internship. Survey data reflects the belief that a greater exposure to and understanding of issues such as business development, office management, project management, and risk management should be acquired during education.
- **Site Design** – Site design knowledge and skills are clearly covered in education; however, practitioners reported the level of performance in this area is below that indicated by educators and suggested that students should have a greater ability to perform these tasks prior to graduation.
- **Constructability** – The integration and coordination of building systems, combined with the interpretation and application of building codes, are interdependent components of constructability. The Practice Analysis provides evidence that these important knowledge and skill areas are being acquired during internship; however, a majority of educators and practitioners indicated they should be acquired prior to completion of accredited education.
- **Sustainability** – As the emphasis on sustainable design continues to increase, the knowledge of design strategies and energy codes, as well as the ability to assess, develop, and implement sustainable criteria, must also increase. Survey respondents indicated they believe that accredited education could better support students in developing this area of expertise.
- **Technology** – The profession's dependence on technology continues at a rapid pace, and while the data indicates accredited programs are exposing students to important applications of technology, interns and architects licensed 10 years or less overwhelmingly indicated they are acquiring technology-related knowledge/skills during internship. Responses from educators and architects collectively indicate that more of these knowledge/skills should be acquired through completion of education.

CONCLUSION

The data resulting from the Education Survey of the *2012 NCARB Practice Analysis of Architecture* provides a comprehensive and rich set of information from a broad and representative sample of architects, interns, and educators. These findings guided *NCARB's Contribution to the National Architectural Accrediting Board (NAAB) 2013 Accreditation Review Conference*, and will continue to inform other important discussions related to the vital role accredited architectural education plays in the path to licensure and in preparing emerging professionals for future practice.

USE AND APPLICATION

The *2012 NCARB Practice Analysis of Architecture* will have a meaningful short-and long-term impact on the Council's education-related programs and policies. Volunteers from across the profession and multiple NCARB staff members are dedicated to ensuring the successful application and implementation of Practice Analysis findings over the next several years.

NCARB has long supported the efforts of the NAAB and accredited architectural education, and the results of the Practice Analysis will help the Council more actively and knowledgeably engage in education-related initiatives.

SHORT-TERM USE

A professional degree in architecture from a NAAB-accredited program provides a solid and important foundation for aspiring architects, while still allowing students the freedom to learn and explore in school. As education is the first step toward licensure, it is fitting that the first application of the 2012 NCARB Practice Analysis of Architecture is to use its findings to support the NAAB 2013 Accreditation Review Conference (ARC). The ARC occurs approximately every five years and affords those organizations and individuals engaged in architectural education the opportunity to provide input into the conditions and procedures for the accreditation of programs that offer professional degrees in architecture.

To inform its contribution to the NAAB 2013 ARC, NCARB reviewed findings from the four education-related Practice Analysis surveys, the focus group results, insight and guidance from the NCARB Education Committee and Board of Directors, and the NAAB *Study of Accredited Architectural Education*. During its review and analysis of survey results, the Education Committee linked the tasks to the existing Student Performance Criteria (SPC). The committee also examined the data related to the level and point of acquisition of a knowledge/skill in relation to completion of a degree from a NAAB-accredited program. These efforts identified common threads and recurring themes to explore throughout the multi-step ARC process. Recommended enhancements to the current Student Performance Criteria (SPC) and other Conditions of the accreditation process were also proposed. You can download *NCARB's Contribution to the NAAB 2013 Accreditation Review Conference* here.

In addition to its use in preparing for the 2013 ARC and the resulting NAAB *Conditions for Accreditation*, the Practice Analysis data will be used to support necessary updates to the *NCARB Education Standard*. Finally, the data may also contribute to the evolution of the Council's Broadly Experienced Architect (BEA) and Broadly Experienced Foreign Architect (BEFA) programs.

LONG-TERM APPLICATION

The NAAB ARC regularly brings educators, students, interns, and practitioners together to strengthen and improve architectural education. As we look beyond the 2013 ARC, NCARB stands ready to collaborate with the Association of Collegiate Schools of Architecture (ACSA), the American Institute of Architects (AIA), the American Institute of Architect Students (AIAS), and the NAAB to explore new models that might further blend the existing components of education, experience, and examination with regulation to more effectively prepare the future practitioner and better serve the profession. These ideas to integrate the path to licensure range from new education models, to mandatory internships, to new expanded/integrated programs that allow licensure upon graduation.

None of these concepts are new; they have surfaced in various discussions over time and will require significant exploration, development, and experimentation over the course of the next decade. The data from the Practice Analysis will support the conversation and collaboration among the collaterals, strengthening the path to licensure, and ensuring the continued protection of the public health, safety, and welfare.

EDUCATION SURVEY

Each education (EDU) survey was designed to elicit different information from the following groups:

- Educators reviewed the tasks and indicated whether the tasks were covered in their architecture programs, and the extent to which students perform each task by completion of architecture education;
- Interns and architects reviewed the tasks and indicated the extent to which they performed each task by completion of their architecture degree program;
- Educators and architects reviewed the Knowledge/Skills (K/S) statements and indicated when the K/S should first be acquired, and to what level each K/S should be acquired within the years of architecture education; and,
- Interns and architects reviewed the K/S statements and indicated when they acquired the K/S and to what extent each K/S was typically used.

A total of 2,015 EDU surveys were completed. The number of survey responses for each EDU survey included in the final data analysis ranged from 52 percent to 80 percent, based on the 90 percent completion rule (participants who responded to at least 90 percent of the items in the survey were included).

EDU SURVEY	RESPONSES RECEIVED	RESPONSES INCLUDED IN DATA ANALYSIS	PERCENTAGE INCLUDED IN DATA ANALYSIS
EDU A	238	171	72%
EDU B	384	308	80%
EDU C	1,444	1,086	75%
EDU D	869	450	52%

The chart below summarizes the survey population, the research questions related to the task and K/S statements, as well as the various rating scales for the Education surveys. The chart also references the related Education (EDU) Data Tables.

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
EDU A	Educators	Task	Is the task covered in your architecture program? • Yes • No • I don't know	B2
			To what extent do students perform the task by completion of their architecture program? • The task is introduced but not performed • The task is performed with guidance and feedback • The task is performed independently with minimal guidance	B3
			Why is the task not covered in your architecture program? (check all that apply) • Not required by the program • Not required by the NAAB Conditions for Accreditation • Covered elsewhere • I do not know • Other	B4
EDU B	Interns who completed IDP within the past two years but not ARE Architects licensed past year and IDP completed in past two years	Task	To what extent did you perform the task by completion of your architecture degree? • Task was not introduced • Task was introduced but not performed • Task was performed with guidance and feedback • Task was performed independently with minimal guidance • I don't know, or I don't remember	B5

CONTINUED

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
EDU C	Educators Licensed architects	Knowledge/ Skill	When should the knowledge/skill first be acquired? • By completion of accredited architecture education program • During internship • After licensure • Acquisition not needed • I don't know	B10
			To what extent should the knowledge/skill be acquired within the years of an accredited degree program? • *Understand*: Use to classify, compare, summarize, explain, and/or interpret information • *Apply*: Use specific information to accomplish a task, correctly selecting the appropriate information, and accurately applying it to the solution of a specific problem, while also distinguishing the effects of its implementation • *Evaluate/synthesize*: Integrate knowledge/skills to develop processes for solving new and/or complex problems and evaluate the effectiveness of the solution	B11
EDU D	Interns who completed IDP within the past two years but not ARE Architects licensed in the past year and completed IDP in past two years Architects licensed 2-10 years	Knowledge/ Skill	When did you first acquire the knowledge/skill? Not acquired • By completion of accredited architecture degree program • During internship • After licensure	B7
			How do you typically use the knowledge/skill? • *Understand*: Use to classify, compare, summarize, explain, and/or interpret information • *Apply*: Use specific information to accomplish a task, correctly selecting the appropriate information, and accurately applying it to the solution of a specific problem, while also distinguishing the effects of its implementation • *Evaluate/synthesize*: Integrate knowledge/skills to develop processes for solving new and/or complex problems and evaluate the effectiveness of the solution • *Do not use* the knowledge or skill	B8
			Indicate the reason(s) you do not use the knowledge/skill. (Select all that apply.) • Not used in my practice • Not allowed by my jurisdiction • Not recommended by my legal counsel or insurance carrier • Provided by consultant(s) • Lack of experience • Other	B9

NCARB'S KEY FINDINGS

When reviewing the results of the Practice Analysis, it is useful and informative to compare and contrast the responses of architects, interns, and educators. This section includes charts and tables that identify various areas of agreement and disagreement related to:

- task coverage
- level of knowledge/skill acquisition
- point of knowledge/skill acquisition

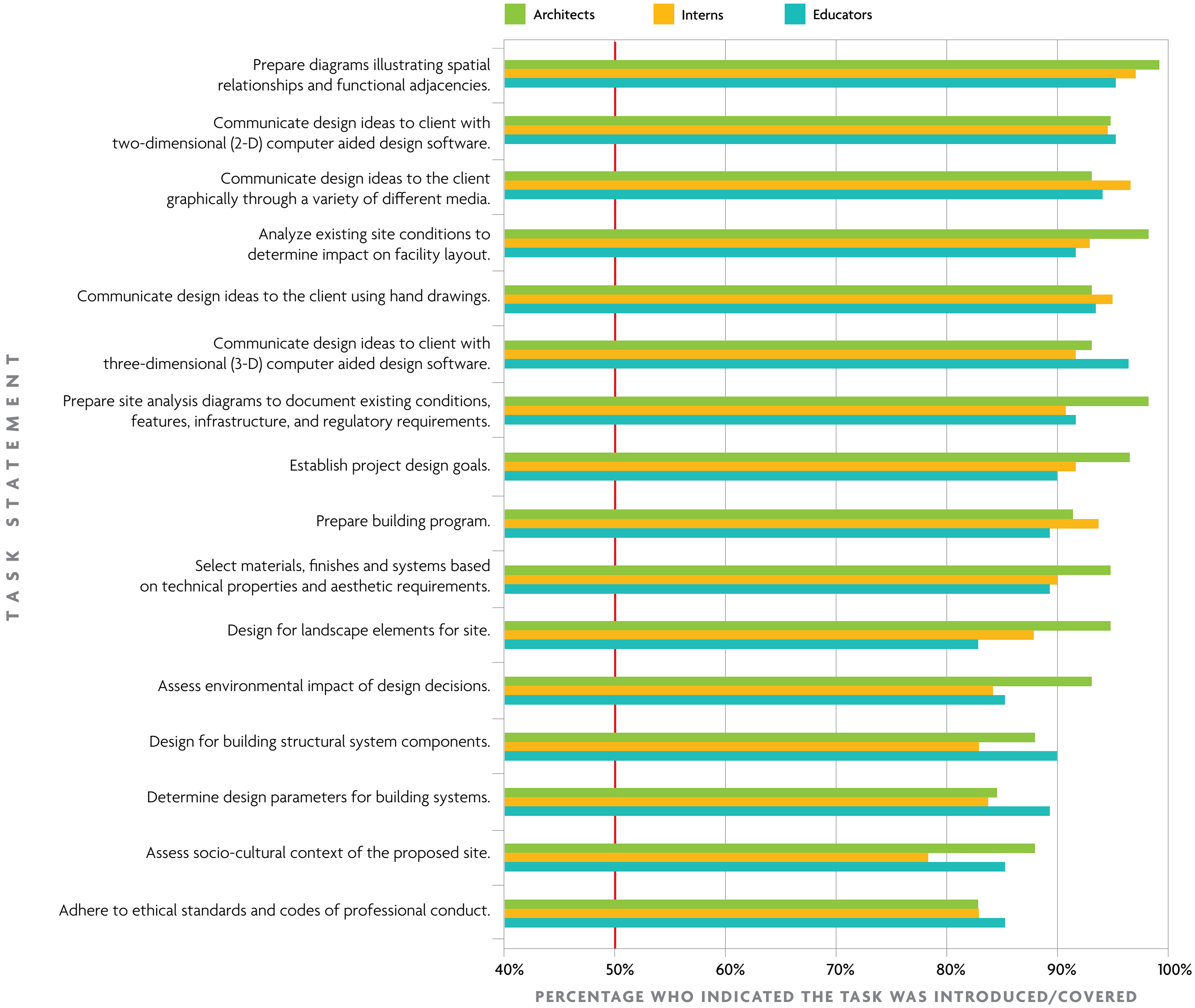
The latter half of this section presents eight key areas that have been identified as needing reinforcement and focus prior to completion of accredited education:

- communication
- collaboration
- professional conduct
- practice management and project management
- site design
- constructability
- sustainability
- technology

TASK COVERAGE

The chart below identifies tasks that a majority of architects, interns, and educators rated as "*covered*" or "*introduced*" by completion of their accredited degree program. While there is variation among the groups at the individual task level, it is encouraging to note that 41 of the 104 tasks included on the survey were identified by over 50 percent of the three respondent groups as being covered or introduced in NAAB-accredited programs.

TASKS THAT 50 PERCENT OR MORE OF ARCHITECTS, INTERNS, AND EDUCATORS RATED AS "COVERED" OR "INTRODUCED" IN THE ACCREDITED PROGRAM



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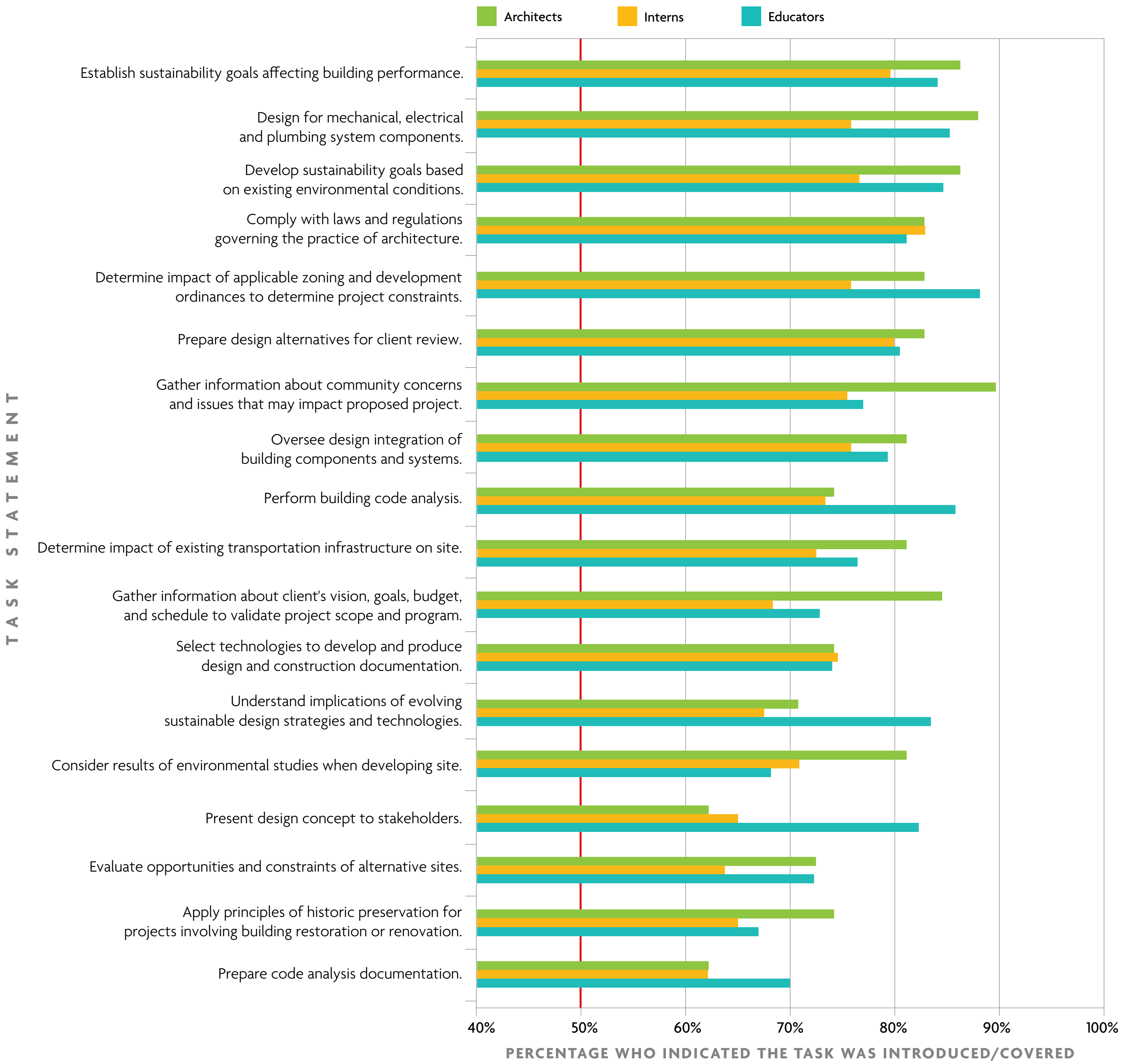
TASKS THAT 50 PERCENT OR MORE OF ARCHITECTS, INTERNS, AND EDUCATORS RATED AS "COVERED" OR "INTRODUCED" IN THE ACCREDITED PROGRAM (CONT.)



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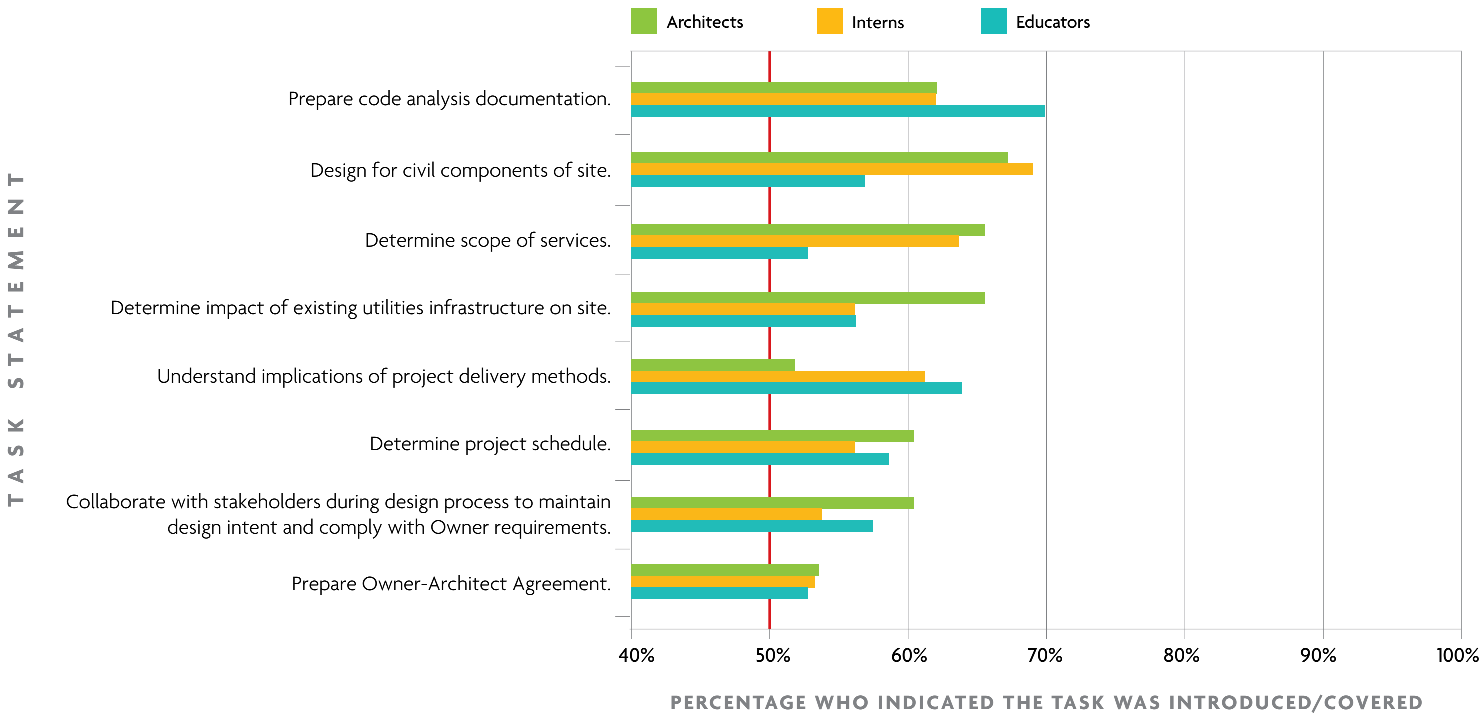
TASKS THAT 50 PERCENT OR MORE OF ARCHITECTS, INTERNS, AND EDUCATORS RATED AS "COVERED" OR "INTRODUCED" IN THE ACCREDITED PROGRAM (CONT.)



Nine of the 104 tasks included in the survey were identified by more than 50 percent of educators as "*not covered*" in their architecture program.

EDU TASK #	TASKS IDENTIFIED AS "NOT COVERED" OR "NOT INTRODUCED" IN EDUCATION BY EDUCATORS, INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS, AND ARCHITECTS LICENSED IN THE PAST YEAR (LISTED FROM HIGHEST TO LOWEST)
41	Update cost of work estimates.
28	Prepare submittals for regulatory approval.
73	Evaluate staffing plan to ensure compliance with established milestones.
75	Assist client in selecting contractors.
55	Review results from field reports, third party inspections, and other test results for conformance with contract documents.
38	Manage project close-out procedures and documentation.
39	Perform quality control reviews throughout the documentation process.
70	Prepare staffing plan to meet project goals.
40	Prepare cost of work estimates.

Responding to a similar question regarding whether the tasks are "*introduced*" during education, interns and recently licensed architects agreed that those nine tasks were "*not introduced*" during their education, and identified 35 additional tasks they considered as "*not introduced*" by completion of their education. Most of these tasks are related to practice management and project management.

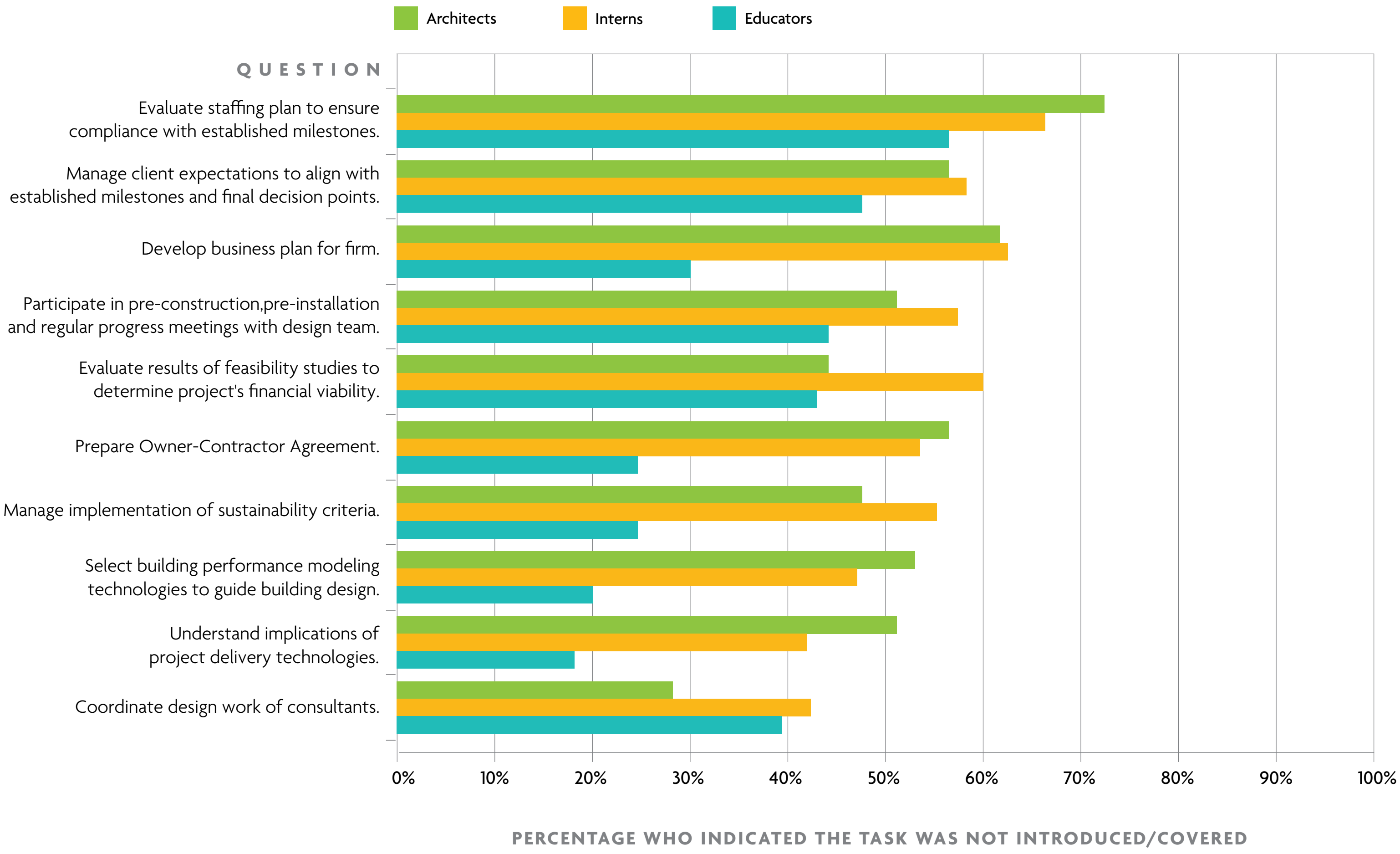
EDU TASK #	ADDITIONAL TASKS IDENTIFIED AS "NOT INTRODUCED" IN EDUCATION BY INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS, AND ARCHITECTS LICENSED IN THE PAST YEAR (LISTED FROM HIGHEST TO LOWEST)
86	Establish procedures for building commissioning.
91	Determine billing rates.
54	Determine specific insurance requirements to meet contract or business needs.
80	Review application and certificate for payment.
56	Manage modifications to the construction contract.
69	Negotiate terms and conditions of services outlined in architect-consultant agreement.
68	Establish procedures for providing post-occupancy services.
90	Develop strategies to control risk and manage liability.
92	Develop business plan for firm.
79	Coordinate testing of building performance and materials.
53	Establish procedures to process documentation during contract administration.
62	Negotiate terms and conditions outlined in owner-architect agreement.
85	Manage project-specific bidding process.
71	Establish procedures for documenting project decisions.
74	Manage client expectations to align with established milestones and final decision points.
87	Select design team consultants.
95	Develop procedures for responding to contractor requests (requests for information).
8	Evaluate results of feasibility studies to determine project's financial viability.
59	Prepare proposals for services in response to client requirements.
6	Determine design fees.
96	Develop strategies for responding to owner requests (requests for proposal, requests for qualifications).
77	Identify changes in project scope that require additional services.
83	Manage information exchange during construction.
50	Perform constructability review to determine ability to procure, sequence construction, and build proposed project.
94	Develop procedures for responding to changes in project scope.
89	Participate in pre-construction, pre-installation, and regular progress meetings with design team.
58	Respond to contractor requests for information.
51	Perform constructability reviews throughout the design process.
78	Assist owner in obtaining necessary permits and approvals.
57	Prepare owner-contractor agreement.
81	Review shop drawings and submittals during construction for conformance with design intent.
76	Manage implementation of sustainability criteria.
49	Prepare life cycle cost analysis.
52	Prepare final procurement and contract documents.
61	Prepare architect-consultant agreement.

The chart below identifies 20 tasks with a significant rate of disagreement among architects, interns, and educators on whether a task was introduced (or covered) prior to completion of an accredited program. Interns and architects were typically more closely aligned across all tasks when compared to educators.

As an example, for EDU Task #98 "*Understand implications of evolving sustainable design strategies and technologies*," only 6 percent of educators indicated the task was not covered, while 32 percent of interns who completed IDP within the past two years and 30 percent of architects licensed in the past year indicated the task was not introduced prior to completion of an accredited program.

This difference in perception between educators vs. interns and recently licensed architects is sizable at times and indicates a disconnect regarding whether these tasks are being covered/introduced during education.

TASKS WITH SIGNIFICANT DISAGREEMENT ON WHETHER "INTRODUCED" OR "COVERED" IN THE ACCREDITED PROGRAM



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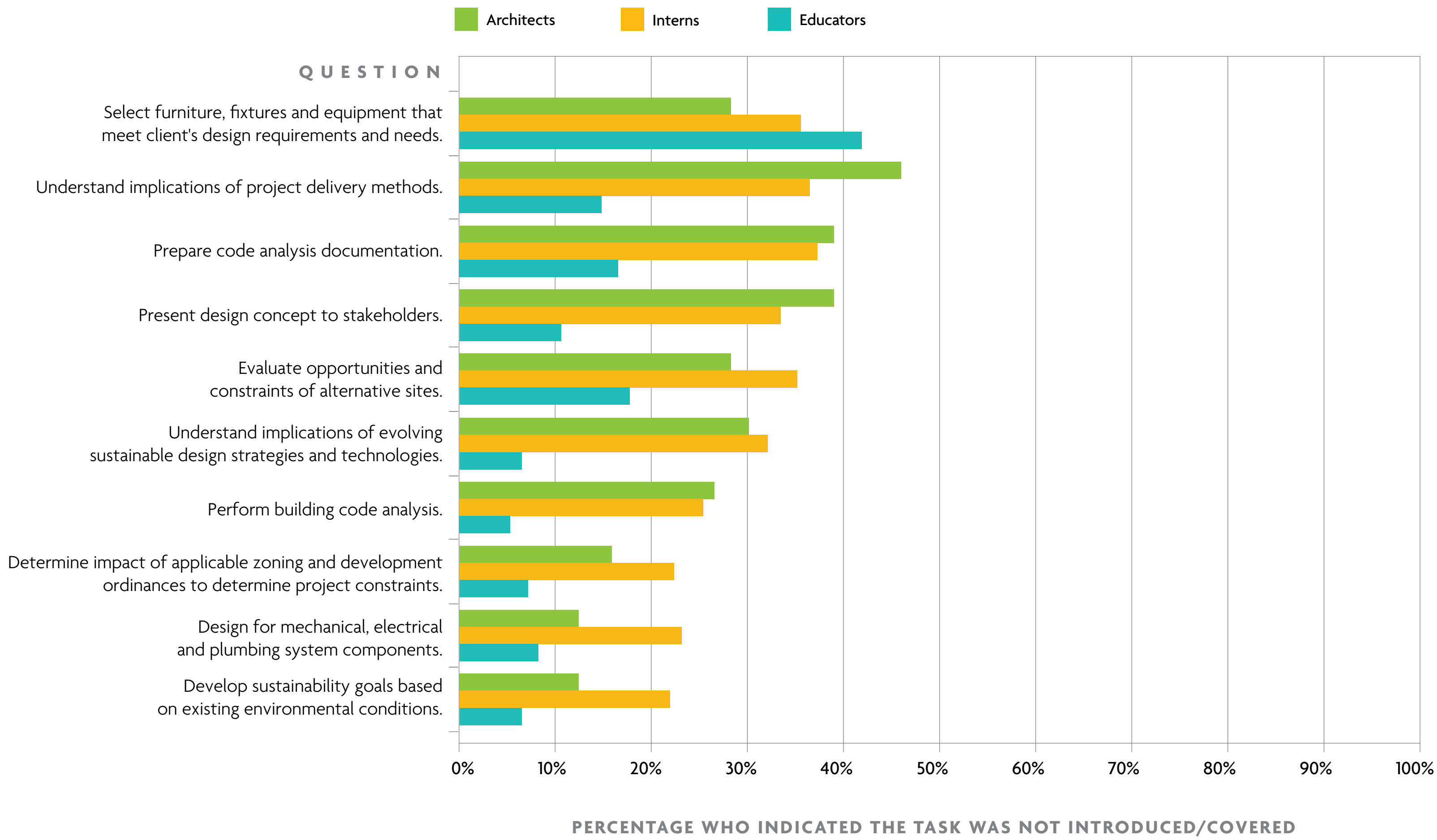
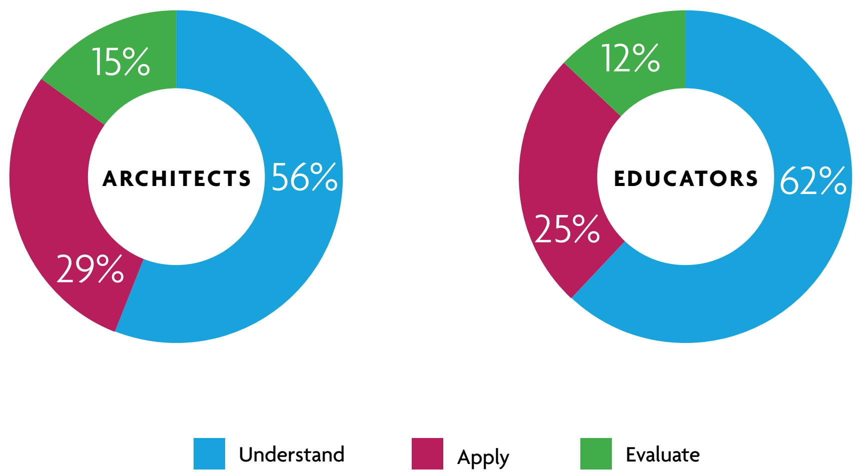
TASKS WITH SIGNIFICANT DISAGREEMENT ON WHETHER "INTRODUCED" OR "COVERED" IN THE ACCREDITED PROGRAM (CONT.)



LEVEL OF ACQUISITION

When asked to identify the level at which each knowledge/skill (K/S) should be acquired by completion of an accredited architecture program, architects and educators were in general agreement. When the list of knowledge/skills is looked at collectively, the mean response of the two survey groups was remarkably similar for "*understand*," "*apply*," and "*evaluate*."

TO WHAT EXTENT SHOULD THE K/S BE ACQUIRED DURING AN ACCREDITED PROGRAM: MEAN RESPONSE FOR ALL ITEMS



While the pie charts above indicate agreement on the level of knowledge acquisition expected, it does not necessarily translate to agreement at the individual K/S level.

UNDERSTAND

The scatter plot below reveals a general consensus between architects and educators regarding K/S that should be acquired at the level of "*understand*" by completion of an accredited program, with few areas of substantial disagreement.

For example, EDU K/S #8 "*Knowledge of standard forms of architectural service agreements for owner-architect, architect-consultant, and owner-contractor*" shows broad agreement, as 78.8 percent of architects said it should be understood, and 85.5 percent of educators agreed.

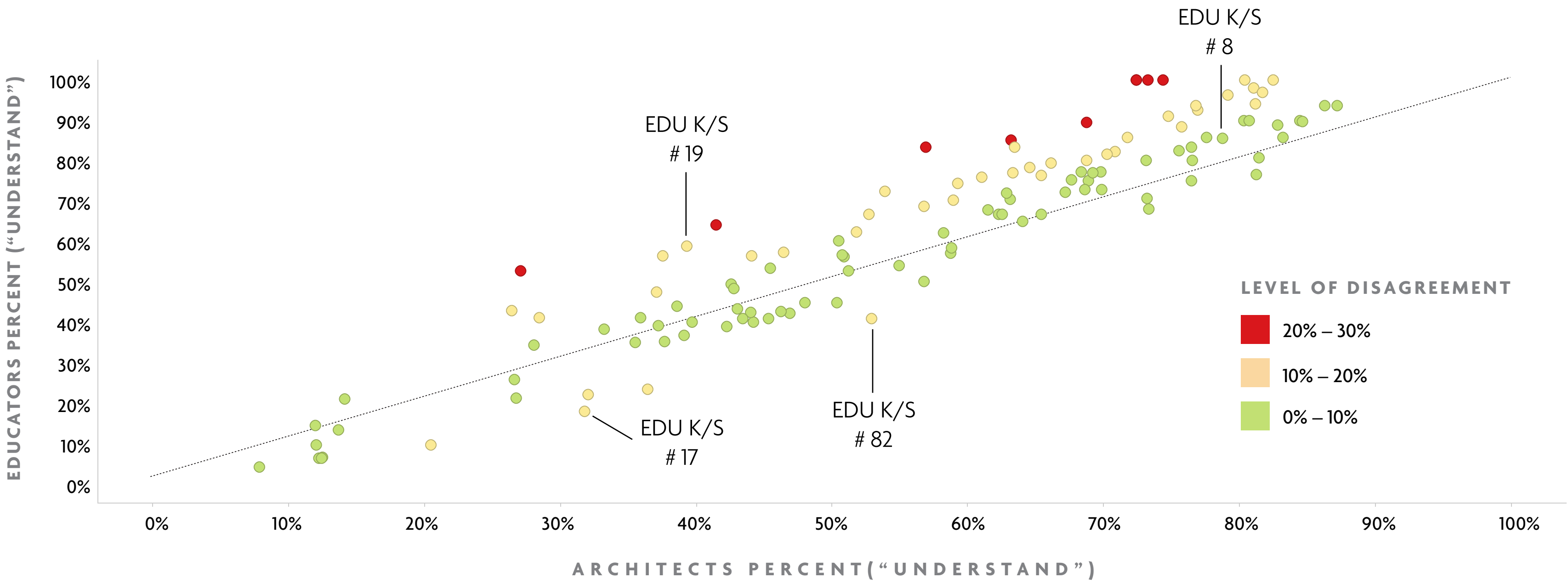
However, 31.8 percent of architects vs. 17.8 percent of educators rated EDU K/S #17 "*Knowledge of elements and processes for conducting a site analysis,*" as a K/S that should be understood by completion of the degree. Similarly, for EDU K/S #82 "*Knowledge of sustainability strategies and/or rating systems,*" more architects (52.9 percent) than educators (40.7 percent) felt the K/S should be acquired at the level of "*understand.*"

Finally, it is worth noting that EDU K/S #19 "*Knowledge of protocols and procedures for conducting a building code analysis*" was ranked more heavily by educators, with 58.7 percent of educators vs. 39.3 percent of architects indicating that the K/S should be understood by completion of the degree program.

The scatter plots on the following pages identify how architects and educators rated what they believe should be the level of knowledge acquisition, for each individual K/S, by completion of an accredited program. While there is generally strong agreement, a few key differences are noted.

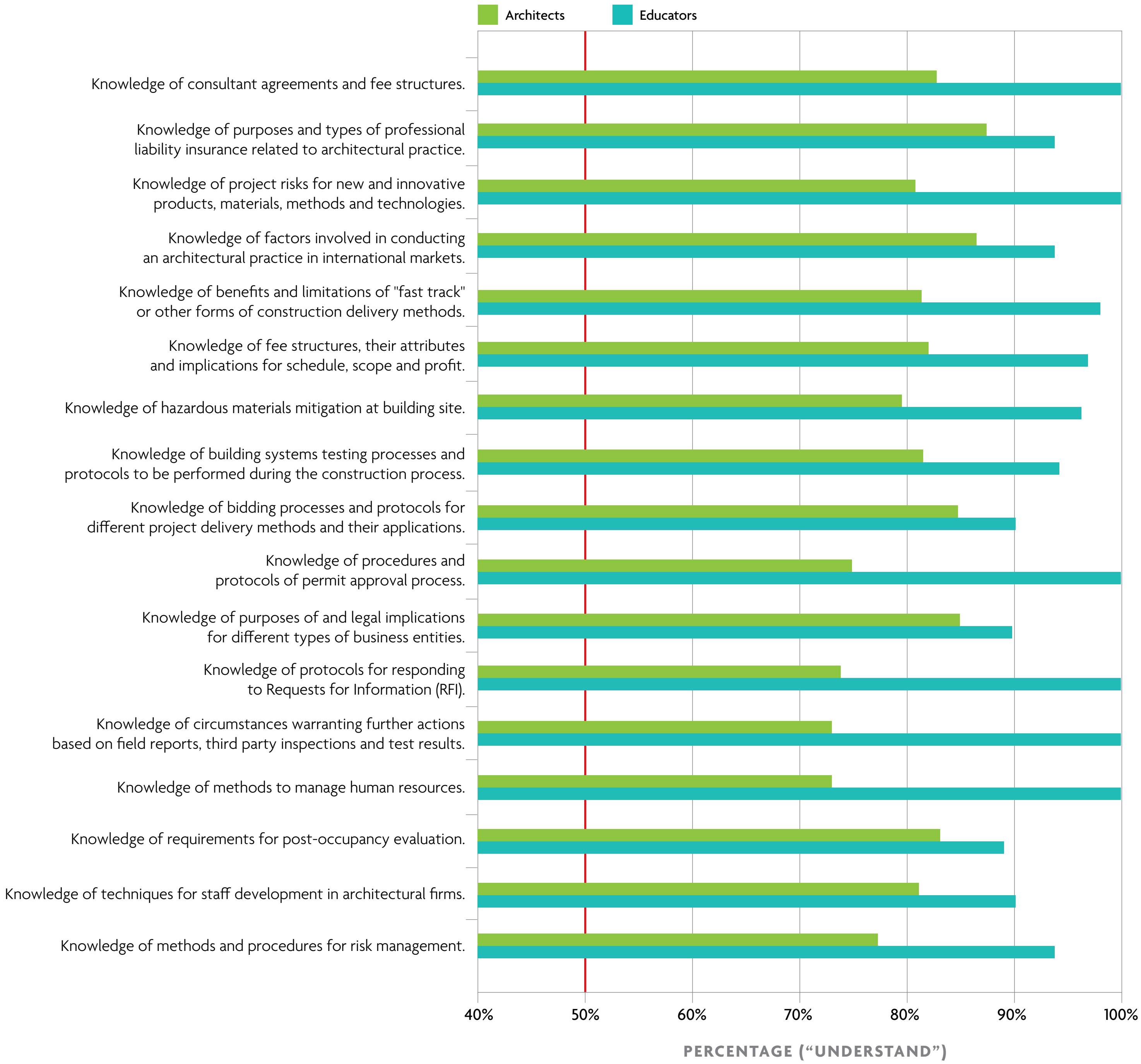
Each dot on the scatter plot represents a specific knowledge/skill (K/S), with position on the x-axis determined by the percentage of architect respondents who indicated that the K/S should be acquired to a particular level by completion of the program. The y-axis represents the response of educators regarding the same K/S.

The K/S on the diagonal line represent an identical response from each group.



The following chart identifies the 76 of 122 knowledge/skills that over 50 percent of both architects and educators agreed should be acquired to the level of "*understand*" by completion of an accredited program.

K/S THAT OVER 50 PERCENT OF ARCHITECTS AND EDUCATORS BELIEVE SHOULD BE ACQUIRED TO THE LEVEL OF "UNDERSTAND" BY COMPLETION OF ACCREDITED PROGRAM



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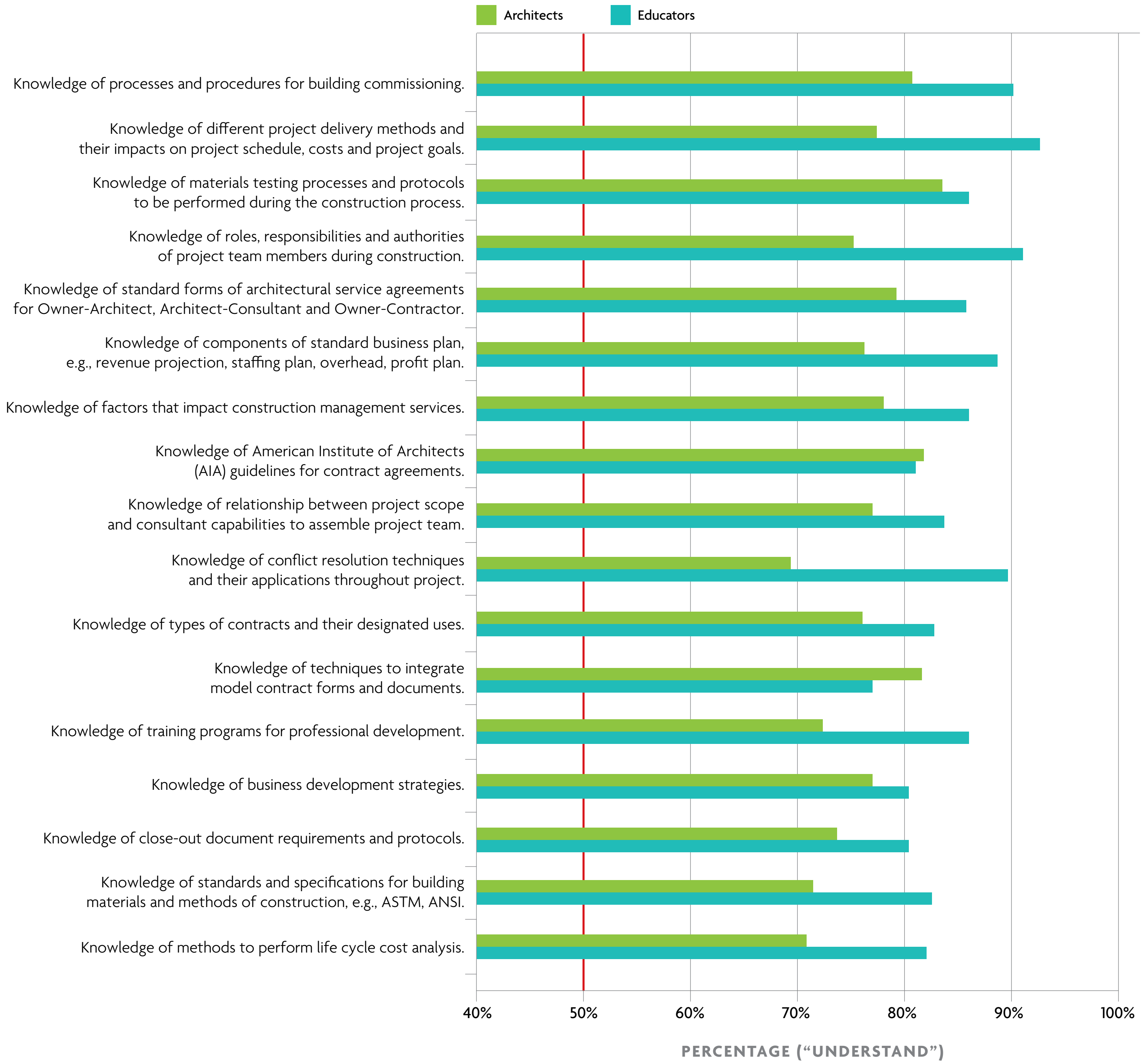
K/S THAT OVER 50 PERCENT OF ARCHITECTS AND EDUCATORS BELIEVE SHOULD BE ACQUIRED TO THE LEVEL OF “UNDERSTAND” BY COMPLETION OF ACCREDITED PROGRAM (CONT.)



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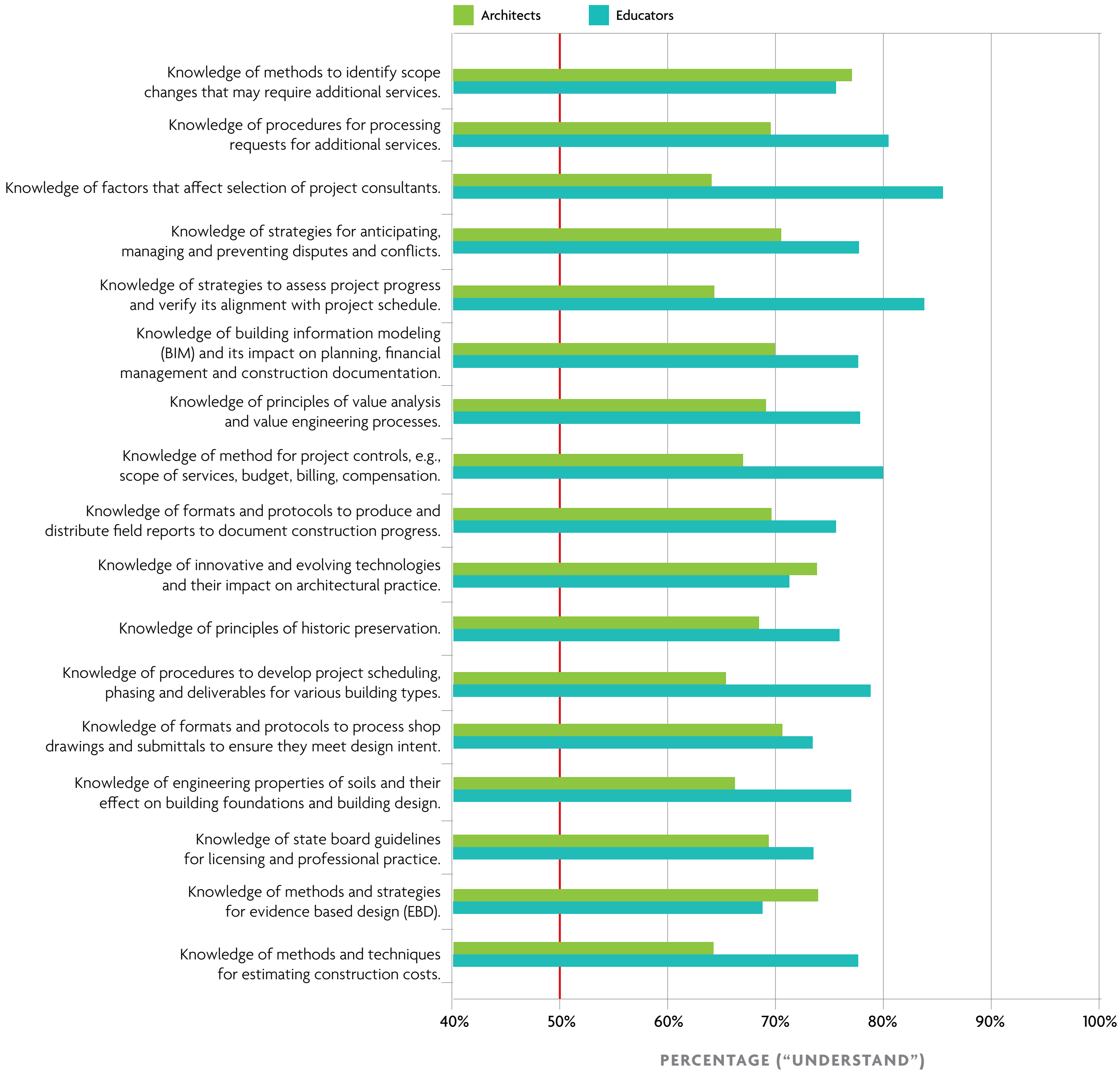
K/S THAT OVER 50 PERCENT OF ARCHITECTS AND EDUCATORS BELIEVE SHOULD BE ACQUIRED TO THE LEVEL OF "UNDERSTAND" BY COMPLETION OF ACCREDITED PROGRAM (CONT.)



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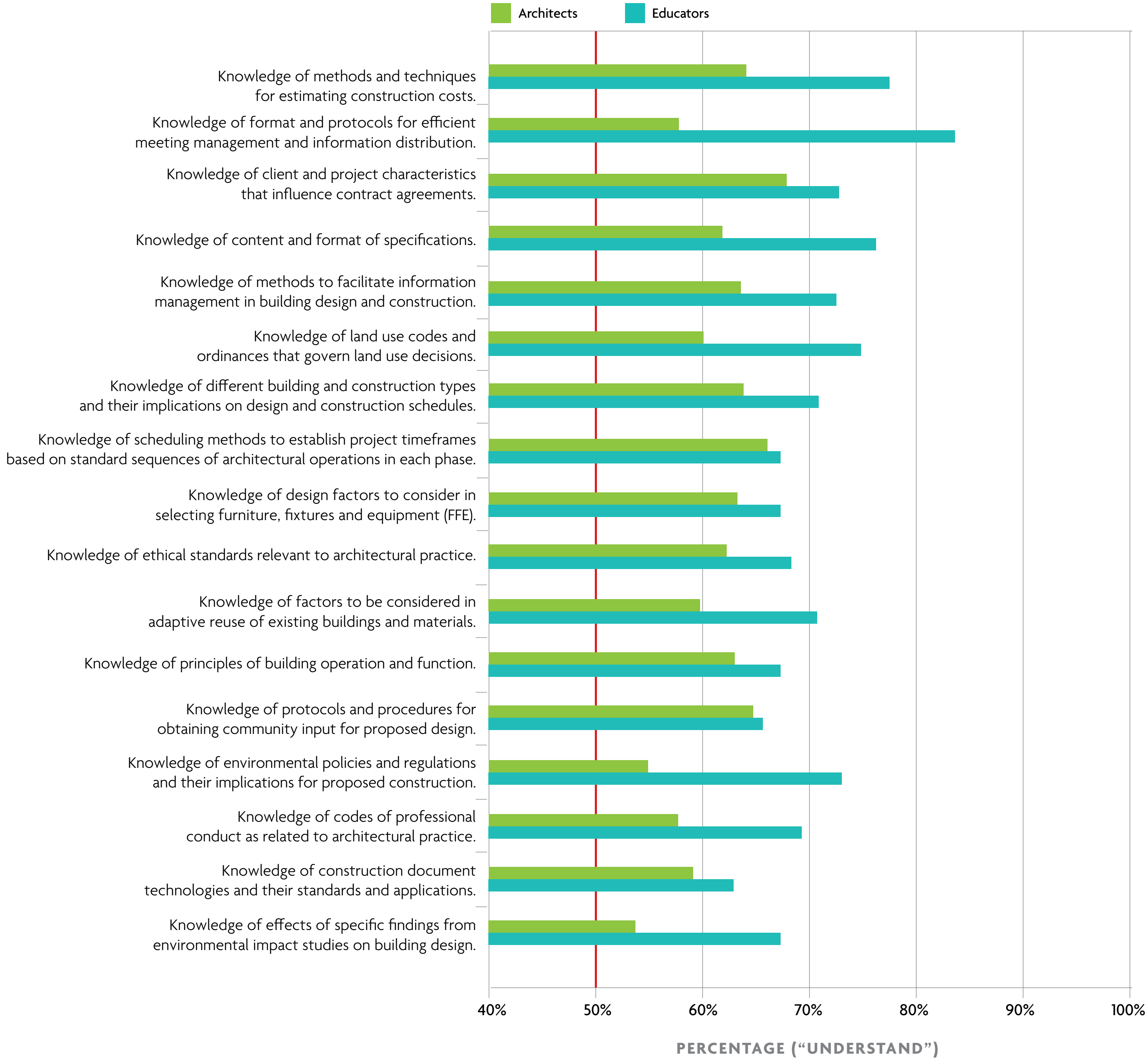
K/S THAT OVER 50 PERCENT OF ARCHITECTS AND EDUCATORS BELIEVE SHOULD BE ACQUIRED TO THE LEVEL OF "UNDERSTAND" BY COMPLETION OF ACCREDITED PROGRAM (CONT.)



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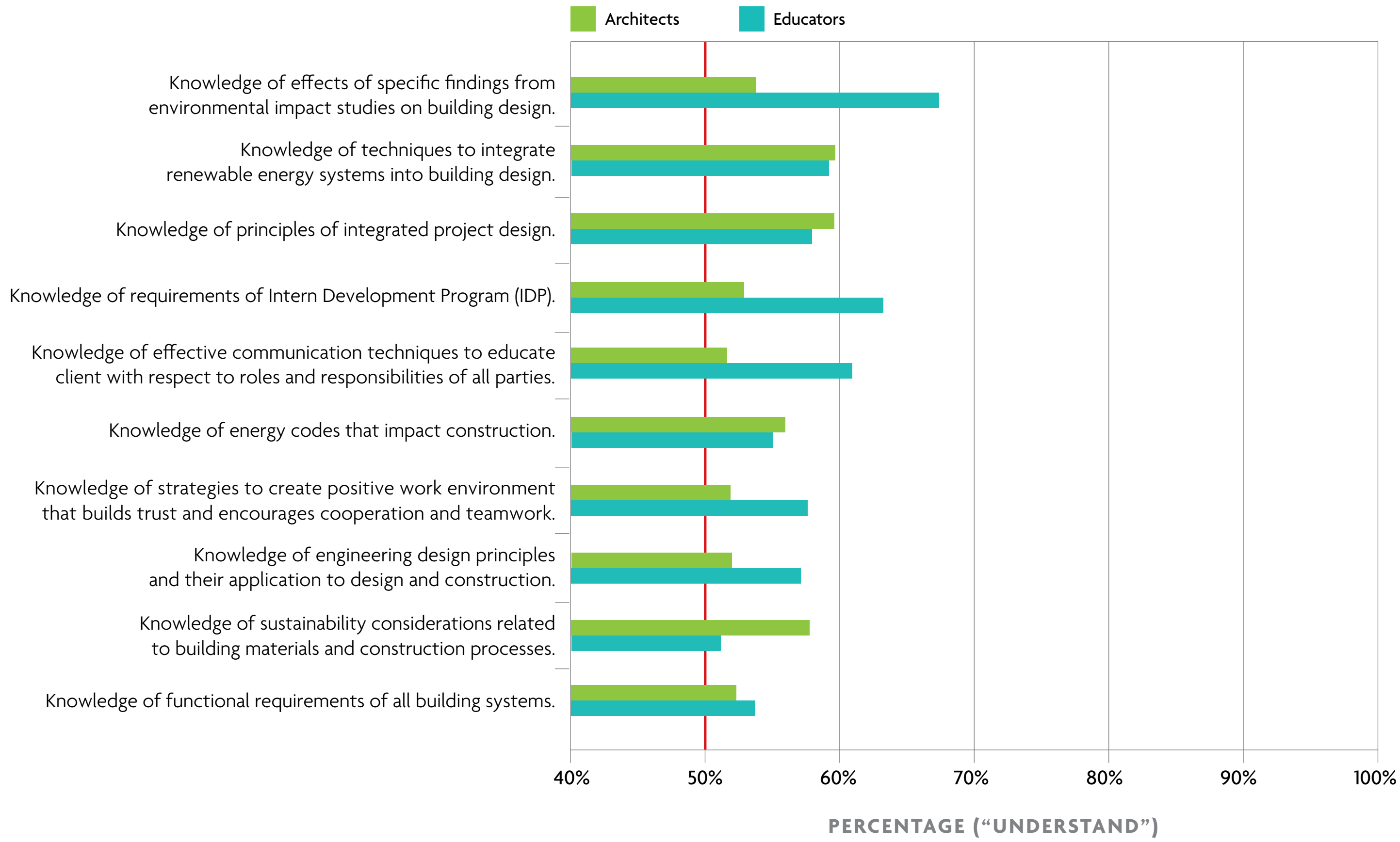
K/S THAT OVER 50 PERCENT OF ARCHITECTS AND EDUCATORS BELIEVE SHOULD BE ACQUIRED TO THE LEVEL OF "UNDERSTAND" BY COMPLETION OF ACCREDITED PROGRAM (CONT.)



APPLY

The scatter plot below reveals strong agreement between architects and educators regarding K/S that should be acquired at the level of "*apply*" by completion of an accredited program; however, a few differences are worth noting.

While the previous scatter plot showed that educators felt more strongly than architects that EDU K/S #19 "*Knowledge of protocols and procedures for conducting a building code analysis*" should be acquired to the level of "*understand*," the scatter plot below conversely shows that 44.0 percent of architects vs. 36.5 percent of educators indicated that this K/S should be acquired to the level of "*apply*" by completion of the degree program. The responses suggest a higher level of ability is expected for this K/S by practitioners.

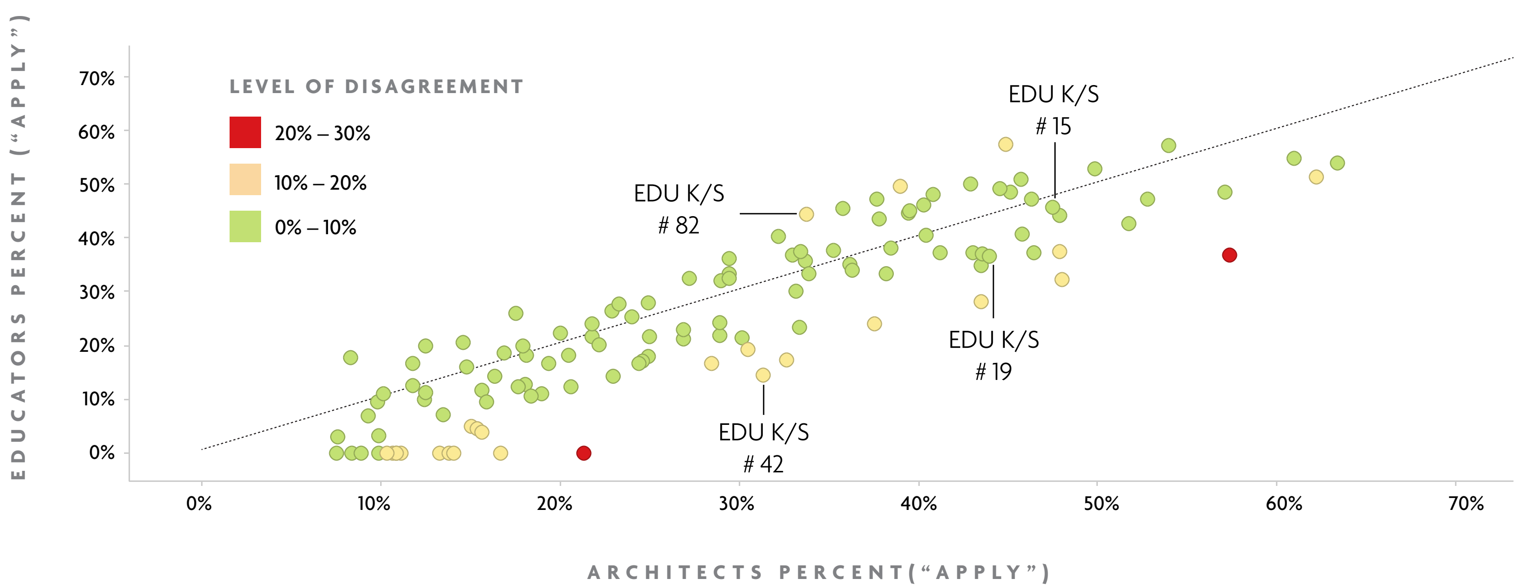
For EDU K/S #42 "*Knowledge of methods and techniques for estimating construction costs*," 31.3 percent of architects vs. 14.6 percent of educators indicated students should be able to "*apply*" the K/S by completion of the degree. Similarly, for EDU K/S #15 "*Skill in designing facility layout and site plan that meets site constraints*," slightly more architects (47.5 percent) than educators (45.6 percent) felt the K/S should be acquired at the level of "*apply*."

Compared to the earlier scatter plot, which showed more architects than educators felt that EDU K/S #82 "*Knowledge of sustainability strategies and/or rating systems*" should be acquired to the level of "*understand*," this scatter plot reveals that 44.4 percent of educators (versus 33.8 percent of architects) indicated students should be able to "*apply*" this K/S by completion of the accredited program.

The scatter plot identifies how architects and educators rated what they believe should be the level of knowledge acquisition, for each individual K/S, by completion of an accredited program. While there is generally strong agreement, a few key differences are noted.

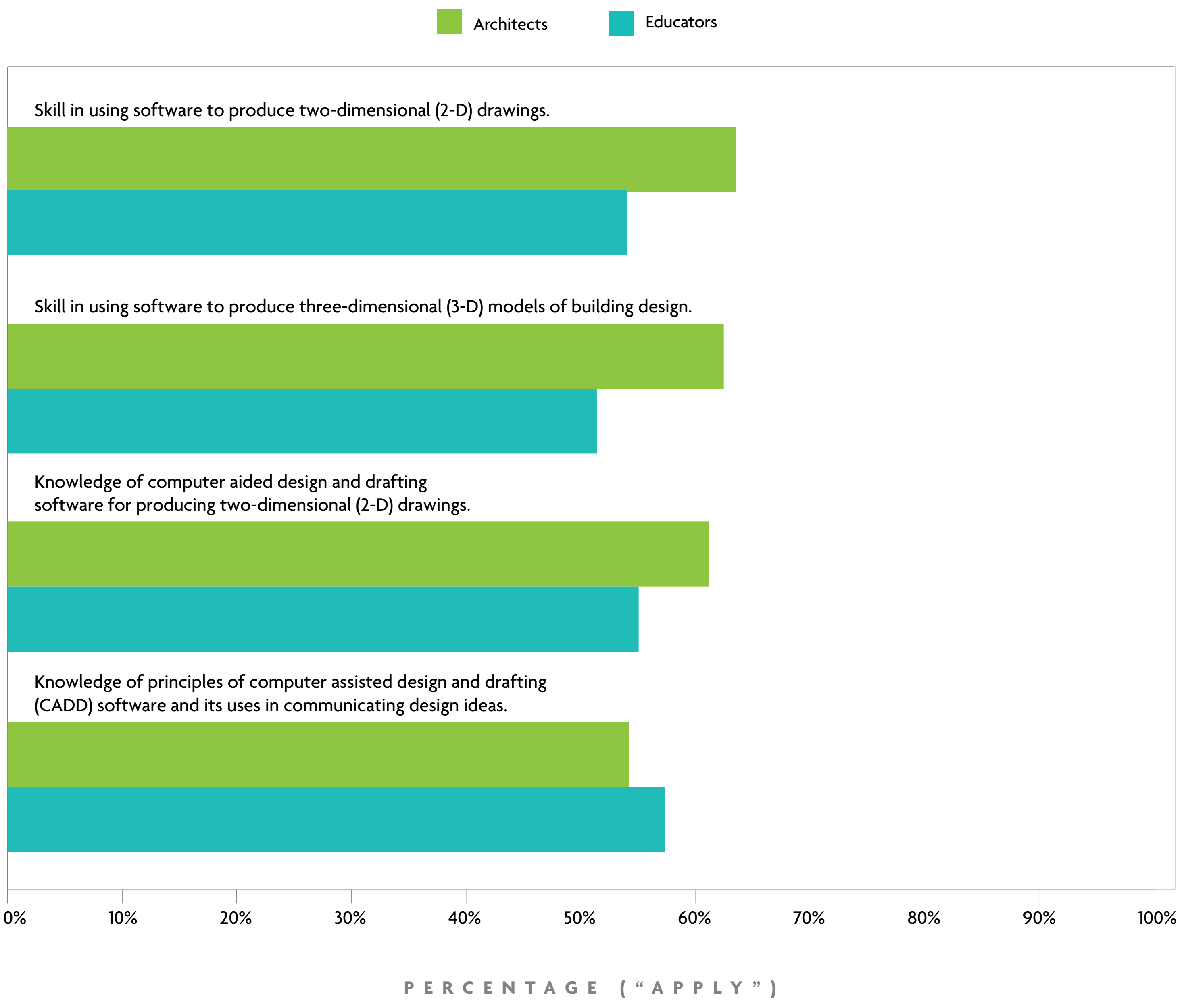
Each dot on the scatter plot represents a specific knowledge/skill (K/S), with position on the x-axis determined by the percentage of architect respondents who indicated that the K/S should be acquired to a particular level by completion of the program. The y-axis represents the response of educators regarding the same K/S.

The K/S on the diagonal line represent an identical response from each group.



While there was significant agreement between architects and educators regarding the knowledge/skills that students should "*understand*" by completion of an accredited program, the level of agreement diminished when asked to identify the knowledge/skills that students should be able to "*apply*" by completion of the program. The following chart identifies only four of 122 knowledge/skills that over 50 percent of both architects and educators agreed students should be able to "*apply*" by completion of the program.

K/S THAT OVER 50 PERCENT OF ARCHITECTS AND EDUCATORS BELIEVE SHOULD BE ACQUIRED TO THE LEVEL OF "APPLY" BY COMPLETION OF ACCREDITED PROGRAM



POINT OF ACQUISITION

When licensed architects were asked, "*when should the knowledge/skill be acquired*," the overwhelming response across all K/S statements was "*before completion of the accredited degree program*." While practitioners' expectations are not surprising, it fails to recognize the academy's struggle with a crowded curriculum and stretched resources.

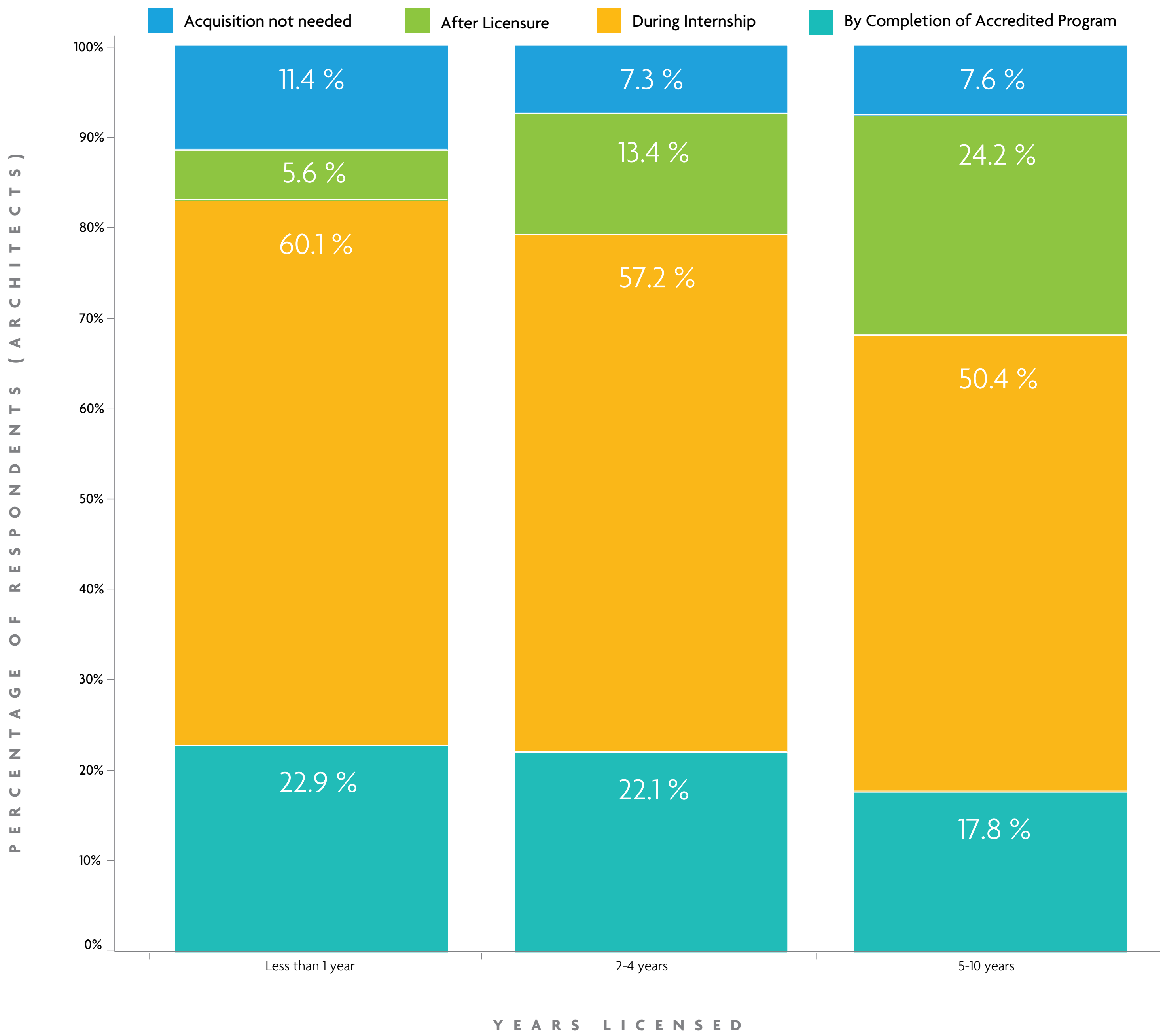
Fifteen K/S rated as important or greater were identified by more than 50 percent of all licensed architects as being acquired "*after licensure*." Ideally, all K/S rated important should be acquired prior to licensure. While this is rarely the case, the data does indicate a positive trend as recently licensed architects responded that they are acquiring many important K/S during education and internship.

EDU K/S #	KNOWLEDGE OF	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED 10 YEARS OR LESS		ALL LICENSED ARCHITECTS	
		FIRST ACQUIRED DURING INTERNSHIP	FIRST ACQUIRED AFTER LICENSURE	ACQUIRED AFTER LICENSURE	IMPORTANCE RATING 0 1 2 3 4
	Financial planning methods to manage revenues, staffing, and overhead expenses.	Not Rated	Not Rated	63.3%	2.49
71	Business development strategies.	37.6%	31.3%	59.9%	2.47
	Relationship between staffing capabilities and hours, and internal project budget to meet established milestones and profitability.	Not Rated	Not Rated	59.7%	2.60
73	Purposes and types of professional liability insurance related to architectural practice.	40.0%	27.8%	58.0%	2.53
111	Methods to manage human resources.	44.0%	20.4%	54.9%	1.95
6	Client and project characteristics that influence contract agreements.	51.8%	34.2%	53.7%	2.96
86	Procedures for processing requests for additional services.	66.9%	22.0%	53.7%	2.55
115	Purposes of and legal implications for different types of business entities.	35.3%	25.3%	53.3%	1.96
122	Methods and procedures for risk management.	43.1%	26.4%	53.3%	2.40
37	Strategies for anticipating, managing, and preventing disputes and conflicts.	54.4%	23.6%	53.0%	2.56
82	Sustainability strategies and/or rating systems.	50.0%	21.1%	52.2%	2.20
83	Sustainability considerations related to building materials and construction processes.	52.7%	20.7%	51.2%	2.27
67	Fee structures, their attributes and implications for schedule, scope, and profit.	54.2%	27.6%	51.1%	2.68
85	Methods to identify scope changes that may require additional services.	74.2%	20.2%	50.4%	2.77
62	Processes and procedures for building commissioning.	48.7%	22.4%	50.3%	1.66

0 = Of little or no Importance 1 = Somewhat Important 2 = Important 3 = Very Important 4 = Critically Important

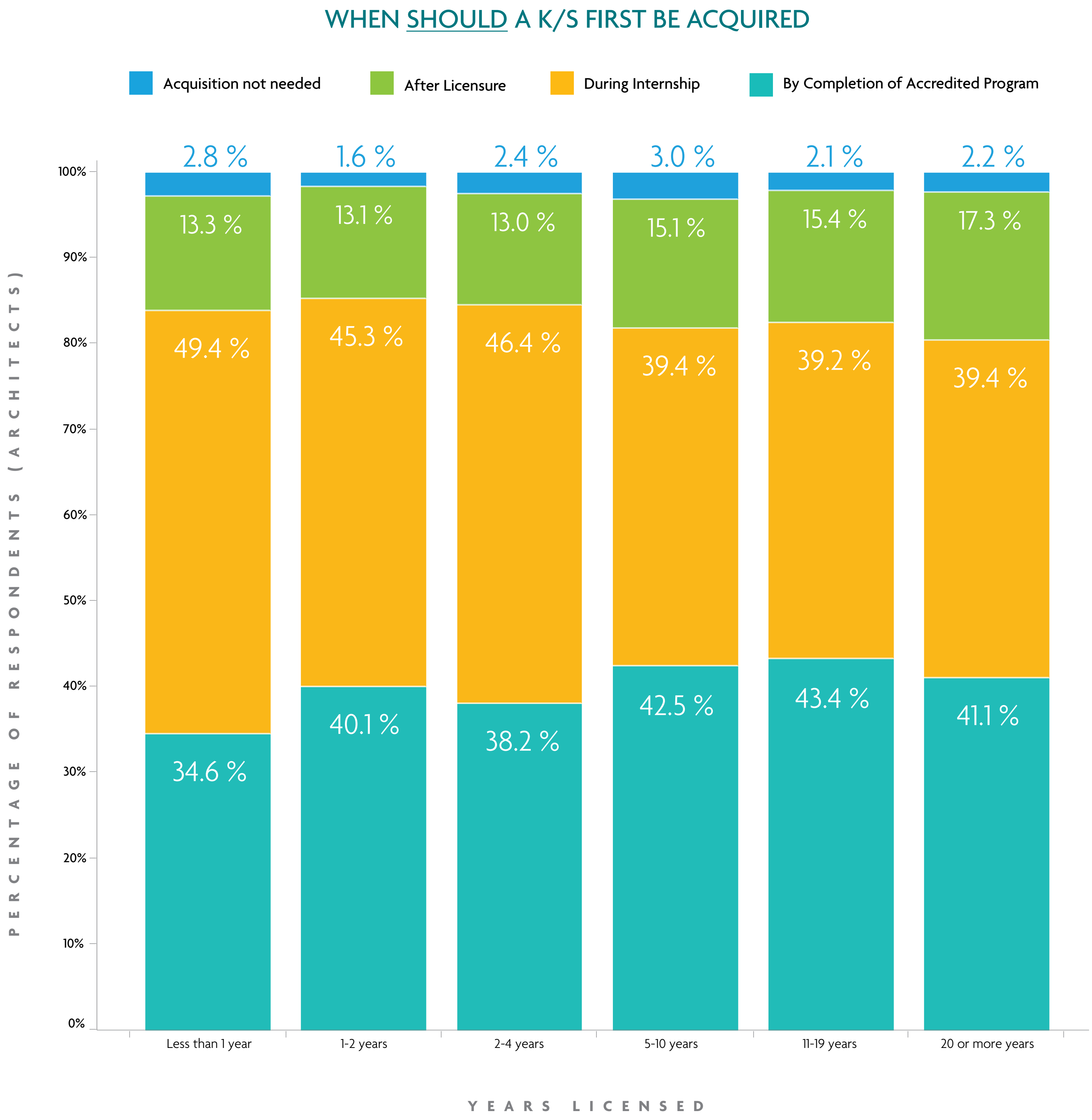
When separated by years of licensure, only 13.4 percent of architects licensed 2-4 years indicated they acquired important K/S "*after licensure*" compared to 24.2 percent for those licensed 5-10 years. The chart below clearly indicates that the more recently licensed acquired a greater number of K/S important to the practice of architecture *prior* to licensure, underscoring the positive impact of advances made in education and internship programs over the course of the past 10 years.

WHEN A K/S WAS FIRST ACQUIRED



As observable in the chart above, recently licensed architects reported they are acquiring important K/S prior to licensure compared to architects licensed 5-10 years.

Looking at the question "*when should a knowledge/skill first be acquired?*" there is consistent agreement across all architects, regardless of years licensed.



COMMUNICATION

Effective communication with colleagues, consultants, and clients, as well as strong interpersonal skills, are critical to the success of the practitioner. Practice Analysis data indicates educators, interns, and practitioners strongly agree that tasks related to communicating design ideas graphically are covered in the curriculum and performed by students prior to completion of their architecture program.

While the ability to communicate graphically is clearly being acquired during education, basic communications skills—both written and oral—were identified in focus groups as skills that need to be strengthened.

Students' basic **written and oral communication skills were identified as skills that need to be strengthened**.

EDU TASK #	TASK STATEMENT	EDUCATORS		INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED IN THE PAST YEAR	ALL LICENSED ARCHITECTS
		TASK IS COVERED IN PROGRAM	TASK IS PERFORMED BY STUDENTS	TASK WAS PERFORMED BY COMPLETION OF DEGREE	IMPORTANCE RATING 0 1 2 3 4
22	Communicate design ideas to the client graphically through a variety of media.	93.6%	98.8%	93.5%	3.25
23	Communicate design ideas to the client using hand drawings.	93.6%	98.1%	88.6%	2.37
24	Communicate design ideas to client with 2-D CAD software.	95.3%	99.4%	90.6%	2.69
25	Communicate design ideas to client with 3-D CAD software.	95.9%	100%	85.4%	2.33
34	Prepare diagrams illustrating spatial relationships and functional adjacencies.	95.3%	98.2%	94.5%	2.51

0 = Of little or no Importance   1 = Somewhat Important   2 = Important   3 = Very Important   4 = Critically Important

COLLABORATION

The practice of architecture is a highly collaborative, team-driven effort; therefore, the ability to successfully interact with other professionals is essential.

Over 80 percent of the architects completing the Practice Analysis survey rated "*collaboration with stakeholders*" as important, very important, or critically important. Data from the Practice Analysis further indicates that over half of the educators surveyed identified collaboration as included in their program, and over 70 percent of those same respondents reported that students performed collaboratively (with guidance and feedback or independently) by completion of their program. Yet, when interns and architects licensed in the past year were asked the same question, only 31.5 percent responded that they had collaborated with stakeholders prior to completion of their program, clearly indicating a gap in perception between educators and interns/architects.

Over 80 percent of architects rated "collaboration with stakeholders" as important/critical, yet **only 31.5 percent of interns and recently licensed architects indicated they had performed collaboratively prior to completion of their education program.**

EDU TASK #	TASK STATEMENT	EDUCATORS		INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED IN THE PAST YEAR	ALL LICENSED ARCHITECTS
		TASK IS COVERED IN PROGRAM	TASK IS PERFORMED BY STUDENTS	TASK WAS PERFORMED BY COMPLETION OF DEGREE	IMPORTANCE RATING 0 1 2 3 4
64	Collaborate with stakeholders during design process to maintain design intent and comply with Owner requirements.	55.6%	70.8%	31.5%	2.46

0 = Of little or no Importance   1 = Somewhat Important   2 = Important   3 = Very Important   4 = Critically Important

PROFESSIONAL CONDUCT

Professional conduct and ethical behavior play an important part of every practitioner's work on a daily basis. According to the Practice Analysis findings, practitioners considered the task *"Adhere to ethical standards and codes of professional conduct"* between very and critically important, and as the most frequently performed of the tasks surveyed. The same group considered the task "*Comply with laws and regulations governing the practice of architecture*" between very and critically important, and as the second most frequently performed task. These findings underscore their importance to the future practitioner.

TASK STATEMENT	ALL LICENSED ARCHITECTS		
	PERCENT PERFORMED	PERFORMED DAILY	IMPORTANCE RATING 0 1 2 3 4
Adhere to ethical standards and codes of professional conduct.	95.3%	70.8%	3.46
Comply with laws and regulations governing the practice of architecture.	94.6%	69.1%	3.50
0 = Of little or no Importance 1 = Somewhat Important 2 = Important 3 = Very Important 4 = Critically Important			

While data from the Practice Analysis suggests that these tasks are being covered during education, there is a slight difference in perception between educators vs. interns and recently licensed architects regarding the level to which the task is being performed.

EDU TASK #	TASK STATEMENT	TASK IS COVERED IN PROGRAM	TASK INTRODUCED BUT NOT PERFORMED		TASK PERFORMED WITH GUIDANCE AND FEEDBACK	
		EDUCATORS	EDUCATORS	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS	EDUCATORS	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS
				ARCHITECTS LICENSED IN THE PAST YEAR		ARCHITECTS LICENSED IN THE PAST YEAR
102	Adhere to ethical standards and codes of professional conduct.	85.4%	45.2%	35.7%	43.8%	33.1%
103	Comply with laws and regulations governing the practice of architecture.	81.3%	56.8%	37.3%	38.8%	35.4%

A third comparison of statistics related to two similar knowledge/skill statements offers an interesting contrast between when professional conduct knowledge is reportedly acquired. Interns and architects licensed 10 years or less indicated that "*Knowledge of codes of professional conduct related to architecture practice*" and "*Knowledge of ethical standards relevant to architectural practice*" are typically first acquired during internship. However, educators and practitioners as a group overwhelmingly reported that these important knowledge and skills should first be acquired by completion of the accredited architecture degree program. When looking at the response rate across all licensed architects, even more suggested this important information should be acquired by completion of accredited education.

EDU K/S #	KNOWLEDGE OF	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED 10 YEARS OR LESS		EDUCATORS / LICENSED ARCHITECTS	ALL LICENSED ARCHITECTS
		FIRST ACQUIRED BY COMPLETION OF DEGREE	FIRST ACQUIRED DURING INTERNSHIP	SHOULD FIRST BE ACQUIRED BY COMPLETION OF DEGREE	SHOULD BE ACQUIRED BY COMPLETION OF DEGREE
18	Codes of professional conduct as related to architectural practice.	27.6%	62.0%	53.6%	56.7%
118	Ethical standards relevant to architectural practice.	39.1%	51.1%	60.4%	67.3%

PRACTICE MANAGEMENT AND PROJECT MANAGEMENT

Issues such as business development, office management, risk management, and project management are extremely important to the livelihood of a successful practitioner. Over 60 tasks and a similar number of knowledge/skill statements related to practice management and project management were included in the Practice Analysis survey. Of the 15 knowledge/skills identified by more than 50 percent of all practitioners as being acquired post-licensure and also rated as "important" or greater, 10 clearly fall into these two categories. The data indicates that more recently licensed architects believe they are acquiring these important knowledge/skills during internship. This trend is good news for internship and the profession.

The qualitative survey data and our focus groups indicated the belief that it is important to ensure that students are exposed to and understand basic practice management and project management knowledge/skills during their education.

EDU K/S #	KNOWLEDGE OF	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED 10 YEARS OR LESS		ALL LICENSED ARCHITECTS	
		FIRST ACQUIRED DURING INTERNSHIP	FIRST ACQUIRED AFTER LICENSURE	ACQUIRED AFTER LICENSURE	IMPORTANCE RATING 0 1 2 3 4
71	Business development strategies.	37.6%	31.3%	59.9%	2.47
73	Purposes and types of professional liability insurance related to architectural practice.	40.0%	27.8%	58.0%	2.53
111	Methods to manage human resources.	44.0%	20.4%	54.9%	1.95
6	Client and project characteristics that influence contract agreements.	51.8%	34.2%	53.7%	2.96
86	Procedures for processing requests for additional services.	66.9%	22.0%	53.7%	2.55
115	Purposes of and legal implications for different types of business entities.	35.3%	25.3%	53.3%	1.96
122	Methods and procedures for risk management.	43.1%	26.4%	53.3%	2.40
37	Strategies for anticipating, managing, and preventing disputes and conflicts.	54.4%	23.6%	53.0%	2.56
67	Fee structures, their attributes and implications for schedule, scope, and profit.	54.2%	27.6%	51.1%	2.68
85	Methods to identify scope changes that may require additional services.	74.2%	20.2%	50.4%	2.77

0 = Of little or no importance   1 = Somewhat Important   2 = Important   3 = Very Important   4 = Critically Important

SITE DESIGN

The results of the Practice Analysis suggest that the wide range of capabilities related to site design and master planning should first be acquired by completion of a degree program. Approximately 17 knowledge/skill statements and 14 task statements are directly tied to site issues, zoning ordinances, environmental issues, utilities, transportation, infrastructure, civil engineering, and landscape architecture related tasks. These areas engage a broad range of underlying considerations such as sustainability, communication, collaboration with others, and application of technologies.

The following table compares the first point of acquisition of 10 of the major site design-related knowledge/skills. Interns and architects licensed 10 years or less were asked when they first acquired the knowledge/skill. When educators and licensed architects were collectively asked when they should first be acquired, the response increased. While respondents indicated these important knowledge/skills are covered in the education curriculum, the survey results indicated that they should be further emphasized.

EDU K/S #	KNOWLEDGE OF	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED 10 YEARS OR LESS / FIRST ACQUIRED BY COMPLETION OF DEGREE	EDUCATORS / LICENSED ARCHITECTS / SHOULD FIRST BE ACQUIRED BY COMPLETION OF DEGREE
53	Site design principles and practices.	54.9%	86.6%
2	Master plans and their impact on building design.	37.1%	65.2%
11	Effect of environmental factors on site development.	45.1%	76.7%
15	Designing facility layout and site plan that meets site constraints.	47.3%	74.7%
17	Elements and processes for conducting a site analysis.	48.4%	71.1%
21	Land use codes and ordinances that govern land use decisions.	12.9%	41.9%
32	Engineering properties of soils and their effect on building foundations and building design.	21.1%	56.7%
52	Principles of landscape design and their influence on building design.	46.4%	78.1%
80	Site analysis techniques to determine project parameters affecting design.	41.3%	63.4%
16	Methods required to mitigate adverse site conditions.	18.4%	39.1%

A similar observation can be made through a comparison of 10 of the major site design-related tasks. Educators completing the survey indicated that students performed tasks "*with guidance and feedback*" or "*independently with minimal guidance*" at a higher rate than did interns and architects licensed in the past year.

EDU TASK #	TASK STATEMENT	EDUCATORS	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED IN THE PAST YEAR
		TASK IS PERFORMED BY STUDENTS	TASK WAS PERFORMED BY COMPLETION OF DEGREE
4	Determine impact of applicable zoning and development ordinances to determine project constraints.	88.7%	52.6%
10	Determine impact of existing utilities infrastructure on site.	63.2%	35.7%
11	Determine impact of existing transportation infrastructure on site.	80.2%	52.6%
15	Analyze existing site conditions to determine impact on facility layout.	98.7%	86.0%
19	Consider results of environmental studies when developing site.	79.1%	47.7%
20	Develop mitigation options to address adverse site conditions.	67.5%	39.6%
29	Evaluate opportunities and constraints of alternative sites.	82.1%	47.4%
33	Prepare site analysis diagrams to document existing conditions, features, infrastructure, and regulatory requirements.	98.1%	81.5%
43	Design for civil components of site.	61.9%	42.5%
45	Design for landscape elements for site.	83.1%	72.4%

CONSTRUCTABILITY

Constructablity is a key component leading to a successful project. Assembling a set of construction drawings comprised of thoughtful details that can be built requires firsthand knowledge of materials, their properties, and unique characteristics. Mastery comes from years of experience, competence is developed in a well-structured and supervised internship, and an understanding of materials and the basic skills necessary to integrate them into a project begins in the classroom.

Building systems and **building envelope** are extremely complex systems that rely on the integration and coordination of various materials and components across multiple disciplines. Based on the results of the Practice Analysis, the responses of educators and practitioners were closely split between "*understand*" and "*apply*" when asked to what extent the knowledge should first be acquired. However, over 50 percent of this respondent group indicated that knowledge related to building systems and building envelope should first be acquired by completion of accredited education, underscoring the importance of establishing an early understanding of the construction sequence.

Over 50 percent of educators and practitioners indicated that knowledge related to building systems, building envelope, and building codes should first be acquired by completion of accredited education.

EDU K/S #	KNOWLEDGE OF	EDUCATORS AND LICENSED ARCHITECTS			
		WHEN KNOWLEDGE SHOULD FIRST BE ACQUIRED	TO WHAT EXTENT KNOWLEDGE SHOULD BE ACQUIRED		
		BY COMPLETION OF EDUCATION	UNDERSTAND	APPLY	EVALUATE
43	Structural load and load conditions that affect building design.	81.7%	46.3%	40.1%	13.6%
39	Structural properties of construction products, materials, and assemblies and the impact on building design and construction.	78.0%	43.5%	40.6%	15.9%
38	Engineering design principles and their application to design and construction.	75.9%	51.5%	35.8%	12.7%
35	Effect of thermal envelope in design of building systems.	75.7%	41.6%	39.2%	19.2%
34	Building technologies that provide solutions for comfort, life safety, and energy efficiency	65.9%	44.5%	37.4%	18.1%
56	Relationship between constructability and aesthetics.	65.0%	37.2%	35.9%	26.8%
40	Means and methods for building construction.	64.6%	49.4%	33.4%	17.2%
10	Factors involved in selection of building systems and components.	61.3%	34.3%	46.8%	18.9%
44	Energy codes that impact construction.	56.4%	54.9%	33.9%	11.2%
107	Design decision and their impact on constructability.	55.7%	43.6%	34.0%	22.4%

Building codes are essential standards developed and enforced to ensure the safety of the public. The understanding and successful incorporation of building and zoning code requirements into a project are a primary responsibility of the architect in fulfilling the obligation to protect the public health, safety, and welfare. This body of knowledge was rated between very important and critically important, and is performed by a significant percentage of all practitioners. Architects and interns disagreed with educators regarding the role of education in acquiring this knowledge. Educators indicated the tasks are performed at a much higher rate by completion of an accredited degree than what was reported by interns and architects licensed in the past year.

EDU TASK #	TASK STATEMENT	EDUCATORS	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED IN THE PAST YEAR	ALL LICENSED ARCHITECTS	
		TASK IS PERFORMED BY STUDENTS	TASK IS PERFORMED BY COMPLETION OF DEGREE	TASK IS PERFORMED BY STUDENTS	IMPORTANCE RATING 0 1 2 3 4
4	Determine impact of applicable zoning and development ordinances to determine project constraints.	88.7%	52.6%	87.3%	3.20
21	Perform building code analysis.	84.1%	48.1%	91.8%	3.55
35	Prepare code analysis documentation.	77.1%	39.6%	86.5%	3.05

0 = Of little or no Importance 1 = Somewhat Important 2 = Important 3 = Very Important 4 = Critically Important

Almost 100 percent of practitioners rated the knowledge of "*building codes and their impact on building design*" between very important and critically important; however, interns and recently licensed architects reported that code-related knowledge and skills are acquired during internship. It is encouraging to note that more than 50 percent of educators and practitioners supported that these important knowledge and skills should first be acquired by completion of accredited education.

EDU K/S #	KNOWLEDGE OF	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED 10 YEARS OR LESS	EDUCATORS / LICENSED ARCHITECTS	ALL LICENSED ARCHITECTS	
		FIRST ACQUIRED DURING INTERNSHIP	SHOULD FIRST BE ACQUIRED BY COMPLETION OF DEGREE	PERCENT IMPORTANT	IMPORTANCE RATING 0 1 2 3 4
20	Building codes and their impact on building design.	82.0%	60.6%	99.3%	3.53
44	Energy codes that impact construction.	68.7%	56.4%	91.1%	2.67

0 = Of little or no Importance 1 = Somewhat Important 2 = Important 3 = Very Important 4 = Critically Important

SUSTAINABILITY

The emphasis on sustainability and its integration into design has increased dramatically over the last several years. While some consider the principles of sustainable design to be a specialization or an additional service, many clients, owners, and the public are expecting sustainability as a basic service and best practice. The results of the Practice Analysis clearly support that sustainable design issues are introduced in the curriculum; however, interns and architects licensed within the past year indicated that the tasks related to sustainable design are actually performed (either *with guidance and feedback* or *independently with minimal guidance*) to a much lesser extent than that indicated by educators.

EDU TASK #	TASK STATEMENT	EDUCATORS		INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED IN THE PAST YEAR	
		INTRODUCED, BUT NOT PERFORMED BY STUDENTS	TASK IS PERFORMED BY STUDENTS	INTRODUCED, BUT NOT PERFORMED BY COMPLETION OF DEGREE	TASK WAS PERFORMED BY COMPLETION OF DEGREE
12	Assess environmental impact of design decisions.	17.5%	82.5%	26.0%	60.4%
17	Develop sustainability goals based on existing environmental conditions.	11.7%	88.3%	23.7%	54.9%
18	Establish sustainability goals affecting building performance.	13.9%	86.1%	26.3%	54.5%
76	Manage implementation of sustainability criteria.	42.0%	58.0%	21.4%	24.4%
48	Select building performance modeling technologies to guide building design.	28.4%	71.6%	24.7%	26.3%
98	Understand implications of evolving sustainable design strategies and technologies.	28.7%	71.3%	26.9%	41.2%

The data also indicates that both educators and practitioners expect that knowledge and understanding of energy codes and various rating systems that impact design and construction <u>should</u> first be acquired prior to completion of education.

EDU K/S #	KNOWLEDGE OF	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED 10 YEARS OR LESS		EDUCATORS / LICENSED ARCHITECTS	
		ACQUIRED BY COMPLETION OF DEGREE	ACQUIRED DURING INTERNSHIP	<u>SHOULD</u> FIRST BE ACQUIRED BY COMPLETION OF DEGREE	LEVEL OF KNOWLEDGE ACQUISITION: *UNDERSTANDING*
44	Energy codes that impact construction.	6.4%	68.7%	56.4%	54.8%
82	Sustainability strategies and/or rating systems.	22.9%	50.0%	62.5%	50.7%
83	Sustainability considerations related to building materials and construction processes.	22.4%	52.7%	61.6%	55.3%
84	Techniques to integrate renewable energy systems into building design.	25.1%	45.8%	63.4%	58.0%

TECHNOLOGY

Technology permeates every facet of professional practice, and the profession's dependence on technology continues to grow. Whether it is a technology that assists in developing and communicating the design of a building or a tool that is used to successfully deliver or administer a project, technology plays a powerful role in both project management and practice management. The data below indicates that accredited architecture programs are clearly covering both applications of technology in the classroom. However, interns and architects licensed in the past year reported they are performing these tasks at a lower level of ability than indicated by educators.

EDU TASK #	TASK STATEMENT	EDUCATORS		INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED IN THE PAST YEAR	
		INTRODUCED, BUT NOT PERFORMED BY STUDENTS	TASK IS PERFORMED BY STUDENTS	INTRODUCED, BUT NOT PERFORMED BY COMPLETION OF DEGREE	TASK WAS PERFORMED BY COMPLETION OF DEGREE
48	Select building performance modeling technologies to guide building design.	28.4%	71.6%	24.7%	26.3%
98	Understand implications of evolving sustainable design strategies and technologies.	28.7%	71.3%	26.9%	41.2%
36	Select technologies to develop and produce design and construction documentation.	11.2%	88.8%	17.9%	57.1%
99	Understand implications of project delivery technologies.	65.7%	34.3%	25.0%	28.9%

As indicated below, interns and architects licensed less than 10 years overwhelmingly indicated they acquired technology-related knowledge during internship. When asked "*When should the knowledge be acquired?*" educators and licensed architects collectively were split between education and internship. This is not surprising considering the fast pace at which technology emerges and advances.

EDU K/S #	KNOWLEDGE OF	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / ARCHITECTS LICENSED 10 YEARS OR LESS		EDUCATORS / LICENSED ARCHITECTS	
		ACQUIRED BY COMPLETION OF DEGREE	ACQUIRED DURING INTERNSHIP	SHOULD FIRST BE ACQUIRED BY COMPLETION OF DEGREE	SHOULD FIRST BE ACQUIRED DURING INTERNSHIP
34	Building technologies that provide solutions for comfort, life safety, and energy efficiency.	27.6%	61.6%	65.9%	28.2%
116	Innovative and evolving technologies and their impact on architectural practice.	25.1%	52.0%	40.3%	29.3%
31	Factors involved in selecting project appropriate computer based design technologies.	22.0%	57.1%	36.2%	43.7%
89	Construction document technologies and their standards and applications	12.4%	80.2%	31.2%	57.7%
106	Project risks for new and innovative products, materials, methods, and technologies.	9.6%	60.9%	23.2%	41.6%

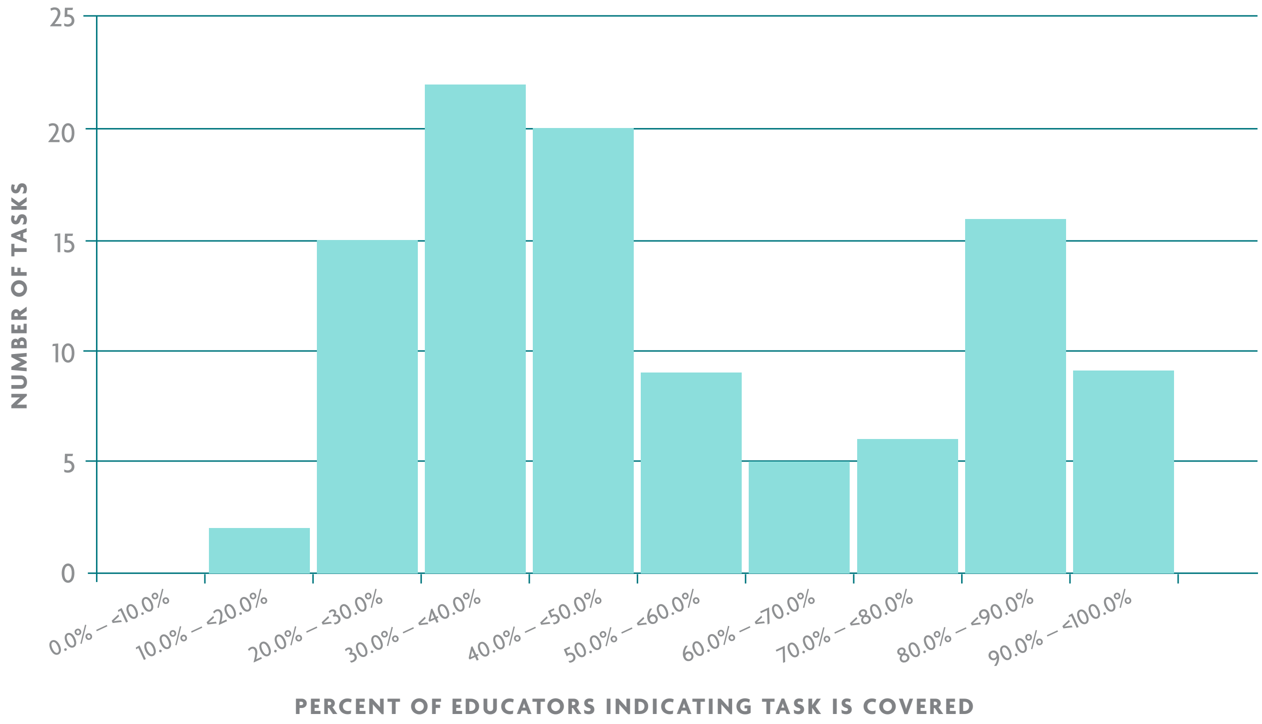
EDUCATION SURVEY RESULTS

EDU TASK RATINGS

WHETHER TASKS WERE COVERED IN ARCHITECTURE EDUCATION

A total of 171 educators responded to the EDU survey and indicated whether each of the 104 task statements was covered in their respective programs. Data Table B2 lists the percent of educators who rated each task as "*yes*," "*no*," or "*I don't know*," for whether the given task was covered. For instance, Data Table B2 shows that for EDU Task #1 "*Gather information about client's vision, goals, budget, and schedule to validate project scope and program*," 71.3 percent indicated the task was covered by their program, 16.4 percent indicated it was not covered, and 12.3 percent indicated they didn't know whether the task was covered.

DISTRIBUTION OF EDU TASK RATINGS: PERCENT OF EDUCATORS INDICATING WHETHER EACH TASK IS COVERED



The percent of educators indicating their program covered each task ranged from 17.5 percent to 95.9 percent. The chart above displays the distribution across tasks for the percent of educators indicating each task is covered. In the figure, the percentages are reported in intervals of 10, where each interval includes the lower bound value and excludes the upper bound value (e.g., 80.0 percent - < 90.0 percent includes the values 80.0 percent to 89.9 percent). The only exception is with the interval 90.0 percent to 100.0 percent, which includes both 90.0 percent and 100.0 percent values. For example, the figure indicates nine tasks were each rated by 90 percent or more of responding educators as being covered by their respective programs. Sixteen (16) tasks were each rated as being covered in 80 percent to 90 percent of the responding educators' programs. The data show a clustering pattern in which 31 tasks (29.8 percent) were rated as covered in 70.0 percent or more of responding educators' programs, and 57 tasks (54.8 percent) were rated as covered in 20.0 percent to 50.0 percent of the educators' programs.

EDUCATORS' RATINGS OF THE EXTENT OF TASK PERFORMANCE BY STUDENTS

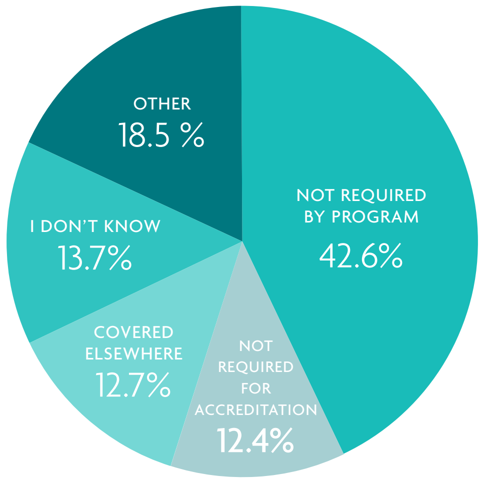
When educators rated a given task as being covered by their respective programs, they were asked a follow-up question regarding the extent to which students in their program perform the task. Data Table B3 lists the percent of educators who rated each task as "*introduced but not performed*," "*performed with guidance and feedback*," or "*performed independently with minimal guidance*."

For instance, with EDU Task #1 "*Gather information about client's vision, goals, budget, and schedule to validate project scope and program*," 122 educators indicated their program covered EDU Task #1. Out of those 122 educators, 23.8 percent indicated students in their program were introduced to, but did not perform the task; 63.1 percent of educators indicated the task was performed by students with guidance and feedback; and 13.1 percent of educators indicated the task was performed independently by students with minimal guidance.

REASONS WHY TASKS WERE NOT COVERED

Educators who rated a given task as not being covered by their programs were then asked to select one or more reasons why that task was not covered. Data Table B4 lists the number of educators who selected each of the reasons offered for a task not being covered.

The pie chart on the right displays the percent of ratings across all tasks for each of five reasons why tasks were not covered. Collectively, the most common reason given (42.6 percent of ratings) was because tasks were not required by their program. The reasons "*not required for accreditation*," "*covered elsewhere*," and "*I don't know*" were selected at similar collective rates, 12.4 percent, 12.7 percent, and 13.7 percent, respectively.



Reasons why tasks were not covered in architecture education program

EXTENT OF TASK PERFORMANCE BY INTERNS AND RECENTLY LICENSED ARCHITECTS

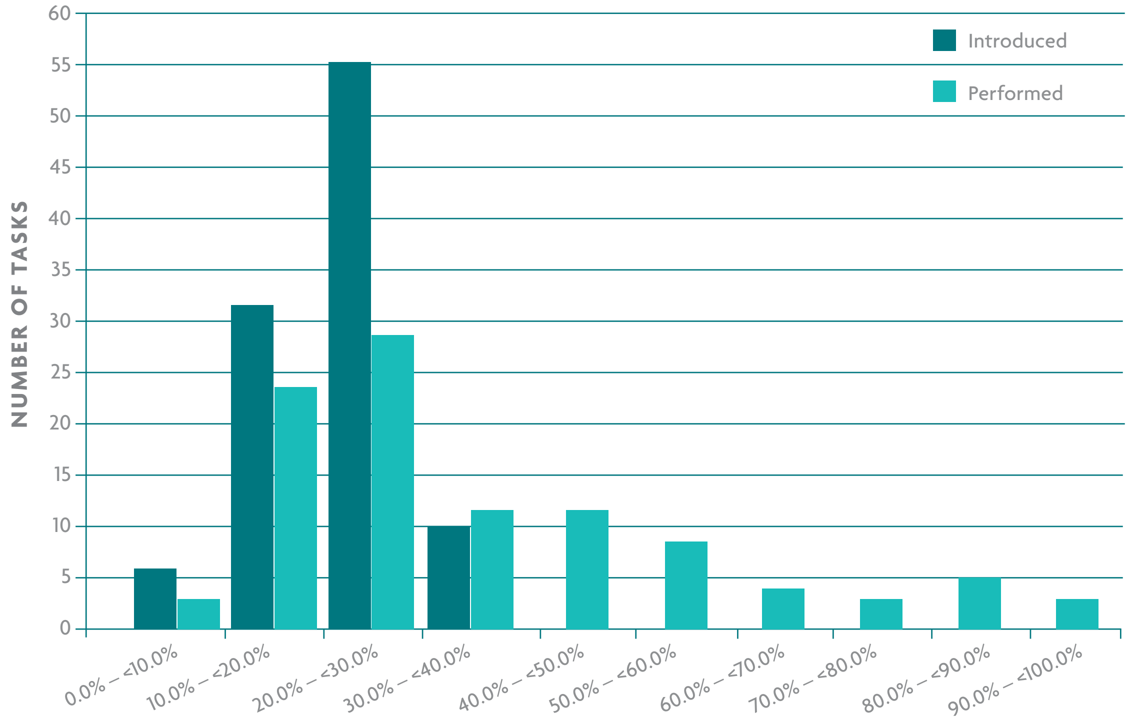
A total of 308 interns (who completed IDP in the past two years but have not yet completed the ARE) and recently licensed architects (licensed in the past year and who completed IDP in the past two years), responded to the EDU survey and indicated the extent to which they performed each task by the time they completed their degree.

Data Table B5 lists the percent of the 308 interns and recently licensed architects who indicated for each task that they were: "*not introduced*;" "*introduced, but not performed*;" "*performed with guidance and feedback*;" "*performed independently with minimal guidance*;" or "*don't know/don't remember.*" For instance, with EDU Task #1 "*Gather information about client's vision, goals, budget, and schedule to validate project scope and program*," 26.0 percent indicated they were "*not introduced*" to EDU Task #1 by the completion of their degree; 29.5 percent indicated they were "*introduced*" to EDU Task #1, but did not perform the task; 30.5 percent indicated they "*performed the task with guidance and feedback*;" 12.0 percent indicated they "*performed independently with minimal guidance*;" and 1.9 percent indicated they "*don't know/don't remember.*"

Across the set of tasks contained in the EDU survey, the percent of interns and recently licensed architects who indicated they "*performed with guidance and feedback*" or "*performed independently with minimal guidance*" ranged from 7.8 percent to 94.5 percent. The percent of interns and architects indicating a given task was "*introduced, but not performed*" ranged from 2.6 percent to 38.3 percent.

The chart below summarizes the distribution of ratings across tasks with respect to the percent of interns and recently licensed architects who indicated they performed a given task (either with guidance or independently with minimal guidance). The figure also shows the distribution of task ratings for the percent of interns and architects who indicated they were introduced to, but did not perform each task.

DISTRIBUTION OF EDU TASK RATINGS: PERCENT OF INTERNS AND RECENTLY LICENSED ARCHITECTS INDICATING THEY PERFORMED OR WERE INTRODUCED TO EACH TASK BY COMPLETION OF THEIR PROGRAM



PERCENT OF RECENT INTERNS AND RECENTLY LICENSED ARCHITECTS WHO PERFORMED VS. INTRODUCED EACH TASK

Overall, the results indicate that higher percentages of interns and architects performed the tasks by the time of program completion, as compared to the percentage who indicated that they were only introduced to the tasks without performing them. Approximately one-quarter (24) of the tasks were performed by a majority (50 percent or more) of interns and architects by the time of program completion.

For example, the figure indicates three tasks were rated by 90 percent or more of the interns and architects as being "*performed*" by the completion of their degree (with guidance and feedback or independently with minimal guidance); five tasks were rated by 80 percent to 90 percent of the respondents as being "*performed*;" three tasks were rated by 70 percent to 80 percent as "*performed*;" four tasks were rated by 60 percent to 70 percent as "*performed*;" and nine tasks were rated by 50 percent to 60 percent as "*performed*." All tasks were rated by fewer than 40 percent of respondents as being "*introduced, but not performed*."

EDU KNOWLEDGE/SKILLS

WHEN INTERNS AND ARCHITECTS FIRST ACQUIRED EDU KNOWLEDGE/SKILLS

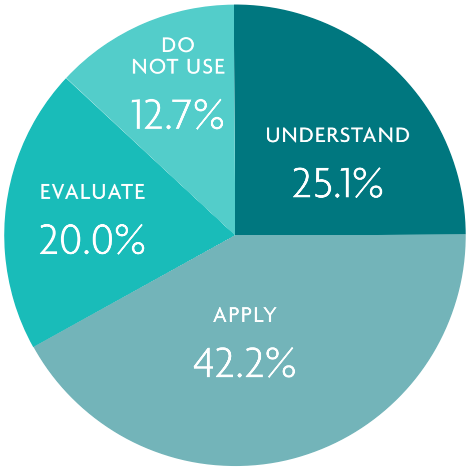
A total of 450 interns and architects responded to the EDU survey and indicated when they first acquired each listed knowledge/skill (K/S). The interns completed IDP in the past two years, but not the ARE; the architects were either: (a) licensed within the past year and completed IDP in the past two years, or (b) licensed two to 10 years. Data Table B7 lists the percent rating each K/S on first acquisition as *"not acquired," "by completion of accredited architecture degree program," "during internship,"* or *"after licensure."* For instance, with EDU K/S #1 *"Knowledge of oral, written, and visual presentation techniques to communicate project information,"* 68.4 percent indicated they first acquired EDU K/S #1 *"by completion of accredited architecture degree program,"* 28.4 percent indicated first acquisition *"during internship,"* and 2.4 percent indicated *"after licensure."* Less than 1 percent indicated the K/S was *"not acquired."*

Of the 122 EDU K/S statements listed in the survey, over two-thirds (85 out of 122 statements) were rated by a majority (50 percent or more) of the respondents as being first acquired *"during internship."* In contrast, only 12 K/S were rated by a majority as being first acquired *by "completion of accredited architecture degree program,"* and only two statements were rated by a majority as *"not acquired."* None of the 122 K/S were rated by a majority of interns and architects as being *"first acquired after licensure."*

COGNITIVE LEVELS OF EDU KNOWLEDGE/SKILLS USED BY INTERNS AND ARCHITECTS

The same group of 450 interns and architects also rated each K/S in the EDU survey with respect to the cognitive level they typically use *"understand," "apply,"* or *"evaluate."* Respondents also had the option to indicate *"do not use knowledge or skill."* Data Table B8 lists the percent of respondents rating each K/S at each cognitive level. For instance, with EDU K/S #1 *"Knowledge of oral, written, and visual presentation techniques to communicate project information,"* 16.2 percent indicated that the level at which they used the K/S was *"understand;"* 55.3 percent rated the K/S at the level of *"apply;"* and 27.1 percent gave a rating of *"evaluate"* for the K/S. A small percentage (1.3 percent) indicated they *"did not use the knowledge/skill."*

The pie chart on the right displays the mean percent of respondents per K/S per cognitive level (when averaged across all EDU K/S statements). Across all 122 K/S statements, the mean percent for *"understand"* was 25.1 percent, for *"apply"* was 42.2 percent, and for *"evaluate"* was 20.0 percent. The mean percent for *"do not use knowledge or skill"* was 12.7 percent.

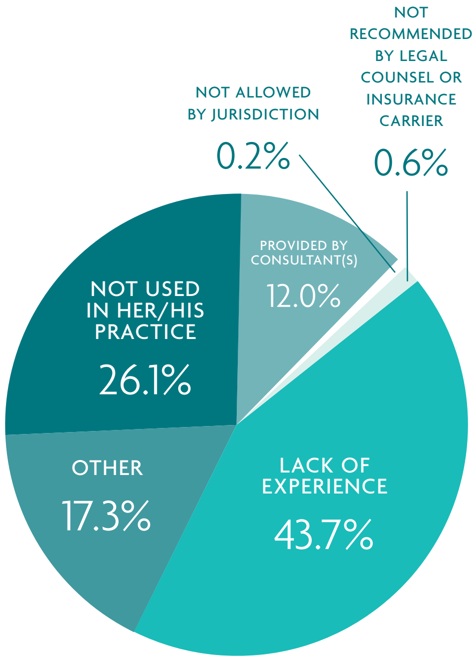


Mean percent of interns and architects rating each level at which they typically use knowledge/skills

REASONS WHY EDU KNOWLEDGE/SKILLS WERE NOT USED BY INTERNS AND ARCHITECTS

The responding interns and architects who indicated they did not use a K/S were asked a follow-up question regarding the reason(s) why they did not use that K/S Data Table B9 tabulates the responses for six possible reasons. For instance, with EDU K/S #1 "*Knowledge of oral, written, and visual presentation techniques to communicate project information*," two respondents did not use the K/S in their practices, three cited "*lack of experience*" as their reason for not using the K/S, and three checked "*other*" and were given the chance to type in a reason. No respondents indicated the reasons "*not allowed by jurisdiction*," "*not recommended by legal counsel or insurance carrier*," or "*provided by consultant(s)*" for EDU K/S #1.

The pie chart on the right displays the average percent of ratings across all K/S statements for each of six reasons why they were not used. Of the reasons cited, the most common was "*lack of experience*" (43.7 percent of ratings), followed by "*not used in her/his practice*" (26.1 percent), and "*provided by consultant(s)*" (12.0 percent). Of all reasons selected, "*not allowed by jurisdiction*" and "*not recommended by legal counsel or insurance carrier*" were the least commonly observed (0.2 percent and 0.6 percent, respectively).



Mean percent of responses per reason why knowledge/skills were not used

WHEN KNOWLEDGE/SKILLS SHOULD FIRST BE ACQUIRED

A total of 1,086 educators and licensed architects responded to the EDU survey and indicated when they believed each K/S should first be acquired. Data Table B10 lists the percent who rated each K/S as "*by completion of accredited architecture education program*," "*during internship*," "*after licensure*," "*acquisition not needed*," or "*I don't know*." For instance, with EDU K/S #1 "*Knowledge of oral, written, and visual presentation techniques to communicate project information*," 80.2 percent of the 1,086 educators and licensed architects indicated that the K/S should first be acquired "*by the completion of an accredited architecture education program*;" 17.7 percent indicated first acquisition "*during internship*," 1.1 percent indicated "*after licensure*," 0.4 percent indicated "*acquisition not needed*," and 0.6 percent indicated they "*don't know*."

Of the 122 K/S statements, 19 were rated by 50.0 percent to 66.7 percent of the educators and licensed architects as K/S that should be acquired by the completion of a degree program. Another 24 of 122 K/S statements were rated by more than 66.7 percent of the educators and licensed architects as needing to be first acquired by the completion of a degree program.

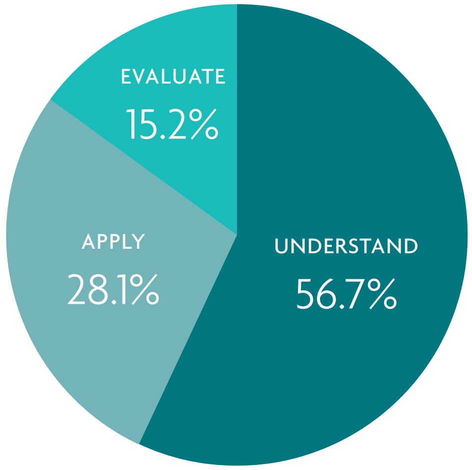
As such, 43 of 122 statements were rated by a majority of the educators and licensed architects as needing to be first acquired by the completion of a degree program. In comparison, 39 of the 122 K/S were rated by 50.0 percent or more of the respondents as needing to be first acquired during internship.

AT WHAT COGNITIVE LEVEL SHOULD KNOWLEDGE/ SKILLS BE ACQUIRED

The educators and licensed architects who indicated a given K/S should be acquired were then asked to indicate the cognitive level at which the K/S should be acquired. Data Table B11 lists the percent of respondents who indicated the cognitive level should be *"understand," "apply,"* or *"evaluate."* For instance, with EDU K/S #1 "*Knowledge of oral, written, and visual presentation techniques to communicate project information*," 871 educators and licensed architects indicated that K/S should be acquired. Of those 871, 18.6 percent indicated *"understand"* should be the level at which that K/S is acquired, 45.5 percent rated *"apply"* as the appropriate level, and 35.9 percent indicated the level should be *"evaluate."*

The pie chart on the right displays the mean percentage of respondents indicating each cognitive level that should be acquired across all of the K/S, as follows: 56.7 percent *"understand,"* 28.1 percent *"apply,"* and 15.2 percent *"evaluate."* It is interesting to compare these results to the earlier reported results in which interns and architects described the cognitive level of K/S that they use (25.1 percent *"understand,"* 42.2 percent *"apply,"* and 20.0 percent *"evaluate"*).

These data suggest that educators and architects believe that a greater percentage of knowledge and skills should be acquired with a basic level of understanding by completion of a degree program, as compared to the actual experience reported by interns and newly licensed architects.



Mean percent of interns and architects rating each level at which knowledge/skills should be acquired

QUALITATIVE FINDINGS

Three open-ended questions were included at the end of the Practice Analysis survey.

> ***"How do you expect your job in the field of architecture to change over the next few years?"***
>
> ***"What tasks will be performed and what knowledge/skills will be needed to meet changing job demands?"***
>
> ***"If you could change the field of architecture, what is the most important change you would make?"***

Nearly 6,000 participants provided qualitative feedback, with many similarities emerging from their responses. The summary below represents the comments and suggestions received from those respondents completing the education survey.

An overwhelming majority felt that the educational curriculum should include more experience in the field and at the job site.

CHANGES OVER THE NEXT FEW YEARS AND MEETING CHANGING JOB DEMANDS

A total of 1,485 respondents who completed the four EDU surveys replied to the questions "*How do you expect your job in the field of architecture to change over the next few years?*" and "*What tasks will be performed and what knowledge/skills will be needed to meet changing job demands?*"

In general, the respondents expect that there will be an increased use of technology (BIM and 3-D modeling) and practice tools, such as Integrated Project Delivery (IPD). Furthermore, respondents see market demands for the knowledge of other computer programs and applications such as project management software, social networking and related social media, and better capability using the Internet for research, file sharing, and communication.

In addition to increasing technological skills, education survey respondents mentioned the importance of business skills including entrepreneurship, client relations, general and strategic management, negotiating, and global practice strategies. Respondents also indicated the need for international language skills. The need for better interdisciplinary collaboration with clients and contractors was also voiced.

MOST IMPORTANT CHANGES TO MAKE

A total of 1,485 EDU survey respondents answered the question "*If you could change the field of architecture, what is the most important change you would make?*"

Many of the themes that emerged from the open-ended questions were similar to the themes that appeared in the *NCARB 2012 Focus Group Report*. The responses have been grouped in the following six major categories:

1. Changing role of the architect
2. Adapting to changing demands
3. Impact of technology on the profession
4. Knowledge and/or skills needed now and in the future
5. Professional practice, accreditation, and licensure
6. NCARB opportunities

Changing Role of the Architect
Some respondents felt that architecture education should emphasize the practice of architecture rather than on narrowly focused specialties such as LEED or green technology. There is a need for well-rounded graduates who have a working knowledge of the basics and hands-on experience in the field rather than concentration on specialties. Other respondents suggested that architects should take a leadership role throughout design and construction in order to oversee the design process, control the quality of designs, and make appropriate decisions regarding codes and standards. Some respondents mentioned that a collaborative approach should be taken in project work, particularly in early stages of all project phases.

Adapting to Changing Demands
An overwhelming majority of respondents felt that the educational curriculum should include more hands-on field experience so that graduates can apply their knowledge to actual construction situations. Some respondents suggested that graduates should have some familiarity with evidence-based design and post-occupancy evaluation, as well as fundamentals of design, material selection, and building performance. Others felt that architects should establish a more collaborative relationship with other professionals earlier in the design and construction phases.

Impact of Technology on the Profession
The majority of respondents commented that graduates' knowledge of fundamentals should be balanced with knowledge of technologies. The focus during education should remain on the fundamentals of design, relying on technology as a tool to truly visualize the finished product.

Knowledge and/or Skills Needed Now and in the Future
Many respondents cited the need to establish clearly defined roles and responsibilities for members of a design and construction team. Defined roles and responsibilities would enable architects to control the outcomes of a project more effectively. Other respondents cited the need for integration of practical business management knowledge and hands-on field skills with the design fundamentals in order to be fully prepared to handle the day-to-day activities and understand the risk exposures involved at a job site. Some indicated a need for a uniform architecture curriculum that focuses on design fundamentals, construction, materials, construction methods, and construction documentation. Others suggested that architecture curricula could be integrated with engineering programs and related disciplines to expose students to diverse aspects of project work that occur in the field.

Professional Practice, Accreditation, and Licensure
Many respondents noted that a uniform code should be created to simplify the design and construction process and documentation requirements. It was suggested by some that there should be a standardized, master's degree program curriculum that would build upon the fundamentals learned in a bachelor's level program. The suggestion is that the bachelor's program would provide fundamentals, and the master's program would provide more specialized coursework and experiences.

Architects should establish a more collaborative relationship with other professionals earlier in the design and construction phases.

A few mentioned that the licensing process should be streamlined, similar to the European system, where examinations are taken upon graduation from a degree program. Some suggested creating separate licensing examinations for generalist and specialty tracks. And several indicated the requirements for licensure should be broadened to allow anyone to take the examination, even those without the IDP, as an alternative pathway to licensure.

NCARB Opportunities

The majority of comments from respondents addressed the IDP. Many suggested extending the internship program to five years with mandated rotations in different subject-matter areas. Others suggested that the IDP could be integrated into the educational curriculum.

EDUCATION DATA TABLES

The chart below summarizes the survey population, the research questions related to the task and K/S statements, as well as the various rating scales for the Education surveys. The chart also references the related Education (EDU) Data Tables.

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
EDU A	Educators	Task	Is the task covered in your architecture program? • Yes • No • I don't know	B2
			To what extent do students perform the task by completion of their architecture program? • The task is introduced but not performed • The task is performed with guidance and feedback • The task is performed independently with minimal guidance	B3
			Why is the task not covered in your architecture program? (check all that apply) • Not required by the program • Not required by the NAAB Conditions for Accreditation • Covered elsewhere • I do not know • Other	B4
EDU B	Interns who completed IDP within the past two years but not ARE Architects licensed past year and IDP completed in past two years	Task	To what extent did you perform the task by completion of your architecture degree? • Task was not introduced • Task was introduced but not performed • Task was performed with guidance and feedback • Task was performed independently with minimal guidance • I don't know, or I don't remember	B5

CONTINUED

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
EDU C	Educators Licensed architects	Knowledge/ Skill	When should the knowledge/skill first be acquired? • By completion of accredited architecture education program • During internship • After licensure • Acquisition not needed • I don't know	B10
			To what extent should the knowledge/skill be acquired within the years of an accredited degree program? • *Understand*: Use to classify, compare, summarize, explain, and/or interpret information • *Apply*: Use specific information to accomplish a task, correctly selecting the appropriate information, and accurately applying it to the solution of a specific problem, while also distinguishing the effects of its implementation • *Evaluate / synthesize*: Integrate knowledge/skills to develop processes for solving new and/or complex problems and evaluate the effectiveness of the solution	B11
EDU D	Interns who completed IDP within the past two years but not ARE Architects licensed in the past year and completed IDP in past two years Architects licensed 2-10 years	Knowledge/ Skill	When did you first acquire the knowledge/skill? Not acquired • By completion of accredited architecture degree program • During internship • After licensure	B7
			How do you typically use the knowledge/skill? • *Understand*: Use to classify, compare, summarize, explain, and/or interpret information • *Apply*: Use specific information to accomplish a task, correctly selecting the appropriate information, and accurately applying it to the solution of a specific problem, while also distinguishing the effects of its implementation • *Evaluate / synthesize*: Integrate knowledge/skills to develop processes for solving new and/or complex problems and evaluate the effectiveness of the solution • *Do not use* the knowledge or skill	B8
			Indicate the reason(s) you do not use the knowledge/skill. (Select all that apply.) • Not used in my practice • Not allowed by my jurisdiction • Not recommended by my legal counsel or insurance carrier • Provided by consultant(s) • Lack of experience • Other	B9

Data Table B1. List of all EDU Survey Task Statements

TASK #	TASK STATEMENT
1	Gather information about client's vision, goals, budget, and schedule to validate project scope and program.
2	Prepare design alternatives for client review.
3	Determine methods for Architect-Client communication based on project scope of work.
4	Determine impact of applicable zoning and development ordinances to determine project constraints.
5	Determine scope of services.
6	Determine design fees.
7	Determine project schedule.
8	Evaluate results of feasibility studies to determine project's financial viability.
9	Evaluate results of feasibility studies to determine project's technical viability.
10	Determine impact of existing utilities infrastructure on site.
11	Determine impact of existing transportation infrastructure on site.
12	Assess environmental impact of design decisions.
13	Define requirements for site survey based on established project scope.
14	Assess socio-cultural context of the proposed site.
15	Analyze existing site conditions to determine impact on facility layout.
16	Consider recommendations from geotechnical studies when establishing design parameters.
17	Develop sustainability goals based on existing environmental conditions.
18	Establish sustainability goals affecting building performance.
19	Consider results of environmental studies when developing site.
20	Develop mitigation options to address adverse site conditions.
21	Perform building code analysis.
22	Communicate design ideas to the client graphically through a variety of different media.
23	Communicate design ideas to the client using hand drawings.
24	Communicate design ideas to client with two-dimensional (2-D) computer aided design software.
25	Communicate design ideas to client with three-dimensional (3-D) computer aided design software.
26	Determine design parameters for building systems.
27	Develop conceptual project budget.

TASK #	TASK STATEMENT
28	Prepare submittals for regulatory approval.
29	Evaluate opportunities and constraints of alternative sites.
30	Gather information about community concerns and issues that may impact proposed project.
31	Prepare building program.
32	Establish project design goals.
33	Prepare site analysis diagrams to document existing conditions, features, infrastructure, and regulatory requirements.
34	Prepare diagrams illustrating spatial relationships and functional adjacencies.
35	Prepare code analysis documentation.
36	Select technologies to develop and produce design and construction documentation.
37	Coordinate documentation of design team.
38	Manage project close-out procedures and documentation.
39	Perform quality control reviews throughout the documentation process.
40	Prepare Cost of Work estimates.
41	Update Cost of Work estimates.
42	Design for building structural system components.
43	Design for civil components of site.
44	Design for mechanical, electrical and plumbing system components.
45	Design for landscape elements for site.
46	Oversee design integration of building components and systems.
47	Select materials, finishes and systems based on technical properties and aesthetic requirements.
48	Select building performance modeling technologies to guide building design.
49	Prepare life cycle cost analysis.
50	Perform constructability review to determine ability to procure, sequence construction, and build proposed project.
51	Perform constructability reviews throughout the design process.
52	Prepare final procurement and contract documents.
53	Establish procedures to process documentation during contract administration.
54	Determine specific insurance requirements to meet contract or business needs.
55	Review results from field reports, third-party inspections and other test results for conformance with contract documents.

CONTINUED

Data Table B1. List of all EDU Survey Task Statements

TASK #	TASK STATEMENT
56	Manage modifications to the construction contract.
57	Prepare Owner-Contractor Agreement.
58	Respond to Contractor Requests for Information.
59	Prepare proposals for services in response to client requirements.
60	Prepare Owner-Architect Agreement.
61	Prepare Architect-Consultant Agreement.
62	Negotiate terms and conditions outlined in Owner-Architect Agreement.
63	Apply principles of historic preservation for projects involving building restoration or renovation.
64	Collaborate with stakeholders during design process to maintain design intent and comply with Owner requirements.
65	Present design concept to stakeholders.
66	Coordinate design work of consultants.
67	Select furniture, fixtures and equipment that meet client's design requirements and needs.
68	Establish procedures for providing post-occupancy services.
69	Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.
70	Prepare staffing plan to meet project goals.
71	Establish procedures for documenting project decisions.
72	Monitor project schedule to maintain compliance with established milestones.
73	Evaluate staffing plan to ensure compliance with established milestones.
74	Manage client expectations to align with established milestones and final decision points.
75	Assist client in selecting contractors.
76	Manage implementation of sustainability criteria.
77	Identify changes in project scope that require additional services.
78	Assist Owner in obtaining necessary permits and approvals.
79	Coordinate testing of building performance and materials.

TASK #	TASK STATEMENT
80	Review Application and Certificate for Payment.
81	Review shop drawings and submittals during construction for conformance with design intent.
82	Complete field reports to document field observations from site visit.
83	Manage information exchange during construction.
84	Resolve conflicts that may arise during design and construction process.
85	Manage project-specific bidding process.
86	Establish procedures for building commissioning.
87	Select design team consultants.
88	Conduct periodic progress meetings with design and project team.
89	Participate in pre-construction, pre-installation and regular progress meetings with design team.
90	Develop strategies to control risk and manage liability.
91	Determine billing rates.
92	Develop business plan for firm.
93	Develop and maintain effective and productive relationships with clients.
94	Develop procedures for responding to changes in project scope.
95	Develop procedures for responding to contractor requests (Requests for Information).
96	Develop strategies for responding to Owner requests (Requests for Proposal, Requests for Qualifications).
97	Understand firm's legal structure to comply with jurisdictional rules and regulations.
98	Understand implications of evolving sustainable design strategies and technologies.
99	Understand implications of project delivery technologies.
100	Understand implications of project delivery methods.
101	Prepare marketing documents that accurately communicate firm's experience and capabilities.
102	Adhere to ethical standards and codes of professional conduct.
103	Comply with laws and regulations governing the practice of architecture.
104	Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.

EDU A

Data Table B2. Percentage Distribution of Whether Tasks Were Covered in the Educator's Architecture Program

Survey Population: Educators

TASK STATEMENT	Is Task Covered			
	YES	NO	I DON'T KNOW	TOTAL N
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	71.3%	16.4%	12.3%	171
2. Prepare design alternatives for client review.	80.7%	14.6%	4.7%	171
3. Determine methods for Architect-Client communication based on project scope of work.	45.6%	33.9%	20.5%	171
4. Determine impact of applicable zoning and development ordinances to determine project constraints.	88.3%	7.0%	4.7%	171
5. Determine scope of services.	52.0%	31.0%	17.0%	171
6. Determine design fees.	40.9%	39.2%	19.9%	171
7. Determine project schedule.	57.3%	25.7%	17.0%	171
8. Evaluate results of feasibility studies to determine project's financial viability.	35.1%	42.7%	22.2%	171
9. Evaluate results of feasibility studies to determine project's technical viability.	38.6%	37.4%	24.0%	171
10. Determine impact of existing utilities infrastructure on site.	55.0%	26.9%	18.1%	171
11. Determine impact of existing transportation infrastructure on site.	76.0%	13.5%	10.5%	171
12. Assess environmental impact of design decisions.	83.6%	9.4%	7.0%	171
13. Define requirements for site survey based on established project scope.	49.1%	31.6%	19.3%	171
14. Assess socio-cultural context of the proposed site.	84.2%	9.4%	6.4%	171
15. Analyze existing site conditions to determine impact on facility layout.	91.8%	4.7%	3.5%	171
16. Consider recommendations from geotechnical studies when establishing design parameters.	40.4%	36.8%	22.8%	171
17. Develop sustainability goals based on existing environmental conditions.	84.8%	6.4%	8.8%	171
18. Establish sustainability goals affecting building performance.	84.2%	7.6%	8.2%	171
19. Consider results of environmental studies when developing site.	67.3%	18.1%	14.6%	171
20. Develop mitigation options to address adverse site conditions.	46.2%	32.2%	21.6%	171
21. Perform building code analysis.	84.8%	5.3%	9.9%	171
22. Communicate design ideas to the client graphically through a variety of different media.	93.6%	4.1%	2.3%	171
23. Communicate design ideas to the client using hand drawings.	93.6%	4.1%	2.3%	171
24. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	95.3%	2.9%	1.8%	171
25. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	95.9%	2.9%	1.2%	171
26. Determine design parameters for building systems.	88.9%	5.8%	5.3%	171
27. Develop conceptual project budget.	48.5%	31.6%	19.9%	171
28. Prepare submittals for regulatory approval.	23.4%	57.3%	19.3%	171
29. Evaluate opportunities and constraints of alternative sites.	71.9%	17.5%	10.5%	171
30. Gather information about community concerns and issues that may impact proposed project.	76.0%	15.2%	8.8%	171
31. Prepare building program.	88.9%	7.6%	3.5%	171
32. Establish project design goals.	90.1%	3.5%	6.4%	171
33. Prepare site analysis diagrams to document existing conditions, features, infrastructure, and regulatory requirements.	91.2%	5.8%	2.9%	171
34. Prepare diagrams illustrating spatial relationships and functional adjacencies.	95.3%	2.9%	1.8%	171
35. Prepare code analysis documentation.	69.0%	16.4%	14.6%	171
36. Select technologies to develop and produce design and construction documentation.	73.1%	13.5%	13.5%	171
37. Coordinate documentation of design team.	48.5%	33.3%	18.1%	171
38. Manage project close-out procedures and documentation.	20.5%	55.0%	24.6%	171

Total N = number of respondents

CONTINUED

EDU A

Data Table B2. Percentage Distribution of Whether Tasks Were Covered in the Educator's Architecture Program

Survey Population: Educators

TASK STATEMENT	Is Task Covered			
	YES	NO	I DON'T KNOW	TOTAL N
39. Perform quality control reviews throughout the documentation process.	22.8%	54.4%	22.8%	171
40. Prepare Cost of Work estimates.	30.4%	50.3%	19.3%	171
41. Update Cost of Work estimates.	18.7%	57.9%	23.4%	171
42. Design for building structural system components.	90.1%	4.1%	5.8%	171
43. Design for civil components of site.	56.1%	28.1%	15.8%	171
44. Design for mechanical, electrical and plumbing system components.	85.4%	8.2%	6.4%	171
45. Design for landscape elements for site.	83.0%	11.7%	5.3%	171
46. Oversee design integration of building components and systems.	78.9%	12.9%	8.2%	171
47. Select materials, finishes and systems based on technical properties and aesthetic requirements.	88.9%	5.8%	5.3%	171
48. Select building performance modeling technologies to guide building design.	59.1%	19.9%	21.1%	171
49. Prepare life cycle cost analysis.	44.4%	32.7%	22.8%	171
50. Perform constructability review to determine ability to procure, sequence construction, and build proposed project.	33.3%	45.6%	21.1%	171
51. Perform constructability reviews throughout the design process.	32.2%	47.4%	20.5%	171
52. Prepare final procurement and contract documents.	35.7%	47.4%	17.0%	171
53. Establish procedures to process documentation during contract administration.	28.1%	48.0%	24.0%	171
54. Determine specific insurance requirements to meet contract or business needs.	28.7%	48.5%	22.8%	171
55. Review results from field reports, third-party inspections and other test results for conformance with contract documents.	20.5%	55.6%	24.0%	171
56. Manage modifications to the construction contract.	28.7%	49.1%	22.2%	171
57. Prepare Owner-Contractor Agreement.	50.3%	24.6%	25.1%	171
58. Respond to Contractor Requests for Information.	34.5%	46.2%	19.3%	171
59. Prepare proposals for services in response to client requirements.	37.4%	36.8%	25.7%	171
60. Prepare Owner-Architect Agreement.	52.0%	25.7%	22.2%	171
61. Prepare Architect-Consultant Agreement.	47.4%	28.7%	24.0%	171
62. Negotiate terms and conditions outlined in Owner-Architect Agreement.	33.9%	40.9%	25.1%	171
63. Apply principles of historic preservation for projects involving building restoration or renovation.	67.3%	21.6%	11.1%	171
64. Collaborate with stakeholders during design process to maintain design intent and comply with Owner requirements.	55.6%	26.9%	17.5%	171
65. Present design concept to stakeholders.	81.9%	10.5%	7.6%	171
66. Coordinate design work of consultants.	45.6%	39.2%	15.2%	171
67. Select furniture, fixtures and equipment that meet client's design requirements and needs.	43.3%	41.5%	15.2%	171
68. Establish procedures for providing post-occupancy services.	31.0%	47.4%	21.6%	171
69. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	26.3%	48.0%	25.7%	171
70. Prepare staffing plan to meet project goals.	24.0%	53.2%	22.8%	171
71. Establish procedures for documenting project decisions.	30.4%	44.4%	25.1%	171
72. Monitor project schedule to maintain compliance with established milestones.	38.0%	38.0%	24.0%	171
73. Evaluate staffing plan to ensure compliance with established milestones.	17.5%	56.1%	26.3%	171
74. Manage client expectations to align with established milestones and final decision points.	24.0%	47.4%	28.7%	171

Total N = number of respondents

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EDU A

Data Table B2. Percentage Distribution of Whether Tasks Were Covered in the Educator's Architecture Program

Survey Population: Educators

TASK STATEMENT	Is Task Covered			
	YES	NO	I DON'T KNOW	TOTAL N
75. Assist client in selecting contractors.	22.2%	56.1%	21.6%	171
76. Manage implementation of sustainability criteria.	58.5%	24.6%	17.0%	171
77. Identify changes in project scope that require additional services.	35.7%	41.5%	22.8%	171
78. Assist Owner in obtaining necessary permits and approvals.	35.7%	43.3%	21.1%	171
79. Coordinate testing of building performance and materials.	32.7%	43.3%	24.0%	171
80. Review Application and Certificate for Payment.	33.9%	41.5%	24.6%	171
81. Review shop drawings and submittals during construction for conformance with design intent.	48.5%	32.2%	19.3%	171
82. Complete field reports to document field observations from site visit.	42.7%	33.9%	23.4%	171
83. Manage information exchange during construction.	24.0%	48.5%	27.5%	171
84. Resolve conflicts that may arise during design and construction process.	42.7%	34.5%	22.8%	171
85. Manage project-specific bidding process.	32.2%	45.6%	22.2%	171
86. Establish procedures for building commissioning.	25.1%	46.8%	28.1%	171
87. Select design team consultants.	39.2%	38.6%	22.2%	171
88. Conduct periodic progress meetings with design and project team.	40.4%	35.7%	24.0%	171
89. Participate in pre-construction, pre-installation and regular progress meetings with design team.	29.2%	43.9%	26.9%	171
90. Develop strategies to control risk and manage liability.	37.4%	38.0%	24.6%	171
91. Determine billing rates.	32.7%	42.7%	24.6%	171
92. Develop business plan for firm.	48.5%	29.8%	21.6%	171
93. Develop and maintain effective and productive relationships with clients.	49.7%	25.1%	25.1%	171
94. Develop procedures for responding to changes in project scope.	32.7%	38.0%	29.2%	171
95. Develop procedures for responding to contractor requests (Requests for Information).	28.7%	43.3%	28.1%	171
96. Develop strategies for responding to Owner requests (Requests for Proposal, Requests for Qualifications).	33.9%	36.3%	29.8%	171
97. Understand firm's legal structure to comply with jurisdictional rules and regulations.	49.7%	25.7%	24.6%	171
98. Understand implications of evolving sustainable design strategies and technologies.	83.6%	6.4%	9.9%	171
99. Understand implications of project delivery technologies.	62.6%	18.1%	19.3%	171
100. Understand implications of project delivery methods.	62.0%	14.6%	23.4%	171
101. Prepare marketing documents that accurately communicate firm's experience and capabilities.	49.1%	29.8%	21.1%	171
102. Adhere to ethical standards and codes of professional conduct.	85.4%	3.5%	11.1%	171
103. Comply with laws and regulations governing the practice of architecture.	81.3%	7.0%	11.7%	171
104. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.	48.0%	22.2%	29.8%	171
MEAN	53.4%	29.1%	17.5%	171.0
MIN	17.5%	2.9%	1.2%	171
MAX	95.9%	57.9%	29.8%	171

Total N = number of respondents

EDU A

Data Table B3. Percentage Distribution of Extent to Which Students Performed Tasks, if Covered

Survey Population: Educators

TASK STATEMENT	If Covered, To What Extent			
	INTRODUCED BUT NOT PERFORMED	PERFORMED WITH GUIDANCE & FEEDBACK	PERFORMED IND. WITH MINIMAL GUIDANCE	TOTAL N
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	23.8%	63.1%	13.1%	122
2. Prepare design alternatives for client review.	6.5%	84.1%	9.4%	138
3. Determine methods for Architect-Client communication based on project scope of work.	41.0%	55.1%	3.8%	78
4. Determine impact of applicable zoning and development ordinances to determine project constraints.	11.3%	80.1%	8.6%	151
5. Determine scope of services.	51.7%	44.9%	3.4%	89
6. Determine design fees.	70.0%	27.1%	2.9%	70
7. Determine project schedule.	36.7%	56.1%	7.1%	98
8. Evaluate results of feasibility studies to determine project's financial viability.	60.0%	35.0%	5.0%	60
9. Evaluate results of feasibility studies to determine project's technical viability.	39.4%	48.5%	12.1%	66
10. Determine impact of existing utilities infrastructure on site.	36.8%	51.6%	11.6%	95
11. Determine impact of existing transportation infrastructure on site.	19.8%	71.0%	9.2%	131
12. Assess environmental impact of design decisions.	17.5%	77.6%	4.9%	143
13. Define requirements for site survey based on established project scope.	21.4%	70.2%	8.3%	84
14. Assess socio-cultural context of the proposed site.	7.6%	83.3%	9.0%	144
15. Analyze existing site conditions to determine impact on facility layout.	1.3%	86.6%	12.1%	157
16. Consider recommendations from geotechnical studies when establishing design parameters.	56.5%	36.2%	7.2%	69
17. Develop sustainability goals based on existing environmental conditions.	11.7%	81.4%	6.9%	145
18. Establish sustainability goals affecting building performance.	13.9%	75.7%	10.4%	144
19. Consider results of environmental studies when developing site.	20.9%	66.1%	13.0%	115
20. Develop mitigation options to address adverse site conditions.	32.5%	51.3%	16.3%	80
21. Perform building code analysis.	15.9%	71.7%	12.4%	145
22. Communicate design ideas to the client graphically through a variety of different media.	1.3%	82.5%	16.3%	160
23. Communicate design ideas to the client using hand drawings.	1.9%	75.6%	22.5%	160
24. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	0.6%	73.0%	26.4%	163
25. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	0.0%	76.2%	23.8%	164
26. Determine design parameters for building systems.	10.5%	82.9%	6.6%	152
27. Develop conceptual project budget.	40.5%	50.0%	9.5%	84
28. Prepare submittals for regulatory approval.	62.5%	27.5%	10.0%	40
29. Evaluate opportunities and constraints of alternative sites.	17.9%	69.1%	13.0%	123
30. Gather information about community concerns and issues that may impact proposed project.	12.3%	73.1%	14.6%	130
31. Prepare building program.	4.6%	85.5%	9.9%	152
32. Establish project design goals.	3.9%	87.0%	9.1%	154
33. Prepare site analysis diagrams to document existing conditions, features, infrastructure, and regulatory requirements.	1.9%	83.3%	14.7%	156

Total N = number of respondents

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EDU A

Data Table B3. Percentage Distribution of Extent to Which Students Performed Tasks, if Covered

Survey Population: Educators

TASK STATEMENT	If Covered, To What Extent			
	INTRODUCED BUT NOT PERFORMED	PERFORMED WITH GUIDANCE & FEEDBACK	PERFORMED IND. WITH MINIMAL GUIDANCE	TOTAL N
34. Prepare diagrams illustrating spatial relationships and functional adjacencies.	1.8%	86.0%	12.2%	164
35. Prepare code analysis documentation.	22.9%	61.9%	15.3%	118
36. Select technologies to develop and produce design and construction documentation.	11.2%	74.4%	14.4%	125
37. Coordinate documentation of design team.	30.1%	51.8%	18.1%	83
38. Manage project close-out procedures and documentation.	72.2%	22.2%	5.6%	36
39. Perform quality control reviews throughout the documentation process.	50.0%	45.0%	5.0%	40
40. Prepare Cost of Work estimates.	44.2%	50.0%	5.8%	52
41. Update Cost of Work estimates.	59.4%	37.5%	3.1%	32
42. Design for building structural system components.	11.7%	82.5%	5.8%	154
43. Design for civil components of site.	38.1%	50.5%	11.3%	97
44. Design for mechanical, electrical and plumbing system components.	17.8%	74.7%	7.5%	146
45. Design for landscape elements for site.	16.9%	71.1%	12.0%	142
46. Oversee design integration of building components and systems.	14.8%	77.8%	7.4%	135
47. Select materials, finishes and systems based on technical properties and aesthetic requirements.	7.9%	80.9%	11.2%	152
48. Select building performance modeling technologies to guide building design.	28.4%	59.8%	11.8%	102
49. Prepare life cycle cost analysis.	74.0%	22.1%	3.9%	77
50. Perform constructability review to determine ability to procure, sequence construction, and build proposed project.	56.1%	36.8%	7.0%	57
51. Perform constructability reviews throughout the design process.	45.5%	49.1%	5.5%	55
52. Prepare final procurement and contract documents.	55.7%	41.0%	3.3%	61
53. Establish procedures to process documentation during contract administration.	87.5%	10.4%	2.1%	48
54. Determine specific insurance requirements to meet contract or business needs.	93.9%	6.1%	0.0%	49
55. Review results from field reports, third-party inspections and other test results for conformance with contract documents.	91.4%	5.7%	2.9%	35
56. Manage modifications to the construction contract.	87.8%	8.2%	4.1%	49
57. Prepare Owner-Contractor Agreement.	69.8%	25.6%	4.7%	86
58. Respond to Contractor Requests for Information.	86.4%	6.8%	6.8%	59
59. Prepare proposals for services in response to client requirements.	67.2%	23.4%	9.4%	64
60. Prepare Owner-Architect Agreement.	71.9%	24.7%	3.4%	89
61. Prepare Architect-Consultant Agreement.	86.4%	11.1%	2.5%	81
62. Negotiate terms and conditions outlined in Owner-Architect Agreement.	91.4%	6.9%	1.7%	58
63. Apply principles of historic preservation for projects involving building restoration or renovation.	35.7%	51.3%	13.0%	115
64. Collaborate with stakeholders during design process to maintain design intent and comply with Owner requirements.	29.2%	62.5%	8.3%	96
65. Present design concept to stakeholders.	11.4%	78.6%	10.0%	140
66. Coordinate design work of consultants.	61.5%	20.5%	17.9%	78

Total N = number of respondents

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EDU A

Data Table B3. Percentage Distribution of Extent to Which Students Performed Tasks, if Covered

Survey Population: Educators

TASK STATEMENT	If Covered, To What Extent			
	INTRODUCED BUT NOT PERFORMED	PERFORMED WITH GUIDANCE & FEEDBACK	PERFORMED IND. WITH MINIMAL GUIDANCE	TOTAL N
67. Select furniture, fixtures and equipment that meet client's design requirements and needs.	39.2%	45.9%	14.9%	74
68. Establish procedures for providing post-occupancy services.	85.2%	11.1%	3.7%	54
69. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	95.7%	2.2%	2.2%	46
70. Prepare staffing plan to meet project goals.	69.0%	21.4%	9.5%	42
71. Establish procedures for documenting project decisions.	71.2%	21.2%	7.7%	52
72. Monitor project schedule to maintain compliance with established milestones.	60.0%	32.3%	7.7%	65
73. Evaluate staffing plan to ensure compliance with established milestones.	76.7%	13.3%	10.0%	30
74. Manage client expectations to align with established milestones and final decision points.	80.5%	12.2%	7.3%	41
75. Assist client in selecting contractors.	87.2%	2.6%	10.3%	39
76. Manage implementation of sustainability criteria.	42.0%	47.0%	11.0%	100
77. Identify changes in project scope that require additional services.	80.6%	9.7%	9.7%	62
78. Assist Owner in obtaining necessary permits and approvals.	85.5%	9.7%	4.8%	62
79. Coordinate testing of building performance and materials.	69.6%	23.2%	7.1%	56
80. Review Application and Certificate for Payment.	91.4%	5.2%	3.4%	58
81. Review shop drawings and submittals during construction for conformance with design intent.	73.5%	22.9%	3.6%	83
82. Complete field reports to document field observations from site visit.	61.6%	31.5%	6.8%	73
83. Manage information exchange during construction.	85.7%	14.3%	0.0%	42
84. Resolve conflicts that may arise during design and construction process.	75.3%	17.8%	6.8%	73
85. Manage project-specific bidding process.	96.4%	3.6%	0.0%	55
86. Establish procedures for building commissioning.	93.2%	6.8%	0.0%	44
87. Select design team consultants.	79.1%	13.4%	7.5%	67
88. Conduct periodic progress meetings with design and project team.	62.3%	34.8%	2.9%	69
89. Participate in pre-construction, pre-installation and regular progress meetings with design team.	68.0%	26.0%	6.0%	50
90. Develop strategies to control risk and manage liability.	90.6%	6.3%	3.1%	64
91. Determine billing rates.	82.1%	12.5%	5.4%	56
92. Develop business plan for firm.	44.6%	48.2%	7.2%	83
93. Develop and maintain effective and productive relationships with clients.	64.7%	28.2%	7.1%	85
94. Develop procedures for responding to changes in project scope.	69.6%	21.4%	8.9%	56
95. Develop procedures for responding to contractor requests (Requests for Information).	83.7%	8.2%	8.2%	49
96. Develop strategies for responding to Owner requests (Requests for Proposal, Requests for Qualifications).	79.3%	15.5%	5.2%	58
97. Understand firm's legal structure to comply with jurisdictional rules and regulations.	77.6%	16.5%	5.9%	85
98. Understand implications of evolving sustainable design strategies and technologies.	28.7%	67.1%	4.2%	143
99. Understand implications of project delivery technologies.	65.7%	28.7%	5.6%	108
100. Understand implications of project delivery methods.	68.2%	24.3%	7.5%	107

Total N = number of respondents

CONTINUED

EDU A

Data Table B3. Percentage Distribution of Extent to Which Students Performed Tasks, if Covered

Survey Population: Educators

TASK STATEMENT	If Covered, To What Extent			
	INTRODUCED BUT NOT PERFORMED	PERFORMED WITH GUIDANCE & FEEDBACK	PERFORMED IND. WITH MINIMAL GUIDANCE	TOTAL N
101. Prepare marketing documents that accurately communicate firm's experience and capabilities.	42.9%	48.8%	8.3%	84
102. Adhere to ethical standards and codes of professional conduct.	45.2%	43.8%	11.0%	146
103. Comply with laws and regulations governing the practice of architecture.	56.8%	38.8%	4.3%	139
104. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.	77.1%	18.1%	4.8%	83
MEAN	48.9%	42.8%	8.2%	91.5
MIN	0.0%	2.2%	0.0%	30
MAX	96.4%	87.0%	26.4%	164

Total N = number of respondents

EDU A

Data Table B4. Percentage Distribution of Reason(s) Why Tasks Were Not Covered

Survey Population: Educators

TASK STATEMENT	Reason(s) Not Covered						
	NOT REQUIRED BY PROGRAM	NOT REQUIRED FOR ACCRED.	COVERED ELSEWHERE	I DON'T KNOW	OTHER	N – TOTAL REASONS NOT COVERED[1]	N – INDIVIDUALS TASK NOT COVERED[2]
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	11	6	2	7	5	31	21
2. Prepare design alternatives for client review.	13	3	2	3	7	28	8
3. Determine methods for Architect-Client communication based on project scope of work.	17	7	5	17	18	64	35
4. Determine impact of applicable zoning and development ordinances to determine project constraints.	4	0	1	3	4	12	8
5. Determine scope of services.	26	9	7	8	12	62	29
6. Determine design fees.	27	12	12	11	15	77	34
7. Determine project schedule.	18	6	9	7	10	50	29
8. Evaluate results of feasibility studies to determine project's financial viability.	40	12	9	13	12	86	38
9. Evaluate results of feasibility studies to determine project's technical viability.	30	11	8	10	16	75	41
10. Determine impact of existing utilities infrastructure on site.	23	9	7	6	10	55	31
11. Determine impact of existing transportation infrastructure on site.	12	3	3	6	3	27	18
12. Assess environmental impact of design decisions.	5	2	2	6	3	18	12
13. Define requirements for site survey based on established project scope.	27	8	5	13	9	62	33
14. Assess socio-cultural context of the proposed site.	8	3	4	0	3	18	11
15. Analyze existing site conditions to determine impact on facility layout.	3	1	0	3	2	9	6
16. Consider recommendations from geotechnical studies when establishing design parameters.	32	13	8	11	8	72	39
17. Develop sustainability goals based on existing environmental conditions.	4	2	1	3	5	15	15
18. Establish sustainability goals affecting building performance.	6	3	1	3	5	18	14
19. Consider results of environmental studies when developing site.	13	5	2	8	9	37	25
20. Develop mitigation options to address adverse site conditions.	27	11	4	11	10	63	37
21. Perform building code analysis.	4	1	2	2	1	10	17
22. Communicate design ideas to the client graphically through a variety of different media.	1	0	1	1	4	7	4
23. Communicate design ideas to the client using hand drawings.	4	2	0	0	3	9	4
24. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	1	0	1	0	3	5	3
25. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	2	0	1	0	2	5	2
26. Determine design parameters for building systems.	8	2	1	1	1	13	9
27. Develop conceptual project budget.	24	5	6	13	16	64	34
28. Prepare submittals for regulatory approval.	46	16	15	21	17	115	33
29. Evaluate opportunities and constraints of alternative sites.	15	2	2	10	5	34	18

[1] This column is a sum of all the reasons participants indicated why a task was not covered. Respondents were allowed to select as many of the reasons as applicable; therefore the number of reasons a task was not covered may exceed the number of participants who indicated a task was not covered.

[2] This column represents the number of individuals who indicated that the task was not covered.

CONTINUED

EDU A

Data Table B4. Percentage Distribution of Reason(s) Why Tasks Were Not Covered

Survey Population: Educators

TASK STATEMENT	Reason(s) Not Covered						
	NOT REQUIRED BY PROGRAM	NOT REQUIRED FOR ACCRED.	COVERED ELSEWHERE	I DON'T KNOW	OTHER	N – TOTAL REASONS NOT COVERED[1]	N – INDIVIDUALS TASK NOT COVERED[2]
30. Gather information about community concerns and issues that may impact proposed project.	12	4	3	7	5	31	15
31. Prepare building program.	6	2	0	4	3	15	6
32. Establish project design goals.	2	0	0	2	3	7	11
33. Prepare site analysis diagrams to document existing conditions, features, infrastructure, and regulatory requirements.	6	0	0	1	3	10	5
34. Prepare diagrams illustrating spatial relationships and functional adjacencies.	4	1	0	0	1	6	3
35. Prepare code analysis documentation.	14	1	3	6	5	29	25
36. Select technologies to develop and produce design and construction documentation.	14	2	2	2	6	26	23
37. Coordinate documentation of design team.	26	9	9	9	14	67	31
38. Manage project close-out procedures and documentation.	42	14	15	23	16	110	42
39. Perform quality control reviews throughout the documentation process.	41	14	15	22	16	108	39
40. Prepare Cost of Work estimates.	44	11	13	14	17	99	33
41. Update Cost of Work estimates.	43	14	16	22	17	112	40
42. Design for building structural system components.	3	1	0	2	1	7	10
43. Design for civil components of site.	24	8	6	11	8	57	27
44. Design for mechanical, electrical and plumbing system components.	7	1	4	2	3	17	11
45. Design for landscape elements for site.	7	1	3	7	2	20	9
46. Oversee design integration of building components and systems.	10	1	1	6	4	22	14
47. Select materials, finishes and systems based on technical properties and aesthetic requirements.	5	0	2	2	2	11	9
48. Select building performance modeling technologies to guide building design.	20	7	5	4	6	42	36
49. Prepare life cycle cost analysis.	24	9	8	12	10	63	39
50. Perform constructability review to determine ability to procure, sequence construction, and build proposed project.	39	13	14	13	17	96	36
51. Perform constructability reviews throughout the design process.	40	7	14	17	13	91	35
52. Prepare final procurement and contract documents.	42	14	18	12	13	99	29
53. Establish procedures to process documentation during contract administration.	39	14	23	9	14	99	41
54. Determine specific insurance requirements to meet contract or business needs.	41	14	16	13	14	98	39
55. Review results from field reports, third-party inspections and other test results for conformance with contract documents.	50	19	15	18	18	120	41
56. Manage modifications to the construction contract.	41	14	18	13	17	103	38
57. Prepare Owner-Contractor Agreement.	23	6	8	4	9	98	33
58. Respond to Contractor Requests for Information.	45	13	12	10	18	74	44
59. Prepare proposals for services in response to client requirements.	34	11	9	7	13	52	38
60. Prepare Owner-Architect Agreement.	23	5	9	5	10	58	41

[1] This column is a sum of all the reasons participants indicated why a task was not covered. Respondents were allowed to select as many of the reasons as applicable; therefore the number of reasons a task was not covered may exceed the number of participants who indicated a task was not covered.

[2] This column represents the number of individuals who indicated that the task was not covered.

CONTINUED

EDU A

Data Table B4. Percentage Distribution of Reason(s) Why Tasks Were Not Covered

Survey Population: Educators

TASK STATEMENT	Reason(s) Not Covered						
	NOT REQUIRED BY PROGRAM	NOT REQUIRED FOR ACCRED.	COVERED ELSEWHERE	I DON'T KNOW	OTHER	N – TOTAL REASONS NOT COVERED[1]	N – INDIVIDUALS TASK NOT COVERED[2]
61. Prepare Architect-Consultant Agreement.	28	7	9	5	9	85	43
62. Negotiate terms and conditions outlined in Owner-Architect Agreement.	36	12	13	10	14	44	19
63. Apply principles of historic preservation for projects involving building restoration or renovation.	19	9	5	5	6	51	30
64. Collaborate with stakeholders during design process to maintain design intent and comply with Owner requirements.	20	6	4	8	13	24	13
65. Present design concept to stakeholders.	9	2	3	3	7	81	26
66. Coordinate design work of consultants.	37	10	11	9	14	84	26
67. Select furniture, fixtures and equipment that meet client's design requirements and needs.	42	10	11	10	11	102	37
68. Establish procedures for providing post-occupancy services.	46	16	13	12	15	98	44
69. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	48	10	15	9	16	109	39
70. Prepare staffing plan to meet project goals.	46	15	18	15	15	91	43
71. Establish procedures for documenting project decisions.	38	11	15	12	15	84	41
72. Monitor project schedule to maintain compliance with established milestones.	35	10	12	9	18	119	45
73. Evaluate staffing plan to ensure compliance with established milestones.	55	15	14	15	20	100	49
74. Manage client expectations to align with established milestones and final decision points.	48	13	11	10	18	123	37
75. Assist client in selecting contractors.	56	18	16	13	20	57	29
76. Manage implementation of sustainability criteria.	25	9	9	5	9	98	33
77. Identify changes in project scope that require additional services.	40	14	15	8	14	91	39
78. Assist Owner in obtaining necessary permits and approvals.	40	15	17	7	18	97	36
79. Coordinate testing of building performance and materials.	43	18	13	10	13	97	41
80. Review Application and Certificate for Payment.	36	12	14	9	16	87	42
81. Review shop drawings and submittals during construction for conformance with design intent.	28	10	9	8	12	67	33
82. Complete field reports to document field observations from site visit.	31	11	11	7	11	71	40
83. Manage information exchange during construction.	50	16	16	9	16	107	47
84. Resolve conflicts that may arise during design and construction process.	33	8	11	6	13	71	39
85. Manage project-specific bidding process.	44	15	14	7	16	96	38
86. Establish procedures for building commissioning.	48	15	13	8	15	99	48
87. Select design team consultants.	39	14	9	7	10	79	38
88. Conduct periodic progress meetings with design and project team.	40	11	7	2	14	74	41
89. Participate in pre-construction, pre-installation and regular progress meetings with design team.	45	14	16	5	20	100	46
90. Develop strategies to control risk and manage liability.	35	10	10	8	13	76	42

[1] This column is a sum of all the reasons participants indicated why a task was not covered. Respondents were allowed to select as many of the reasons as applicable; therefore the number of reasons a task was not covered may exceed the number of participants who indicated a task was not covered.

[2] This column represents the number of individuals who indicated that the task was not covered.

CONTINUED

EDU A

Data Table B4. Percentage Distribution of Reason(s) Why Tasks Were Not Covered

Survey Population: Educators

TASK STATEMENT	Reason(s) Not Covered						
	NOT REQUIRED BY PROGRAM	NOT REQUIRED FOR ACCRED.	COVERED ELSEWHERE	I DON'T KNOW	OTHER	N – TOTAL REASONS NOT COVERED[1]	N – INDIVIDUALS TASK NOT COVERED[2]
91. Determine billing rates.	40	12	13	11	12	88	42
92. Develop business plan for firm.	23	8	11	10	9	61	37
93. Develop and maintain effective and productive relationships with clients.	25	8	9	7	11	60	43
94. Develop procedures for responding to changes in project scope.	32	12	15	9	12	80	50
95. Develop procedures for responding to contractor requests (Requests for Information).	41	13	15	10	14	93	48
96. Develop strategies for responding to Owner requests (Requests for Proposal, Requests for Qualifications).	35	10	13	7	13	78	51
97. Understand firm's legal structure to comply with jurisdictional rules and regulations.	23	8	7	6	7	51	42
98. Understand implications of evolving sustainable design strategies and technologies.	5	3	2	1	1	12	17
99. Understand implications of project delivery technologies.	21	4	6	2	3	36	33
100. Understand implications of project delivery methods.	16	3	7	3	3	32	40
101. Prepare marketing documents that accurately communicate firm's experience and capabilities.	33	6	7	6	8	60	36
102. Adhere to ethical standards and codes of professional conduct.	4	1	1	1	1	8	19
103. Comply with laws and regulations governing the practice of architecture.	7	1	3	2	2	15	20
104. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.	18	6	7	2	10	43	51
MEAN	25.82	8.03	8.19	7.73	10.03	59.80	
MIN	1	0	0	0	1	5	
MAX	56	19	23	23	20	123	

[1] This column is a sum of all the reasons participants indicated why a task was not covered. Respondents were allowed to select as many of the reasons as applicable; therefore the number of reasons a task was not covered may exceed the number of participants who indicated a task was not covered.

[2] This column represents the number of individuals who indicated that the task was not covered.

Data Table B5. Percentage Distribution of Extent to Which Survey Respondents Performed Tasks by Completion of Their Program, if Covered

Survey Population: Interns + Architects licensed in the past year

TASK STATEMENT	Extent Performed						
	NOT INTRODUCED	INTRODUCED, NOT PERFORMED	PERFORMED WITH GUIDANCE & FEEDBACK	PERFORMED INDE-PENDENTLY	DON'T KNOW OR DON'T REMEMBER	PERCENT PERFORMED	TOTAL N
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	26.0%	29.5%	30.5%	12.0%	1.9%	42.5%	308
2. Prepare design alternatives for client review.	17.9%	13.0%	50.6%	17.2%	1.3%	67.9%	308
3. Determine methods for Architect-Client communication based on project scope of work.	42.2%	21.4%	23.4%	9.4%	3.6%	32.8%	308
4. Determine impact of applicable zoning and development ordinances to determine project constraints.	19.8%	25.3%	36.7%	15.9%	2.3%	52.6%	308
5. Determine scope of services.	32.8%	29.9%	25.0%	8.4%	3.9%	33.4%	308
6. Determine design fees.	55.8%	26.9%	11.4%	4.5%	1.3%	15.9%	308
7. Determine project schedule.	40.9%	32.1%	16.9%	7.5%	2.6%	24.4%	308
8. Evaluate results of feasibility studies to determine project's financial viability.	56.2%	23.1%	14.3%	4.9%	1.6%	19.2%	308
9. Evaluate results of feasibility studies to determine project's technical viability.	47.4%	22.7%	22.4%	5.5%	1.9%	27.9%	308
10. Determine impact of existing utilities infrastructure on site.	39.0%	22.4%	26.6%	9.1%	2.9%	35.7%	308
11. Determine impact of existing transportation infrastructure on site.	23.1%	22.1%	40.6%	12.0%	2.3%	52.6%	308
12. Assess environmental impact of design decisions.	12.3%	26.0%	48.1%	12.3%	1.3%	60.4%	308
13. Define requirements for site survey based on established project scope.	29.9%	19.2%	35.4%	12.3%	3.2%	47.7%	308
14. Assess socio-cultural context of the proposed site.	17.5%	15.3%	53.9%	11.4%	1.9%	65.3%	308
15. Analyze existing site conditions to determine impact on facility layout.	4.9%	8.1%	69.8%	16.2%	1.0%	86.0%	308
16. Consider recommendations from geotechnical studies when establishing design parameters.	47.1%	24.0%	19.8%	7.5%	1.6%	27.3%	308
17. Develop sustainability goals based on existing environmental conditions.	19.5%	23.7%	41.2%	13.6%	1.9%	54.9%	308
18. Establish sustainability goals affecting building performance.	17.5%	26.3%	41.2%	13.3%	1.6%	54.5%	308
19. Consider results of environmental studies when developing site.	25.3%	25.0%	38.0%	9.7%	1.9%	47.7%	308
20. Develop mitigation options to address adverse site conditions.	37.0%	20.1%	31.5%	8.1%	3.2%	39.6%	308
21. Perform building code analysis.	25.3%	25.0%	29.9%	18.2%	1.6%	48.1%	308
22. Communicate design ideas to the client graphically through a variety of different media.	2.9%	2.6%	69.8%	23.7%	1.0%	93.5%	308
23. Communicate design ideas to the client using hand drawings.	3.9%	6.2%	64.6%	24.0%	1.3%	88.6%	308
24. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	4.9%	3.9%	61.4%	29.2%	0.6%	90.6%	308
25. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	7.8%	6.2%	54.9%	30.5%	0.6%	85.4%	308
26. Determine design parameters for building systems.	13.3%	25.0%	47.7%	11.4%	2.6%	59.1%	308
27. Develop conceptual project budget.	49.7%	25.3%	18.5%	5.5%	1.0%	24.0%	308

Total N = number of respondents

CONTINUED

EDU B

Data Table B5. Percentage Distribution of Extent to Which Survey Respondents Performed Tasks by Completion of Their Program, if Covered

Survey Population: Interns + Architects licensed in the past year

TASK STATEMENT	Extent Performed						
	NOT INTRODUCED	INTRODUCED, NOT PERFORMED	PERFORMED WITH GUIDANCE & FEEDBACK	PERFORMED INDE-PENDENTLY	DON'T KNOW OR DON'T REMEMBER	PERCENT PERFORMED	TOTAL N
28. Prepare submittals for regulatory approval.	59.1%	16.6%	15.9%	7.8%	0.6%	23.7%	308
29. Evaluate opportunities and constraints of alternative sites.	33.4%	17.5%	36.0%	11.4%	1.6%	47.4%	308
30. Gather information about community concerns and issues that may impact proposed project.	21.1%	21.1%	46.1%	11.4%	0.3%	57.5%	308
31. Prepare building program.	6.2%	13.6%	64.3%	15.3%	0.6%	79.5%	308
32. Establish project design goals.	5.8%	11.4%	63.3%	17.9%	1.6%	81.2%	308
33. Prepare site analysis diagrams to document existing conditions, features, infrastructure, and regulatory requirements.	6.8%	11.0%	61.0%	20.5%	0.6%	81.5%	308
34. Prepare diagrams illustrating spatial relationships and functional adjacencies.	1.6%	3.2%	70.1%	24.4%	0.6%	94.5%	308
35. Prepare code analysis documentation.	37.0%	22.1%	24.7%	14.9%	1.3%	39.6%	308
36. Select technologies to develop and produce design and construction documentation.	23.1%	17.9%	37.7%	19.5%	1.9%	57.1%	308
37. Coordinate documentation of design team.	38.0%	19.2%	22.4%	18.5%	1.9%	40.9%	308
38. Manage project close-out procedures and documentation.	64.0%	16.6%	11.4%	7.5%	0.6%	18.8%	308
39. Perform quality control reviews throughout the documentation process.	57.5%	14.3%	17.5%	9.7%	1.0%	27.3%	308
40. Prepare Cost of Work estimates.	61.4%	20.1%	12.7%	5.2%	0.6%	17.9%	308
41. Update Cost of Work estimates.	64.3%	20.1%	10.1%	4.5%	1.0%	14.6%	308
42. Design for building structural system components.	14.0%	19.2%	53.2%	11.7%	1.9%	64.9%	308
43. Design for civil components of site.	29.2%	26.3%	34.4%	8.1%	1.9%	42.5%	308
44. Design for mechanical, electrical and plumbing system components.	20.1%	26.9%	40.6%	11.0%	1.3%	51.6%	308
45. Design for landscape elements for site.	9.1%	17.2%	53.6%	18.8%	1.3%	72.4%	308
46. Oversee design integration of building components and systems.	21.8%	23.4%	40.6%	12.7%	1.6%	53.2%	308
47. Select materials, finishes and systems based on technical properties and aesthetic requirements.	7.8%	13.3%	53.2%	24.7%	1.0%	77.9%	308
48. Select building performance modeling technologies to guide building design.	47.7%	24.7%	18.2%	8.1%	1.3%	26.3%	308
49. Prepare life cycle cost analysis.	52.3%	35.1%	8.8%	3.2%	0.6%	12.0%	308
50. Perform constructability review to determine ability to procure, sequence construction, and build proposed project.	54.9%	23.4%	13.6%	5.2%	2.9%	18.8%	308
51. Perform constructability reviews throughout the design process.	53.9%	22.7%	16.6%	5.2%	1.6%	21.8%	308
52. Prepare final procurement and contract documents.	51.9%	20.8%	20.1%	5.8%	1.3%	26.0%	308
53. Establish procedures to process documentation during contract administration.	58.8%	20.1%	14.6%	5.5%	1.0%	20.1%	308
54. Determine specific insurance requirements to meet contract or business needs.	67.5%	24.0%	5.5%	2.3%	0.6%	7.8%	308
55. Review results from field reports, third-party inspections and other test results for conformance with contract documents.	60.7%	17.2%	13.0%	7.8%	1.3%	20.8%	308

Total N = number of respondents

CONTINUED

Data Table B5. Percentage Distribution of Extent to Which Survey Respondents Performed Tasks by Completion of Their Program, if Covered

Survey Population: Interns + Architects licensed in the past year

TASK STATEMENT	Extent Performed						
	NOT INTRODUCED	INTRODUCED, NOT PERFORMED	PERFORMED WITH GUIDANCE & FEEDBACK	PERFORMED INDE-PENDENTLY	DON'T KNOW OR DON'T REMEMBER	PERCENT PERFORMED	TOTAL N
56. Manage modifications to the construction contract.	64.3%	20.1%	9.7%	4.9%	1.0%	14.6%	308
57. Prepare Owner-Contractor Agreement.	53.6%	33.1%	10.4%	2.3%	0.6%	12.7%	308
58. Respond to Contractor Requests for Information.	54.2%	18.5%	11.4%	14.6%	1.3%	26.0%	308
59. Prepare proposals for services in response to client requirements.	56.2%	21.1%	13.0%	8.8%	1.0%	21.8%	308
60. Prepare Owner-Architect Agreement.	46.4%	38.3%	10.4%	3.9%	1.0%	14.3%	308
61. Prepare Architect-Consultant Agreement.	50.6%	37.3%	7.8%	2.9%	1.3%	10.7%	308
62. Negotiate terms and conditions outlined in Owner-Architect Agreement.	58.1%	31.8%	5.8%	2.9%	1.3%	8.8%	308
63. Apply principles of historic preservation for projects involving building restoration or renovation.	31.5%	29.5%	29.5%	7.8%	1.6%	37.3%	308
64. Collaborate with stakeholders during design process to maintain design intent and comply with Owner requirements.	42.9%	23.7%	22.7%	8.8%	1.9%	31.5%	308
65. Present design concept to stakeholders.	33.8%	15.6%	39.9%	8.8%	1.9%	48.7%	308
66. Coordinate design work of consultants.	39.0%	25.6%	18.5%	15.9%	1.0%	34.4%	308
67. Select furniture, fixtures and equipment that meet client's design requirements and needs.	33.4%	20.8%	27.9%	16.6%	1.3%	44.5%	308
68. Establish procedures for providing post-occupancy services.	62.7%	23.4%	7.8%	4.2%	1.9%	12.0%	308
69. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	64.0%	26.6%	6.5%	2.3%	0.6%	8.8%	308
70. Prepare staffing plan to meet project goals.	65.9%	16.6%	11.7%	4.9%	1.0%	16.6%	308
71. Establish procedures for documenting project decisions.	57.8%	16.9%	16.6%	6.8%	1.9%	23.4%	308
72. Monitor project schedule to maintain compliance with established milestones.	49.0%	22.7%	16.6%	10.7%	1.0%	27.3%	308
73. Evaluate staffing plan to ensure compliance with established milestones.	67.2%	16.9%	9.4%	5.5%	1.0%	14.9%	308
74. Manage client expectations to align with established milestones and final decision points.	57.1%	19.8%	15.3%	6.8%	1.0%	22.1%	308
75. Assist client in selecting contractors.	62.3%	19.8%	9.7%	6.2%	1.9%	15.9%	308
76. Manage implementation of sustainability criteria.	52.9%	21.4%	16.9%	7.5%	1.3%	24.4%	308
77. Identify changes in project scope that require additional services.	55.2%	21.8%	13.0%	8.8%	1.3%	21.8%	308
78. Assist Owner in obtaining necessary permits and approvals.	53.9%	22.4%	14.6%	8.4%	0.6%	23.1%	308
79. Coordinate testing of building performance and materials.	59.4%	25.6%	10.7%	2.9%	1.3%	13.6%	308
80. Review Application and Certificate for Payment.	64.6%	18.5%	9.1%	6.8%	1.0%	15.9%	308
81. Review shop drawings and submittals during construction for conformance with design intent.	53.6%	17.5%	15.3%	13.0%	0.6%	28.2%	308
82. Complete field reports to document field observations from site visit.	46.8%	20.5%	17.5%	14.6%	0.6%	32.1%	308
83. Manage information exchange during construction.	55.2%	17.5%	13.3%	13.0%	1.0%	26.3%	308
84. Resolve conflicts that may arise during design and construction process.	48.1%	23.4%	16.6%	10.7%	1.3%	27.3%	308
85. Manage project-specific bidding process.	58.1%	22.7%	10.7%	6.8%	1.6%	17.5%	308

Total N = number of respondents

CONTINUED

EDU B

Data Table B5. Percentage Distribution of Extent to Which Survey Respondents Performed Tasks by Completion of Their Program, if Covered

Survey Population: Interns + Architects licensed in the past year

TASK STATEMENT	Extent Performed						
	NOT INTRODUCED	INTRODUCED, NOT PERFORMED	PERFORMED WITH GUIDANCE & FEEDBACK	PERFORMED INDE-PENDENTLY	DON'T KNOW OR DON'T REMEMBER	PERCENT PERFORMED	TOTAL N
86. Establish procedures for building commissioning.	71.8%	15.9%	6.2%	4.5%	1.6%	10.7%	308
87. Select design team consultants.	56.5%	28.2%	10.1%	4.5%	0.6%	14.6%	308
88. Conduct periodic progress meetings with design and project team.	46.8%	20.5%	20.5%	11.4%	1.0%	31.8%	308
89. Participate in pre-construction, pre-installation and regular progress meetings with design team.	54.5%	18.5%	16.2%	9.1%	1.6%	25.3%	308
90. Develop strategies to control risk and manage liability.	62.0%	24.4%	7.1%	4.2%	2.3%	11.4%	308
91. Determine billing rates.	69.2%	17.9%	9.1%	2.3%	1.6%	11.4%	308
92. Develop business plan for firm.	62.0%	20.1%	12.3%	4.2%	1.3%	16.6%	308
93. Develop and maintain effective and productive relationships with clients.	48.4%	22.4%	14.6%	12.0%	2.6%	26.6%	308
94. Develop procedures for responding to changes in project scope.	54.9%	21.1%	15.6%	6.5%	1.9%	22.1%	308
95. Develop procedures for responding to contractor requests (Requests for Information).	56.5%	19.8%	12.3%	9.4%	1.9%	21.8%	308
96. Develop strategies for responding to Owner requests (Requests for Proposal, Requests for Qualifications).	55.8%	19.5%	12.7%	9.1%	2.9%	21.8%	308
97. Understand firm's legal structure to comply with jurisdictional rules and regulations.	49.0%	29.9%	13.6%	5.5%	1.9%	19.2%	308
98. Understand implications of evolving sustainable design strategies and technologies.	30.5%	26.9%	29.5%	11.7%	1.3%	41.2%	308
99. Understand implications of project delivery technologies.	43.2%	25.0%	20.8%	8.1%	2.9%	28.9%	308
100. Understand implications of project delivery methods.	37.3%	30.8%	20.8%	7.5%	3.6%	28.2%	308
101. Prepare marketing documents that accurately communicate firm's experience and capabilities.	50.0%	17.5%	20.8%	9.7%	1.9%	30.5%	308
102. Adhere to ethical standards and codes of professional conduct.	15.6%	35.7%	33.1%	13.6%	1.9%	46.8%	308
103. Comply with laws and regulations governing the practice of architecture.	16.6%	37.3%	35.4%	9.7%	1.0%	45.1%	308
104. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.	29.9%	30.5%	30.2%	7.8%	1.6%	38.0%	308
MEAN	40.9%	21.5%	25.8%	10.2%	1.5%	36.0%	308.0
MIN	1.6%	2.6%	5.5%	2.3%	0.3%	7.8%	308
MAX	71.8%	38.3%	70.1%	30.5%	3.9%	94.5%	308

Total N = number of respondents

Data Table B6. List of all EDU Knowledge/Skill (K/S) Statements

K/S #	KNOWLEDGE/SKILL STATEMENT
1	Knowledge of oral, written, and visual presentation techniques to communicate project information.
2	Knowledge of master plans and their impact on building design.
3	Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.
4	Knowledge of factors that affect selection of project consultants.
5	Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.
6	Knowledge of client and project characteristics that influence contract agreements.
7	Knowledge of types of contracts and their designated uses.
8	Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.
9	Knowledge of effects of specific findings from feasibility studies on building design.
10	Knowledge of factors involved in selection of building systems and components.
11	Knowledge of effect of environmental factors on site development.
12	Knowledge of environmental policies and regulations and their implications for proposed construction.
13	Knowledge of processes involved in conducting a survey of existing conditions.
14	Knowledge of effects of specific findings from environmental impact studies on building design.
15	Skill in designing facility layout and site plan that meets site constraints.
16	Knowledge of methods required to mitigate adverse site conditions.
17	Knowledge of elements and processes for conducting a site analysis.
18	Knowledge of codes of professional conduct as related to architectural practice.
19	Knowledge of protocols and procedures for conducting a building code analysis.
20	Knowledge of building codes and their impact on building design.
21	Knowledge of land use codes and ordinances that govern land use decisions.
22	Skill in producing hand drawings of design ideas.
23	Knowledge of standards for graphic symbols and units of measurement in technical drawings.
24	Skill in producing two-dimensional (2-D) drawings using hand methods.
25	Skill in using software to produce two-dimensional (2-D) drawings.
26	Skill in using software to produce three-dimensional (3-D) models of building design.
27	Skill in producing physical scale models.
28	Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.
29	Knowledge of protocols and procedures for obtaining community input for proposed design.
30	Knowledge of computer aided design and drafting software for producing two-dimensional (2-D) drawings.
31	Knowledge of factors involved in selecting project appropriate computer based design technologies.
32	Knowledge of engineering properties of soils and their effect on building foundations and building design.
33	Knowledge of factors to be considered in adaptive reuse of existing buildings and materials.
34	Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.
35	Knowledge of effect of thermal envelope in design of building systems.
36	Knowledge of principles of integrated project design.
37	Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.
38	Knowledge of engineering design principles and their application to design and construction.
39	Knowledge of structural properties of construction products, materials and assemblies and their impact on building design and construction.
40	Knowledge of means and methods for building construction.
41	Knowledge of benefits and limitations of "fast track" or other forms of construction delivery methods.
42	Knowledge of methods and techniques for estimating construction costs.
43	Knowledge of structural load and load conditions that affect building design.
44	Knowledge of energy codes that impact construction.
45	Knowledge of methods and strategies for evidence based design (EBD).
46	Knowledge of impact of design on human behavior.

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Data Table B6. List of all EDU Knowledge/Skill (K/S) Statements

K/S #	KNOWLEDGE/SKILL STATEMENT
47	Knowledge of functional requirements of all building systems.
48	Knowledge of hazardous materials mitigation at building site.
49	Knowledge of principles of building operation and function.
50	Knowledge of content and format of specifications.
51	Knowledge of principles of interior design and their influences on building design.
52	Knowledge of principles of landscape design and their influences on building design.
53	Knowledge of site design principles and practices.
54	Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.
55	Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.
56	Knowledge of relationship between constructability and aesthetics.
57	Knowledge of standards and specifications for building materials and methods of construction, e.g., ASTM, ANSI.
58	Knowledge of methods to perform life cycle cost analysis.
59	Knowledge of principles of value analysis and value engineering processes.
60	Knowledge of procedures and protocols of permit approval process.
61	Knowledge of principles of historic preservation.
62	Knowledge of processes and procedures for building commissioning.
63	Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).
64	Knowledge of methods and tools for space planning.
65	Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.
66	Knowledge of factors that impact construction management services.
67	Knowledge of fee structures, their attributes and implications for schedule, scope and profit.
68	Knowledge of consultant agreements and fee structures.
69	Knowledge of different building and construction types and their implications on design and construction schedules.
70	Knowledge of scheduling methods to establish project time frames based on standard sequences of architectural operations in each phase.
71	Knowledge of business development strategies.
72	Knowledge of relationship between project scope and consultant capabilities to assemble project team.
73	Knowledge of purposes and types of professional liability insurance related to architectural practice.
74	Knowledge of format and protocols for efficient meeting management and information distribution.
75	Knowledge of strategies to assess project progress and verify its alignment with project schedule.
76	Knowledge of ways to translate project goals into specific tasks and measurable design criteria.
77	Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.
78	Knowledge of formats and protocols to produce and distribute field reports to document construction progress.
79	Knowledge of site requirements for specific building types to determine client's site needs.
80	Knowledge of site analysis techniques to determine project parameters affecting design.
81	Knowledge of methods to prioritize or objectively evaluate design options based on project goals.
82	Knowledge of sustainability strategies and/or rating systems.
83	Knowledge of sustainability considerations related to building materials and construction processes.
84	Knowledge of techniques to integrate renewable energy systems into building design.
85	Knowledge of methods to identify scope changes that may require additional services.
86	Knowledge of procedures for processing requests for additional services.
87	Knowledge of appropriate documentation level required for construction documents.
88	Knowledge of close-out document requirements and protocols.
89	Knowledge of construction document technologies and their standards and applications.
90	Knowledge of building information modeling (BIM) and its impact on planning, financial management and construction documentation.
91	Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.
92	Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.

CONTINUED

Data Table B6. List of all EDU Knowledge/Skill (K/S) Statements

K/S #	KNOWLEDGE/SKILL STATEMENT
93	Knowledge of techniques to integrate model contract forms and documents.
94	Knowledge of methods for production of construction documentation and drawings.
95	Knowledge of standard methods for production of design development documentation.
96	Knowledge of standard methods for production of site plan documentation.
97	Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.
98	Knowledge of materials testing processes and protocols to be performed during the construction process.
99	Knowledge of building systems testing processes and protocols to be performed during the construction process.
100	Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.
101	Knowledge of protocols for responding to Requests for Information (RFI).
102	Knowledge of roles, responsibilities and authorities of project team members during construction.
103	Knowledge of conflict resolution techniques and their applications throughout project.
104	Knowledge of bidding processes and protocols for different project delivery methods and their applications.
105	Knowledge of requirements for post-occupancy evaluation.
106	Knowledge of project risks for new and innovative products, materials, methods and technologies.
107	Knowledge of design decisions and their impact on constructability.

K/S #	KNOWLEDGE/SKILL STATEMENT
108	Knowledge of interpersonal skills necessary to elicit client needs and desired scope of services.
109	Knowledge of requirements of Intern Development Program (IDP).
110	Knowledge of techniques for staff development in architectural firms.
111	Knowledge of methods to manage human resources.
112	Knowledge of state board guidelines for licensing and professional practice.
113	Knowledge of strategies to create positive work environment that builds trust and encourages cooperation and teamwork.
114	Knowledge of principles of universal design.
115	Knowledge of purposes of and legal implications for different types of business entities.
116	Knowledge of innovative and evolving technologies and their impact on architectural practice.
117	Knowledge of training programs for professional development.
118	Knowledge of ethical standards relevant to architectural practice.
119	Knowledge of methods to facilitate information management in building design and construction.
120	Knowledge of factors involved in conducting an architectural practice in international markets.
121	Knowledge of components of standard business plan, e.g., revenue projection, staffing plan, overhead, profit plan.
122	Knowledge of methods and procedures for risk management.

Data Table B7. Percentage Distribution of Ratings for When Survey Respondent First Acquired Knowledge

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	When First Acquired				
	NOT ACQUIRED	BY COMPLETION OF ACCREDITED ARCHITECTURE DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	TOTAL N
1. Knowledge of oral, written, and visual presentation techniques to communicate project information.	0.7%	68.4%	28.4%	2.4%	450
2. Knowledge of master plans and their impact on building design.	4.0%	37.1%	51.3%	7.6%	450
3. Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.	5.6%	2.4%	63.8%	28.2%	450
4. Knowledge of factors that affect selection of project consultants.	11.6%	1.1%	63.1%	24.2%	450
5. Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.	4.9%	7.6%	66.2%	21.3%	450
6. Knowledge of client and project characteristics that influence contract agreements.	11.3%	2.7%	51.8%	34.2%	450
7. Knowledge of types of contracts and their designated uses.	9.1%	13.8%	53.6%	23.6%	450
8. Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.	6.0%	19.1%	59.3%	15.6%	450
9. Knowledge of effects of specific findings from feasibility studies on building design.	14.0%	9.8%	60.4%	15.8%	450
10. Knowledge of factors involved in selection of building systems and components.	1.8%	23.3%	65.8%	9.1%	450
11. Knowledge of effect of environmental factors on site development.	1.8%	45.1%	43.3%	9.8%	450
12. Knowledge of environmental policies and regulations and their implications for proposed construction.	8.0%	9.8%	62.7%	19.6%	450
13. Knowledge of processes involved in conducting a survey of existing conditions.	2.7%	18.4%	72.9%	6.0%	450
14. Knowledge of effects of specific findings from environmental impact studies on building design.	17.6%	11.6%	54.2%	16.7%	450
15. Skill in designing facility layout and site plan that meets site constraints.	0.9%	47.3%	48.4%	3.3%	450
16. Knowledge of methods required to mitigate adverse site conditions.	9.8%	18.4%	58.4%	13.3%	450
17. Knowledge of elements and processes for conducting a site analysis.	5.1%	48.4%	41.8%	4.7%	450
18. Knowledge of codes of professional conduct as related to architectural practice.	1.8%	27.6%	62.0%	8.7%	450
19. Knowledge of protocols and procedures for conducting a building code analysis.	2.0%	7.3%	82.2%	8.4%	450
20. Knowledge of building codes and their impact on building design.	0.2%	13.8%	82.0%	4.0%	450
21. Knowledge of land use codes and ordinances that govern land use decisions.	7.1%	12.9%	68.9%	11.1%	450
22. Skill in producing hand drawings of design ideas.	0.9%	88.2%	10.7%	0.2%	450
23. Knowledge of standards for graphic symbols and units of measurement in technical drawings.	0.0%	56.7%	43.3%	0.0%	450
24. Skill in producing two-dimensional (2-D) drawings using hand methods.	1.3%	88.7%	9.6%	0.4%	450
25. Skill in using software to produce two-dimensional (2-D) drawings.	1.3%	54.0%	42.2%	2.4%	450
26. Skill in using software to produce three-dimensional (3-D) models of building design.	10.7%	45.6%	32.0%	11.8%	450
27. Skill in producing physical scale models.	1.3%	93.6%	4.9%	0.2%	450
28. Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	34.0%	4.9%	37.1%	24.0%	450
29. Knowledge of protocols and procedures for obtaining community input for proposed design.	16.9%	15.3%	53.3%	14.4%	450
30. Knowledge of computer aided design and drafting software for producing two-dimensional (2-D) drawings.	1.3%	57.3%	39.1%	2.2%	450
31. Knowledge of factors involved in selecting project appropriate computer based design technologies.	8.9%	22.0%	57.1%	12.0%	450

Total N = number of respondents

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Data Table B7. Percentage Distribution of Ratings for When Survey Respondent First Acquired Knowledge

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	When First Acquired				
	NOT ACQUIRED	BY COMPLETION OF ACCREDITED ARCHITECTURE DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	TOTAL N
32. Knowledge of engineering properties of soils and their effect on building foundations and building design.	9.3%	21.1%	60.2%	9.3%	450
33. Knowledge of factors to be considered in adaptive reuse of existing buildings and materials.	8.0%	18.2%	62.2%	11.6%	450
34. Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.	1.1%	27.6%	61.6%	9.8%	450
35. Knowledge of effect of thermal envelope in design of building systems.	2.0%	40.9%	48.4%	8.7%	450
36. Knowledge of principles of integrated project design.	15.3%	14.2%	47.3%	23.1%	450
37. Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.	11.6%	10.4%	54.4%	23.6%	450
38. Knowledge of engineering design principles and their application to design and construction.	2.2%	38.9%	54.9%	4.0%	450
39. Knowledge of structural properties of construction products, materials and assemblies and their impact on building design and construction.	1.3%	45.6%	48.4%	4.7%	450
40. Knowledge of means and methods for building construction.	1.3%	32.2%	64.7%	1.8%	450
41. Knowledge of benefits and limitations of “fast track” or other forms of construction delivery methods.	7.6%	16.9%	61.3%	14.2%	450
42. Knowledge of methods and techniques for estimating construction costs.	13.1%	10.7%	64.7%	11.6%	450
43. Knowledge of structural load and load conditions that affect building design.	2.2%	59.1%	35.1%	3.6%	450
44. Knowledge of energy codes that impact construction.	6.9%	6.4%	68.7%	18.0%	450
45. Knowledge of methods and strategies for evidence based design (EBD).	62.2%	6.4%	18.0%	13.3%	450
46. Knowledge of impact of design on human behavior.	6.7%	68.7%	20.7%	4.0%	450
47. Knowledge of functional requirements of all building systems.	2.0%	36.7%	54.4%	6.9%	450
48. Knowledge of hazardous materials mitigation at building site.	17.8%	8.0%	61.8%	12.4%	450
49. Knowledge of principles of building operation and function.	5.3%	30.7%	56.0%	8.0%	450
50. Knowledge of content and format of specifications.	1.8%	9.8%	80.4%	8.0%	450
51. Knowledge of principles of interior design and their influences on building design.	5.8%	36.4%	55.1%	2.7%	450
52. Knowledge of principles of landscape design and their influences on building design.	6.9%	46.4%	42.9%	3.8%	450
53. Knowledge of site design principles and practices.	2.0%	54.9%	40.9%	2.2%	450
54. Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.	3.1%	44.0%	47.1%	5.8%	450
55. Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.	7.3%	6.2%	71.1%	15.3%	450
56. Knowledge of relationship between constructability and aesthetics.	1.1%	30.7%	61.8%	6.4%	450
57. Knowledge of standards and specifications for building materials and methods of construction, e.g., ASTM, ANSI.	2.0%	11.8%	75.8%	10.4%	450
58. Knowledge of methods to perform life cycle cost analysis.	30.4%	14.2%	40.4%	14.9%	450
59. Knowledge of principles of value analysis and value engineering processes.	6.4%	5.8%	76.4%	11.3%	450
60. Knowledge of procedures and protocols of permit approval process.	4.0%	3.3%	86.0%	6.7%	450
61. Knowledge of principles of historic preservation.	19.1%	33.6%	39.1%	8.2%	450

Total N = number of respondents

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Data Table B7. Percentage Distribution of Ratings for When Survey Respondent First Acquired Knowledge

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	When First Acquired				
	NOT ACQUIRED	BY COMPLETION OF ACCREDITED ARCHITECTURE DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	TOTAL N
62. Knowledge of processes and procedures for building commissioning.	25.8%	3.1%	48.7%	22.4%	450
63. Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).	9.3%	8.7%	70.9%	11.1%	450
64. Knowledge of methods and tools for space planning.	2.7%	53.3%	41.6%	2.4%	450
65. Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.	7.6%	14.7%	64.7%	13.1%	450
66. Knowledge of factors that impact construction management services.	13.3%	7.3%	63.8%	15.6%	450
67. Knowledge of fee structures, their attributes and implications for schedule, scope and profit.	11.6%	6.7%	54.2%	27.6%	450
68. Knowledge of consultant agreements and fee structures.	8.9%	4.0%	61.3%	25.8%	450
69. Knowledge of different building and construction types and their implications on design and construction schedules.	3.1%	20.0%	68.2%	8.7%	450
70. Knowledge of scheduling methods to establish project time frames based on standard sequences of architectural operations in each phase.	10.9%	6.7%	67.8%	14.7%	450
71. Knowledge of business development strategies.	24.4%	6.7%	37.6%	31.3%	450
72. Knowledge of relationship between project scope and consultant capabilities to assemble project team.	9.6%	2.9%	63.3%	24.2%	450
73. Knowledge of purposes and types of professional liability insurance related to architectural practice.	20.4%	11.8%	40.0%	27.8%	450
74. Knowledge of format and protocols for efficient meeting management and information distribution.	7.1%	4.9%	74.0%	14.0%	450
75. Knowledge of strategies to assess project progress and verify its alignment with project schedule.	7.8%	3.3%	67.6%	21.3%	450
76. Knowledge of ways to translate project goals into specific tasks and measurable design criteria.	7.6%	10.7%	65.1%	16.7%	450
77. Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.	6.9%	8.2%	66.0%	18.9%	450
78. Knowledge of formats and protocols to produce and distribute field reports to document construction progress.	6.7%	3.1%	81.1%	9.1%	450
79. Knowledge of site requirements for specific building types to determine client's site needs.	9.3%	19.6%	62.2%	8.9%	450
80. Knowledge of site analysis techniques to determine project parameters affecting design.	5.3%	41.3%	47.6%	5.8%	450
81. Knowledge of methods to prioritize or objectively evaluate design options based on project goals.	3.3%	29.1%	60.0%	7.6%	450
82. Knowledge of sustainability strategies and/or rating systems.	6.0%	22.9%	50.0%	21.1%	450
83. Knowledge of sustainability considerations related to building materials and construction processes.	4.2%	22.4%	52.7%	20.7%	450
84. Knowledge of techniques to integrate renewable energy systems into building design.	8.0%	25.1%	45.8%	21.1%	450
85. Knowledge of methods to identify scope changes that may require additional services.	3.1%	2.4%	74.2%	20.2%	450
86. Knowledge of procedures for processing requests for additional services.	9.6%	1.6%	66.9%	22.0%	450
87. Knowledge of appropriate documentation level required for construction documents.	0.9%	5.1%	90.0%	4.0%	450
88. Knowledge of close-out document requirements and protocols.	9.3%	1.8%	76.2%	12.7%	450
89. Knowledge of construction document technologies and their standards and applications.	3.3%	12.4%	80.2%	4.0%	450
90. Knowledge of building information modeling (BIM) and its impact on planning, financial management and construction documentation.	28.9%	2.0%	40.0%	29.1%	450

Total N = number of respondents

CONTINUED

Data Table B7. Percentage Distribution of Ratings for When Survey Respondent First Acquired Knowledge

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	When First Acquired				
	NOT ACQUIRED	BY COMPLETION OF ACCREDITED ARCHITECTURE DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	TOTAL N
91. Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.	0.9%	50.0%	45.8%	3.3%	450
92. Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.	5.8%	26.0%	59.6%	8.7%	450
93. Knowledge of techniques to integrate model contract forms and documents.	20.0%	12.0%	50.7%	17.3%	450
94. Knowledge of methods for production of construction documentation and drawings.	0.9%	19.6%	78.9%	0.7%	450
95. Knowledge of standard methods for production of design development documentation.	1.6%	18.4%	78.4%	1.6%	450
96. Knowledge of standard methods for production of site plan documentation.	4.0%	25.3%	68.2%	2.4%	450
97. Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.	6.7%	3.1%	76.2%	14.0%	450
98. Knowledge of materials testing processes and protocols to be performed during the construction process.	8.0%	8.0%	71.8%	12.2%	450
99. Knowledge of building systems testing processes and protocols to be performed during the construction process.	10.7%	5.8%	70.2%	13.3%	450
100. Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	0.7%	3.3%	92.2%	3.8%	450
101. Knowledge of protocols for responding to Requests for Information (RFI).	2.2%	2.7%	89.6%	5.6%	450
102. Knowledge of roles, responsibilities and authorities of project team members during construction.	0.7%	7.6%	88.7%	3.1%	450
103. Knowledge of conflict resolution techniques and their applications throughout project.	10.7%	11.1%	64.7%	13.6%	450
104. Knowledge of bidding processes and protocols for different project delivery methods and their applications.	4.7%	10.0%	76.0%	9.3%	450
105. Knowledge of requirements for post-occupancy evaluation.	21.3%	10.0%	53.8%	14.9%	450
106. Knowledge of project risks for new and innovative products, materials, methods and technologies.	12.7%	9.6%	60.9%	16.9%	450
107. Knowledge of design decisions and their impact on constructability.	0.9%	21.1%	73.1%	4.9%	450
108. Knowledge of interpersonal skills necessary to elicit client needs and desired scope of services.	4.0%	13.1%	69.3%	13.6%	450
109. Knowledge of requirements of Intern Development Program (IDP).	3.1%	35.8%	58.4%	2.7%	450
110. Knowledge of techniques for staff development in architectural firms.	18.4%	3.3%	60.2%	18.0%	450
111. Knowledge of methods to manage human resources.	32.2%	3.3%	44.0%	20.4%	450
112. Knowledge of state board guidelines for licensing and professional practice.	1.6%	13.6%	78.0%	6.9%	450
113. Knowledge of strategies to create positive work environment that builds trust and encourages cooperation and teamwork.	8.4%	15.1%	61.1%	15.3%	450
114. Knowledge of principles of universal design.	10.7%	32.2%	49.8%	7.3%	450
115. Knowledge of purposes of and legal implications for different types of business entities.	18.4%	20.9%	35.3%	25.3%	450
116. Knowledge of innovative and evolving technologies and their impact on architectural practice.	4.2%	25.1%	52.0%	18.7%	450
117. Knowledge of training programs for professional development.	6.7%	10.0%	63.3%	20.0%	450
118. Knowledge of ethical standards relevant to architectural practice.	2.7%	39.1%	51.1%	7.1%	450
119. Knowledge of methods to facilitate information management in building design and construction.	9.8%	6.2%	71.6%	12.4%	450

Total N = number of respondents

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EDU D

Data Table B7. Percentage Distribution of Ratings for When Survey Respondent First Acquired Knowledge

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	When First Acquired				
	NOT ACQUIRED	BY COMPLETION OF ACCREDITED ARCHITECTURE DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	TOTAL N
120. Knowledge of factors involved in conducting an architectural practice in international markets.	66.2%	4.0%	18.9%	10.9%	450
121. Knowledge of components of standard business plan, e.g., revenue projection, staffing plan, overhead, profit plan.	33.1%	10.0%	28.7%	28.2%	450
122. Knowledge of methods and procedures for risk management.	24.4%	6.0%	43.1%	26.4%	450
MEAN	9.0%	21.4%	57.3%	12.3%	450.0
MIN	0.0%	1.1%	4.9%	0.0%	450
MAX	66.2%	93.6%	92.2%	34.2%	450

Total N = number of respondents

EDU D

Data Table B8. Percentage Distribution of Ratings for How Survey Respondents Typically Use Knowledge

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	How Typically Used				
	UNDERSTAND	APPLY	EVALUATE	DO NOT USE KNOWLEDGE OR SKILL	TOTAL N
1. Knowledge of oral, written, and visual presentation techniques to communicate project information.	16.2%	55.3%	27.1%	1.3%	450
2. Knowledge of master plans and their impact on building design.	26.0%	35.8%	29.6%	8.7%	450
3. Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.	25.3%	50.4%	15.1%	9.1%	450
4. Knowledge of factors that affect selection of project consultants.	22.2%	42.4%	19.3%	16.0%	450
5. Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.	10.2%	61.3%	20.9%	7.6%	450
6. Knowledge of client and project characteristics that influence contract agreements.	28.9%	32.7%	20.7%	17.8%	450
7. Knowledge of types of contracts and their designated uses.	34.9%	35.1%	12.0%	18.0%	450
8. Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.	34.2%	42.9%	8.0%	14.9%	450
9. Knowledge of effects of specific findings from feasibility studies on building design.	22.7%	29.6%	29.6%	18.2%	450
10. Knowledge of factors involved in selection of building systems and components.	16.4%	47.8%	32.7%	3.1%	450
11. Knowledge of effect of environmental factors on site development.	23.6%	40.4%	31.3%	4.7%	450
12. Knowledge of environmental policies and regulations and their implications for proposed construction.	26.7%	35.6%	26.4%	11.3%	450
13. Knowledge of processes involved in conducting a survey of existing conditions.	19.3%	49.1%	27.8%	3.8%	450
14. Knowledge of effects of specific findings from environmental impact studies on building design.	25.6%	30.2%	22.4%	21.8%	450
15. Skill in designing facility layout and site plan that meets site constraints.	9.1%	55.3%	32.4%	3.1%	450
16. Knowledge of methods required to mitigate adverse site conditions.	16.4%	42.0%	28.7%	12.9%	450
17. Knowledge of elements and processes for conducting a site analysis.	27.8%	37.8%	27.1%	7.3%	450
18. Knowledge of codes of professional conduct as related to architectural practice.	32.7%	48.9%	15.8%	2.7%	450
19. Knowledge of protocols and procedures for conducting a building code analysis.	14.2%	54.2%	28.4%	3.1%	450
20. Knowledge of building codes and their impact on building design.	11.3%	54.4%	32.7%	1.6%	450
21. Knowledge of land use codes and ordinances that govern land use decisions.	23.1%	42.4%	21.6%	12.9%	450
22. Skill in producing hand drawings of design ideas.	16.0%	48.7%	28.7%	6.7%	450
23. Knowledge of standards for graphic symbols and units of measurement in technical drawings.	16.2%	66.2%	17.3%	0.2%	450
24. Skill in producing two-dimensional (2-D) drawings using hand methods.	14.4%	53.1%	19.1%	13.3%	450
25. Skill in using software to produce two-dimensional (2-D) drawings.	6.7%	63.8%	26.9%	2.7%	450
26. Skill in using software to produce three-dimensional (3-D) models of building design.	12.0%	42.4%	28.0%	17.6%	450
27. Skill in producing physical scale models.	15.3%	30.2%	20.7%	33.8%	450
28. Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	11.1%	30.2%	17.6%	41.1%	450
29. Knowledge of protocols and procedures for obtaining community input for proposed design.	28.2%	27.1%	20.0%	24.7%	450
30. Knowledge of computer aided design and drafting software for producing two-dimensional (2-D) drawings.	6.4%	66.4%	24.7%	2.4%	450
31. Knowledge of factors involved in selecting project appropriate computer based design technologies.	20.2%	39.1%	30.7%	10.0%	450
32. Knowledge of engineering properties of soils and their effect on building foundations and building design.	37.8%	29.6%	16.7%	16.0%	450
33. Knowledge of factors to be considered in adaptive reuse of existing buildings and materials.	22.7%	38.9%	27.6%	10.9%	450
34. Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.	16.9%	53.8%	26.7%	2.7%	450

Total N = number of respondents

CONTINUED

Data Table B8. Percentage Distribution of Ratings for How Survey Respondents Typically Use Knowledge

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	How Typically Used				
	UNDERSTAND	APPLY	EVALUATE	DO NOT USE KNOWLEDGE OR SKILL	TOTAL N
35. Knowledge of effect of thermal envelope in design of building systems.	19.3%	49.8%	27.3%	3.6%	450
36. Knowledge of principles of integrated project design.	25.3%	31.1%	21.1%	22.4%	450
37. Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.	25.8%	36.9%	22.9%	14.4%	450
38. Knowledge of engineering design principles and their application to design and construction.	28.9%	42.4%	23.8%	4.9%	450
39. Knowledge of structural properties of construction products, materials and assemblies and their impact on building design and construction.	23.6%	45.8%	26.0%	4.7%	450
40. Knowledge of means and methods for building construction.	22.4%	49.1%	25.8%	2.7%	450
41. Knowledge of benefits and limitations of “fast track” or other forms of construction delivery methods.	34.4%	31.6%	19.6%	14.4%	450
42. Knowledge of methods and techniques for estimating construction costs.	30.4%	32.7%	16.0%	20.9%	450
43. Knowledge of structural load and load conditions that affect building design.	36.0%	35.1%	18.2%	10.7%	450
44. Knowledge of energy codes that impact construction.	28.4%	42.2%	20.0%	9.3%	450
45. Knowledge of methods and strategies for evidence based design (EBD).	15.1%	9.8%	8.0%	67.1%	450
46. Knowledge of impact of design on human behavior.	30.0%	31.8%	27.3%	10.9%	450
47. Knowledge of functional requirements of all building systems.	28.2%	45.3%	23.1%	3.3%	450
48. Knowledge of hazardous materials mitigation at building site.	34.7%	30.0%	12.0%	23.3%	450
49. Knowledge of principles of building operation and function.	33.6%	38.4%	20.9%	7.1%	450
50. Knowledge of content and format of specifications.	21.1%	60.2%	15.1%	3.6%	450
51. Knowledge of principles of interior design and their influences on building design.	23.1%	50.7%	19.8%	6.4%	450
52. Knowledge of principles of landscape design and their influences on building design.	30.9%	38.7%	19.3%	11.1%	450
53. Knowledge of site design principles and practices.	22.4%	46.7%	26.9%	4.0%	450
54. Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.	19.3%	44.0%	31.3%	5.3%	450
55. Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.	28.2%	44.9%	17.1%	9.8%	450
56. Knowledge of relationship between constructability and aesthetics.	12.7%	49.6%	36.4%	1.3%	450
57. Knowledge of standards and specifications for building materials and methods of construction, e.g., ASTM, ANSI.	35.1%	46.9%	14.2%	3.8%	450
58. Knowledge of methods to perform life cycle cost analysis.	33.8%	16.4%	13.8%	36.0%	450
59. Knowledge of principles of value analysis and value engineering processes.	22.0%	42.4%	27.1%	8.4%	450
60. Knowledge of procedures and protocols of permit approval process.	17.3%	59.3%	16.4%	6.9%	450
61. Knowledge of principles of historic preservation.	29.1%	29.3%	12.9%	28.7%	450
62. Knowledge of processes and procedures for building commissioning.	34.7%	21.1%	10.0%	34.2%	450
63. Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).	25.3%	46.4%	14.2%	14.0%	450
64. Knowledge of methods and tools for space planning.	16.9%	52.4%	26.4%	4.2%	450
65. Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.	32.2%	36.9%	20.9%	10.0%	450
66. Knowledge of factors that impact construction management services.	38.0%	28.7%	18.0%	15.3%	450
67. Knowledge of fee structures, their attributes and implications for schedule, scope and profit.	31.6%	34.0%	17.3%	17.1%	450

Total N = number of respondents

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Data Table B8. Percentage Distribution of Ratings for How Survey Respondents Typically Use Knowledge

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	How Typically Used				
	UNDERSTAND	APPLY	EVALUATE	DO NOT USE KNOWLEDGE OR SKILL	TOTAL N
68. Knowledge of consultant agreements and fee structures.	36.0%	35.8%	12.9%	15.3%	450
69. Knowledge of different building and construction types and their implications on design and construction schedules.	27.3%	44.9%	23.3%	4.4%	450
70. Knowledge of scheduling methods to establish project time frames based on standard sequences of architectural operations in each phase.	29.3%	41.3%	14.2%	15.1%	450
71. Knowledge of business development strategies.	24.0%	29.6%	16.2%	30.2%	450
72. Knowledge of relationship between project scope and consultant capabilities to assemble project team.	31.3%	35.8%	18.9%	14.0%	450
73. Knowledge of purposes and types of professional liability insurance related to architectural practice.	44.9%	14.4%	10.7%	30.0%	450
74. Knowledge of format and protocols for efficient meeting management and information distribution.	20.9%	58.2%	13.6%	7.3%	450
75. Knowledge of strategies to assess project progress and verify its alignment with project schedule.	28.4%	43.6%	18.9%	9.1%	450
76. Knowledge of ways to translate project goals into specific tasks and measurable design criteria.	20.0%	48.7%	23.3%	8.0%	450
77. Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.	21.3%	54.0%	16.4%	8.2%	450
78. Knowledge of formats and protocols to produce and distribute field reports to document construction progress.	20.4%	56.2%	14.0%	9.3%	450
79. Knowledge of site requirements for specific building types to determine client's site needs.	30.0%	37.3%	22.0%	10.7%	450
80. Knowledge of site analysis techniques to determine project parameters affecting design.	24.7%	41.8%	26.2%	7.3%	450
81. Knowledge of methods to prioritize or objectively evaluate design options based on project goals.	18.0%	45.8%	32.0%	4.2%	450
82. Knowledge of sustainability strategies and/or rating systems.	24.2%	38.7%	25.3%	11.8%	450
83. Knowledge of sustainability considerations related to building materials and construction processes.	22.7%	42.9%	26.0%	8.4%	450
84. Knowledge of techniques to integrate renewable energy systems into building design.	29.1%	32.4%	22.2%	16.2%	450
85. Knowledge of methods to identify scope changes that may require additional services.	23.1%	53.3%	19.1%	4.4%	450
86. Knowledge of procedures for processing requests for additional services.	26.9%	47.8%	13.3%	12.0%	450
87. Knowledge of appropriate documentation level required for construction documents.	9.1%	63.6%	25.8%	1.6%	450
88. Knowledge of close-out document requirements and protocols.	23.1%	54.9%	10.7%	11.3%	450
89. Knowledge of construction document technologies and their standards and applications.	16.7%	58.9%	20.4%	4.0%	450
90. Knowledge of building information modeling (BIM) and its impact on planning, financial management and construction documentation.	19.8%	25.1%	16.0%	39.1%	450
91. Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.	10.2%	61.6%	26.7%	1.6%	450
92. Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.	39.3%	39.3%	8.7%	12.7%	450
93. Knowledge of techniques to integrate model contract forms and documents.	35.6%	29.3%	8.9%	26.2%	450
94. Knowledge of methods for production of construction documentation and drawings.	8.2%	66.0%	24.7%	1.1%	450
95. Knowledge of standard methods for production of design development documentation.	8.9%	69.3%	19.6%	2.2%	450
96. Knowledge of standard methods for production of site plan documentation.	17.1%	61.6%	14.0%	7.3%	450
97. Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.	26.4%	42.9%	22.0%	8.7%	450
98. Knowledge of materials testing processes and protocols to be performed during the construction process.	34.4%	38.4%	14.0%	13.1%	450

Total N = number of respondents

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Data Table B8. Percentage Distribution of Ratings for How Survey Respondents Typically Use Knowledge

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	How Typically Used				
	UNDERSTAND	APPLY	EVALUATE	DO NOT USE KNOWLEDGE OR SKILL	TOTAL N
99. Knowledge of building systems testing processes and protocols to be performed during the construction process.	40.4%	29.3%	14.0%	16.2%	450
100. Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	10.7%	65.6%	22.0%	1.8%	450
101. Knowledge of protocols for responding to Requests for Information (RFI).	12.9%	64.0%	19.3%	3.8%	450
102. Knowledge of roles, responsibilities and authorities of project team members during construction.	24.9%	54.4%	19.1%	1.6%	450
103. Knowledge of conflict resolution techniques and their applications throughout project.	28.9%	40.4%	18.7%	12.0%	450
104. Knowledge of bidding processes and protocols for different project delivery methods and their applications.	31.8%	46.4%	14.4%	7.3%	450
105. Knowledge of requirements for post-occupancy evaluation.	34.0%	25.3%	10.0%	30.7%	450
106. Knowledge of project risks for new and innovative products, materials, methods and technologies.	35.8%	26.4%	22.9%	14.9%	450
107. Knowledge of design decisions and their impact on constructability.	16.2%	47.1%	35.6%	1.1%	450
108. Knowledge of interpersonal skills necessary to elicit client needs and desired scope of services.	20.9%	52.7%	20.7%	5.8%	450
109. Knowledge of requirements of Intern Development Program (IDP).	33.8%	45.1%	14.0%	7.1%	450
110. Knowledge of techniques for staff development in architectural firms.	31.3%	32.0%	14.2%	22.4%	450
111. Knowledge of methods to manage human resources.	30.9%	21.6%	12.2%	35.3%	450
112. Knowledge of state board guidelines for licensing and professional practice.	44.2%	45.6%	8.0%	2.2%	450
113. Knowledge of strategies to create positive work environment that builds trust and encourages cooperation and teamwork.	27.6%	46.0%	18.4%	8.0%	450
114. Knowledge of principles of universal design.	26.7%	42.9%	19.6%	10.9%	450
115. Knowledge of purposes of and legal implications for different types of business entities.	48.7%	19.1%	8.4%	23.8%	450
116. Knowledge of innovative and evolving technologies and their impact on architectural practice.	39.8%	30.0%	23.8%	6.4%	450
117. Knowledge of training programs for professional development.	39.1%	42.4%	10.4%	8.0%	450
118. Knowledge of ethical standards relevant to architectural practice.	40.0%	47.3%	9.8%	2.9%	450
119. Knowledge of methods to facilitate information management in building design and construction.	29.1%	45.6%	14.9%	10.4%	450
120. Knowledge of factors involved in conducting an architectural practice in international markets.	14.0%	9.1%	6.0%	70.9%	450
121. Knowledge of components of standard business plan, e.g., revenue projection, staffing plan, overhead, profit plan.	28.0%	19.8%	12.9%	39.3%	450
122. Knowledge of methods and procedures for risk management.	39.3%	22.0%	12.9%	25.8%	450
MEAN	25.1%	42.2%	20.0%	12.7%	450.0
MIN	6.4%	9.1%	6.0%	0.2%	450
MAX	48.7%	69.3%	36.4%	70.9%	450

Total N = number of respondents

Data Table B9. Percentage Distribution of Ratings for Reason(s) a Knowledge Was Not Used

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used							
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER	N – TOTAL REASONS NOT USED[1]	N – INDIVIDUALS NOT USED[2]
1. Knowledge of oral, written, and visual presentation techniques to communicate project information.	2	0	0	0	3	3	8	6
2. Knowledge of master plans and their impact on building design.	27	0	0	3	12	6	48	39
3. Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.	1	0	0	0	28	14	43	41
4. Knowledge of factors that affect selection of project consultants.	7	0	0	1	45	20	73	72
5. Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.	12	0	0	1	17	8	38	34
6. Knowledge of client and project characteristics that influence contract agreements.	6	2	0	1	55	20	84	80
7. Knowledge of types of contracts and their designated uses.	13	2	2	2	52	20	91	81
8. Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.	16	0	1	3	39	17	76	67
9. Knowledge of effects of specific findings from feasibility studies on building design.	39	0	0	5	34	10	88	82
10. Knowledge of factors involved in selection of building systems and components.	5	0	0	7	5	3	20	14
11. Knowledge of effect of environmental factors on site development.	8	0	0	3	5	6	22	21
12. Knowledge of environmental policies and regulations and their implications for proposed construction.	11	0	0	12	29	4	56	51
13. Knowledge of processes involved in conducting a survey of existing conditions.	5	0	0	5	6	4	20	17
14. Knowledge of effects of specific findings from environmental impact studies on building design.	44	0	1	22	41	4	112	98
15. Skill in designing facility layout and site plan that meets site constraints.	7	0	0	3	5	3	18	14
16. Knowledge of methods required to mitigate adverse site conditions.	17	0	0	21	29	4	71	58
17. Knowledge of elements and processes for conducting a site analysis.	12	0	1	13	13	2	41	33
18. Knowledge of codes of professional conduct as related to architectural practice.	3	0	0	0	7	4	14	12
19. Knowledge of protocols and procedures for conducting a building code analysis.	3	0	0	4	5	4	16	14
20. Knowledge of building codes and their impact on building design.	1	0	0	2	5	2	10	7
21. Knowledge of land use codes and ordinances that govern land use decisions.	19	0	0	20	23	4	66	58
22. Skill in producing hand drawings of design ideas.	15	0	0	0	9	10	34	30
23. Knowledge of standards for graphic symbols and units of measurement in technical drawings.	0	0	0	0	0	1	1	1

[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

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Data Table B9. Percentage Distribution of Ratings for Reason(s) a Knowledge Was Not Used

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used							
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER	N – TOTAL REASONS NOT USED[1]	N – INDIVIDUALS NOT USED[2]
24. Skill in producing two-dimensional (2-D) drawings using hand methods.	50	0	0	1	1	13	65	60
25. Skill in using software to produce two-dimensional (2-D) drawings.	4	0	0	1	1	9	15	12
26. Skill in using software to produce three-dimensional (3-D) models of building design.	24	0	0	10	33	22	89	79
27. Skill in producing physical scale models.	119	1	0	17	3	26	166	152
28. Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	106	1	1	5	83	26	222	185
29. Knowledge of protocols and procedures for obtaining community input for proposed design.	63	0	0	8	50	9	130	111
30. Knowledge of computer aided design and drafting software for producing two-dimensional (2-D) drawings.	4	0	0	1	1	5	11	11
31. Knowledge of factors involved in selecting project appropriate computer based design technologies.	14	0	0	2	16	17	49	45
32. Knowledge of engineering properties of soils and their effect on building foundations and building design.	11	0	0	51	18	5	85	72
33. Knowledge of factors to be considered in adaptive reuse of existing buildings and materials.	27	0	0	4	24	3	58	49
34. Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.	2	0	0	7	5	3	17	12
35. Knowledge of effect of thermal envelope in design of building systems.	5	0	1	9	5	1	21	16
36. Knowledge of principles of integrated project design.	59	0	2	2	43	9	115	101
37. Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.	9	1	0	3	51	7	71	65
38. Knowledge of engineering design principles and their application to design and construction.	1	0	1	17	6	2	27	22
39. Knowledge of structural properties of construction products, materials and assemblies and their impact on building design and construction.	2	0	0	14	5	2	23	21
40. Knowledge of means and methods for building construction.	1	0	4	2	3	4	14	12
41. Knowledge of benefits and limitations of "fast track" or other forms of construction delivery methods.	39	0	3	1	27	5	75	65
42. Knowledge of methods and techniques for estimating construction costs.	18	0	3	34	50	12	117	94
43. Knowledge of structural load and load conditions that affect building design.	5	0	1	36	10	5	57	48
44. Knowledge of energy codes that impact construction.	5	1	0	22	17	2	47	42
45. Knowledge of methods and strategies for evidence based design (EBD).	139	0	0	8	154	34	335	302
46. Knowledge of impact of design on human behavior.	22	0	0	0	28	4	54	49
47. Knowledge of functional requirements of all building systems.	1	0	0	8	6	4	19	15

[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

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Data Table B9. Percentage Distribution of Ratings for Reason(s) a Knowledge Was Not Used

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used							
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER	N – TOTAL REASONS NOT USED[1]	N – INDIVIDUALS NOT USED[2]
48. Knowledge of hazardous materials mitigation at building site.	32	0	5	41	48	4	130	105
49. Knowledge of principles of building operation and function.	10	0	0	7	18	2	37	32
50. Knowledge of content and format of specifications.	7	0	0	1	9	3	20	16
51. Knowledge of principles of interior design and their influences on building design.	11	0	0	12	13	4	40	29
52. Knowledge of principles of landscape design and their influences on building design.	13	1	0	32	12	4	62	50
53. Knowledge of site design principles and practices.	11	0	0	5	3	4	23	18
54. Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.	7	0	0	1	11	6	25	24
55. Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.	8	0	0	4	29	10	51	44
56. Knowledge of relationship between constructability and aesthetics.	3	0	0	0	4	2	9	6
57. Knowledge of standards and specifications for building materials and methods of construction, e.g., ASTM, ANSI.	1	0	0	6	11	3	21	17
58. Knowledge of methods to perform life cycle cost analysis.	64	0	0	34	86	11	195	162
59. Knowledge of principles of value analysis and value engineering processes.	13	0	0	6	23	7	49	38
60. Knowledge of procedures and protocols of permit approval process.	5	0	0	3	21	6	35	31
61. Knowledge of principles of historic preservation.	98	0	0	8	39	4	149	129
62. Knowledge of processes and procedures for building commissioning.	60	0	1	47	72	8	188	154
63. Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).	23	0	0	23	17	9	72	63
64. Knowledge of methods and tools for space planning.	6	0	0	1	8	5	20	19
65. Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.	9	0	0	3	33	8	53	45
66. Knowledge of factors that impact construction management services.	24	0	0	7	41	7	79	69
67. Knowledge of fee structures, their attributes and implications for schedule, scope and profit.	6	1	0	0	65	14	86	77
68. Knowledge of consultant agreements and fee structures.	9	1	0	1	51	15	77	69
69. Knowledge of different building and construction types and their implications on design and construction schedules.	4	0	0	1	16	2	23	20
70. Knowledge of scheduling methods to establish project time frames based on standard sequences of architectural operations in each phase.	11	0	0	7	48	13	79	68
71. Knowledge of business development strategies.	18	2	0	1	109	22	152	136

[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

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Data Table B9. Percentage Distribution of Ratings for Reason(s) a Knowledge Was Not Used

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used							
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER	N – TOTAL REASONS NOT USED[1]	N – INDIVIDUALS NOT USED[2]
72. Knowledge of relationship between project scope and consultant capabilities to assemble project team.	9	1	0	3	48	11	72	63
73. Knowledge of purposes and types of professional liability insurance related to architectural practice.	13	1	1	4	103	24	146	135
74. Knowledge of format and protocols for efficient meeting management and information distribution.	8	0	0	0	23	3	34	33
75. Knowledge of strategies to assess project progress and verify its alignment with project schedule.	10	0	0	1	25	9	45	41
76. Knowledge of ways to translate project goals into specific tasks and measurable design criteria.	8	0	0	0	28	2	38	36
77. Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.	4	0	0	0	28	6	38	37
78. Knowledge of formats and protocols to produce and distribute field reports to document construction progress.	17	1	0	1	19	8	46	42
79. Knowledge of site requirements for specific building types to determine client's site needs.	16	0	0	9	26	7	58	48
80. Knowledge of site analysis techniques to determine project parameters affecting design.	8	0	0	9	17	4	38	33
81. Knowledge of methods to prioritize or objectively evaluate design options based on project goals.	4	0	0	1	14	2	21	19
82. Knowledge of sustainability strategies and/or rating systems.	27	0	1	6	26	5	65	53
83. Knowledge of sustainability considerations related to building materials and construction processes.	16	0	0	2	19	5	42	38
84. Knowledge of techniques to integrate renewable energy systems into building design.	31	0	0	16	31	10	88	73
85. Knowledge of methods to identify scope changes that may require additional services.	1	0	0	0	14	7	22	20
86. Knowledge of procedures for processing requests for additional services.	4	0	0	0	43	10	57	54
87. Knowledge of appropriate documentation level required for construction documents.	2	0	0	1	2	2	7	7
88. Knowledge of close-out document requirements and protocols.	8	0	0	1	39	6	54	51
89. Knowledge of construction document technologies and their standards and applications.	3	0	0	0	11	5	19	18
90. Knowledge of building information modeling (BIM) and its impact on planning, financial management and construction documentation.	108	0	1	4	85	18	216	176
91. Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.	4	0	0	1	0	3	8	7

[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

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Data Table B9. Percentage Distribution of Ratings for Reason(s) a Knowledge Was Not Used

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used							
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER	N – TOTAL REASONS NOT USED[1]	N – INDIVIDUALS NOT USED[2]
92. Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.	16	0	1	1	30	16	64	57
93. Knowledge of techniques to integrate model contract forms and documents.	20	1	4	2	87	18	132	118
94. Knowledge of methods for production of construction documentation and drawings.	2	0	0	1	0	2	5	5
95. Knowledge of standard methods for production of design development documentation.	4	0	0	0	4	4	12	10
96. Knowledge of standard methods for production of site plan documentation.	8	0	0	15	10	4	37	33
97. Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.	5	0	0	5	28	4	42	39
98. Knowledge of materials testing processes and protocols to be performed during the construction process.	13	0	2	17	29	5	66	59
99. Knowledge of building systems testing processes and protocols to be performed during the construction process.	16	0	2	22	41	4	85	73
100. Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	3	0	0	1	3	2	9	8
101. Knowledge of protocols for responding to Requests for Information (RFI).	7	0	0	0	9	4	20	17
102. Knowledge of roles, responsibilities and authorities of project team members during construction.	2	0	0	0	4	1	7	7
103. Knowledge of conflict resolution techniques and their applications throughout project.	11	1	1	0	41	6	60	54
104. Knowledge of bidding processes and protocols for different project delivery methods and their applications.	12	0	0	1	20	7	40	33
106. Knowledge of project risks for new and innovative products, materials, methods and technologies.	28	0	1	4	43	5	81	67
107. Knowledge of design decisions and their impact on constructability.	0	0	0	1	3	2	6	5
108. Knowledge of interpersonal skills necessary to elicit client needs and desired scope of services.	4	0	0	0	21	7	32	26
109. Knowledge of requirements of Intern Development Program (IDP).	7	0	0	0	9	17	33	32
110. Knowledge of techniques for staff development in architectural firms.	37	1	0	0	51	18	107	101
111. Knowledge of methods to manage human resources.	48	2	0	3	95	27	175	159
112. Knowledge of state board guidelines for licensing and professional practice.	0	0	0	0	5	5	10	10
113. Knowledge of strategies to create positive work environment that builds trust and encourages cooperation and teamwork.	11	1	0	0	20	9	41	36

[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

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EDU D

Data Table B9. Percentage Distribution of Ratings for Reason(s) a Knowledge Was Not Used

Survey Population: Interns + Architects licensed in the past year + Architects licensed 2-10 years

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used							
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER	N – TOTAL REASONS NOT USED[1]	N – INDIVIDUALS NOT USED[2]
114. Knowledge of principles of universal design.	16	0	0	1	26	14	57	49
115. Knowledge of purposes of and legal implications for different types of business entities.	24	1	3	5	80	8	121	107
116. Knowledge of innovative and evolving technologies and their impact on architectural practice.	12	0	0	0	14	4	30	29
117. Knowledge of training programs for professional development.	17	0	0	0	20	5	42	36
118. Knowledge of ethical standards relevant to architectural practice.	4	0	0	0	8	3	15	13
119. Knowledge of methods to facilitate information management in building design and construction.	12	0	0	4	32	9	57	47
120. Knowledge of factors involved in conducting an architectural practice in international markets.	224	1	1	1	126	13	366	319
121. Knowledge of components of standard business plan, e.g., revenue projection, staffing plan, overhead, profit plan.	27	2	0	2	135	34	200	177
122. Knowledge of methods and procedures for risk management.	18	1	0	4	98	7	128	116
MEAN	20.01	0.22	0.37	6.57	30.00	8.16	65.33	
MIN	0	0	0	0	0	1	1	
MAX	224	2	5	51	154	34	366	

[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

EDU C

Data Table B10. Percentage Distribution of When Knowledge/Skills Should First Be Acquired

Survey Population: Educators + All licensed architects

KNOWLEDGE/SKILL STATEMENT	When Knowledge/Skill Should First Be Acquired					
	BY COMPLETION OF ACCREDITED ARCHITECTURE EDUCATION PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	ACQUISITION NOT NEEDED	I DON'T KNOW	TOTAL N
1. Knowledge of oral, written, and visual presentation techniques to communicate project information.	80.2%	17.7%	1.1%	0.4%	0.6%	1,086
2. Knowledge of master plans and their impact on building design.	65.2%	29.2%	2.9%	0.9%	1.8%	1,086
3. Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.	20.9%	61.2%	16.9%	0.4%	0.6%	1,086
4. Knowledge of factors that affect selection of project consultants.	11.9%	64.2%	22.7%	0.7%	0.5%	1,086
5. Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.	13.3%	56.1%	29.1%	0.8%	0.7%	1,086
6. Knowledge of client and project characteristics that influence contract agreements.	13.9%	51.7%	33.3%	0.2%	0.8%	1,086
7. Knowledge of types of contracts and their designated uses.	32.4%	49.4%	17.6%	0.3%	0.4%	1,086
8. Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.	39.0%	45.6%	14.6%	0.3%	0.5%	1,086
9. Knowledge of effects of specific findings from feasibility studies on building design.	31.0%	50.4%	14.7%	1.1%	2.8%	1,086
10. Knowledge of factors involved in selection of building systems and components.	61.3%	33.1%	5.2%	0.2%	0.3%	1,086
11. Knowledge of effect of environmental factors on site development.	76.7%	18.7%	3.6%	0.4%	0.6%	1,086
12. Knowledge of environmental policies and regulations and their implications for proposed construction.	33.3%	49.9%	15.2%	0.6%	0.9%	1,086
13. Knowledge of processes involved in conducting a survey of existing conditions.	37.6%	57.0%	4.3%	0.7%	0.4%	1,086
14. Knowledge of effects of specific findings from environmental impact studies on building design.	30.3%	52.3%	14.5%	1.2%	1.7%	1,086
15. Skill in designing facility layout and site plan that meets site constraints.	74.7%	20.5%	4.4%	0.1%	0.3%	1,086
16. Knowledge of methods required to mitigate adverse site conditions.	39.1%	41.7%	17.2%	1.0%	0.9%	1,086
17. Knowledge of elements and processes for conducting a site analysis.	71.1%	23.9%	3.9%	0.4%	0.7%	1,086
18. Knowledge of codes of professional conduct as related to architectural practice.	53.6%	42.2%	3.7%	0.4%	0.2%	1,086
19. Knowledge of protocols and procedures for conducting a building code analysis.	40.5%	55.0%	4.1%	0.1%	0.4%	1,086
20. Knowledge of building codes and their impact on building design.	60.6%	35.3%	3.7%	0.1%	0.3%	1,085
21. Knowledge of land use codes and ordinances that govern land use decisions.	41.9%	43.9%	12.7%	0.8%	0.6%	1,086
22. Skill in producing hand drawings of design ideas.	92.0%	4.0%	0.3%	3.1%	0.6%	1,086
23. Knowledge of standards for graphic symbols and units of measurement in technical drawings.	78.3%	20.7%	0.2%	0.5%	0.4%	1,086
24. Skill in producing two-dimensional (2-D) drawings using hand methods.	88.9%	3.3%	0.2%	6.9%	0.7%	1,086
25. Skill in using software to produce two-dimensional (2-D) drawings.	88.6%	9.2%	0.3%	1.4%	0.6%	1,086
26. Skill in using software to produce three-dimensional (3-D) models of building design.	81.7%	13.1%	1.0%	3.1%	1.1%	1,086
27. Skill in producing physical scale models.	86.3%	3.9%	0.5%	8.8%	0.6%	1,086
28. Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	40.1%	43.5%	7.5%	5.1%	3.9%	1,086

Total N = number of respondents

CONTINUED

Data Table B10. Percentage Distribution of When Knowledge/Skills Should First Be Acquired

Survey Population: Educators + All licensed architects

KNOWLEDGE/SKILL STATEMENT	When Knowledge/Skill Should First Be Acquired					
	BY COMPLETION OF ACCREDITED ARCHITECTURE EDUCATION PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	ACQUISITION NOT NEEDED	I DON'T KNOW	TOTAL N
29. Knowledge of protocols and procedures for obtaining community input for proposed design.	26.1%	50.6%	20.0%	1.8%	1.5%	1,086
30. Knowledge of computer aided design and drafting software for producing two-dimensional (2-D) drawings.	85.7%	11.3%	0.4%	1.8%	0.7%	1,086
31. Knowledge of factors involved in selecting project appropriate computer based design technologies.	36.2%	43.7%	11.8%	4.3%	4.0%	1,086
32. Knowledge of engineering properties of soils and their effect on building foundations and building design.	56.7%	31.1%	8.9%	2.5%	0.7%	1,086
33. Knowledge of factors to be considered in adaptive reuse of existing buildings and materials.	51.3%	34.3%	11.7%	1.3%	1.4%	1,086
34. Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.	65.9%	28.2%	5.2%	0.2%	0.5%	1,086
35. Knowledge of effect of thermal envelope in design of building systems.	75.7%	18.9%	4.6%	0.4%	0.5%	1,086
36. Knowledge of principles of integrated project design.	45.0%	36.4%	12.2%	1.9%	4.5%	1,086
37. Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.	18.7%	45.3%	32.2%	1.7%	2.0%	1,086
38. Knowledge of engineering design principles and their application to design and construction.	75.9%	19.2%	4.0%	0.5%	0.6%	1,086
39. Knowledge of structural properties of construction products, materials and assemblies and their impact on building design and construction.	78.0%	17.9%	2.8%	0.8%	0.6%	1,086
40. Knowledge of means and methods for building construction.	64.6%	30.1%	3.5%	1.2%	0.6%	1,086
41. Knowledge of benefits and limitations of “fast track” or other forms of construction delivery methods.	29.7%	50.6%	16.6%	1.9%	1.3%	1,086
42. Knowledge of methods and techniques for estimating construction costs.	33.0%	50.1%	13.5%	3.1%	0.3%	1,086
43. Knowledge of structural load and load conditions that affect building design.	81.7%	12.7%	3.5%	1.5%	0.6%	1,086
44. Knowledge of energy codes that impact construction.	56.4%	37.6%	4.8%	0.8%	0.4%	1,086
45. Knowledge of methods and strategies for evidence based design (EBD).	28.9%	27.3%	11.0%	6.8%	26.1%	1,086
46. Knowledge of impact of design on human behavior.	82.0%	8.3%	3.9%	2.9%	2.9%	1,086
47. Knowledge of functional requirements of all building systems.	67.9%	24.0%	5.8%	1.2%	1.1%	1,086
48. Knowledge of hazardous materials mitigation at building site.	20.2%	48.4%	21.5%	6.8%	3.0%	1,086
49. Knowledge of principles of building operation and function.	46.2%	34.5%	14.1%	2.7%	2.5%	1,086
50. Knowledge of content and format of specifications.	41.8%	51.9%	4.9%	0.6%	0.7%	1,086
51. Knowledge of principles of interior design and their influences on building design.	71.3%	19.9%	4.1%	2.8%	2.0%	1,086
52. Knowledge of principles of landscape design and their influences on building design.	78.1%	15.2%	3.7%	1.7%	1.4%	1,086
53. Knowledge of site design principles and practices.	86.6%	12.2%	0.6%	0.3%	0.5%	1,086
54. Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.	71.7%	22.5%	4.4%	0.2%	1.2%	1,086

Total N = number of respondents

CONTINUED

Data Table B10. Percentage Distribution of When Knowledge/Skills Should First Be Acquired

Survey Population: Educators + All licensed architects

KNOWLEDGE/SKILL STATEMENT	When Knowledge/Skill Should First Be Acquired					
	BY COMPLETION OF ACCREDITED ARCHITECTURE EDUCATION PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	ACQUISITION NOT NEEDED	I DON'T KNOW	TOTAL N
55. Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.	18.6%	56.8%	23.0%	0.9%	0.6%	1,086
56. Knowledge of relationship between constructability and aesthetics.	65.0%	29.2%	3.5%	0.6%	1.7%	1,086
57. Knowledge of standards and specifications for building materials and methods of construction, e.g., ASTM, ANSI.	35.8%	51.2%	10.5%	1.4%	1.1%	1,086
58. Knowledge of methods to perform life cycle cost analysis.	30.8%	37.9%	23.8%	5.2%	2.2%	1,086
59. Knowledge of principles of value analysis and value engineering processes.	21.1%	49.7%	24.3%	2.9%	2.0%	1,086
60. Knowledge of procedures and protocols of permit approval process.	12.0%	72.8%	13.5%	0.9%	0.7%	1,086
61. Knowledge of principles of historic preservation.	58.0%	22.8%	9.3%	6.7%	3.1%	1,086
62. Knowledge of processes and procedures for building commissioning.	20.9%	43.8%	23.2%	7.0%	5.1%	1,086
63. Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).	26.5%	48.1%	14.0%	7.6%	3.8%	1,086
64. Knowledge of methods and tools for space planning.	72.2%	21.2%	3.5%	1.3%	1.8%	1,086
65. Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.	30.1%	48.6%	18.9%	0.9%	1.5%	1,086
66. Knowledge of factors that impact construction management services.	16.5%	49.0%	28.1%	3.8%	2.7%	1,086
67. Knowledge of fee structures, their attributes and implications for schedule, scope and profit.	19.3%	46.3%	32.5%	0.5%	1.4%	1,086
68. Knowledge of consultant agreements and fee structures.	15.2%	48.9%	34.8%	0.5%	0.6%	1,086
69. Knowledge of different building and construction types and their implications on design and construction schedules.	46.5%	42.4%	9.8%	0.6%	0.6%	1,086
70. Knowledge of scheduling methods to establish project time frames based on standard sequences of architectural operations in each phase.	16.9%	55.1%	24.4%	1.7%	1.9%	1,086
71. Knowledge of business development strategies.	19.9%	28.6%	44.8%	3.6%	3.0%	1,086
72. Knowledge of relationship between project scope and consultant capabilities to assemble project team.	8.7%	48.3%	39.8%	1.0%	2.2%	1,086
73. Knowledge of purposes and types of professional liability insurance related to architectural practice.	19.6%	35.1%	43.4%	0.8%	1.1%	1,086
74. Knowledge of format and protocols for efficient meeting management and information distribution.	12.3%	56.6%	25.0%	2.9%	3.0%	1,086
75. Knowledge of strategies to assess project progress and verify its alignment with project schedule.	8.7%	60.0%	28.5%	1.3%	1.5%	1,086
76. Knowledge of ways to translate project goals into specific tasks and measurable design criteria.	25.5%	44.7%	24.4%	2.1%	3.3%	1,086
77. Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.	21.0%	50.2%	26.7%	1.0%	1.1%	1,086
78. Knowledge of formats and protocols to produce and distribute field reports to document construction progress.	6.6%	76.0%	14.7%	1.5%	1.2%	1,086

Total N = number of respondents

CONTINUED

Data Table B10. Percentage Distribution of When Knowledge/Skills Should First Be Acquired

Survey Population: Educators + All licensed architects

KNOWLEDGE/SKILL STATEMENT	When Knowledge/Skill Should First Be Acquired					
	BY COMPLETION OF ACCREDITED ARCHITECTURE EDUCATION PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	ACQUISITION NOT NEEDED	I DON'T KNOW	TOTAL N
79. Knowledge of site requirements for specific building types to determine client's site needs.	40.0%	43.3%	13.4%	1.1%	2.2%	1,086
80. Knowledge of site analysis techniques to determine project parameters affecting design.	63.4%	27.2%	7.0%	1.0%	1.5%	1,086
81. Knowledge of methods to prioritize or objectively evaluate design options based on project goals.	53.4%	31.9%	11.6%	1.0%	2.1%	1,086
82. Knowledge of sustainability strategies and/or rating systems.	62.5%	22.2%	8.9%	4.2%	2.1%	1,086
83. Knowledge of sustainability considerations related to building materials and construction processes.	61.6%	26.1%	7.0%	3.9%	1.5%	1,086
84. Knowledge of techniques to integrate renewable energy systems into building design.	63.4%	21.5%	8.9%	4.1%	2.2%	1,086
85. Knowledge of methods to identify scope changes that may require additional services.	7.4%	60.1%	30.7%	0.9%	0.9%	1,086
86. Knowledge of procedures for processing requests for additional services.	5.3%	55.4%	37.3%	0.7%	1.2%	1,086
87. Knowledge of appropriate documentation level required for construction documents.	22.1%	69.8%	7.3%	0.1%	0.7%	1,086
88. Knowledge of close-out document requirements and protocols.	7.2%	68.3%	22.0%	1.0%	1.5%	1,086
89. Knowledge of construction document technologies and their standards and applications.	31.2%	57.7%	7.5%	0.6%	2.9%	1,086
90. Knowledge of building information modeling (BIM) and its impact on planning, financial management and construction documentation.	32.2%	38.5%	16.1%	7.1%	6.1%	1,086
91. Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.	79.3%	16.5%	1.2%	1.6%	1.5%	1,086
92. Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.	35.5%	47.1%	13.6%	2.9%	0.8%	1,086
93. Knowledge of techniques to integrate model contract forms and documents.	15.4%	51.7%	26.9%	2.6%	3.5%	1,086
94. Knowledge of methods for production of construction documentation and drawings.	42.8%	54.3%	2.1%	0.1%	0.6%	1,086
95. Knowledge of standard methods for production of design development documentation.	41.1%	56.1%	2.2%	0.1%	0.6%	1,086
96. Knowledge of standard methods for production of site plan documentation.	40.4%	55.1%	2.1%	1.2%	1.2%	1,086
97. Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.	6.1%	62.2%	28.7%	0.9%	2.0%	1,086
98. Knowledge of materials testing processes and protocols to be performed during the construction process.	15.9%	60.1%	19.8%	2.5%	1.7%	1,086
99. Knowledge of building systems testing processes and protocols to be performed during the construction process.	13.0%	60.5%	20.9%	3.0%	2.6%	1,086
100. Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	9.0%	81.4%	8.6%	0.4%	0.6%	1,086
101. Knowledge of protocols for responding to Requests for Information (RFI).	7.6%	80.4%	10.8%	0.2%	1.1%	1,086

Total N = number of respondents

CONTINUED

EDU C

Data Table B10. Percentage Distribution of When Knowledge/Skills Should First Be Acquired

Survey Population: Educators + All licensed architects

KNOWLEDGE/SKILL STATEMENT	When Knowledge/Skill Should First Be Acquired					
	BY COMPLETION OF ACCREDITED ARCHITECTURE EDUCATION PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	ACQUISITION NOT NEEDED	I DON'T KNOW	TOTAL N
102. Knowledge of roles, responsibilities and authorities of project team members during construction.	21.6%	68.3%	9.2%	0.4%	0.5%	1,086
103. Knowledge of conflict resolution techniques and their applications throughout project.	17.7%	47.3%	31.1%	1.6%	2.3%	1,086
104. Knowledge of bidding processes and protocols for different project delivery methods and their applications.	21.3%	58.7%	18.4%	0.6%	1.1%	1,086
105. Knowledge of requirements for post-occupancy evaluation.	15.1%	47.5%	27.7%	5.7%	4.0%	1,086
106. Knowledge of project risks for new and innovative products, materials, methods and technologies.	23.2%	41.6%	28.9%	2.7%	3.6%	1,086
107. Knowledge of design decisions and their impact on constructability.	55.7%	37.2%	6.3%	0.1%	0.7%	1,086
108. Knowledge of interpersonal skills necessary to elicit client needs and desired scope of services.	30.3%	46.8%	18.3%	2.1%	2.5%	1,086
109. Knowledge of requirements of Intern Development Program (IDP).	66.9%	24.8%	2.7%	2.7%	3.0%	1,086
110. Knowledge of techniques for staff development in architectural firms.	8.8%	35.5%	47.4%	4.7%	3.6%	1,086
111. Knowledge of methods to manage human resources.	5.6%	24.8%	56.0%	8.3%	5.3%	1,086
112. Knowledge of state board guidelines for licensing and professional practice.	33.3%	59.9%	4.9%	1.2%	0.7%	1,086
113. Knowledge of strategies to create positive work environment that builds trust and encourages cooperation and teamwork.	21.8%	36.4%	33.9%	4.2%	3.7%	1,086
114. Knowledge of principles of universal design.	65.1%	20.1%	4.4%	2.9%	7.6%	1,086
115. Knowledge of purposes of and legal implications for different types of business entities.	23.5%	23.8%	42.1%	5.5%	5.2%	1,086
116. Knowledge of innovative and evolving technologies and their impact on architectural practice.	40.3%	29.3%	25.0%	2.0%	3.3%	1,086
117. Knowledge of training programs for professional development.	18.0%	51.7%	25.5%	2.6%	2.2%	1,086
118. Knowledge of ethical standards relevant to architectural practice.	60.4%	32.5%	5.6%	0.9%	0.6%	1,086
119. Knowledge of methods to facilitate information management in building design and construction.	21.5%	53.2%	16.3%	3.5%	5.4%	1,086
120. Knowledge of factors involved in conducting an architectural practice in international markets.	9.3%	14.5%	50.3%	15.4%	10.5%	1,086
121. Knowledge of components of standard business plan, e.g., revenue projection, staffing plan, overhead, profit plan.	19.2%	20.0%	52.8%	4.4%	3.7%	1,086
122. Knowledge of methods and procedures for risk management.	14.9%	36.2%	42.6%	2.4%	3.9%	1,086
MEAN	40.5%	39.8%	15.5%	2.2%	2.0%	1,086.0
MIN	5.3%	3.3%	0.2%	0.1%	0.2%	1,085
MAX	92.0%	81.4%	56.0%	15.4%	26.1%	1,086

Total N = number of respondents

EDU C

Data Table B11. Percentage Distribution of Ratings for Level at Which Knowledge/Skills Should be Acquired

Survey Population: Educators + All licensed architects

KNOWLEDGE/SKILL STATEMENT	Level At Which Knowledge/Skill Should Be Acquired			
	UNDERSTAND	APPLY	EVALUATE	TOTAL N
1. Knowledge of oral, written, and visual presentation techniques to communicate project information.	18.6%	45.5%	35.9%	871
2. Knowledge of master plans and their impact on building design.	39.7%	36.3%	24.0%	708
3. Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.	69.2%	16.3%	14.5%	227
4. Knowledge of factors that affect selection of project consultants.	68.2%	17.1%	14.7%	129
5. Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.	31.3%	53.5%	15.3%	144
6. Knowledge of client and project characteristics that influence contract agreements.	67.5%	19.9%	12.6%	151
7. Knowledge of types of contracts and their designated uses.	77.3%	16.2%	6.5%	352
8. Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.	80.0%	14.9%	5.2%	424
9. Knowledge of effects of specific findings from feasibility studies on building design.	40.1%	41.2%	18.7%	337
10. Knowledge of factors involved in selection of building systems and components.	34.7%	46.4%	18.9%	666
11. Knowledge of effect of environmental factors on site development.	30.6%	41.4%	28.0%	833
12. Knowledge of environmental policies and regulations and their implications for proposed construction.	56.9%	29.8%	13.3%	362
13. Knowledge of processes involved in conducting a survey of existing conditions.	33.8%	45.3%	20.8%	408
14. Knowledge of effects of specific findings from environmental impact studies on building design.	55.0%	28.3%	16.7%	329
15. Skill in designing facility layout and site plan that meets site constraints.	13.6%	47.1%	39.3%	811
16. Knowledge of methods required to mitigate adverse site conditions.	43.3%	38.6%	18.1%	425
17. Knowledge of elements and processes for conducting a site analysis.	29.7%	43.9%	26.4%	772
18. Knowledge of codes of professional conduct as related to architectural practice.	59.5%	25.4%	15.1%	582
19. Knowledge of protocols and procedures for conducting a building code analysis.	41.8%	42.7%	15.5%	440
20. Knowledge of building codes and their impact on building design.	38.9%	45.1%	16.0%	658
21. Knowledge of land use codes and ordinances that govern land use decisions.	61.1%	27.9%	11.0%	455
22. Skill in producing hand drawings of design ideas.	11.3%	42.2%	46.4%	999
23. Knowledge of standards for graphic symbols and units of measurement in technical drawings.	15.2%	51.6%	33.2%	850
24. Skill in producing two-dimensional (2-D) drawings using hand methods.	11.8%	50.5%	37.7%	965
25. Skill in using software to produce two-dimensional (2-D) drawings.	7.4%	62.0%	30.7%	962
26. Skill in using software to produce three-dimensional (3-D) models of building design.	11.4%	60.9%	27.7%	887
27. Skill in producing physical scale models.	11.5%	55.9%	32.6%	937
28. Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	35.6%	46.8%	17.7%	436
29. Knowledge of protocols and procedures for obtaining community input for proposed design.	64.0%	24.0%	12.0%	283
30. Knowledge of computer aided design and drafting software for producing two-dimensional (2-D) drawings.	12.1%	60.4%	27.5%	931
31. Knowledge of factors involved in selecting project appropriate computer based design technologies.	37.7%	39.4%	22.9%	393
32. Knowledge of engineering properties of soils and their effect on building foundations and building design.	66.7%	24.2%	9.1%	616
33. Knowledge of factors to be considered in adaptive reuse of existing buildings and materials.	60.1%	28.5%	11.3%	557
34. Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.	44.7%	36.9%	18.4%	716

Total N = number of respondents

CONTINUED

EDU C

Data Table B11. Percentage Distribution of Ratings for Level at Which Knowledge/Skills Should be Acquired

Survey Population: Educators + All licensed architects

KNOWLEDGE/SKILL STATEMENT	Level At Which Knowledge/Skill Should Be Acquired			
	UNDERSTAND	APPLY	EVALUATE	TOTAL N
35. Knowledge of effect of thermal envelope in design of building systems.	41.5%	38.9%	19.6%	822
36. Knowledge of principles of integrated project design.	58.9%	25.2%	16.0%	489
37. Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.	70.9%	16.3%	12.8%	203
38. Knowledge of engineering design principles and their application to design and construction.	51.3%	35.8%	12.9%	824
39. Knowledge of structural properties of construction products, materials and assemblies and their impact on building design and construction.	43.6%	40.3%	16.2%	847
40. Knowledge of means and methods for building construction.	49.4%	33.0%	17.5%	702
41. Knowledge of benefits and limitations of "fast track" or other forms of construction delivery methods.	84.2%	8.7%	7.1%	322
42. Knowledge of methods and techniques for estimating construction costs.	64.8%	29.1%	6.1%	358
43. Knowledge of structural load and load conditions that affect building design.	46.7%	39.5%	13.9%	887
44. Knowledge of energy codes that impact construction.	54.8%	33.4%	11.7%	613
45. Knowledge of methods and strategies for evidence based design (EBD).	72.9%	18.2%	8.9%	314
46. Knowledge of impact of design on human behavior.	47.1%	28.1%	24.8%	890
47. Knowledge of functional requirements of all building systems.	50.9%	33.8%	15.3%	737
48. Knowledge of hazardous materials mitigation at building site.	81.3%	8.7%	10.0%	219
49. Knowledge of principles of building operation and function.	62.5%	21.9%	15.5%	502
50. Knowledge of content and format of specifications.	63.0%	29.1%	7.9%	454
51. Knowledge of principles of interior design and their influences on building design.	37.0%	46.5%	16.5%	774
52. Knowledge of principles of landscape design and their influences on building design.	45.4%	40.3%	14.3%	848
53. Knowledge of site design principles and practices.	26.9%	49.8%	23.3%	940
54. Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.	28.4%	44.8%	26.8%	779
55. Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.	65.8%	24.3%	9.9%	202
56. Knowledge of relationship between constructability and aesthetics.	37.1%	35.6%	27.3%	706
57. Knowledge of standards and specifications for building materials and methods of construction, e.g., ASTM, ANSI.	72.5%	21.6%	5.9%	389
58. Knowledge of methods to perform life cycle cost analysis.	71.3%	20.0%	8.7%	335
59. Knowledge of principles of value analysis and value engineering processes.	69.0%	18.3%	12.7%	229
60. Knowledge of procedures and protocols of permit approval process.	76.9%	11.5%	11.5%	130
61. Knowledge of principles of historic preservation.	68.7%	21.7%	9.5%	630
62. Knowledge of processes and procedures for building commissioning.	81.1%	12.3%	6.6%	227
63. Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).	62.2%	29.9%	8.0%	288
64. Knowledge of methods and tools for space planning.	29.6%	46.3%	24.1%	784
65. Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.	78.3%	14.4%	7.3%	327
66. Knowledge of factors that impact construction management services.	78.8%	12.3%	8.9%	179
67. Knowledge of fee structures, their attributes and implications for schedule, scope and profit.	83.8%	8.6%	7.6%	210
68. Knowledge of consultant agreements and fee structures.	84.8%	7.3%	7.9%	165

Total N = number of respondents

CONTINUED

EDU C

Data Table B11. Percentage Distribution of Ratings for Level at Which Knowledge/Skills Should be Acquired

Survey Population: Educators + All licensed architects

KNOWLEDGE/SKILL STATEMENT	Level At Which Knowledge/Skill Should Be Acquired			
	UNDERSTAND	APPLY	EVALUATE	TOTAL N
69. Knowledge of different building and construction types and their implications on design and construction schedules.	63.6%	24.2%	12.3%	505
70. Knowledge of scheduling methods to establish project time frames based on standard sequences of architectural operations in each phase.	65.6%	23.5%	10.9%	183
71. Knowledge of business development strategies.	76.9%	14.8%	8.3%	216
72. Knowledge of relationship between project scope and consultant capabilities to assemble project team.	76.8%	11.6%	11.6%	95
73. Knowledge of purposes and types of professional liability insurance related to architectural practice.	88.3%	6.6%	5.2%	213
74. Knowledge of format and protocols for efficient meeting management and information distribution.	59.7%	26.9%	13.4%	134
75. Knowledge of strategies to assess project progress and verify its alignment with project schedule.	63.8%	24.5%	11.7%	94
76. Knowledge of ways to translate project goals into specific tasks and measurable design criteria.	42.2%	41.5%	16.2%	277
77. Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.	52.2%	31.6%	16.2%	228
78. Knowledge of formats and protocols to produce and distribute field reports to document construction progress.	69.4%	18.1%	12.5%	72
79. Knowledge of site requirements for specific building types to determine client's site needs.	46.8%	33.6%	19.6%	434
80. Knowledge of site analysis techniques to determine project parameters affecting design.	39.1%	40.6%	20.3%	688
81. Knowledge of methods to prioritize or objectively evaluate design options based on project goals.	29.0%	41.7%	29.3%	580
82. Knowledge of sustainability strategies and/or rating systems.	50.7%	35.3%	14.0%	679
83. Knowledge of sustainability considerations related to building materials and construction processes.	55.3%	30.5%	14.2%	669
84. Knowledge of techniques to integrate renewable energy systems into building design.	58.0%	29.8%	12.2%	688
85. Knowledge of methods to identify scope changes that may require additional services.	76.3%	11.3%	12.5%	80
86. Knowledge of procedures for processing requests for additional services.	70.7%	12.1%	17.2%	58
87. Knowledge of appropriate documentation level required for construction documents.	44.6%	35.4%	20.0%	240
88. Knowledge of close-out document requirements and protocols.	73.1%	17.9%	9.0%	78
89. Knowledge of construction document technologies and their standards and applications.	58.4%	30.1%	11.5%	339
90. Knowledge of building information modeling (BIM) and its impact on planning, financial management and construction documentation.	70.0%	19.4%	10.6%	350
91. Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.	26.0%	54.0%	20.0%	861
92. Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.	80.8%	12.7%	6.5%	386
93. Knowledge of techniques to integrate model contract forms and documents.	80.8%	9.0%	10.2%	167
94. Knowledge of methods for production of construction documentation and drawings.	46.0%	42.2%	11.8%	465
95. Knowledge of standard methods for production of design development documentation.	38.6%	47.1%	14.3%	446
96. Knowledge of standard methods for production of site plan documentation.	43.7%	44.9%	11.4%	439
97. Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.	74.2%	12.1%	13.6%	66
98. Knowledge of materials testing processes and protocols to be performed during the construction process.	83.8%	9.2%	6.9%	173
99. Knowledge of building systems testing processes and protocols to be performed during the construction process.	83.0%	9.2%	7.8%	141
100. Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	70.4%	19.4%	10.2%	98
101. Knowledge of protocols for responding to Requests for Information (RFI).	75.6%	12.2%	12.2%	82
102. Knowledge of roles, responsibilities and authorities of project team members during construction.	78.3%	12.8%	8.9%	235

Total N = number of respondents

CONTINUED

EDU C

Data Table B11. Percentage Distribution of Ratings for Level at Which Knowledge/Skills Should be Acquired

Survey Population: Educators + All licensed architects

KNOWLEDGE/SKILL STATEMENT	Level At Which Knowledge/Skill Should Be Acquired			
	UNDERSTAND	APPLY	EVALUATE	TOTAL N
103. Knowledge of conflict resolution techniques and their applications throughout project.	70.3%	18.2%	11.5%	192
104. Knowledge of bidding processes and protocols for different project delivery methods and their applications.	85.3%	8.7%	6.1%	231
105. Knowledge of requirements for post-occupancy evaluation.	83.5%	10.4%	6.1%	164
106. Knowledge of project risks for new and innovative products, materials, methods and technologies.	81.7%	8.7%	9.5%	252
107. Knowledge of design decisions and their impact on constructability.	44.1%	33.2%	22.6%	605
108. Knowledge of interpersonal skills necessary to elicit client needs and desired scope of services.	46.2%	37.7%	16.1%	329
109. Knowledge of requirements of Intern Development Program (IDP).	53.9%	26.0%	20.1%	726
110. Knowledge of techniques for staff development in architectural firms.	81.3%	9.4%	9.4%	96
111. Knowledge of methods to manage human resources.	72.1%	9.8%	18.0%	61
112. Knowledge of state board guidelines for licensing and professional practice.	69.1%	17.4%	13.5%	362
113. Knowledge of strategies to create positive work environment that builds trust and encourages cooperation and teamwork.	51.5%	32.5%	16.0%	237
114. Knowledge of principles of universal design.	43.1%	38.3%	18.5%	707
115. Knowledge of purposes of and legal implications for different types of business entities.	85.5%	8.6%	5.9%	255
116. Knowledge of innovative and evolving technologies and their impact on architectural practice.	71.9%	16.4%	11.6%	438
117. Knowledge of training programs for professional development.	73.0%	15.3%	11.7%	196
118. Knowledge of ethical standards relevant to architectural practice.	62.5%	24.2%	13.3%	656
119. Knowledge of methods to facilitate information management in building design and construction.	64.1%	21.8%	14.1%	234
120. Knowledge of factors involved in conducting an architectural practice in international markets.	87.1%	5.9%	6.9%	101
121. Knowledge of components of standard business plan, e.g., revenue projection, staffing plan, overhead, profit plan.	76.9%	14.4%	8.7%	208
122. Knowledge of methods and procedures for risk management.	79.0%	14.2%	6.8%	162
MEAN	56.7%	28.1%	15.2%	439.4
MIN	7.4%	5.9%	5.2%	58
MAX	88.3%	62.0%	46.4%	999

Total N = number of respondents

INTERNSHIP REPORT

EXECUTIVE SUMMARY

THE INTERNSHIP SURVEY

This *Internship Report* encompasses extensive data collected from the three internship-specific surveys:

INTERNSHIP A Survey
Intern Development Program (IDP) supervisors and mentors were asked to indicate the level at which interns perform specific tasks by completion of the IDP.

INTERNSHIP B Survey
In this survey, IDP supervisors and mentors, as well as architects licensed two to 10 years, were asked to indicate whether specific tasks should be required as part of the IDP; to what level the task should be performed by completion of the IDP; and whether supplemental education/experience would be acceptable in lieu of on-the-job performance of the task.

INTERNSHIP C Survey
Interns who completed the IDP within the past year, and architects licensed in the past year who also completed the IDP in the past two years, were asked to indicate the level at which they performed specific tasks by completion of their IDP experience, and how frequently they performed (or observed others performing) the task during their IDP experience.

KEY FINDINGS

The data resulting from the Internship Survey of the *2012 NCARB Practice Analysis of Architecture* provides a significant and robust amount of information representing a broad sample of architects, supervisors, and mentors, as well as the voice of interns and recently licensed architects. The NCARB Internship Committee, consisting of Member Board Members, recently licensed architects, and other subject-matter experts will use the findings to support and enhance the existing IDP framework. The data will also be used to inform the development of a future internship experience as the Council, with the insights of its new Intern Think Tank, the IDP Advisory Committee, and an internal internship task force, undertakes a fresh and comprehensive review of how architectural internship serves as an important bridge connecting education with licensure.

- **Task relevance** – Supervisors, mentors, and architects determined that over 70 percent of the tasks surveyed should be required as a part of the IDP. After further review, several of these tasks were identified as being performed throughout the course of a project and therefore span multiple IDP experience areas. The linking study, which linked tasks to the appropriate IDP experience areas, will be used to inform any suggested revisions to the structure and content of the existing experience areas.
- **Level of performance** – By completion of their internship experience, interns are expected to be able to perform the tasks included in the IDP without assistance. When asked how interns typically performed the tasks by completion of the IDP, supervisors and mentors overwhelmingly indicated that interns were performing the tasks with assistance or observing others perform the tasks—clearly not the intended goal of the program. It is hoped that a combination of program enhancements and improved supervisor/mentor education can raise the level of intern performance.

- **Frequency of performance** – The scope of the survey questions was expanded to gather information from interns and recently licensed architects on how frequently they performed each task (or observed others performing each task) during their IDP experience. Only 25 percent of the tasks included in the survey were rated by interns and recently licensed architects as being performed *"often"* and *"regularly."* This data will be considered as the existing core and elective hourly requirements for each experience area are reviewed. Additional analysis is required to better understand the relationship between the frequency of task performance, task relevance, and its requirement in the IDP.
- **Value of supplemental education/experienc**e – Supervisors, mentors, and architects do not believe that supplemental education/experience is an acceptable alternative to on-the-job performance of tasks. According to the data, supplemental experience was "acceptable" for only 11 of the 96 tasks surveyed. These survey findings, coupled with a review of intern use of existing supplemental education/experience options to fulfill program requirements, will inform decisions on the development and implementation of future supplemental opportunities.

CONCLUSION

Internship provides aspiring architects an essential, hands-on opportunity to experience the actual practice of architecture. With accredited architectural education serving as the foundation, internship provides a structured environment where theory and precedent can be applied to actual projects, and knowledge of materials and systems is transformed into thoughtful construction details. The findings of the Practice Analysis will be used to ensure the internship experience is viewed by educators, interns, supervisors, and the profession as a valuable step in the development of the next generation of practitioners.

USE AND APPLICATION

A relevant and practical internship remains an important component of the path to licensure as an architect. The *2012 NCARB Practice Analysis of Architecture* will have a significant impact on internship over the course of the next several years. NCARB will use the results of the Practice Analysis to inform updates to the current version of the IDP as well as to explore new opportunities and directions in internship and its relationship to licensure and practice.

SHORT-TERM USE

The tasks performed during internship serve to develop competent professionals capable of practicing architecture independently upon licensure. To fulfill this obligation, it is critical that internship responds to changes in the profession and reflects the realities of contemporary practice. The results of the Practice Analysis will be used in the short-term to inform and guide incremental revisions that will keep the IDP current, responsive, and relevant.

The tasks identified by 50 percent or more of the supervisors and mentors surveyed, as tasks that should be included in internship, will be incorporated in the relevant IDP experience areas based on the linking study conducted by the Internship Committee. This new set of tasks will replace the previous tasks from the *2007 Practice Analysis of Architecture* that informed the current program.

The data related to the frequency at which tasks are performed by interns will inform potential modifications to the core hour requirements in the current IDP. Responses from supervisors, mentors, and architects licensed two to 10 years regarding whether the tasks should be required as part of the IDP will also influence the appropriate distribution of core hour requirements among the IDP experience areas.

The low number of tasks that were rated by supervisors/mentors and interns/recently licensed architects as "*performed with no assistance*" indicates a performance gap that must be addressed. In the short-term, this could most directly be accomplished by crafting a strong training initiative aimed at educating supervisors, mentors, and firms as a whole about the importance of encouraging and fostering independent performance of tasks by completion of internship.

Current supplemental experience opportunities need to be closely analyzed in light of survey findings. The Practice Analysis data strongly suggests that practitioners currently do not view supplemental education/experience as an acceptable alternative to on-the-job performance in almost all cases. Based upon the relatively low ratings by supervisors, mentors, and architects of whether supplemental education/experience would be acceptable in lieu of on-the-job performance of the tasks, any short-term changes or additions to the opportunities available should focus on improving the value of supplemental experience.

LONG-TERM APPLICATION

The IDP must continually evolve through both continuous modifications and adjustments, and through periodic comprehensive review of the design, structure, and implementation of the program. The data from the 2012 Practice Analysis will guide this effort in the long-term, as the Internship Committee, associated task forces, and special project teams look to ensure that internship remains a positive and valuable training experience that prepares future architects for independent practice.

The internship-related tasks surveyed in the Practice Analysis will be carefully reviewed based on the linking performed by the Internship Committee. Of particular importance will be determining how to address tasks that are performed throughout the course of a project and therefore fall into multiple IDP experience areas. Potential shifts in the structure, grouping, or titling of experience areas may need to be considered. The Internship Committee specifically noted the need to examine and evaluate three experience areas in detail—schematic design, design development, and construction documentation—as a significant number of the tasks occur throughout these phases of a project.

The performance gap indicated by the low level of performance ratings indicated in the category "*performed with no assistance*" must also be addressed in the long-term. Further investigation and analysis by the Internship Committee and other subject-matter experts may lead to substantial changes to the implementation and structure of the program.

Supplemental education/experience will also need to be addressed carefully in any long-term program development, as these opportunities are already integrated in the existing program. Changes to the overall structure and/or inclusion of supplemental education/experience will need to be considered in conjunction with evaluating intern usage rates and the degree of resources expended to develop, maintain, and offer supplemental opportunities. As the concept of supplemental education/experience is a unique element within a professional internship, it is imperative that thorough and thoughtful analysis be conducted to ensure that any changes to this element of the IDP are appropriate.

INTERNSHIP SURVEY

Each internship (IDP) survey was designed to elicit different information from the following groups:

- IDP supervisors and mentors reviewed the tasks and indicated the level at which interns typically perform each task by completion of the IDP;
- IDP supervisors/mentors and architects licensed two to 10 years were asked if the task should be required as part of the IDP, to what level the task should be performed by completion of the IDP, and whether supplemental experience is an acceptable alternative to on-the job performance; and,
- Interns and recently licensed architects were asked to indicate the level at which they performed specific tasks by completion of their IDP experience, and how frequently they performed (or observed others performing) the task during their IDP experience.

A total of 2,302 IDP surveys were included in the data analysis. The number of survey responses for each IDP survey included in the final data analysis ranged from 47 percent to 75 percent, based on the 90 percent completion rule (participants who responded to at least 90 percent of the items in the survey were included). The smaller number of respondents for IDP Survey C was related to the limited size of that target population. The intention of narrowing the focus to specific subgroups of interns and recently licensed architects was to gain insight from those with the most recent IDP experience.

IDP SURVEY	RESPONSES RECEIVED	RESPONSES INCLUDED IN DATA ANALYSIS	PERCENTAGE INCLUDED IN DATA ANALYSIS
IDP A	1,345	1,003	75%
IDP B	1,778	1,152	65%
IDP C	315	147	47%

The chart below summarizes the survey population and the research questions related to the task statements, as well as the various rating scales for the internship surveys. The chart also references the related Internship (IDP) Data Tables.

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
IDP A	IDP supervisors and mentors	Task	How did the interns you supervised or mentored during the past two years typically perform the task by completion of the IDP experience? • My interns did not perform this task • My interns observed others performing this task • My interns performed this task with assistance • My interns performed this task with no assistance	C2
IDP B	IDP supervisors and mentors Architects licensed 2-10 years	Task	Should this task be required as part of the IDP? • Yes • No	C3
			At what level should the task be performed by completion of the IDP? • Interns should have observed others performing the task • Interns should have performed the task with assistance • Interns should have performed the task with no assistance	C4
			Would supplemental education/experience be acceptable in lieu of on-the-job performance of the task? • Yes • No	C5

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
IDP C	IDP supervisors and mentors Architects licensed in the past year and completed IDP in past two years	Task	How did you perform the task by completion of the IDP experience? • I performed the task with no assistance • I performed the task with assistance • I observed others performing the task • I gained exposure to this task only through supplemental education or experience • I did not have any exposure to this task	C6
			How frequently did you perform (or observe others performing) the task during your IDP experience? • Rarely (1-2 times) • Sometimes (monthly or less) • Often (weekly) • Regularly	C7

NCARB'S KEY FINDINGS

The *2012 NCARB Practice Analysis of Architecture* provided an opportunity to analyze the Intern Development Program (IDP) in relation to the contemporary practice of architecture, as well as establish a foundation of knowledge to inform the future evolution of the program.

The resulting findings were the product of four key areas of analysis:

- Task relevance
- Level of performance
- Frequency of performance
- Value of supplemental education/experience

TASK RELEVANCE

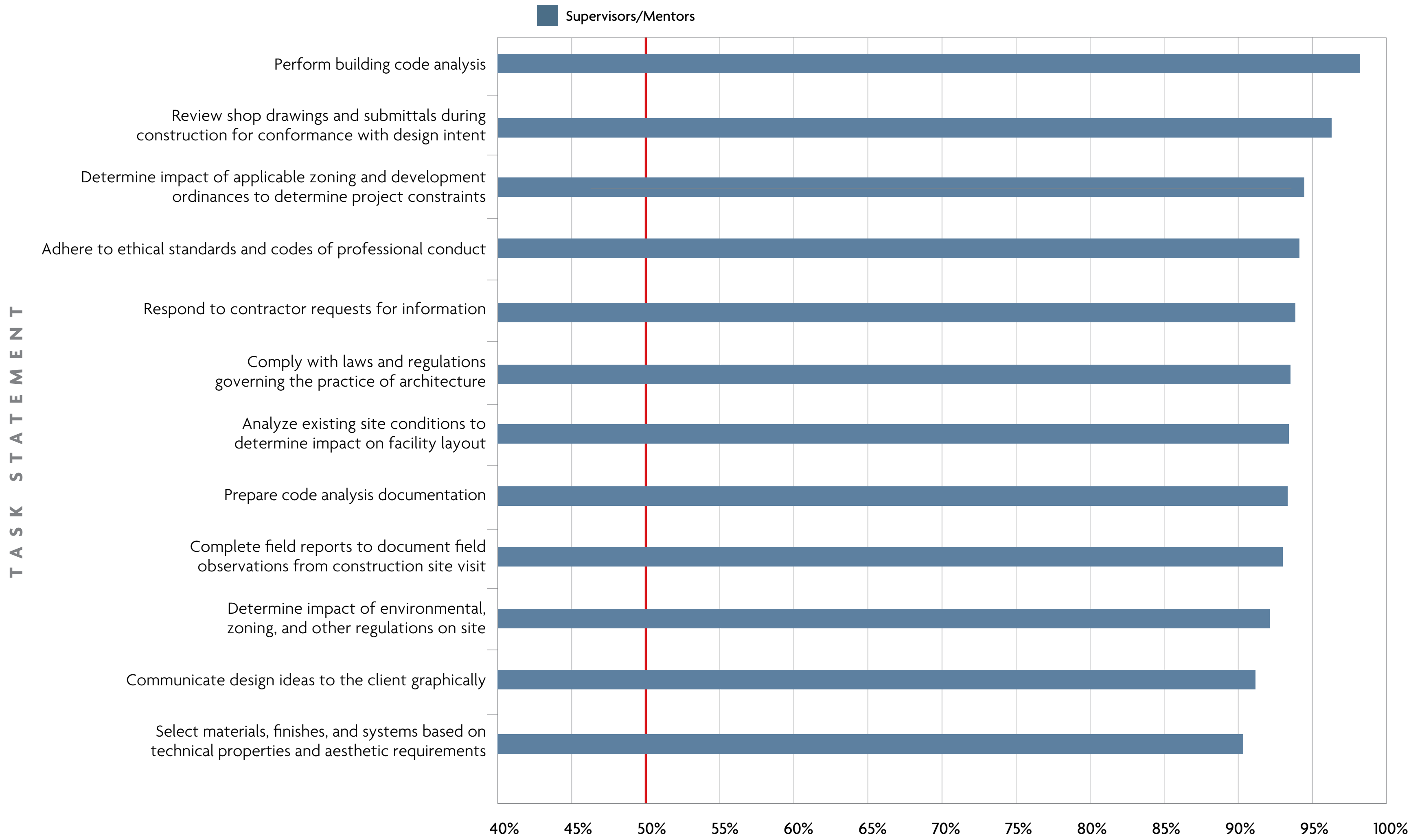
One use of the results of the Practice Analysis was the identification of tasks that are most relevant to internship and practice as identified by supervisors and mentors. The NCARB Internship Committee used these findings to help determine which tasks should be required as part of the IDP and how those tasks should be linked to the 17 existing IDP experience areas, which can be found in the IDP Guidelines.

Ultimately, the new list of tasks resulting from the 2012 Practice Analysis will form the basis of the next generation of the IDP.

HIGHEST RATED TASKS

The chart below identifies tasks that over 50 percent of supervisors and mentors believe should be required as part of the IDP. These tasks represent 96 of the 136 total tasks included in the survey.

TASKS IDENTIFIED BY OVER 50% OF SUPERVISORS/MENTORS AS "SHOULD BE INCLUDED IN THE IDP"



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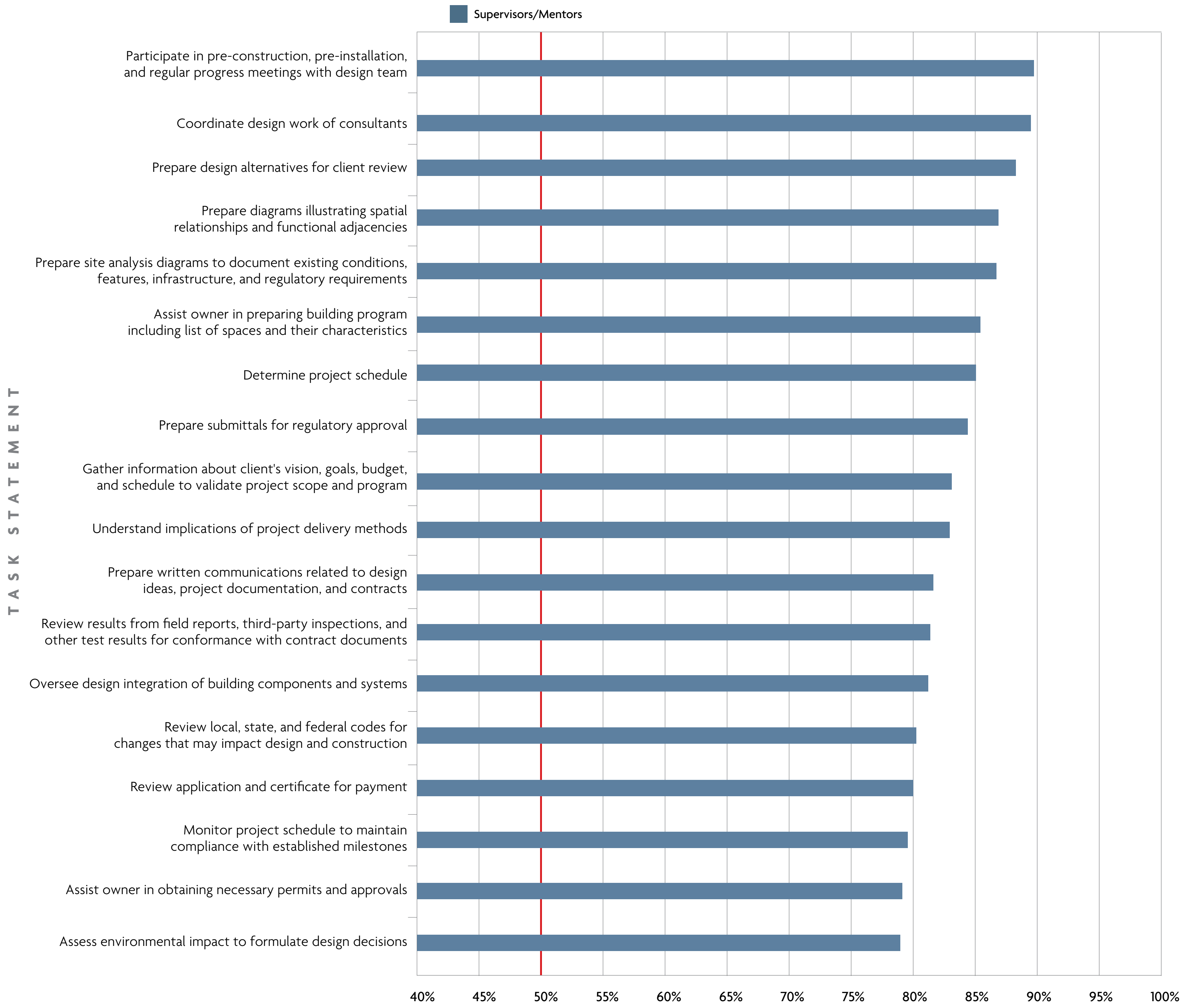
TASKS IDENTIFIED BY OVER 50% OF SUPERVISORS/MENTORS AS "SHOULD BE INCLUDED IN THE IDP" (CONT.)



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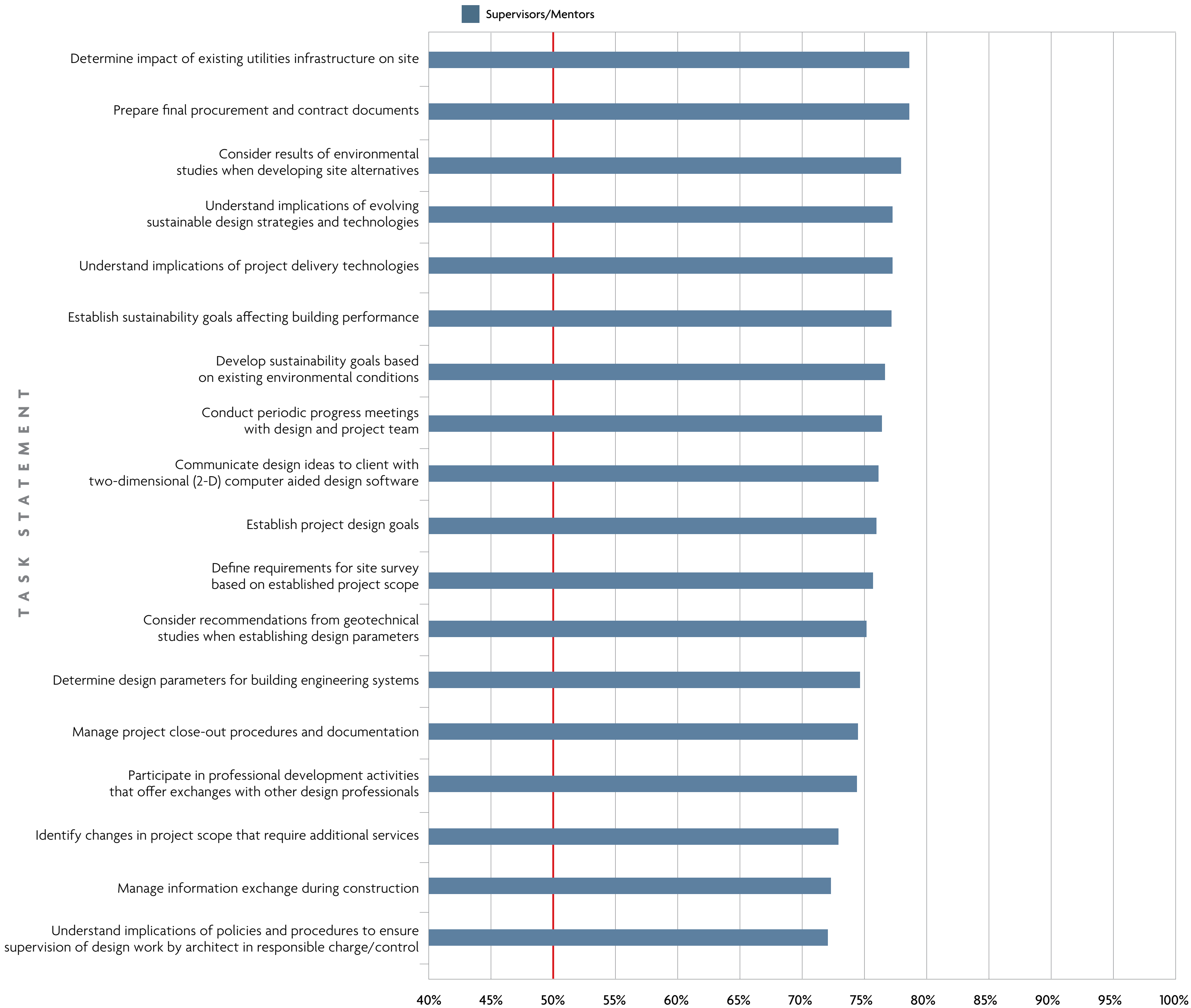
TASKS IDENTIFIED BY OVER 50% OF SUPERVISORS/MENTORS AS "SHOULD BE INCLUDED IN THE IDP" (CONT.)



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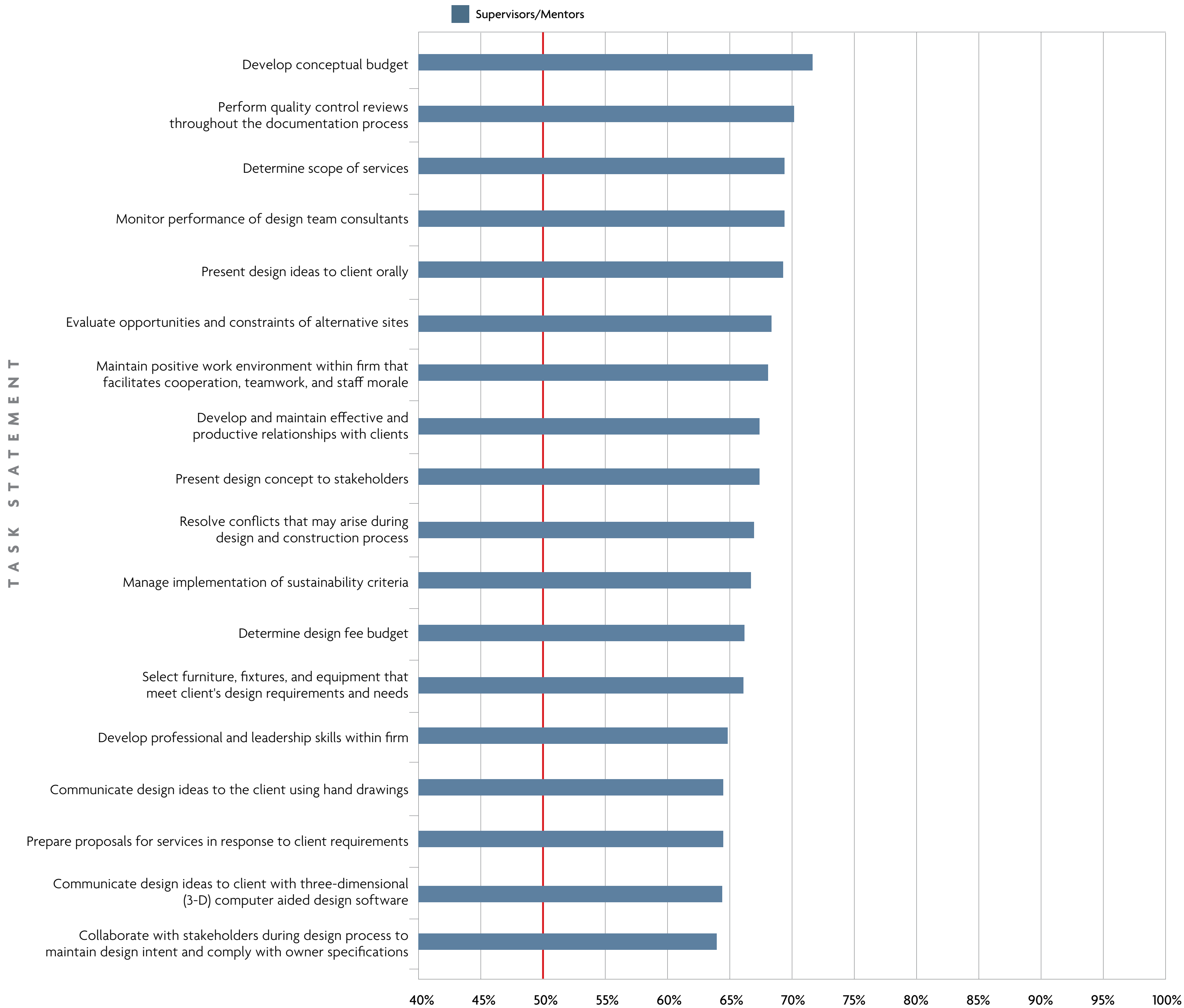
TASKS IDENTIFIED BY OVER 50% OF SUPERVISORS/MENTORS AS "SHOULD BE INCLUDED IN THE IDP" (CONT.)



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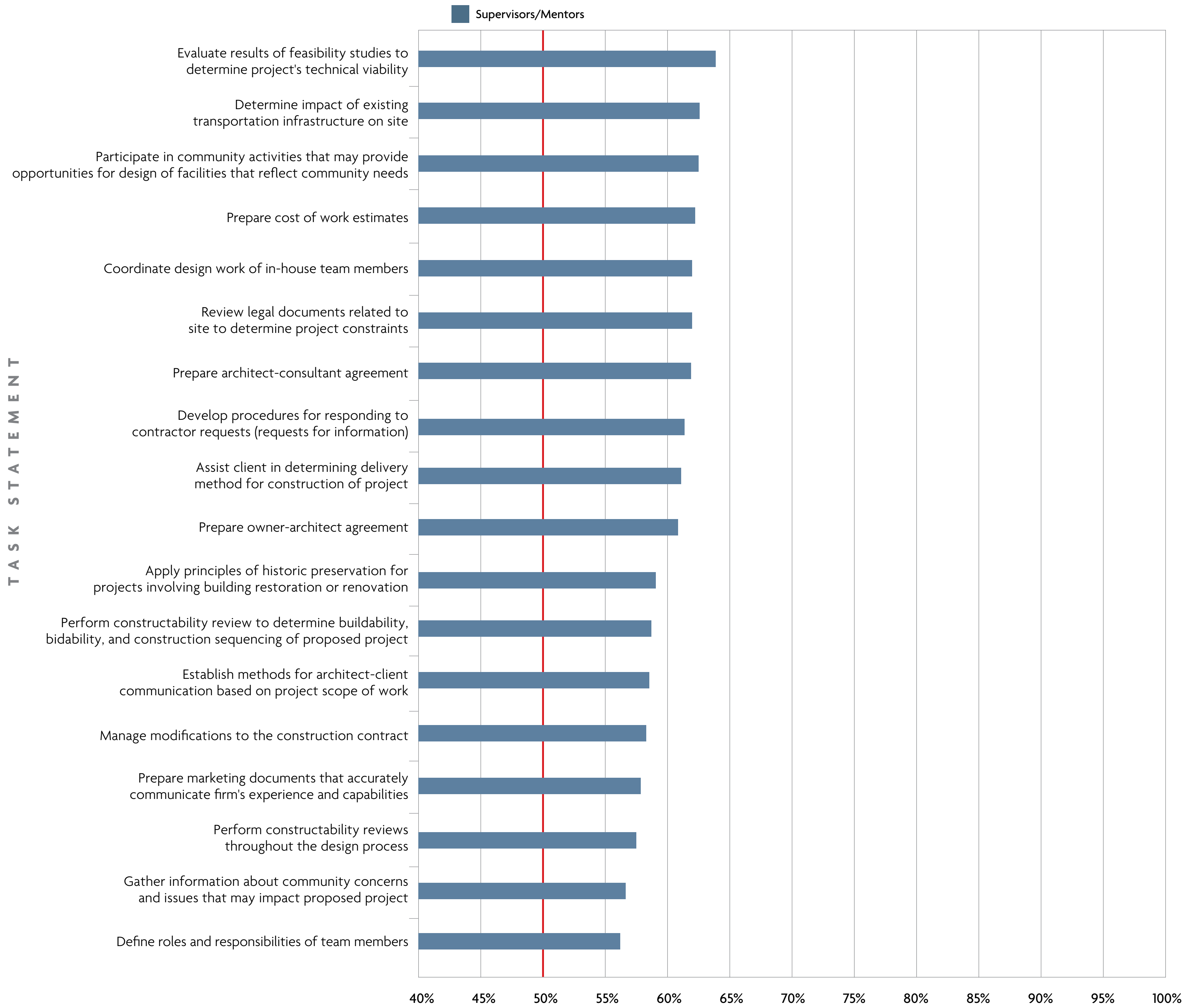
TASKS IDENTIFIED BY OVER 50% OF SUPERVISORS/MENTORS AS “SHOULD BE INCLUDED IN THE IDP” (CONT.)



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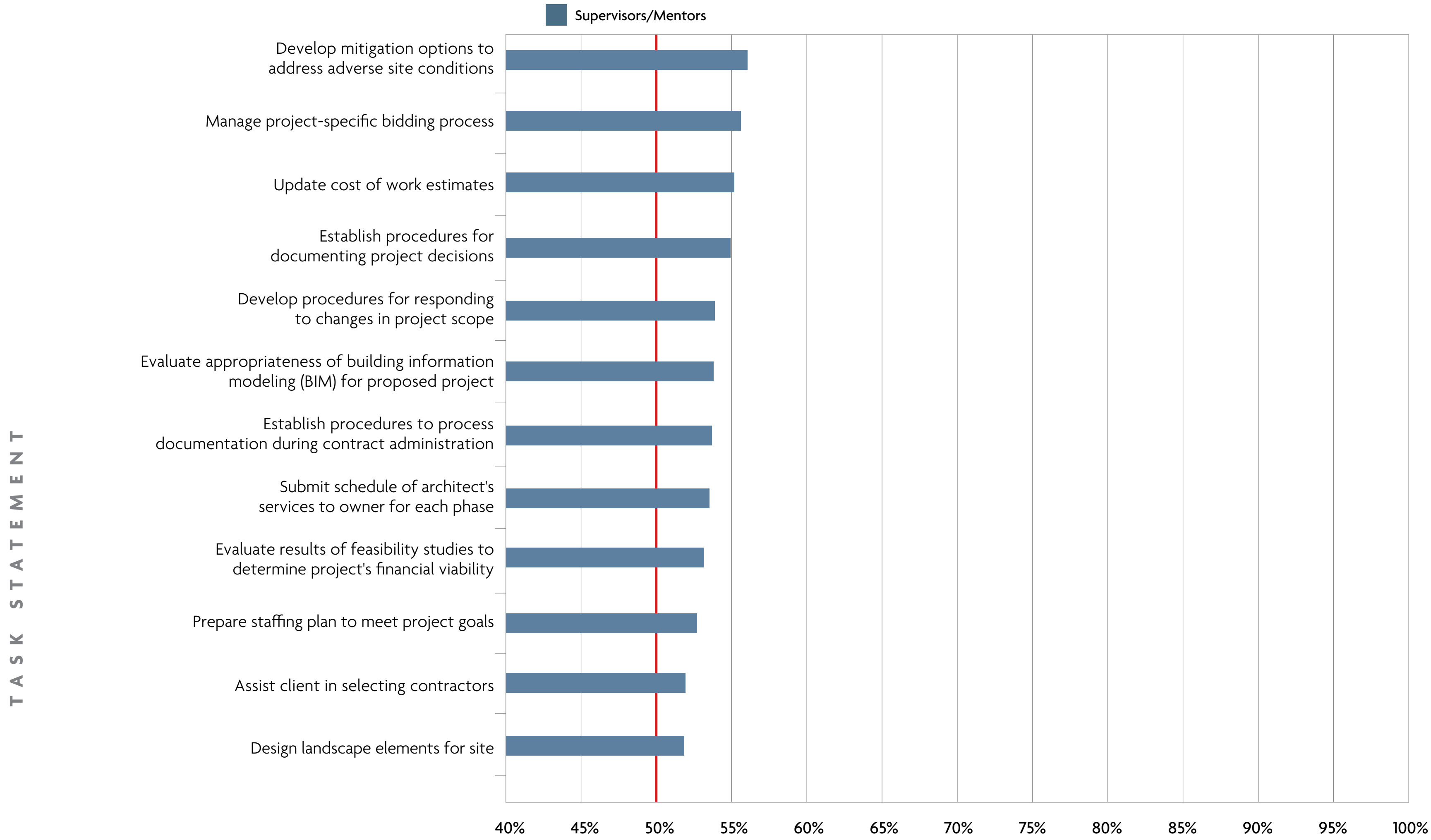
TASKS IDENTIFIED BY OVER 50% OF SUPERVISORS/MENTORS AS "SHOULD BE INCLUDED IN THE IDP" (CONT.)



These 96 tasks were subsequently reviewed by the Internship Committee and individually linked to the appropriate IDP experience areas. Of the linked tasks, the committee identified seven as tasks that occur throughout the course of a project and therefore belong in multiple IDP experience areas. The committee recommended that particular attention be paid to these seven tasks when considering how they are incorporated into the IDP experience areas in the future.

IDP TASK #	TASK STATEMENT	IDP EXPERIENCE AREAS																
		CATEGORY 1: PRE-DESIGN				CATEGORY 2: DESIGN							CATEGORY 3: PROJECT MANAGEMENT				CATEGORY 4: PRACTICE MANAGEMENT	
		PROGRAMMING	SITE AND BUILDING ANALYSIS	PROJECT COST AND FEASIBILITY	PLANNING AND ZONING REGULATIONS	SCHEMATIC DESIGN	ENGINEERING SYSTEMS	CONSTRUCTION COST	CODES AND REGULATIONS	DESIGN DEVELOPMENT	CONSTRUCTION DOCUMENTS	MATERIAL SELECTION AND SPECIFICATION	BIDDING AND CONTRACT NEGOTIATION	CONSTRUCTION ADMINISTRATION	CONSTRUCTION PHASE: OBSERVATION	GENERAL PROJECT MANAGEMENT	BUSINESS OPERATIONS	LEADERSHIP AND SERVICE
2	Prepare design alternatives for client review	X	X		X	X	X			X								
26	Present design ideas to client orally	X	X			X	X			X	X	X						
28	Communicate design ideas to the client graphically	X	X		X	X	X			X	X			X				
29	Communicate design ideas to the client using hand drawings	X	X			X				X								
30	Communicate design ideas to client with two-dimensional (2-D) computer aided design software	X				X				X	X							
31	Communicate design ideas to client with three-dimensional (3-D) computer aided design software	X				X				X	X							
117	Understand implications of evolving sustainable design strategies and technologies	X	X	X		X	X	X	X	X	X	X						

LOWEST RATED TASKS

The remaining 40 tasks (those that less than 50 percent of supervisors and mentors indicated should be required as part of the IDP) were also individually reviewed to ensure that none of critical importance were overlooked. In all cases, the tasks either represented elements beyond the typical scope of an architect's independent practice, or represented areas of expertise that an architect would naturally acquire over the course of an entire career.

Supervisors and mentors rated IDP Task #50 and IDP Task #57 at 47.8 percent and 46.4 percent respectively, falling just below the 50 percent mark. After significant discussion, the Internship Committee ultimately confirmed these two tasks should not be included in the IDP:

- IDP Task #50 – "*Design building structural system*" (47.8 percent)—The committee noted that the "design" of a structural system is typically the responsibility of a structural engineer, with most architects serving primarily in a coordination function.
- IDP Task #57 – "*Prepare life cycle costs analysis*" (46.4 percent)—This represents a task learned by architects through both experience and continuing education throughout their career.

IDP Task #47 and IDP Task #129 are two of the lowest rated tasks, and the committee agreed they should not be included in the IDP:

- IDP Task #47 – "*Institute procedures to ensure privacy and security of project documentation and information technology*" (24.8 percent)—The committee recognized this task as an important aspect of project management; however, it felt the skills related to this task can better be performed in consultation with information technology specialists.
- IDP Task #129 – "*Institute procedures to manage alternative work scenarios—e.g., offshore, home*" (10.5 percent)—This represents expertise that can be acquired through experience over the course of a career, generally post-licensure.

TASK COMPARISON

Finally, the Internship Committee compared the new list of tasks to the tasks identified in the *2007 Practice Analysis of Architecture*. All of the previous 2007 tasks were identified as covered by the new 2012 tasks with the exception of one: "*Prepare specifications based on performance criteria*." The committee determined this task should be retained and incorporated into future IDP requirements.

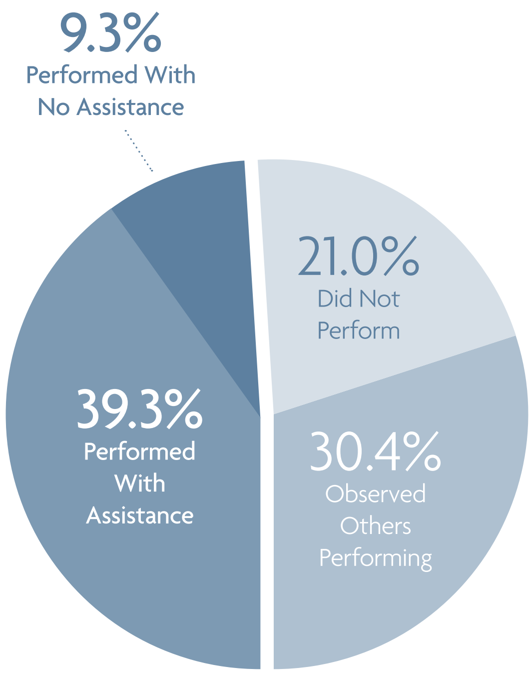
LEVEL OF PERFORMANCE

When reviewing the survey results, it is useful and informative to compare and contrast the responses of supervisors, mentors, and architects licensed two to 10 years with those of interns and more recently licensed architects. The following charts and tables share data regarding level of task performance and identify areas of agreement and disagreement among the respondent groups. The data presented in this section includes only the 96 tasks identified by more than 50 percent of supervisors and mentors as those that should be required as part of the IDP. The entire data set may be referenced in the Internship Data Tables.

The IDP Guidelines state, "Upon the completion of the IDP, you should be able to complete the tasks associated with each experience area."

The pie chart below indicates the mean response rates of supervisors and mentors when asked how interns they supervised or mentored in the past two years typically performed tasks by completion of the IDP.

HOW DID THE INTERNS YOU SUPERVISED OR MENTORED DURING THE PAST TWO YEARS TYPICALLY PERFORM THE TASK BY COMPLETION OF THE IDP?



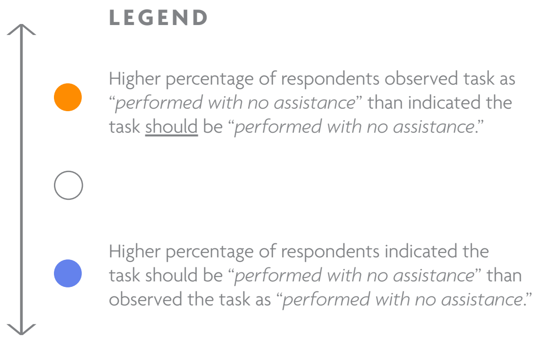
Very few responses indicated tasks were "*performed with no assistance*," identifying a significant gap between the observed level of intern performance versus the level of performance expected from interns by the IDP. This area of concern should be addressed through a combination of future program development and improved supervisor/firm education. Although it is expected that interns perform tasks independently upon completion of the program, it is understood that interns may not always be granted the full authority to do so by supervisors and firms until licensure is achieved. This key finding represents two opportunities. A future internship program could be structured in a way that encourages more tasks to be completed without assistance by the completion of internship. Additionally, increased supervisor/firm education could communicate and encourage greater intern independence during internship.

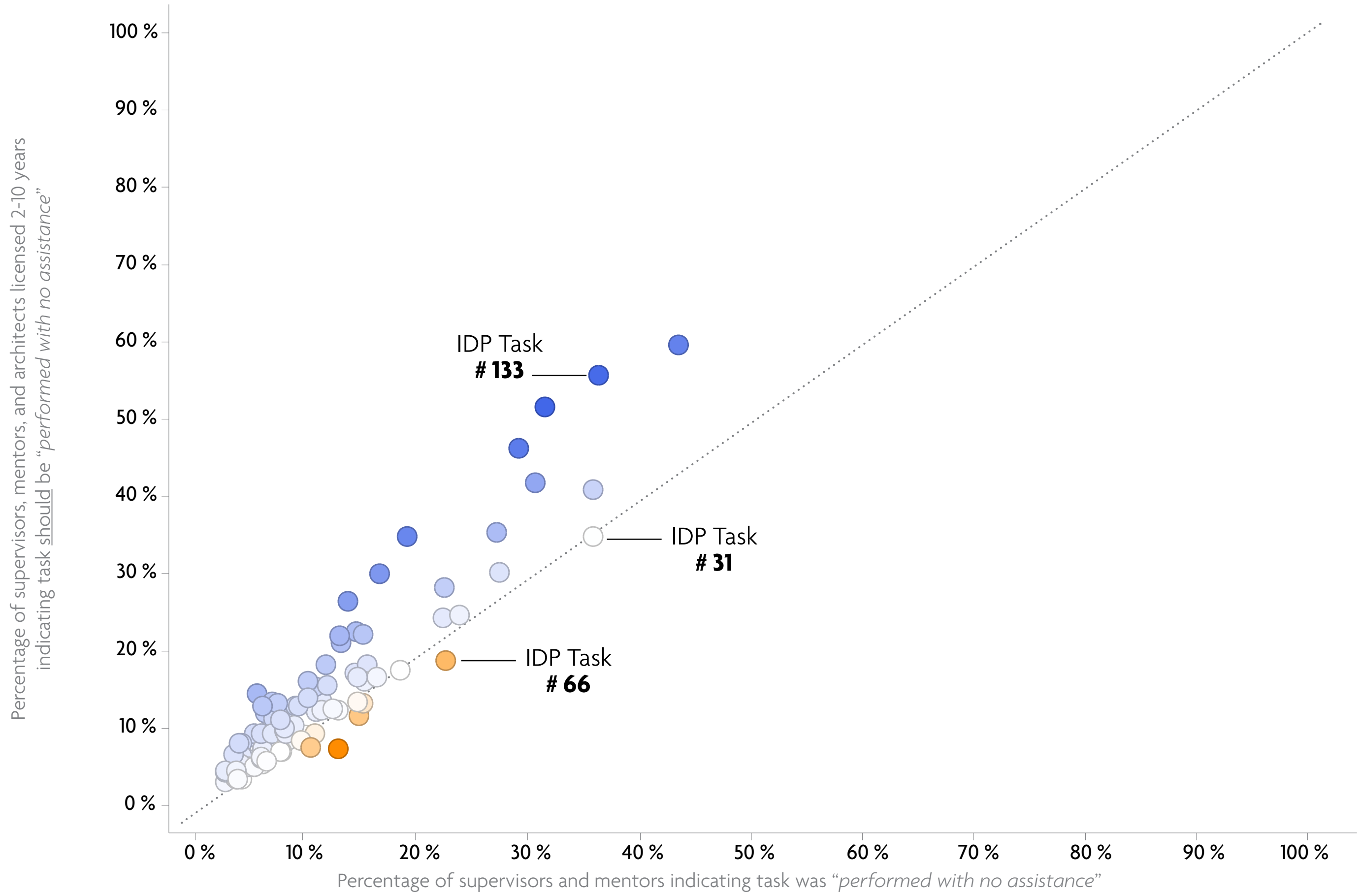
A corresponding question was posed of supervisors, mentors, and architects licensed 2-10 years asking them to indicate the level at which interns should perform the tasks by completion of the IDP. The scatter plot below identifies how respondents rated the level of actual intern performance by task in relation to the level at which they believe each task should be performed, specifically in regard to the level "*performed with no assistance*."

Each dot on this scatter plot represents a specific task, with position on the x-axis determined by the percentage of supervisors and mentors who indicated that they observed the task as being "*performed without assistance*" by their interns by the completion of the IDP.

The y-axis represents the percentage of supervisors, mentors, and architects licensed 2-10 years who indicated that the same task should be "*performed with no assistance*" by the completion of IDP.

The diagonal line represents perfect agreement among responses to the two questions. If a task was observed as being "*performed with no assistance*" to the same degree as supervisors/mentors/architects indicated it should be "*performed with no assistance*," it will appear on or close to this line.





The scatter plot reveals a general consensus between the low percentages indicated in actual performance and similarly low percentages in expected performance regarding the level "*performed with no assistance*." This is indicated by the clustering of dots in the lower left corner of the scatter plot. For example, IDP Task #31 "*Communicate design ideas to client with three-dimensional (3-D) computer aided design software*," shows close agreement, as 33.5 percent of supervisors and mentors said it was being "*performed with no assistance*," and 33.6 percent indicated that it <u>should</u> be "*performed with no assistance*."

While there is general agreement across most tasks, two areas of disagreement are worth noting. IDP Task #66 "*Respond to contractor requests for information*," shows some disagreement, as 20.2 percent of supervisors and mentors said it was being "*performed with no assistance*," and 17.4 percent indicated that it <u>should</u> be "*performed with no assistance*." Furthermore, IDP Task #133 "*Participate in professional development activities that offer exchanges with other design professionals*," shows significant disagreement, as 33.9 percent of supervisors and mentors said it was being "*performed with no assistance*" and 54.5 percent indicated that it <u>should</u> be "*performed with no assistance*."

As the chart illustrates, the significant number of tasks that received low percentage ratings for actual performance with no assistance is somewhat offset, as supervisors, mentors, and architects licensed two to 10 years agreed that most tasks should not need to be "*performed with no assistance*" by the completion of internship. Here again, the data indicates that supervisors may not be offering enough opportunities for interns to independently perform tasks prior to licensure. This reinforces the need for the potential solutions mentioned previously of both modifying the approach of a future internship program as well as increasing supervisor/firm education.

Supervisors may not be offering enough opportunities for interns to independently perform tasks prior to licensure.

Data regarding level of performance was also collected from a population of interns who completed the IDP within the past year and architects licensed in the past year who also completed IDP in the past two years. The scatter plot below reveals a disconnect between the level of performance observed by supervisors and mentors and the level of performance indicated by interns and recently licensed architects, specifically in regard to the level "*performed with no assistance*."

Each dot on this scatter plot represents a specific task, with position on the x-axis determined by the percentage of interns and recently licensed architects who reported the task as "*performed with no assistance*" by the completion of the IDP.

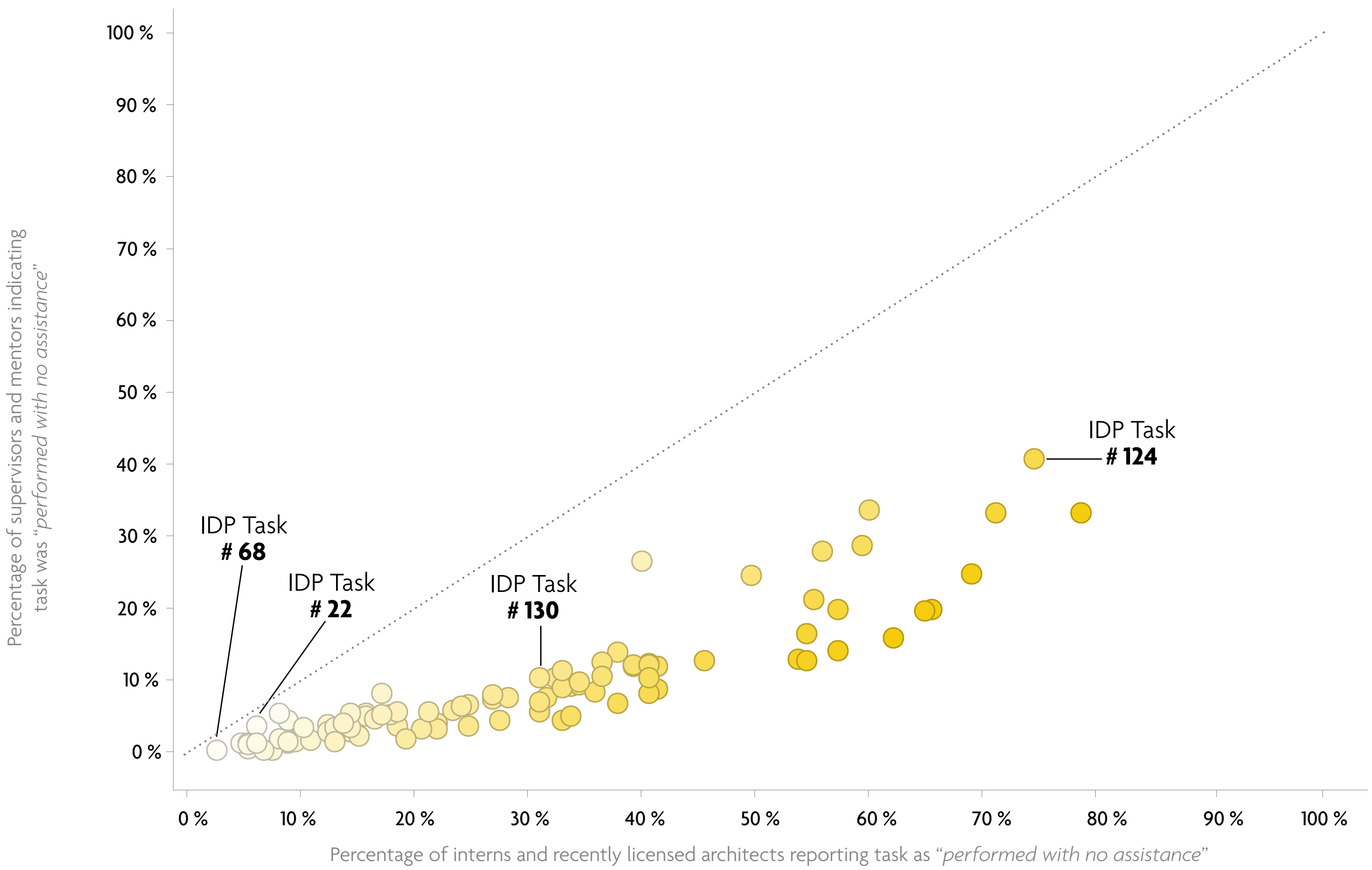
The y-axis represents the percentage of supervisors and mentors who indicated that they observed the same task as being "*performed with no assistance*" by their interns by the end of the IDP.

The diagonal line represents perfect agreement between the two groups. If supervisors and mentors indicated observing the task to the same degree as interns and recently licensed architects indicated performing the task, it will appear on or close to this line.

LEGEND

Higher percentage of interns reported the task was "*performed with no assistance*" than supervisors/mentors observed.

Higher percentage of supervisors/mentors observed the task being "*performed with no assistance*" than interns indicated performing.



The clustering of dots below the line illustrates that, for each task surveyed, interns and recently licensed architects always reported a higher level of "*performance with no assistance*" versus what supervisors and mentors observed.

For example, IDP Task #68 "*Prepare owner-architect agreement*," shows disagreement, as 0.6 percent of supervisors and mentors said it was being "*performed with no assistance*," while 2.7 percent of interns and recently licensed architects indicated that it was "*performed with no assistance*." Additionally, IDP Task #22 "*Consider results of environmental studies when developing site alternatives*," shows disagreement, as 3.9 percent of supervisors and mentors said it was being "*performed with no assistance*," while 6.1 percent of interns and recently licensed architects indicated that it was "*performed with no assistance*." Even more significantly, IDP Task #124 "*Adhere to ethical standards and codes of professional conduct*," shows considerable disagreement, as 41.1 percent of supervisors and mentors said it was being "*performed with no assistance*," while 73.5 percent of interns and recently licensed architects indicated that it was "*performed with no assistance*." Additionally, IDP Task #130 "*Evaluate appropriateness of building information modeling (BIM) for proposed project*," shows considerable disagreement, as 10.7 percent of supervisors and mentors said it was being "*performed with no assistance*," while 30.6 percent of interns and recently licensed architects indicated that it was "*performed with no assistance*."

The difference in response between supervisors/mentors and interns/recently licensed architects may be explained by a combination of the following factors:

1. Interns and recently licensed architects are more closely connected and knowledgeable about the current internship format, and

2. Supervisors and mentors may have a greater understanding of the actual scope of a particular task in practice, and thus are expecting an intern to reach a level at which no assistance is required.

Interns and recently licensed architects always reported a higher level of "*performance with no assistance*" versus what supervisors and mentors observed.

Further disagreement between these populations emerges when examining data regarding the actual level of performance, as indicated by both supervisors/mentors and interns/recently licensed architects, and the level of performance that supervisors, mentors, and architects licensed two to 10 years indicated should be performed by completion of the IDP. The table below shows tasks with disagreement of 15 percent or more between the combined ratings of "*performed with assistance*" and "*performed with no assistance*" for both populations and similarly combined ratings indicated by supervisors and mentors regarding the level at which tasks should be performed by completion of the IDP.

IDP TASK #	TASK STATEMENT	SUPERVISORS AND MENTORS			INTERNS & RECENTLY LICENSED ARCHITECTS			SUPERVISORS, MENTORS, AND ARCHITECTS LICENSED 2-10 YEARS		
		OBSERVED PERFORMANCE			SELF-REPORTED PERFORMANCE			LEVAL AT WHICH TASK SHOULD BE PERFORMED		
		PERFORMED WITH ASSISTANCE	PERFORMED WITH NO ASSISTANCE	TOTAL OBSERVED PERFORMANCE	PERFORMED WITH ASSISTANCE	PERFORMED WITH NO ASSISTANCE	TOTAL SELF-REPORTED PERFORMANCE	PERFORMED WITH ASSISTANCE	PERFORMED WITH NO ASSISTANCE	TOTAL "SHOULD BE PERFORMED"
48	Prepare cost of work estimates	22.5%	2.7%	25.2%	12.9%	31.3%	44.2%	64.0%	3.8%	67.8%
49	Update cost of work estimates	25.4%	3.8%	29.2%	14.3%	27.9%	42.2%	66.2%	8.1%	74.3%
58	Perform constructability review to determine buildability, bidability, and construction sequencing of proposed project	17.2%	1.3%	18.5%	5.4%	28.6%	34.0%	45.5%	5.4%	50.8%
59	Perform constructability reviews throughout the design process	18.5%	1.8%	20.3%	8.8%	30.6%	39.5%	50.6%	6.7%	57.3%
68	Prepare owner-architect agreement	9.7%	0.6%	10.3%	2.7%	19.7%	22.4%	42.1%	3.0%	45.1%
69	Prepare architect-consulting agreement	10.0%	0.6%	10.6%	6.8%	19.0%	25.9%	42.8%	3.2%	46.0%
71	Apply principles of historic preservation for projects involving building restoration or renovation	31.9%	3.8%	35.7%	12.9%	33.3%	46.3%	65.9%	4.9%	70.8%
85	Manage implementation of sustainability criteria	39.1%	5.6%	44.7%	17.7%	23.1%	40.8%	64.1%	5.6%	69.7%
117	Understand implications of evolving sustainable design strategies and technologies	37.7%	8.0%	45.7%	27.9%	24.5%	52.4%	60.6%	12.8%	73.4%
122	Participate in community activities that may provide opportunities for design of facilities that reflect community needs	36.5%	26.8%	63.3%	39.5%	23.8%	63.3%	42.4%	45.0%	87.4%
133	Participate in professional development activities that offer exchanges with other design professionals	35.9%	33.9%	69.8%	59.2%	12.9%	72.1%	37.6%	54.5%	92.1%

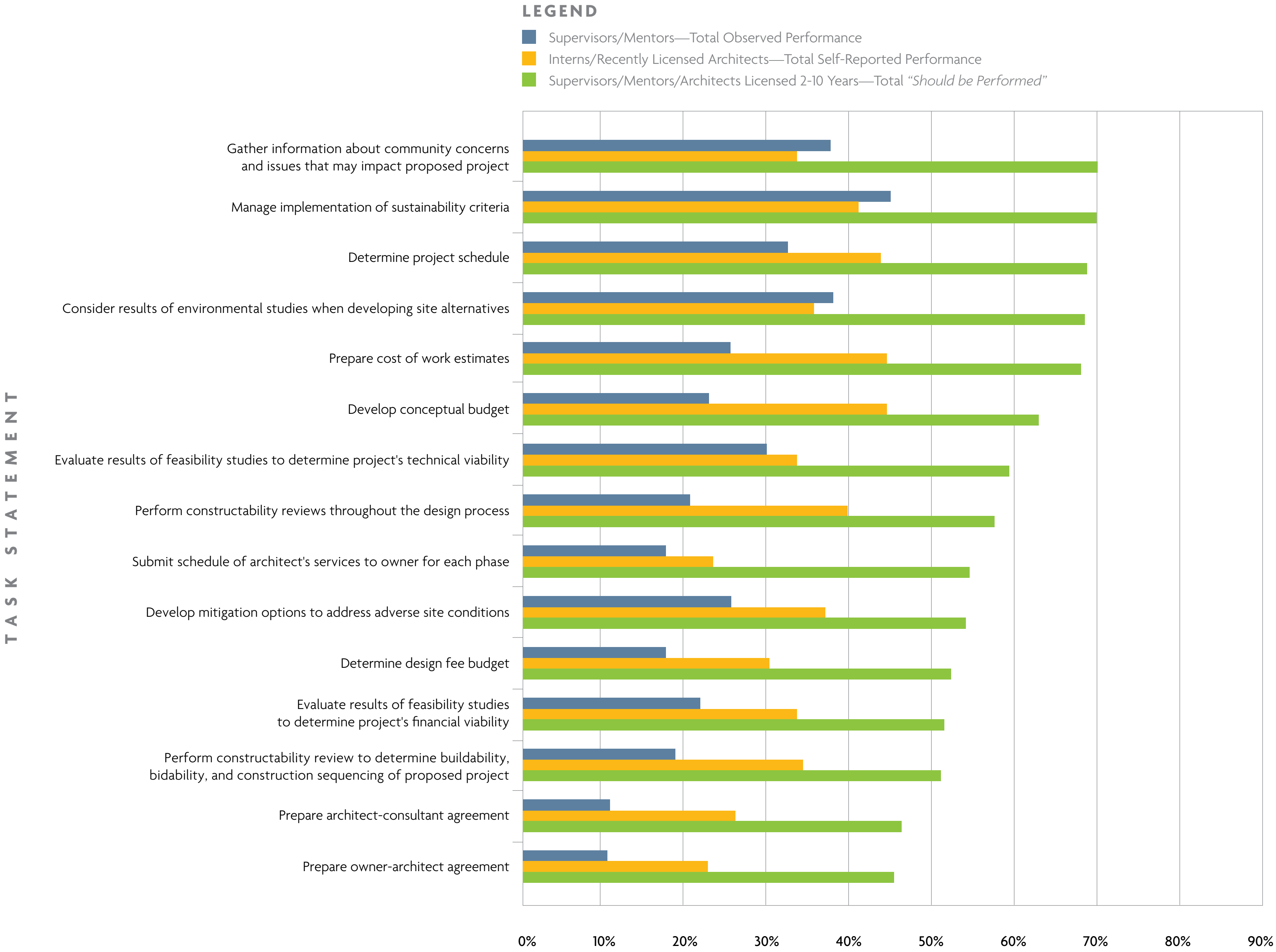
The following chart offers a comparison of the total performance ratings, defined here as the sum of responses for "*performed with assistance*" and "*performed with no assistance*." Contrasted below are the total observed performance ratings (by supervisors and mentors) and the total self-reported performance ratings (by interns and recently licensed architects) in relation to the total ratings for the level at which the task should be performed (as indicated by supervisors, mentors, and architects licensed 2-10 years).

ITEMS INDICATING 15 PERCENTAGE POINT DISAGREEMENT BETWEEN THE LEVEL A TASK SHOULD BE PERFORMED AND ITS PERFORMANCE BY INTERNS AND RECENTLY LICENSED ARCHITECTS

CONTINUED

For example, IDP Task #71 "*Apply principles of historic preservation for projects involving building restoration or renovation*" indicates a combined rating of 35.7 percent for supervisors/mentors and 46.3 percent for interns/recently licensed architects regarding the actual levels at which interns "*performed the task with assistance*" and "*performed the task with no assistance*." However, 70.8 percent of supervisors, mentors, and architects licensed two to 10 years indicated that it should be "*performed with assistance*" or "*performed with no assistance*."

ITEMS INDICATING 15 PERCENTAGE POINT DISAGREEMENT BETWEEN THE LEVEL A TASK SHOULD BE PERFORMED AND ITS PERFORMANCE BY INTERNS AND RECENTLY LICENSED ARCHITECTS (CONT.)



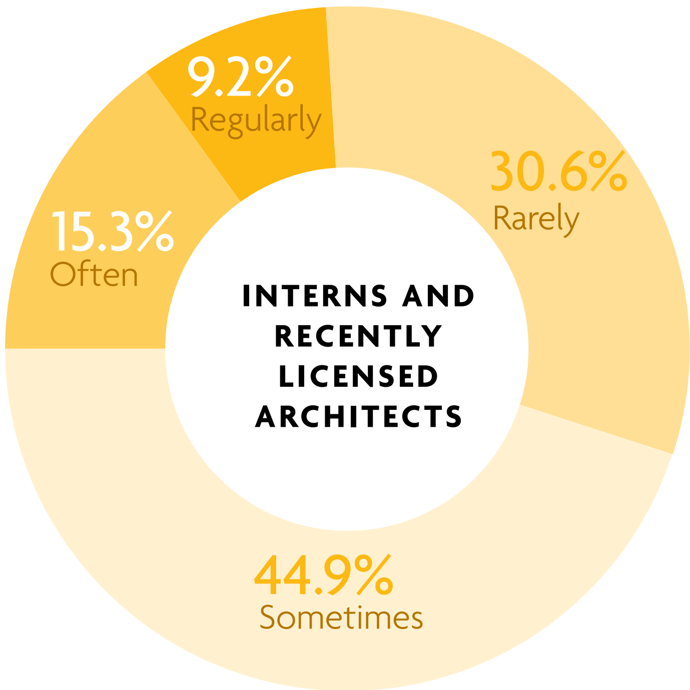
FREQUENCY OF PERFORMANCE

Data regarding the frequency at which tasks were performed during internship was collected for the first time in the Practice Analysis survey, and will be used to guide the weighting and distribution of hours in the next iteration of the IDP.

Interns who completed the IDP within the past year and architects licensed in the past year (who completed IDP in the past two years) were asked to indicate how frequently they performed (or observed others performing) each task during their internship. As the pie chart below illustrates, the combined mean response ratings for tasks performed "*rarely*" and "*sometimes*" was approximately 75 percent. Surprisingly, only 25 percent of responses rated a task as being performed "*often*" or "*regularly*."

Only 25 percent of the tasks included in the survey were rated as performed "*often*" or "*regularly*."

FREQUENCY OF TASK PERFORMANCE (MEAN RESPONSE RATINGS)



The table below compares the frequency of task performance to the percentage of IDP supervisors, mentors, and architects licensed two to 10 years who indicated the task should be required as part of the IDP. The selected sample highlights the three tasks with the highest rating across each of the four frequency levels.

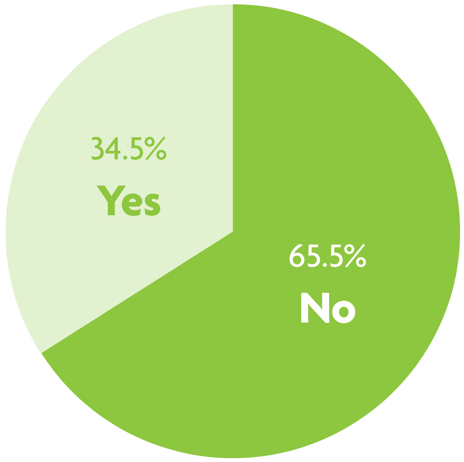
IDP TASK #	TASK STATEMENT	INTERNS WHO COMPLETED IDP WITHIN THE PAST YEAR, AND ARCHITECTS LICENSED IN THE PAST YEAR AND COMPLETED IDP IN PAST 2 YEARS				IDP SUPERVISORS AND MENTORS ARCHITECTS LICENSED 2-10 YEARS
		FREQUENCY AT WHICH TASK PERFORMED				SHOULD BE REQUIRED AS PART OF IDP
		RARELY (1-2 TIMES)	SOMETIMES (MONTHLY OR LESS)	OFTEN (WEEKLY)	REGULARLY	
36	Gather information about community concerns and issues that may impact proposed project	**64.4%**	32.2%	3.3%	0.0%	**56.1%**
22	Consider results of environmental studies when developing site alternatives	**56.2%**	30.3%	11.2%	2.2%	**77.5%**
19	Consider recommendations from geotechnical studies when establishing design parameters	**53.9%**	39.1%	2.6%	4.3%	**74.7%**
73	Present design concept to stakeholders	29.4%	**61.8%**	6.9%	2.0%	**66.9%**
120	Understand implications of project delivery methods	27.9%	**61.5%**	6.6%	4.1%	**82.6%**
15	Determine impact of environmental, zoning and other regulations on site	24.3%	**61.4%**	8.6%	5.7%	**91.8%**
74	Coordinate design work of consultants	3.5%	29.9%	**40.3%**	26.4%	**89.1%**
28	Communicate design ideas to the client graphically	3.4%	32.2%	**37.7%**	26.7%	**90.9%**
27	Prepare written communications related to design ideas, project documentation and contracts	9.7%	33.8%	**37.2%**	19.3%	**81.3%**
125	Comply with laws and regulations governing the practice of architecture	5.6%	11.3%	14.1%	**69.0%**	**93.2%**
124	Adhere to ethical standards and codes of professional conduct	5.7%	15.0%	12.9%	**66.4%**	**93.8%**
111	Maintain positive work environment within firm that facilitates cooperation, teamwork, and staff morale	7.8%	20.3%	27.3%	**44.5%**	**67.6%**

These findings will influence future hourly requirements for each experience area. For example, a task that is performed rarely yet identified by a large number of respondents as one that should be required as part of the IDP may have its hourly requirement maintained in the related experience area, but be paired with a supplemental experience opportunity. In contrast, a task performed rarely and also ranked as a task that should be required in the IDP by a small number of respondents could result in a reduction of the core hour requirement in the related experience area.

VALUE OF SUPPLEMENTAL EDUCATION/EXPERIENCE

The Practice Analysis also provided valuable feedback from practitioners on whether they view supplemental education/experience as acceptable in lieu of on-the-job performance of specific tasks during internship.

The pie chart to the right indicates that most IDP supervisors and mentors, and architects licensed two to 10 years, believe that supplemental education/experience is not an acceptable substitute.



Supplemental education/experience was identified by more than 50 percent of respondents as a suitable alternative for only 11 of 96 tasks. This key finding signals that **the role of supplemental education/experience should be closely evaluated during any future program development**, as noted earlier in the Use and Application section of this report.

IDP TASK #	TASK STATEMENT	SUPPLEMENTAL EDUCATION/EXPERIENCE ACCEPTABLE IN LIEU OF ON-THE-JOB PERFORMANCE
		PERCENTAGE OF RESPONDENTS WHO SAID "YES"
13	Determine impact of existing transportation infrastructure on site	50.1%
14	Assess environmental impact to formulate design decisions	55.5%
20	Develop sustainability goals based on existing environmental conditions	58.7%
21	Establish sustainability goals affecting building performance	60.3%
22	Consider results of environmental studies when developing site alternatives	51.1%
23	Develop mitigation options to address adverse site conditions	51.5%
24	Review legal documents related to site to determine project constraints	51.2%
71	Apply principles of historic preservation for projects involving building restoration or renovation	57.3%
117	Understand implications of evolving sustainable design strategies and technologies	60.2%
119	Understand implications of project delivery technologies	55.4%
120	Understand implications of project delivery methods	56.5%

INTERNSHIP SURVEY RESULTS

IDP TASK RATINGS

TASKS PERFORMED IN IDP WITH VS. WITHOUT ASSISTANCE

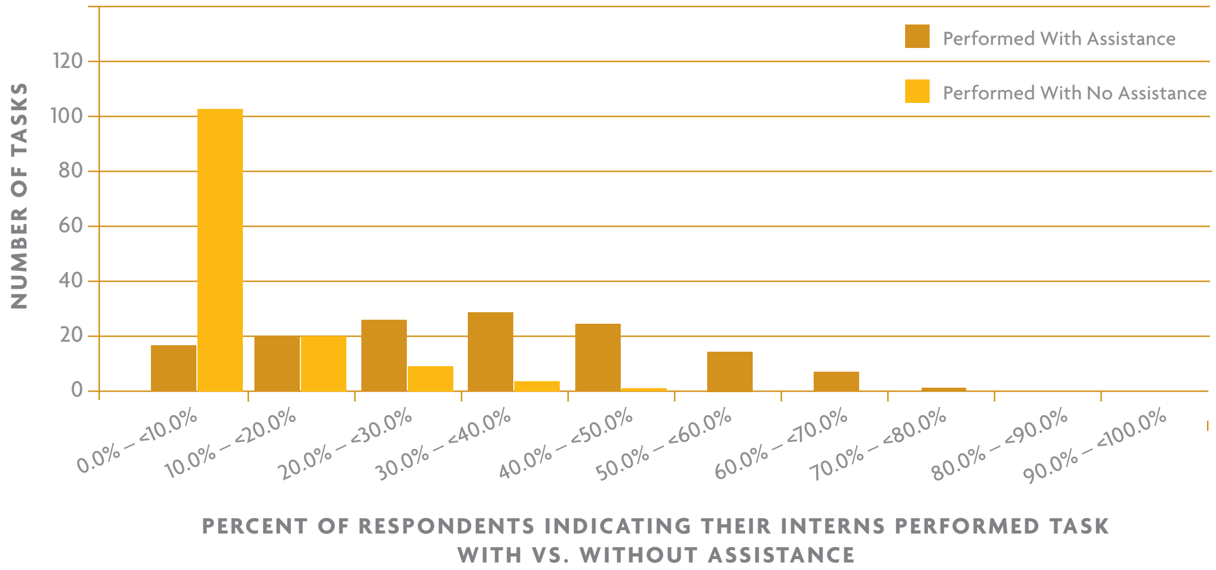
A total of 1,003 IDP supervisors and mentors responded to the Internship (IDP) survey and indicated how IDP interns in the past two years typically performed tasks by completion of the IDP. Data Table C2 lists the percent of IDP supervisors' and mentors' ratings of intern performance of each IDP task as follows:

- *My interns did not perform this task*
- *My interns observed others performing this task*
- *My interns performed this task with assistance*
- *My interns performed this task with no assistance*

For example, with IDP Task #1 "*Gather information about client's vision, goals, budget, and schedule to validate project scope and program*," 12.1 percent of the supervisors and mentors indicated that their interns "*did not perform*" the task, 35.4 percent indicated their interns "*observed others performing*" the task, 48.7 percent indicated their interns "*performed with assistance*," and 3.9 percent indicated their interns "*performed with no assistance*."

The chart below displays the distribution of IDP supervisors and mentors who indicated that interns who "*performed this task with assistance*" versus "*performed this task with no assistance*." For example, 28 tasks were rated by 40 percent to 50 percent of IDP supervisors and mentors as "*performed this task with assistance*." Three tasks were rated by 40 percent to 50 percent as "*performed this task with no assistance*." Overall, a substantially greater number of tasks were rated by IDP supervisors and mentors as "*performed with assistance*" compared to tasks rated as "*performed with no assistance*."

DISTRIBUTION OF IDP TASK RATINGS: PERCENT OF IDP SUPERVISORS AND MENTORS WHO INDICATED INTERNS PERFORM TASKS WITH VS. WITHOUT ASSISTANCE

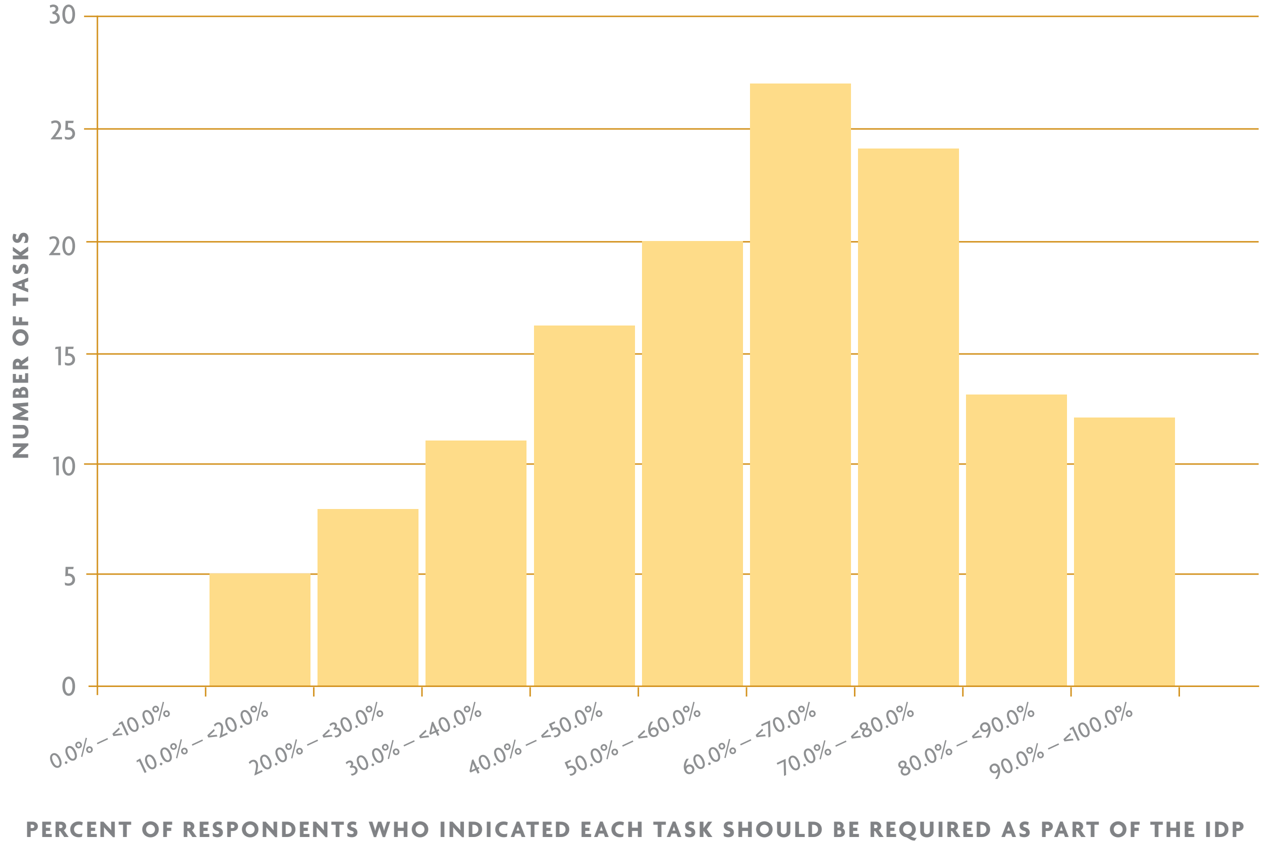


TASK INCLUSION IN IDP

A total of 1,152 IDP supervisors, mentors, and architects (licensed 2-10 years) provided ratings on whether each IDP task should be required as part of the IDP. Data Table C3 lists the percent of IDP supervisors, mentors, and architects who rated *"yes"* or *"no"* on whether each task should be included. For example, with IDP Task #1 "*Gather information about client's vision, goals, budget, and schedule to validate project scope and program*," 82.7 percent of the supervisors, mentors, and architects indicated the task should be included as part of the IDP and 17.3 percent indicated the task should not be included.

The chart below displays the distribution of task ratings by IDP supervisors, mentors, and architects who indicated that tasks should be required as part of the IDP. For example, the chart indicates 12 tasks were rated by 90 percent or more respondents as tasks that should be included in the IDP. Thirteen (13) tasks were rated by 80 percent to 90 percent of IDP supervisors, mentors, and architects, as tasks that should be included. Overall, 96 out of 136 tasks (70.5 percent) were rated by 50 percent or more of IDP supervisors, mentors, and architects as tasks that should be included as part of the IDP.

DISTRIBUTION OF IDP TASK RATINGS: PERCENT OF SUPERVISORS, MENTORS, AND ARCHITECTS WHO INDICATED TASKS SHOULD BE REQUIRED IN IDP



LEVEL OF TASK PERFORMANCE IN IDP

The responding IDP supervisors, mentors, and architects who indicated that a given task should be included as part of the IDP were asked a follow-up question, to indicate what level interns should perform that task by the completion of the intern's IDP experience by choosing one of the following:

- *Interns should have observed others performing this task*
- *Interns should have performed this task with assistance*
- *Interns should have performed this task with no assistance*

Data Table C4 lists the percent of IDP supervisors, mentors, and architects who rated the level of intern performance. For example, with IDP Task #1 "*Gather information about client's vision, goals, budget, and schedule to validate project scope and program*," 44.6 percent of 953 IDP supervisors, mentors, and architects indicated that interns should have "*observed others performing the task*" by the completion of the IDP, 51.3 percent indicated that interns should have "*performed this task with assistance*" by the completion of the IDP, and 4.1 percent indicated that interns should have "*performed this task with no assistance*."

Supplemental Education/Experience In Lieu Of On-The-Job Performance.
A third question was asked of the same group of responding IDP supervisors, mentors, and architects: "*For that task, was supplemental education/experience acceptable in lieu of on-the-job performance?*" Data Table C5 lists the percent of supervisors, mentors, and architects who indicated *"yes"* or *"no."*

For example, with IDP Task #1 "*Gather information about client's vision, goals, budget, and schedule to validate project scope and program*," 953 supervisors, mentors, and architects indicated that IDP Task #1 should be required as part of the IDP. In response to the follow-up question regarding whether supplemental education/experience would be acceptable in lieu of on-the-job-performance of that task, 29 percent indicated *"yes,"* while 70.1 percent indicated *"no."* Overall, 26 tasks were rated *"yes"* by 50 percent or more of supervisors, mentors, and architects, and 111 tasks were rated *"no"* by at least 50 percent of the supervisors, mentors, and architects.

LEVEL OF ASSISTANCE AND EXPOSURE TO TASK

A total of 147 interns who completed the IDP within the past year and recently licensed architects (architects licensed in the past year who completed the IDP in the past two years), indicated the level they performed a task during their own IDP experience, using the following scale:

- *I performed the task with no assistance*
- *I performed the task with assistance*
- *I observed others performing this task*
- *I gained exposure to this task only through supplemental education or experience*
- *I did not have any exposure to this task*

Level of assistance.

Data Table C6 lists the percentage of interns and recently licensed architects who rated each task. For example, with IDP Task #1 "*Gather information about client's vision, goals, budget, and schedule to validate project scope and program*," 18.4 percent of the interns and architects indicated they "*performed the task with no assistance*," 54.4 percent indicated they "*performed the task with assistance*," 18.4 percent indicated they "*observed others performing this task*," 4.1 percent indicated they "*gained exposure only through supplemental education or experience*," and 4.8 percent indicated they "*did not have any exposure*" to the task.

Exposure to task.

Interns and newly licensed architects who indicated anything other than "*I did not have any exposure*" were asked the follow-up question of how frequently they performed (or observed others performing) the task by the completion of their own IDP experience.

Data Table C7 lists the percentage of interns and recently licensed architects who rated frequency of performance for each task as "*rarely*" (1-2 times), "*sometimes*" (monthly or less), "*often*" (weekly), and "*regularly*."

For example, with IDP Task #1 "*Gather information about client's vision, goals, budget, and schedule to validate project scope and program*," seven respondents indicated that they had no exposure to the task. The remaining 140 respondents were asked the follow-up question related to frequency of performance, and for IDP Task #1, 22.9 percent indicated "*rarely*," 49.3 percent indicated "*sometimes*," 19.3 percent indicated "*often*," and 8.6 percent indicated they "*regularly*" performed or observed the task during their own IDP experience.

QUALITATIVE FINDINGS

Three open-ended questions were included at the end of each Practice Analysis survey.

> *"How do you expect your job in the field of architecture to change over the next few years?"*
> *"What tasks will be performed and what knowledge/skills will be needed to meet changing job demands?"*
> *"If you could change the field of architecture, what is the most important change you would make?"*

Nearly 6,000 survey participants provided qualitative feedback, with many similarities emerging from their responses. The summary below represents the comments and suggestions received from those respondents completing the internship survey.

CHANGES OVER THE NEXT FEW YEARS AND MEETING CHANGING JOB DEMANDS

A total of 1,745 respondents who completed the three IDP surveys replied to the questions "*How do you expect your job in the field of architecture to change over the next few years?*" and "*What tasks will be performed and what knowledge/skills will be needed to meet changing job demands?*"

In general, the respondents commented on the importance of technology, particularly the increased use of BIM as a design coordination, construction documentation, and construction administration tool. Respondents also mentioned other aspects of technology such as Integrated Project Delivery (IPD), 3-D drawings, social media, and electronic security. Other respondents indicated a need for increased knowledge of LEED, sustainable design, high-performance building design, and new construction materials. Survey respondents also identified knowledge of business development skills, such as management, marketing, and project management, as being important to practitioners. The practices of collaborating with clients and contractors, and interdisciplinary coordination, were also described as necessary skills. Furthermore, respondents pointed out the increased emphasis on construction financing and real estate development.

MOST IMPORTANT CHANGES TO MAKE

A total of 1,733 IDP survey respondents answered the question "*If you could change the field of architecture, what is the most important change you would make?*" The comments received were similar to the themes that appeared in the *NCARB 2012 Focus Group Report* and have been grouped into six major categories:

1. Changing role of the architect
2. Adapting to changing demands
3. Impact of technology on the profession
4. Knowledge and/or skills needed now and in the future
5. Professional practice, accreditation, and licensure
6. NCARB opportunities

Changing Role of the Architect

Opinions regarding generalist versus specialist roles were mixed. Some respondents felt that training should restore the generalist approach to a broad spectrum of building types rather than accelerating the trend toward specific building types or specialty technologies while others suggested that avenues should be provided for specialization in training, title, and qualifications of architects. Others indicated that architects should act as a "master architect/master builder" and assume a leadership role in the project management/construction management process that includes an integrated approach to decision making. Many of the respondents indicated a need for architects to promote public awareness of the role and value of architects in the design of buildings and public works.

Adapting to Changing Demands

An overwhelming majority of respondents felt that educational curriculum should include more hands-on experience in the field at the job site. By having hands-on experience, graduates would be able to better visualize the design and construction process. Some respondents suggested that bidding methods should be revised to foster leadership by architects rather than contractors. Several respondents suggested that litigation procedures affecting liability insurance rates should be streamlined.

Impact of Technology on the Profession

The majority of respondents indicated that they would maintain a focus on design fundamentals rather than software tools like BIM and Revit. They also suggested that architects should maintain good problem-solving and critical-thinking skills rather than rely on technology alone. Several respondents suggested that architects need to educate the public and clarify misconceptions regarding the use of software in the design process and the expected outcomes of the design and construction process. Many respondents felt that technology provided useful tools for design, but should not dictate design or be used to replace hand drawings.

Knowledge and/or Skills Needed Now and in the Future

Many respondents mentioned that architects should work collaboratively with other design team members to encourage diversity of thought in decision-making processes during all phases of design and construction. Others felt that the educational curriculum should place more emphasis on real-world skills used in the field and less on studio and design. Some respondents thought a uniform educational curriculum that focuses on principles of design and construction, materials, constructability, and construction documentation will be essential. Additional comments indicated a need for graduates to develop good listening skills and acquire a good understanding of construction practices. Some respondents suggested the need for training in adaptive re-use so that architects can understand the challenges faced with existing and/or historic buildings. Finally, it was suggested that there is a need for an international style of liability insurance that reduces liability exposure.

Professional Practice, Accreditation, and Licensure

Many respondents commented that there should be consistency in regulation among the states, citing standardized building codes and unilateral performance-based codes as examples.

NCARB Opportunities

Many respondents suggested that internship should be integrated with the educational curriculum thereby extending the years spent in undergraduate curriculum. Interestingly, some respondents suggested that the IDP should be extended to five years with mandated rotation in different subject-matter areas—in direct opposition to other respondents who suggested the program should be shortened and linked to business, industry, and government settings. And finally, some commented that alternate educational routes and additional registration possibilities should be provided without the need for IDP, while others suggested using the IDP as the sole pathway to licensure.

INTERNSHIP DATA TABLES

The chart below summarizes the survey population and the research questions related to the task statements, as well as the various rating scales for the internship surveys. The chart also references the related Internship (IDP) Data Tables.

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
IDP A	IDP supervisors and mentors	Task	How did the interns you supervised or mentored during the past two years typically perform the task by completion of the IDP experience? • My interns did not perform this task • My interns observed others performing this task • My interns performed this task with assistance • My interns performed this task with no assistance	C2
IDP B	IDP supervisors and mentors Architects licensed 2-10 years	Task	Should this task be required as part of the IDP? • Yes • No	C3
			At what level should the task be performed by completion of the IDP? • Interns should have observed others performing the task • Interns should have performed the task with assistance • Interns should have performed the task with no assistance	C4
			Would supplemental education/experience be acceptable in lieu of on-the-job performance of the task? • Yes • No	C5
IDP C	IDP supervisors and mentors Architects licensed in the past year and completed IDP in past two years	Task	How did you perform the task by completion of the IDP experience? • I performed the task with no assistance • I performed the task with assistance • I observed others performing the task • I gained exposure to this task only through supplemental education or experience • I did not have any exposure to this task	C6
			How frequently did you perform (or observe others performing) the task during your IDP experience? • Rarely (1-2 times) • Sometimes (monthly or less) • Often (weekly) • Regularly	C7

Data Table C1. List of All IDP Survey Task Statements

TASK #	TASK STATEMENT
1	Gather information about client's vision, goals, budget, and schedule to validate project scope and program.
2	Prepare design alternatives for client review.
3	Establish methods for Architect-Client communication based on project scope of work.
4	Assist client in determining delivery method for construction of project.
5	Determine impact of applicable zoning and development ordinances to determine project constraints.
6	Define roles and responsibilities of team members.
7	Determine scope of services.
8	Determine design fee budget.
9	Determine project schedule.
10	Evaluate results of feasibility studies to determine project's financial viability.
11	Evaluate results of feasibility studies to determine project's technical viability.
12	Determine impact of existing utilities infrastructure on site.
13	Determine impact of existing transportation infrastructure on site.
14	Assess environmental impact to formulate design decisions.
15	Determine impact of environmental, zoning and other regulations on site.
16	Assess socio-cultural context of the proposed site.
17	Define requirements for site survey based on established project scope.
18	Analyze existing site conditions to determine impact on facility layout.
19	Consider recommendations from geotechnical studies when establishing design parameters.
20	Develop sustainability goals based on existing environmental conditions.
21	Establish sustainability goals affecting building performance.
22	Consider results of environmental studies when developing site alternatives.
23	Develop mitigation options to address adverse site conditions.
24	Review legal documents related to site to determine project constraints.
25	Perform building code analysis.
26	Present design ideas to client orally.

TASK #	TASK STATEMENT
27	Prepare written communications related to design ideas, project documentation and contracts.
28	Communicate design ideas to the client graphically.
29	Communicate design ideas to the client using hand drawings.
30	Communicate design ideas to client with two-dimensional (2-D) computer aided design software.
31	Communicate design ideas to client with three-dimensional (3-D) computer aided design software.
32	Determine design parameters for building engineering systems.
33	Develop conceptual budget.
34	Prepare submittals for regulatory approval.
35	Evaluate opportunities and constraints of alternative sites.
36	Gather information about community concerns and issues that may impact proposed project.
37	Assist Owner in preparing building program including list of spaces and their characteristics.
38	Establish project design goals.
39	Prepare site analysis diagrams to document existing conditions, features, infrastructure and regulatory requirements.
40	Prepare diagrams illustrating spatial relationships and functional adjacencies.
41	Submit schedule of Architect's services to Owner for each phase.
42	Prepare code analysis documentation.
43	Select technologies to develop and produce design and construction documentation.
44	Coordinate design work of in-house team members.
45	Manage project close-out procedures and documentation.
46	Perform quality control reviews throughout the documentation process.
47	Institute procedures to ensure privacy and security of project documentation and information technology.
48	Prepare Cost of Work estimates.
49	Update Cost of Work estimates.
50	Design building structural system.
51	Design civil components of site.
52	Design mechanical, electrical, and plumbing systems.
53	Design landscape elements for site.

CONTINUED

Data Table C1. List of All IDP Survey Task Statements

TASK #	TASK STATEMENT
54	Oversee design integration of building components and systems.
55	Select materials, finishes, and systems based on technical properties and aesthetic requirements.
56	Select building performance modeling technologies to guide building design.
57	Prepare life cycle cost analysis.
58	Perform constructability review to determine buildability, bidability, and construction sequencing of proposed project.
59	Perform constructability reviews throughout the design process.
60	Prepare final procurement and contract documents.
61	Establish procedures to process documentation during contract administration.
62	Determine specific insurance requirements to meet contract or business needs.
63	Review results from field reports, third-party inspections, and other test results for conformance with contract documents.
64	Manage modifications to the construction contract.
65	Assist Owner in preparing Owner-Contractor Agreement.
66	Respond to Contractor Requests for Information.
67	Prepare proposals for services in response to client requirements.
68	Prepare Owner-Architect Agreement.
69	Prepare Architect-Consultant Agreement.
70	Negotiate terms and conditions outlined in Owner-Architect Agreement.
71	Apply principles of historic preservation for projects involving building restoration or renovation.
72	Collaborate with stakeholders during design process to maintain design intent and comply with Owner specifications.
73	Present design concept to stakeholders.
74	Coordinate design work of consultants.
75	Select furniture, fixtures and equipment that meet client's design requirements and needs.
76	Establish procedures for providing post-occupancy services.
77	Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.
78	Establish financial controls within firm to monitor profitability of individual projects.
79	Prepare staffing plan to meet project goals.
80	Establish procedures for documenting project decisions.

TASK #	TASK STATEMENT
81	Monitor project schedule to maintain compliance with established milestones.
82	Evaluate staffing plan to ensure compliance with established milestones.
83	Manage client expectations to align with established milestones and final decision points.
84	Assist client in selecting contractors.
85	Manage implementation of sustainability criteria.
86	Identify changes in project scope that require additional services.
87	Assist Owner in obtaining necessary permits and approvals.
88	Coordinate testing of building performance and materials.
89	Review Application and Certificate for Payment.
90	Review shop drawings and submittals during construction for conformance with design intent.
91	Complete field reports to document field observations from construction site visit.
92	Manage information exchange during construction.
93	Resolve conflicts that may arise during design and construction process.
94	Manage project-specific bidding process.
95	Establish procedures for building commissioning.
96	Manage post-occupancy issues, e.g., evaluation of building performance, warranty issues.
97	Select design team consultants.
98	Conduct periodic progress meetings with design and project team.
99	Participate in pre-construction, pre-installation and regular progress meetings with design team.
100	Maintain insurance policies related to general, automobile, workers' compensation, and professional liability.
101	Develop procedures to control risk and manage liability.
102	Determine billing rates.
103	Develop business plan for firm.
104	Develop and maintain effective and productive relationships with clients.
105	Develop procedures for responding to changes in project scope.
106	Develop procedures for responding to contractor requests (Requests for Information).
107	Develop procedures for responding to Owner requests for proposal (Requests for Proposal, Requests for Qualifications).

CONTINUED

Data Table C1. List of All IDP Survey Task Statements

TASK #	TASK STATEMENT
108	Develop professional and leadership skills within firm.
109	Establish policies to support participation in Intern Development Program (IDP).
110	Establish policies to encourage licensure.
111	Maintain positive work environment within firm that facilitates cooperation, teamwork, and staff morale.
112	Provide continuing education opportunities to enhance staff skills and meet statutory requirements.
113	Review local, state and federal codes for changes that may impact design and construction.
114	Make staff assignments based on knowledge and skill of staff members.
115	Monitor staff time and production costs for compliance with established goals.
116	Understand firm's legal structure to comply with jurisdictional rules and regulations.
117	Understand implications of evolving sustainable design strategies and technologies.
118	Establish human resource procedures that comply with regulations.
119	Understand implications of project delivery technologies.
120	Understand implications of project delivery methods.
121	Maintain professional and business licenses and certifications for legal compliance and mobility.
122	Participate in community activities that may provide opportunities for design of facilities that reflect community needs.
123	Prepare marketing documents that accurately communicate firm's experience and capabilities.
124	Adhere to ethical standards and codes of professional conduct.
125	Comply with laws and regulations governing the practice of architecture.
126	Review proposed projects for appropriateness of fit for firm.
127	Institute procedures to manage firm's internal and external correspondence.
128	Institute procedures for the firm to prevent losses resulting from natural and manmade disasters.
129	Institute procedures to manage alternative work scenarios, e.g., offshore, home.
130	Evaluate appropriateness of building information modeling (BIM) for proposed project.
131	Evaluate appropriateness of alternative project delivery systems to make recommendations to the client.
132	Establish procedures to balance individual employee workloads.
133	Participate in professional development activities that offer exchanges with other design professionals.
134	Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.
135	Monitor performance of design team consultants.
136	Establish network of design and construction consultants.

Data Table C2. Percentage Distribution of Ratings for How Supervised or Mentored Interns in the Past Two Years Typically Performed Tasks by Completion of IDP

Survey Population: IDP Supervisors and Mentors

TASK STATEMENT	How Interns Performed Task					
	DID NOT PERFORM	OBSERVED OTHERS PERFORMING	PERFORMED WITH ASSISTANCE	PERFORMED WITH NO ASSISTANCE	PERCENT OBSERVED OR PERFORMED	TOTAL N
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	12.1%	35.4%	48.7%	3.9%	87.9%	1,003
2. Prepare design alternatives for client review.	3.8%	9.2%	77.9%	9.2%	96.2%	1,003
3. Establish methods for Architect-Client communication based on project scope of work.	21.4%	38.0%	36.3%	4.3%	78.6%	1,003
4. Assist client in determining delivery method for construction of project.	33.9%	43.8%	20.2%	2.1%	66.1%	1,003
5. Determine impact of applicable zoning and development ordinances to determine project constraints.	12.4%	22.8%	56.2%	8.6%	87.6%	1,003
6. Define roles and responsibilities of team members.	28.9%	47.4%	20.2%	3.5%	71.1%	1,003
7. Determine scope of services.	31.4%	45.2%	21.8%	1.6%	68.6%	1,003
8. Determine design fee budget.	42.1%	40.6%	16.6%	0.8%	57.9%	1,003
9. Determine project schedule.	22.1%	45.7%	30.2%	2.0%	77.9%	1,003
10. Evaluate results of feasibility studies to determine project's financial viability.	42.3%	36.2%	20.9%	0.6%	57.7%	1,003
11. Evaluate results of feasibility studies to determine project's technical viability.	30.4%	40.0%	28.1%	1.5%	69.6%	1,003
12. Determine impact of existing utilities infrastructure on site.	20.9%	34.5%	40.4%	4.2%	79.1%	1,003
13. Determine impact of existing transportation infrastructure on site.	38.0%	26.5%	32.0%	3.5%	62.0%	1,003
14. Assess environmental impact to formulate design decisions.	30.2%	32.9%	33.7%	3.2%	69.8%	1,003
15. Determine impact of environmental, zoning and other regulations on site.	21.8%	29.1%	44.3%	4.8%	78.2%	1,003
16. Assess socio-cultural context of the proposed site.	52.2%	21.6%	22.2%	3.9%	47.8%	1,003
17. Define requirements for site survey based on established project scope.	23.9%	35.2%	35.8%	5.1%	76.1%	1,003
18. Analyze existing site conditions to determine impact on facility layout.	9.8%	23.1%	57.5%	9.6%	90.2%	1,003
19. Consider recommendations from geotechnical studies when establishing design parameters.	28.0%	42.3%	27.8%	1.9%	72.0%	1,003
20. Develop sustainability goals based on existing environmental conditions.	21.2%	29.9%	43.2%	5.7%	78.8%	1,003
21. Establish sustainability goals affecting building performance.	21.2%	31.6%	41.8%	5.4%	78.8%	1,003
22. Consider results of environmental studies when developing site alternatives.	28.6%	33.7%	33.8%	3.9%	71.4%	1,003
23. Develop mitigation options to address adverse site conditions.	41.0%	33.7%	23.7%	1.6%	59.0%	1,003
24. Review legal documents related to site to determine project constraints.	48.1%	27.8%	22.0%	2.1%	51.9%	1,003
25. Perform building code analysis.	3.3%	17.1%	65.2%	14.4%	96.7%	1,003
26. Present design ideas to client orally.	9.2%	32.9%	45.8%	12.2%	90.8%	1,003
27. Prepare written communications related to design ideas, project documentation and contracts.	9.9%	21.8%	55.0%	13.3%	90.1%	1,003
28. Communicate design ideas to the client graphically.	3.6%	9.1%	62.2%	25.1%	96.4%	1,003
29. Communicate design ideas to the client using hand drawings.	21.5%	18.8%	42.8%	16.8%	78.5%	1,003
30. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	4.6%	5.6%	56.3%	33.5%	95.4%	1,003

Total N = number of respondents

CONTINUED

Data Table C2. Percentage Distribution of Ratings for How Supervised or Mentored Interns in the Past Two Years Typically Performed Tasks by Completion of IDP

Survey Population: IDP Supervisors and Mentors

TASK STATEMENT	How Interns Performed Task					
	DID NOT PERFORM	OBSERVED OTHERS PERFORMING	PERFORMED WITH ASSISTANCE	PERFORMED WITH NO ASSISTANCE	PERCENT OBSERVED OR PERFORMED	TOTAL N
31. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	8.2%	5.8%	52.5%	33.5%	91.8%	1,003
32. Determine design parameters for building engineering systems.	16.4%	46.5%	34.7%	2.5%	83.6%	1,003
33. Develop conceptual budget.	34.0%	43.4%	20.9%	1.7%	66.0%	1,003
34. Prepare submittals for regulatory approval.	10.6%	14.7%	62.2%	12.6%	89.4%	1,003
35. Evaluate opportunities and constraints of alternative sites.	34.0%	24.5%	36.8%	4.7%	66.0%	1,003
36. Gather information about community concerns and issues that may impact proposed project.	38.3%	24.3%	31.6%	5.8%	61.7%	1,003
37. Assist Owner in preparing building program including list of spaces and their characteristics.	16.6%	29.6%	47.0%	6.9%	83.4%	1,003
38. Establish project design goals.	13.7%	42.4%	39.1%	4.9%	86.3%	1,003
39. Prepare site analysis diagrams to document existing conditions, features, infrastructure and regulatory requirements.	14.3%	17.5%	55.9%	12.3%	85.7%	1,003
40. Prepare diagrams illustrating spatial relationships and functional adjacencies.	7.7%	9.9%	57.6%	24.8%	92.3%	1,003
41. Submit schedule of Architect's services to Owner for each phase.	41.0%	41.7%	15.3%	2.1%	59.0%	1,003
42. Prepare code analysis documentation.	7.4%	20.5%	59.1%	13.0%	92.6%	1,003
43. Select technologies to develop and produce design and construction documentation.	20.9%	29.4%	41.6%	8.1%	79.1%	1,003
44. Coordinate design work of in-house team members.	12.9%	30.7%	43.4%	13.1%	87.1%	1,003
45. Manage project close-out procedures and documentation.	20.5%	27.5%	44.2%	7.8%	79.5%	1,003
46. Perform quality control reviews throughout the documentation process.	16.5%	41.0%	37.3%	5.3%	83.5%	1,003
47. Institute procedures to ensure privacy and security of project documentation and information technology.	47.9%	25.3%	21.4%	5.4%	52.1%	1,003
48. Prepare Cost of Work estimates.	39.8%	35.0%	22.5%	2.7%	60.2%	1,003
49. Update Cost of Work estimates.	39.4%	31.4%	25.4%	3.8%	60.6%	1,003
50. Design building structural system.	37.7%	46.3%	15.1%	1.0%	62.3%	1,003
51. Design civil components of site.	40.2%	44.7%	14.4%	0.8%	59.8%	1,003
52. Design mechanical, electrical, and plumbing systems.	39.1%	47.6%	13.0%	0.4%	60.9%	1,003
53. Design landscape elements for site.	31.4%	43.5%	23.1%	2.0%	68.6%	1,003
54. Oversee design integration of building components and systems.	11.2%	38.6%	45.5%	4.8%	88.8%	1,003
55. Select materials, finishes, and systems based on technical properties and aesthetic requirements.	3.0%	17.9%	64.9%	14.2%	97.0%	1,003
56. Select building performance modeling technologies to guide building design.	36.8%	31.0%	27.2%	5.0%	63.2%	1,003
57. Prepare life cycle cost analysis.	59.8%	29.9%	10.0%	0.3%	40.2%	1,003
58. Perform constructability review to determine buildability, bidability, and construction sequencing of proposed project.	34.1%	47.4%	17.2%	1.3%	65.9%	1,003
59. Perform constructability reviews throughout the design process.	32.0%	47.7%	18.5%	1.8%	68.0%	1,003

Total N = number of respondents

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IDP A

Data Table C2. Percentage Distribution of Ratings for How Supervised or Mentored Interns in the Past Two Years Typically Performed Tasks by Completion of IDP

Survey Population: IDP Supervisors and Mentors

TASK STATEMENT	How Interns Performed Task					
	DID NOT PERFORM	OBSERVED OTHERS PERFORMING	PERFORMED WITH ASSISTANCE	PERFORMED WITH NO ASSISTANCE	PERCENT OBSERVED OR PERFORMED	TOTAL N
60. Prepare final procurement and contract documents.	12.6%	12.6%	65.2%	9.7%	87.4%	1,003
61. Establish procedures to process documentation during contract administration.	22.7%	40.3%	31.1%	5.9%	77.3%	1,003
62. Determine specific insurance requirements to meet contract or business needs.	72.4%	22.6%	4.4%	0.6%	27.6%	1,003
63. Review results from field reports, third-party inspections, and other test results for conformance with contract documents.	19.9%	29.6%	41.8%	8.7%	80.1%	1,003
64. Manage modifications to the construction contract.	31.2%	30.7%	31.9%	6.2%	68.8%	1,003
65. Assist Owner in preparing Owner-Contractor Agreement.	54.4%	34.0%	10.6%	1.0%	45.6%	1,003
66. Respond to Contractor Requests for Information.	5.6%	12.0%	62.2%	20.2%	94.4%	1,003
67. Prepare proposals for services in response to client requirements.	29.3%	41.5%	26.0%	3.2%	70.7%	1,003
68. Prepare Owner-Architect Agreement.	51.6%	38.1%	9.7%	0.6%	48.4%	1,003
69. Prepare Architect-Consultant Agreement.	52.6%	36.8%	10.0%	0.6%	47.4%	1,003
70. Negotiate terms and conditions outlined in Owner-Architect Agreement.	68.9%	26.3%	4.7%	0.1%	31.1%	1,003
71. Apply principles of historic preservation for projects involving building restoration or renovation.	46.7%	17.6%	31.9%	3.8%	53.3%	1,003
72. Collaborate with stakeholders during design process to maintain design intent and comply with Owner specifications.	20.0%	32.1%	42.2%	5.7%	80.0%	1,003
73. Present design concept to stakeholders.	13.8%	34.7%	43.0%	8.6%	86.2%	1,003
74. Coordinate design work of consultants.	6.0%	20.5%	57.2%	16.3%	94.0%	1,003
75. Select furniture, fixtures and equipment that meet client's design requirements and needs.	15.2%	21.3%	50.6%	12.9%	84.8%	1,003
76. Establish procedures for providing post-occupancy services.	60.4%	25.9%	12.5%	1.2%	39.6%	1,003
77. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	67.8%	26.5%	4.8%	0.9%	32.2%	1,003
78. Establish financial controls within firm to monitor profitability of individual projects.	66.3%	27.4%	5.5%	0.8%	33.7%	1,003
79. Prepare staffing plan to meet project goals.	36.4%	43.9%	18.1%	1.6%	63.6%	1,003
80. Establish procedures for documenting project decisions.	28.5%	43.0%	24.5%	4.0%	71.5%	1,003
81. Monitor project schedule to maintain compliance with established milestones.	16.7%	38.2%	37.2%	8.0%	83.3%	1,003
82. Evaluate staffing plan to ensure compliance with established milestones.	34.3%	42.6%	19.5%	3.6%	65.7%	1,003
83. Manage client expectations to align with established milestones and final decision points.	28.7%	44.0%	23.3%	4.0%	71.3%	1,003
84. Assist client in selecting contractors.	33.9%	43.6%	20.8%	1.7%	66.1%	1,003
85. Manage implementation of sustainability criteria.	27.1%	28.2%	39.1%	5.6%	72.9%	1,003
86. Identify changes in project scope that require additional services.	17.9%	42.5%	33.6%	6.0%	82.1%	1,003
87. Assist Owner in obtaining necessary permits and approvals.	15.8%	24.9%	48.7%	10.7%	84.2%	1,003
88. Coordinate testing of building performance and materials.	42.5%	32.3%	22.3%	2.9%	57.5%	1,003

Total N = number of respondents

CONTINUED

IDP A

Data Table C2. Percentage Distribution of Ratings for How Supervised or Mentored Interns in the Past Two Years Typically Performed Tasks by Completion of IDP

Survey Population: IDP Supervisors and Mentors

TASK STATEMENT	How Interns Performed Task					
	DID NOT PERFORM	OBSERVED OTHERS PERFORMING	PERFORMED WITH ASSISTANCE	PERFORMED WITH NO ASSISTANCE	PERCENT OBSERVED OR PERFORMED	TOTAL N
89. Review Application and Certificate for Payment.	23.2%	32.3%	37.7%	6.8%	76.8%	1,003
90. Review shop drawings and submittals during construction for conformance with design intent.	4.2%	9.9%	65.9%	20.0%	95.8%	1,003
91. Complete field reports to document field observations from construction site visit.	7.9%	15.4%	56.6%	20.1%	92.1%	1,003
92. Manage information exchange during construction.	8.2%	18.3%	51.9%	21.5%	91.8%	1,003
93. Resolve conflicts that may arise during design and construction process.	10.8%	34.6%	47.3%	7.4%	89.2%	1,003
94. Manage project-specific bidding process.	27.4%	42.7%	26.1%	3.8%	72.6%	1,003
95. Establish procedures for building commissioning.	57.6%	31.5%	10.1%	0.8%	42.4%	1,003
96. Manage post-occupancy issues, e.g., evaluation of building performance, warranty issues.	53.1%	31.4%	13.4%	2.1%	46.9%	1,003
97. Select design team consultants.	43.4%	46.9%	8.6%	1.2%	56.6%	1,003
98. Conduct periodic progress meetings with design and project team.	12.4%	40.1%	38.3%	9.3%	87.6%	1,003
99. Participate in pre-construction, pre-installation and regular progress meetings with design team.	9.4%	24.4%	53.8%	12.4%	90.6%	1,003
100. Maintain insurance policies related to general, automobile, workers' compensation, and professional liability.	83.6%	14.0%	2.1%	0.3%	16.4%	1,003
101. Develop procedures to control risk and manage liability.	72.1%	23.3%	4.6%	0.0%	27.9%	1,003
102. Determine billing rates.	82.2%	15.4%	2.4%	0.1%	17.8%	1,003
103. Develop business plan for firm.	82.0%	15.2%	2.7%	0.2%	18.0%	1,003
104. Develop and maintain effective and productive relationships with clients.	12.1%	30.6%	44.9%	12.5%	87.9%	1,003
105. Develop procedures for responding to changes in project scope.	21.9%	48.1%	25.7%	4.3%	78.1%	1,003
106. Develop procedures for responding to contractor requests (Requests for Information).	20.4%	40.0%	32.5%	7.1%	79.6%	1,003
107. Develop procedures for responding to Owner requests for proposal (Requests for Proposal, Requests for Qualifications).	27.0%	46.5%	23.6%	2.9%	73.0%	1,003
108. Develop professional and leadership skills within firm.	16.6%	28.3%	44.2%	11.0%	83.4%	1,003
109. Establish policies to support participation in Intern Development Program (IDP).	39.2%	28.9%	25.2%	6.7%	60.8%	1,003
110. Establish policies to encourage licensure.	38.7%	32.7%	23.7%	4.9%	61.3%	1,003
111. Maintain positive work environment within firm that facilitates cooperation, teamwork, and staff morale.	8.0%	20.7%	43.0%	28.3%	92.0%	1,003
112. Provide continuing education opportunities to enhance staff skills and meet statutory requirements.	19.9%	35.6%	32.3%	12.2%	80.1%	1,003
113. Review local, state and federal codes for changes that may impact design and construction.	14.9%	26.8%	47.6%	10.8%	85.1%	1,003
114. Make staff assignments based on knowledge and skill of staff members.	41.5%	43.8%	12.3%	2.5%	58.5%	1,003
115. Monitor staff time and production costs for compliance with established goals.	40.3%	41.1%	16.2%	2.5%	59.7%	1,003

Total N = number of respondents

CONTINUED

IDP A

Data Table C2. Percentage Distribution of Ratings for How Supervised or Mentored Interns in the Past Two Years Typically Performed Tasks by Completion of IDP

Survey Population: IDP Supervisors and Mentors

TASK STATEMENT	How Interns Performed Task					
	DID NOT PERFORM	OBSERVED OTHERS PERFORMING	PERFORMED WITH ASSISTANCE	PERFORMED WITH NO ASSISTANCE	PERCENT OBSERVED OR PERFORMED	TOTAL N
116. Understand firm's legal structure to comply with jurisdictional rules and regulations.	53.3%	33.8%	11.8%	1.1%	46.7%	1,003
117. Understand implications of evolving sustainable design strategies and technologies.	22.6%	31.7%	37.7%	8.0%	77.4%	1,003
118. Establish human resource procedures that comply with regulations.	70.9%	24.6%	4.2%	0.3%	29.1%	1,003
119. Understand implications of project delivery technologies.	15.1%	40.3%	38.8%	5.9%	84.9%	1,003
120. Understand implications of project delivery methods.	13.1%	41.7%	39.7%	5.6%	86.9%	1,003
121. Maintain professional and business licenses and certifications for legal compliance and mobility.	58.8%	31.6%	7.1%	2.5%	41.2%	1,003
122. Participate in community activities that may provide opportunities for design of facilities that reflect community needs.	18.9%	17.7%	36.5%	26.8%	81.1%	1,003
123. Prepare marketing documents that accurately communicate firm's experience and capabilities.	16.1%	23.8%	51.8%	8.3%	83.9%	1,003
124. Adhere to ethical standards and codes of professional conduct.	3.1%	15.3%	40.6%	41.1%	96.9%	1,003
125. Comply with laws and regulations governing the practice of architecture.	4.8%	19.8%	46.3%	29.1%	95.2%	1,003
126. Review proposed projects for appropriateness of fit for firm.	38.7%	39.8%	18.5%	3.0%	61.3%	1,003
127. Institute procedures to manage firm's internal and external correspondence.	51.6%	32.6%	14.1%	1.7%	48.4%	1,003
128. Institute procedures for the firm to prevent losses resulting from natural and manmade disasters.	74.0%	19.9%	5.4%	0.7%	26.0%	1,003
129. Institute procedures to manage alternative work scenarios, e g, offshore, home.	70.5%	20.3%	7.5%	1.7%	29.5%	1,003
130. Evaluate appropriateness of building information modeling (BIM) for proposed project.	32.7%	24.7%	31.9%	10.7%	67.3%	1,003
131. Evaluate appropriateness of alternative project delivery systems to make recommendations to the client.	39.5%	40.6%	17.6%	2.3%	60.5%	1,003
132. Establish procedures to balance individual employee workloads.	38.5%	44.5%	14.4%	2.7%	61.5%	1,003
133. Participate in professional development activities that offer exchanges with other design professionals.	14.8%	15.5%	35.9%	33.9%	85.2%	1,003
134. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.	14.9%	36.4%	37.2%	11.6%	85.1%	1,003
135. Monitor performance of design team consultants.	12.9%	34.5%	42.5%	10.2%	87.1%	1,003
136. Establish network of design and construction consultants.	25.0%	38.2%	29.6%	7.2%	75.0%	1,003
MEAN	29.8%	30.9%	32.0%	7.3%	70.2%	1,003
MIN	3.0%	5.6%	2.1%	0.0%	16.4%	1,003
MAX	83.6%	48.1%	77.9%	41.1%	97.0%	1,003

Total N = number of respondents

Data Table C3. Percentage Distribution of Ratings for Whether Tasks Should be Required as Part of the IDP

Survey Population: IDP Supervisors and mentors + Architects licensed 2-10 years

TASK STATEMENT	Should Be Required		
	YES	NO	TOTAL N
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	82.7%	17.3%	1,152
2. Prepare design alternatives for client review.	87.9%	12.1%	1,152
3. Establish methods for Architect-Client communication based on project scope of work.	58.0%	42.0%	1,152
4. Assist client in determining delivery method for construction of project.	60.6%	39.4%	1,152
5. Determine impact of applicable zoning and development ordinances to determine project constraints.	94.2%	5.8%	1,152
6. Define roles and responsibilities of team members.	55.6%	44.4%	1,152
7. Determine scope of services.	68.9%	31.1%	1,152
8. Determine design fee budget.	65.7%	34.3%	1,152
9. Determine project schedule.	84.7%	15.3%	1,152
10. Evaluate results of feasibility studies to determine project's financial viability.	52.6%	47.4%	1,152
11. Evaluate results of feasibility studies to determine project's technical viability.	63.4%	36.6%	1,152
12. Determine impact of existing utilities infrastructure on site.	78.2%	21.8%	1,152
13. Determine impact of existing transportation infrastructure on site.	62.1%	37.9%	1,152
14. Assess environmental impact to formulate design decisions.	78.6%	21.4%	1,152
15. Determine impact of environmental, zoning and other regulations on site.	91.8%	8.2%	1,152
16. Assess socio-cultural context of the proposed site.	41.2%	58.8%	1,152
17. Define requirements for site survey based on established project scope.	75.3%	24.7%	1,152
18. Analyze existing site conditions to determine impact on facility layout.	93.1%	6.9%	1,152
19. Consider recommendations from geotechnical studies when establishing design parameters.	74.7%	25.3%	1,152
20. Develop sustainability goals based on existing environmental conditions.	76.2%	23.8%	1,152
21. Establish sustainability goals affecting building performance.	76.7%	23.3%	1,152
22. Consider results of environmental studies when developing site alternatives.	77.5%	22.5%	1,152
23. Develop mitigation options to address adverse site conditions.	55.5%	44.5%	1,152
24. Review legal documents related to site to determine project constraints.	61.5%	38.5%	1,152
25. Perform building code analysis.	98.0%	2.0%	1,152
26. Present design ideas to client orally.	68.8%	31.2%	1,152
27. Prepare written communications related to design ideas, project documentation and contracts.	81.3%	18.8%	1,152
28. Communicate design ideas to the client graphically.	90.9%	9.1%	1,152
29. Communicate design ideas to the client using hand drawings.	64.0%	36.0%	1,152
30. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	75.7%	24.3%	1,152
31. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	63.9%	36.1%	1,152
32. Determine design parameters for building engineering systems.	74.2%	25.8%	1,152
33. Develop conceptual budget.	71.2%	28.8%	1,152
34. Prepare submittals for regulatory approval.	84.0%	16.0%	1,152
35. Evaluate opportunities and constraints of alternative sites.	67.9%	32.1%	1,152
36. Gather information about community concerns and issues that may impact proposed project.	56.1%	43.9%	1,152
37. Assist Owner in preparing building program including list of spaces and their characteristics.	85.1%	14.9%	1,152
38. Establish project design goals.	75.5%	24.5%	1,152

Total N = number of respondents

CONTINUED

IDP B

Data Table C3. Percentage Distribution of Ratings for Whether Tasks Should be Required as Part of the IDP

Survey Population: IDP Supervisors and mentors + Architects licensed 2-10 years

TASK STATEMENT	Should Be Required		
	YES	NO	TOTAL N
39. Prepare site analysis diagrams to document existing conditions, features, infrastructure and regulatory requirements.	86.4%	13.6%	1,152
40. Prepare diagrams illustrating spatial relationships and functional adjacencies.	86.5%	13.5%	1,152
41. Submit schedule of Architect's services to Owner for each phase.	53.0%	47.0%	1,152
42. Prepare code analysis documentation.	93.1%	6.9%	1,152
43. Select technologies to develop and produce design and construction documentation.	45.1%	54.9%	1,152
44. Coordinate design work of in-house team members.	61.5%	38.5%	1,152
45. Manage project close-out procedures and documentation.	74.0%	26.0%	1,152
46. Perform quality control reviews throughout the documentation process.	69.7%	30.3%	1,152
47. Institute procedures to ensure privacy and security of project documentation and information technology.	24.8%	75.2%	1,152
48. Prepare Cost of Work estimates.	61.7%	38.3%	1,152
49. Update Cost of Work estimates.	54.6%	45.4%	1,152
50. Design building structural system.	47.8%	52.2%	1,152
51. Design civil components of site.	42.5%	57.5%	1,152
52. Design mechanical, electrical, and plumbing systems.	39.8%	60.2%	1,152
53. Design landscape elements for site.	51.2%	48.8%	1,152
54. Oversee design integration of building components and systems.	80.8%	19.2%	1,152
55. Select materials, finishes, and systems based on technical properties and aesthetic requirements.	90.0%	10.0%	1,152
56. Select building performance modeling technologies to guide building design.	34.2%	65.8%	1,152
57. Prepare life cycle cost analysis.	46.4%	53.6%	1,152
58. Perform constructability review to determine buildability, bidability, and construction sequencing of proposed project.	58.2%	41.8%	1,152
59. Perform constructability reviews throughout the design process.	56.9%	43.1%	1,152
60. Prepare final procurement and contract documents.	78.2%	21.8%	1,152
61. Establish procedures to process documentation during contract administration.	53.1%	46.9%	1,152
62. Determine specific insurance requirements to meet contract or business needs.	25.6%	74.4%	1,152
63. Review results from field reports, third-party inspections, and other test results for conformance with contract documents.	81.0%	19.0%	1,152
64. Manage modifications to the construction contract.	57.7%	42.3%	1,152
65. Assist Owner in preparing Owner-Contractor Agreement.	49.7%	50.3%	1,152
66. Respond to Contractor Requests for Information.	93.6%	6.4%	1,152
67. Prepare proposals for services in response to client requirements.	64.0%	36.0%	1,152
68. Prepare Owner-Architect Agreement.	60.3%	39.7%	1,152
69. Prepare Architect-Consultant Agreement.	61.4%	38.6%	1,152
70. Negotiate terms and conditions outlined in Owner-Architect Agreement.	32.1%	67.9%	1,152
71. Apply principles of historic preservation for projects involving building restoration or renovation.	58.5%	41.5%	1,152
72. Collaborate with stakeholders during design process to maintain design intent and comply with Owner specifications.	63.5%	36.5%	1,152
73. Present design concept to stakeholders.	66.9%	33.1%	1,152
74. Coordinate design work of consultants.	89.1%	10.9%	1,152
75. Select furniture, fixtures and equipment that meet client's design requirements and needs.	65.6%	34.4%	1,152

Total N = number of respondents

CONTINUED

Data Table C3. Percentage Distribution of Ratings for Whether Tasks Should be Required as Part of the IDP

Survey Population: IDP Supervisors and mentors + Architects licensed 2-10 years

TASK STATEMENT	Should Be Required		
	YES	NO	TOTAL N
76. Establish procedures for providing post-occupancy services.	30.2%	69.8%	1,152
77. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	32.7%	67.3%	1,152
78. Establish financial controls within firm to monitor profitability of individual projects.	34.8%	65.2%	1,152
79. Prepare staffing plan to meet project goals.	52.1%	47.9%	1,152
80. Establish procedures for documenting project decisions.	54.3%	45.7%	1,152
81. Monitor project schedule to maintain compliance with established milestones.	79.2%	20.8%	1,152
82. Evaluate staffing plan to ensure compliance with established milestones.	45.6%	54.4%	1,152
83. Manage client expectations to align with established milestones and final decision points.	43.0%	57.0%	1,152
84. Assist client in selecting contractors.	51.3%	48.7%	1,152
85. Manage implementation of sustainability criteria.	66.2%	33.8%	1,152
86. Identify changes in project scope that require additional services.	72.5%	27.5%	1,152
87. Assist Owner in obtaining necessary permits and approvals.	78.7%	21.3%	1,152
88. Coordinate testing of building performance and materials	40.5%	59.5%	1,152
89. Review Application and Certificate for Payment.	79.6%	20.4%	1,152
90. Review shop drawings and submittals during construction for conformance with design intent.	96.0%	4.0%	1,152
91. Complete field reports to document field observations from construction site visit.	92.7%	7.3%	1,152
92. Manage information exchange during construction.	71.9%	28.1%	1,152
93. Resolve conflicts that may arise during design and construction process.	66.5%	33.5%	1,152
94. Manage project-specific bidding process.	55.0%	45.0%	1,152
95. Establish procedures for building commissioning.	27.9%	72.1%	1,152
96. Manage post-occupancy issues, e.g., evaluation of building performance, warranty issues.	39.0%	61.0%	1,152
97. Select design team consultants.	40.4%	59.6%	1,152
98. Conduct periodic progress meetings with design and project team.	76.0%	24.0%	1,152
99. Participate in pre-construction, pre-installation and regular progress meetings with design team.	89.4%	10.6%	1,152
100. Maintain insurance policies related to general, automobile, workers' compensation, and professional liability.	16.8%	83.2%	1,152
101. Develop procedures to control risk and manage liability.	33.0%	67.0%	1,152
102. Determine billing rates.	22.4%	77.6%	1,152
103. Develop business plan for firm.	22.7%	77.3%	1,152
104. Develop and maintain effective and productive relationships with clients.	66.9%	33.1%	1,152
105. Develop procedures for responding to changes in project scope.	53.3%	46.7%	1,152
106. Develop procedures for responding to contractor requests (Requests for Information).	60.9%	39.1%	1,152
107. Develop procedures for responding to Owner requests for proposal (Requests for Proposal, Requests for Qualifications).	47.7%	52.3%	1,152
108. Develop professional and leadership skills within firm.	64.3%	35.7%	1,152
109. Establish policies to support participation in Intern Development Program (IDP).	43.8%	56.3%	1,152
110. Establish policies to encourage licensure.	38.5%	61.5%	1,152
111. Maintain positive work environment within firm that facilitates cooperation, teamwork, and staff morale.	67.6%	32.4%	1,152
112. Provide continuing education opportunities to enhance staff skills and meet statutory requirements.	41.1%	58.9%	1,152

Total N = number of respondents

CONTINUED

IDP B

Data Table C3. Percentage Distribution of Ratings for Whether Tasks Should be Required as Part of the IDP

Survey Population: IDP Supervisors and mentors + Architects licensed 2-10 years

TASK STATEMENT	Should Be Required		
	YES	NO	TOTAL N
113. Review local, state and federal codes for changes that may impact design and construction.	79.9%	20.1%	1,152
114. Make staff assignments based on knowledge and skill of staff members.	24.5%	75.5%	1,152
115. Monitor staff time and production costs for compliance with established goals.	40.0%	60.0%	1,152
116. Understand firm's legal structure to comply with jurisdictional rules and regulations.	42.9%	57.1%	1,152
117. Understand implications of evolving sustainable design strategies and technologies.	76.8%	23.2%	1,152
118. Establish human resource procedures that comply with regulations.	13.8%	86.2%	1,152
119. Understand implications of project delivery technologies.	76.8%	23.2%	1,152
120. Understand implications of project delivery methods.	82.6%	17.4%	1,152
121. Maintain professional and business licenses and certifications for legal compliance and mobility.	26.6%	73.4%	1,152
122. Participate in community activities that may provide opportunities for design of facilities that reflect community needs.	62.0%	38.0%	1,152
123. Prepare marketing documents that accurately communicate firm's experience and capabilities.	57.3%	42.7%	1,152
124. Adhere to ethical standards and codes of professional conduct.	93.8%	6.2%	1,152
125. Comply with laws and regulations governing the practice of architecture.	93.2%	6.8%	1,152
126. Review proposed projects for appropriateness of fit for firm.	32.7%	67.3%	1,152
127. Institute procedures to manage firm's internal and external correspondence.	17.9%	82.1%	1,152
128. Institute procedures for the firm to prevent losses resulting from natural and manmade disasters.	10.9%	89.1%	1,152
129. Institute procedures to manage alternative work scenarios, e.g., offshore, home.	10.5%	89.5%	1,152
130. Evaluate appropriateness of building information modeling (BIM) for proposed project.	53.2%	46.8%	1,152
131. Evaluate appropriateness of alternative project delivery systems to make recommendations to the client.	48.9%	51.1%	1,152
132. Establish procedures to balance individual employee workloads.	23.1%	76.9%	1,152
133. Participate in professional development activities that offer exchanges with other design professionals.	74.0%	26.0%	1,152
134. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.	71.6%	28.4%	1,151
135. Monitor performance of design team consultants.	68.9%	31.1%	1,152
136. Establish network of design and construction consultants.	30.9%	69.1%	1,152
MEAN	60.6%	39.4%	1,152.0
MIN	10.5%	2.0%	1,151
MAX	98.0%	89.5%	1,152

Total N = number of respondents

IDP B

Data Table C4. Percentage Distribution of Ratings for at What Level the Tasks Should be Performed by Completion of the IDP

Survey Population: IDP Supervisors and mentors + Architects licensed 2-10 years

TASK STATEMENT	Level Task Should Be Performed			
	OBSERVED OTHERS PERFORMING	PERFORMED WITH ASSISTANCE	PERFORMED WITH NO ASSISTANCE	TOTAL N
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	44.6%	51.3%	4.1%	953
2. Prepare design alternatives for client review.	7.8%	80.0%	12.2%	1,013
3. Establish methods for Architect-Client communication based on project scope of work.	40.1%	53.8%	6.1%	669
4. Assist client in determining delivery method for construction of project.	60.8%	37.1%	2.1%	699
5. Determine impact of applicable zoning and development ordinances to determine project constraints.	12.7%	73.1%	14.2%	1,085
6. Define roles and responsibilities of team members.	48.6%	43.9%	7.5%	642
7. Determine scope of services.	48.4%	47.2%	4.4%	794
8. Determine design fee budget.	48.0%	49.8%	2.2%	757
9. Determine project schedule.	31.5%	62.3%	6.3%	976
10. Evaluate results of feasibility studies to determine project's financial viability.	48.8%	49.4%	1.8%	607
11. Evaluate results of feasibility studies to determine project's technical viability.	40.8%	56.8%	2.3%	730
12. Determine impact of existing utilities infrastructure on site.	29.5%	59.7%	10.8%	901
13. Determine impact of existing transportation infrastructure on site.	29.0%	57.8%	13.3%	715
14. Assess environmental impact to formulate design decisions.	28.3%	63.8%	7.9%	906
15. Determine impact of environmental, zoning and other regulations on site.	20.9%	66.9%	12.2%	1,058
16. Assess socio-cultural context of the proposed site.	29.0%	57.4%	13.7%	476
17. Define requirements for site survey based on established project scope.	29.1%	60.6%	10.4%	867
18. Analyze existing site conditions to determine impact on facility layout.	16.0%	67.0%	17.0%	1,073
19. Consider recommendations from geotechnical studies when establishing design parameters.	38.6%	55.2%	6.1%	862
20. Develop sustainability goals based on existing environmental conditions.	21.6%	68.0%	10.4%	878
21. Establish sustainability goals affecting building performance.	26.8%	64.7%	8.5%	884
22. Consider results of environmental studies when developing site alternatives.	31.7%	62.3%	6.0%	893
23. Develop mitigation options to address adverse site conditions.	46.2%	51.6%	2.2%	639
24. Review legal documents related to site to determine project constraints.	39.8%	53.5%	6.8%	709
25. Perform building code analysis.	6.7%	64.5%	28.8%	1,129
26. Present design ideas to client orally.	29.1%	55.0%	15.9%	794
27. Prepare written communications related to design ideas, project documentation and contracts.	14.0%	69.1%	17.0%	937
28. Communicate design ideas to the client graphically.	7.4%	63.7%	28.9%	1,047
29. Communicate design ideas to the client using hand drawings.	8.8%	57.6%	33.6%	738
30. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	5.0%	55.4%	39.6%	872
31. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	6.5%	59.9%	33.6%	736
32. Determine design parameters for building engineering systems.	34.5%	60.6%	4.9%	856
33. Develop conceptual budget.	37.3%	59.1%	3.7%	821
34. Prepare submittals for regulatory approval.	15.4%	74.3%	10.3%	968
35. Evaluate opportunities and constraints of alternative sites.	25.5%	65.9%	8.6%	783
36. Gather information about community concerns and issues that may impact proposed project.	30.1%	59.5%	10.4%	647

Total N = number of respondents

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Data Table C4. Percentage Distribution of Ratings for at What Level the Tasks Should be Performed by Completion of the IDP

Survey Population: IDP Supervisors and mentors + Architects licensed 2-10 years

TASK STATEMENT	Level Task Should Be Performed			
	OBSERVED OTHERS PERFORMING	PERFORMED WITH ASSISTANCE	PERFORMED WITH NO ASSISTANCE	TOTAL N
37. Assist Owner in preparing building program including list of spaces and their characteristics.	23.3%	65.2%	11.5%	980
38. Establish project design goals.	32.3%	57.7%	10.0%	870
39. Prepare site analysis diagrams to document existing conditions, features, infrastructure and regulatory requirements.	9.6%	69.0%	21.3%	995
40. Prepare diagrams illustrating spatial relationships and functional adjacencies.	5.1%	60.8%	34.1%	997
41. Submit schedule of Architect's services to Owner for each phase.	45.7%	49.1%	5.2%	611
42. Prepare code analysis documentation.	9.6%	69.5%	20.9%	1,072
43. Select technologies to develop and produce design and construction documentation.	26.3%	63.3%	10.4%	521
44. Coordinate design work of in-house team members.	28.9%	56.3%	14.8%	709
45. Manage project close-out procedures and documentation.	30.0%	62.1%	7.9%	853
46. Perform quality control reviews throughout the documentation process.	31.9%	56.2%	12.0%	803
47. Institute procedures to ensure privacy and security of project documentation and information technology.	44.9%	47.0%	8.0%	287
48. Prepare Cost of Work estimates.	32.2%	64.0%	3.8%	712
49. Update Cost of Work estimates.	25.7%	66.2%	8.1%	630
50. Design building structural system.	50.5%	45.7%	3.8%	552
51. Design civil components of site.	49.5%	46.2%	4.3%	491
52. Design mechanical, electrical, and plumbing systems.	53.3%	44.3%	2.4%	460
53. Design landscape elements for site.	39.6%	56.3%	4.1%	591
54. Oversee design integration of building components and systems.	28.9%	63.1%	8.1%	931
55. Select materials, finishes, and systems based on technical properties and aesthetic requirements.	15.0%	69.5%	15.4%	1,037
56. Select building performance modeling technologies to guide building design.	42.8%	53.2%	4.1%	395
57. Prepare life cycle cost analysis.	46.1%	50.0%	3.9%	536
58. Perform constructability review to determine buildability, bidability, and construction sequencing of proposed project.	49.2%	45.5%	5.4%	671
59. Perform constructability reviews throughout the design process.	42.7%	50.6%	6.7%	656
60. Prepare final procurement and contract documents.	16.6%	69.0%	14.3%	901
61. Establish procedures to process documentation during contract administration.	35.0%	56.7%	8.3%	612
62. Determine specific insurance requirements to meet contract or business needs.	73.6%	25.3%	1.0%	296
63. Review results from field reports, third-party inspections, and other test results for conformance with contract documents.	24.8%	64.3%	10.9%	933
64. Manage modifications to the construction contract.	39.3%	53.6%	7.1%	666
65. Assist Owner in preparing Owner-Contractor Agreement.	56.9%	40.1%	3.0%	573
66. Respond to Contractor Requests for Information.	11.4%	71.2%	17.4%	1,078
67. Prepare proposals for services in response to client requirements.	40.3%	55.9%	3.8%	737
68. Prepare Owner-Architect Agreement.	54.9%	42.1%	3.0%	696
69. Prepare Architect-Consultant Agreement.	54.0%	42.8%	3.2%	708
70. Negotiate terms and conditions outlined in Owner-Architect Agreement.	75.7%	22.9%	1.3%	371

Total N = number of respondents

CONTINUED

IDP B

Data Table C4. Percentage Distribution of Ratings for at What Level the Tasks Should be Performed by Completion of the IDP

Survey Population: IDP Supervisors and mentors + Architects licensed 2-10 years

TASK STATEMENT	Level Task Should Be Performed			
	OBSERVED OTHERS PERFORMING	PERFORMED WITH ASSISTANCE	PERFORMED WITH NO ASSISTANCE	TOTAL N
71. Apply principles of historic preservation for projects involving building restoration or renovation.	29.2%	65.9%	4.9%	675
72. Collaborate with stakeholders during design process to maintain design intent and comply with Owner specifications.	35.4%	58.8%	5.7%	731
73. Present design concept to stakeholders.	36.5%	55.4%	8.0%	772
74. Coordinate design work of consultants.	16.4%	67.4%	16.3%	1,027
75. Select furniture, fixtures and equipment that meet client's design requirements and needs.	19.0%	69.1%	11.9%	757
76. Establish procedures for providing post-occupancy services.	57.0%	40.7%	2.3%	349
77. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	69.0%	28.8%	2.1%	378
78. Establish financial controls within firm to monitor profitability of individual projects.	70.6%	27.4%	2.0%	402
79. Prepare staffing plan to meet project goals.	53.2%	43.6%	3.2%	601
80. Establish procedures for documenting project decisions.	35.8%	52.6%	11.7%	626
81. Monitor project schedule to maintain compliance with established milestones.	28.3%	56.9%	14.8%	912
82. Evaluate staffing plan to ensure compliance with established milestones.	43.0%	47.7%	9.3%	526
83. Manage client expectations to align with established milestones and final decision points.	50.8%	43.5%	5.6%	496
84. Assist client in selecting contractors.	61.1%	36.7%	2.2%	591
85. Manage implementation of sustainability criteria.	30.3%	64.1%	5.6%	763
86. Identify changes in project scope that require additional services.	40.8%	51.1%	8.0%	835
87. Assist Owner in obtaining necessary permits and approvals.	26.8%	62.2%	11.0%	907
88. Coordinate testing of building performance and materials.	44.8%	49.3%	6.0%	467
89. Review Application and Certificate for Payment.	37.9%	52.9%	9.2%	918
90. Review shop drawings and submittals during construction for conformance with design intent.	8.7%	68.3%	23.1%	1,106
91. Complete field reports to document field observations from construction site visit.	13.8%	59.3%	27.0%	1,068
92. Manage information exchange during construction.	15.1%	61.6%	23.3%	828
93. Resolve conflicts that may arise during design and construction process.	41.1%	51.7%	7.2%	766
94. Manage project-specific bidding process.	48.6%	46.4%	5.0%	634
95. Establish procedures for building commissioning.	64.9%	33.9%	1.2%	322
96. Manage post-occupancy issues, e.g., evaluation of building performance, warranty issues.	50.0%	45.6%	4.4%	450
97. Select design team consultants.	69.3%	29.2%	1.5%	466
98. Conduct periodic progress meetings with design and project team.	40.8%	48.1%	11.1%	875
99. Participate in pre-construction, pre-installation and regular progress meetings with design team.	33.7%	54.2%	12.1%	1,030
100. Maintain insurance policies related to general, automobile, workers' compensation, and professional liability.	72.7%	25.8%	1.5%	194
101. Develop procedures to control risk and manage liability.	74.8%	23.6%	1.6%	381
102. Determine billing rates.	73.0%	24.7%	2.3%	259
103. Develop business plan for firm.	78.3%	19.8%	1.9%	263
104. Develop and maintain effective and productive relationships with clients.	43.0%	41.7%	15.3%	772
105. Develop procedures for responding to changes in project scope.	52.2%	43.3%	4.6%	615

Total N = number of respondents

CONTINUED

IDP B

Data Table C4. Percentage Distribution of Ratings for at What Level the Tasks Should be Performed by Completion of the IDP

Survey Population: IDP Supervisors and mentors + Architects licensed 2-10 years

TASK STATEMENT	Level Task Should Be Performed			
	OBSERVED OTHERS PERFORMING	PERFORMED WITH ASSISTANCE	PERFORMED WITH NO ASSISTANCE	TOTAL N
106. Develop procedures for responding to contractor requests (Requests for Information).	31.5%	56.9%	11.6%	701
107. Develop procedures for responding to Owner requests for proposal (Requests for Proposal, Requests for Qualifications).	45.6%	49.6%	4.7%	550
108. Develop professional and leadership skills within firm.	26.4%	53.8%	19.8%	742
109. Establish policies to support participation in Intern Development Program (IDP).	23.6%	60.2%	16.2%	505
110. Establish policies to encourage licensure.	30.9%	55.0%	14.2%	444
111. Maintain positive work environment within firm that facilitates cooperation, teamwork, and staff morale.	18.6%	40.8%	40.6%	779
112. Provide continuing education opportunities to enhance staff skills and meet statutory requirements.	25.9%	50.9%	23.2%	475
113. Review local, state and federal codes for changes that may impact design and construction.	12.2%	67.1%	20.8%	920
114. Make staff assignments based on knowledge and skill of staff members.	54.8%	41.0%	4.2%	283
115. Monitor staff time and production costs for compliance with established goals.	45.8%	48.6%	5.6%	461
116. Understand firm's legal structure to comply with jurisdictional rules and regulations.	59.9%	35.8%	4.3%	494
117. Understand implications of evolving sustainable design strategies and technologies.	26.6%	60.6%	12.8%	886
118. Establish human resource procedures that comply with regulations.	65.0%	30.0%	5.0%	160
119. Understand implications of project delivery technologies.	41.4%	49.8%	8.8%	885
120. Understand implications of project delivery methods.	42.4%	47.7%	9.9%	951
121. Maintain professional and business licenses and certifications for legal compliance and mobility.	55.4%	30.9%	13.7%	307
122. Participate in community activities that may provide opportunities for design of facilities that reflect community needs.	12.6%	42.4%	45.0%	715
123. Prepare marketing documents that accurately communicate firm's experience and capabilities.	26.9%	66.9%	6.2%	661
124. Adhere to ethical standards and codes of professional conduct.	12.2%	29.3%	58.5%	1,081
125. Comply with laws and regulations governing the practice of architecture.	15.2%	34.5%	50.3%	1,074
126. Review proposed projects for appropriateness of fit for firm.	56.9%	40.5%	2.6%	378
127. Institute procedures to manage firm's internal and external correspondence.	53.6%	42.0%	4.3%	207
128. Institute procedures for the firm to prevent losses resulting from natural and manmade disasters.	57.1%	41.3%	1.6%	126
129. Institute procedures to manage alternative work scenarios, e.g., offshore, home.	53.3%	44.3%	2.5%	122
130. Evaluate appropriateness of building information modeling (BIM) for proposed project.	36.5%	57.5%	6.0%	614
131. Evaluate appropriateness of alternative project delivery systems to make recommendations to the client.	55.2%	42.1%	2.7%	563
132. Establish procedures to balance individual employee workloads.	57.7%	38.6%	3.7%	267
133. Participate in professional development activities that offer exchanges with other design professionals.	7.9%	37.6%	54.5%	853
134. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.	32.6%	42.2%	25.1%	824
135. Monitor performance of design team consultants.	33.4%	55.4%	11.2%	794
136. Establish network of design and construction consultants.	36.7%	42.6%	20.7%	357
MEAN	36.8%	52.1%	11.1%	698.4
MIN	5.0%	19.8%	1.0%	122
MAX	78.3%	80.0%	58.5%	1,129

Total N = number of respondents

Data Table C5. Percentage Distribution of Ratings for Whether Supplemental Education/Experience Would be Acceptable in Lieu of On-the-Job Performance

Survey Population: IDP Supervisors and mentors + Architects licensed 2-10 years

TASK STATEMENT	Supplemental Experience Acceptable		
	YES	NO	TOTAL N
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	29.9%	70.1%	953
2. Prepare design alternatives for client review.	24.9%	75.1%	1,013
3. Establish methods for Architect-Client communication based on project scope of work.	37.5%	62.5%	669
4. Assist client in determining delivery method for construction of project.	47.1%	52.9%	699
5. Determine impact of applicable zoning and development ordinances to determine project constraints.	37.1%	62.9%	1,085
6. Define roles and responsibilities of team members.	35.8%	64.2%	642
7. Determine scope of services.	35.3%	64.7%	794
8. Determine design fee budget.	41.4%	58.6%	1,152
9. Determine project schedule.	37.1%	62.9%	976
10. Evaluate results of feasibility studies to determine project's financial viability.	49.9%	50.1%	607
11. Evaluate results of feasibility studies to determine project's technical viability.	44.2%	55.8%	730
12. Determine impact of existing utilities infrastructure on site.	37.5%	62.5%	901
13. Determine impact of existing transportation infrastructure on site.	50.1%	49.9%	715
14. Assess environmental impact to formulate design decisions.	55.5%	44.5%	906
15. Determine impact of environmental, zoning and other regulations on site.	44.5%	55.5%	1,058
16. Assess socio-cultural context of the proposed site.	59.0%	41.0%	476
17. Define requirements for site survey based on established project scope.	40.8%	59.2%	867
18. Analyze existing site conditions to determine impact on facility layout.	34.7%	65.3%	1,073
19. Consider recommendations from geotechnical studies when establishing design parameters.	45.9%	54.1%	862
20. Develop sustainability goals based on existing environmental conditions.	58.7%	41.3%	878
21. Establish sustainability goals affecting building performance.	60.3%	39.7%	884
22. Consider results of environmental studies when developing site alternatives.	51.1%	48.9%	893
23. Develop mitigation options to address adverse site conditions.	51.5%	48.5%	639
24. Review legal documents related to site to determine project constraints.	51.2%	48.8%	709
25. Perform building code analysis.	28.2%	71.8%	1,129
26. Present design ideas to client orally.	15.2%	84.8%	794
27. Prepare written communications related to design ideas, project documentation and contracts.	24.8%	75.2%	937
28. Communicate design ideas to the client graphically.	21.6%	78.4%	1,047
29. Communicate design ideas to the client using hand drawings.	24.4%	75.6%	738
30. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	31.3%	68.7%	872
31. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	37.6%	62.4%	736
32. Determine design parameters for building engineering systems.	40.0%	60.0%	856
33. Develop conceptual budget.	43.5%	56.5%	821
34. Prepare submittals for regulatory approval.	22.7%	77.3%	968
35. Evaluate opportunities and constraints of alternative sites.	43.4%	56.6%	783
36. Gather information about community concerns and issues that may impact proposed project.	42.8%	57.2%	647
37. Assist Owner in preparing building program including list of spaces and their characteristics.	30.6%	69.4%	980
38. Establish project design goals.	32.8%	67.2%	870

Total N = number of respondents

CONTINUED

IDP B

Data Table C5. Percentage Distribution of Ratings for Whether Supplemental Education/Experience Would be Acceptable in Lieu of On-the-Job Performance

Survey Population: IDP Supervisors and mentors + Architects licensed 2-10 years

TASK STATEMENT	Supplemental Experience Acceptable		
	YES	NO	TOTAL N
39. Prepare site analysis diagrams to document existing conditions, features, infrastructure and regulatory requirements.	34.9%	65.1%	995
40. Prepare diagrams illustrating spatial relationships and functional adjacencies.	35.0%	65.0%	997
41. Submit schedule of Architect's services to Owner for each phase.	38.0%	62.0%	611
42. Prepare code analysis documentation.	30.7%	69.3%	1,072
43. Select technologies to develop and produce design and construction documentation.	36.7%	63.3%	521
44. Coordinate design work of in-house team members.	18.2%	81.8%	709
45. Manage project close-out procedures and documentation.	25.1%	74.9%	853
46. Perform quality control reviews throughout the documentation process.	20.0%	80.0%	803
47. Institute procedures to ensure privacy and security of project documentation and information technology.	47.4%	52.6%	287
48. Prepare Cost of Work estimates.	45.8%	54.2%	712
49. Update Cost of Work estimates.	41.7%	58.3%	630
50. Design building structural system.	44.6%	55.4%	552
51. Design civil components of site.	46.6%	53.4%	491
52. Design mechanical, electrical, and plumbing systems.	45.4%	54.6%	460
53. Design landscape elements for site.	49.9%	50.1%	591
54. Oversee design integration of building components and systems.	25.8%	74.2%	931
55. Select materials, finishes, and systems based on technical properties and aesthetic requirements.	27.3%	72.7%	1,037
56. Select building performance modeling technologies to guide building design.	50.1%	49.9%	395
57. Prepare life cycle cost analysis.	65.9%	34.1%	536
58. Perform constructability review to determine buildability, bidability, and construction sequencing of proposed project.	38.6%	61.4%	671
59. Perform constructability reviews throughout the design process.	32.2%	67.8%	656
60. Prepare final procurement and contract documents.	21.5%	78.5%	901
61. Establish procedures to process documentation during contract administration.	30.7%	69.3%	612
62. Determine specific insurance requirements to meet contract or business needs.	60.1%	39.9%	296
63. Review results from field reports, third-party inspections, and other test results for conformance with contract documents.	29.9%	70.1%	933
64. Manage modifications to the construction contract.	29.9%	70.1%	666
65. Assist Owner in preparing Owner-Contractor Agreement.	47.8%	52.2%	573
66. Respond to Contractor Requests for Information.	18.6%	81.4%	1,078
67. Prepare proposals for services in response to client requirements.	29.6%	70.4%	737
68. Prepare Owner-Architect Agreement.	43.1%	56.9%	696
69. Prepare Architect-Consultant Agreement.	42.7%	57.3%	708
70. Negotiate terms and conditions outlined in Owner-Architect Agreement.	37.2%	62.8%	371
71. Apply principles of historic preservation for projects involving building restoration or renovation.	57.3%	42.7%	675
72. Collaborate with stakeholders during design process to maintain design intent and comply with Owner specifications.	26.3%	73.7%	731
73. Present design concept to stakeholders.	20.2%	79.8%	772
74. Coordinate design work of consultants.	17.0%	83.0%	1,027
75. Select furniture, fixtures and equipment that meet client's design requirements and needs.	31.3%	68.7%	757
76. Establish procedures for providing post-occupancy services.	52.4%	47.6%	349

Total N = number of respondents

CONTINUED

IDP B

Data Table C5. Percentage Distribution of Ratings for Whether Supplemental Education/Experience Would be Acceptable in Lieu of On-the-Job Performance

Survey Population: IDP Supervisors and mentors + Architects licensed 2-10 years

TASK STATEMENT	Supplemental Experience Acceptable		
	YES	NO	TOTAL N
77. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	37.6%	62.4%	378
78. Establish financial controls within firm to monitor profitability of individual projects.	44.0%	56.0%	402
79. Prepare staffing plan to meet project goals.	34.6%	65.4%	601
80. Establish procedures for documenting project decisions.	33.1%	66.9%	626
81. Monitor project schedule to maintain compliance with established milestones.	26.1%	73.9%	912
82. Evaluate staffing plan to ensure compliance with established milestones.	29.8%	70.2%	526
83. Manage client expectations to align with established milestones and final decision points.	26.2%	73.8%	496
84. Assist client in selecting contractors.	25.0%	75.0%	591
85. Manage implementation of sustainability criteria.	45.2%	54.8%	763
86. Identify changes in project scope that require additional services.	30.5%	69.5%	835
87. Assist Owner in obtaining necessary permits and approvals.	22.6%	77.4%	907
88. Coordinate testing of building performance and materials.	40.9%	59.1%	467
89. Review Application and Certificate for Payment.	29.7%	70.3%	918
90. Review shop drawings and submittals during construction for conformance with design intent.	18.4%	81.6%	1,106
91. Complete field reports to document field observations from construction site visit.	18.7%	81.3%	1,068
92. Manage information exchange during construction.	19.1%	80.9%	828
93. Resolve conflicts that may arise during design and construction process.	17.5%	82.5%	766
94. Manage project-specific bidding process.	28.5%	71.5%	634
95. Establish procedures for building commissioning.	55.0%	45.0%	322
96. Manage post-occupancy issues, e.g., evaluation of building performance, warranty issues.	42.4%	57.6%	450
97. Select design team consultants.	25.8%	74.2%	466
98. Conduct periodic progress meetings with design and project team.	17.3%	82.7%	875
99. Participate in pre-construction, pre-installation and regular progress meetings with design team	16.8%	83.2%	1,030
100. Maintain insurance policies related to general, automobile, workers' compensation, and professional liability.	58.2%	41.8%	194
101. Develop procedures to control risk and manage liability.	58.8%	41.2%	381
102. Determine billing rates.	52.1%	47.9%	259
103. Develop business plan for firm.	61.2%	38.8%	263
104. Develop and maintain effective and productive relationships with clients.	20.9%	79.1%	772
105. Develop procedures for responding to changes in project scope.	31.5%	68.5%	615
106. Develop procedures for responding to contractor requests (Requests for Information).	28.4%	71.6%	701
107. Develop procedures for responding to Owner requests for proposal (Requests for Proposal, Requests for Qualifications).	34.4%	65.6%	550
108. Develop professional and leadership skills within firm.	30.9%	69.1%	742
109. Establish policies to support participation in Intern Development Program (IDP).	37.0%	63.0%	505
110. Establish policies to encourage licensure.	37.8%	62.2%	444
111. Maintain positive work environment within firm that facilitates cooperation, teamwork, and staff morale.	25.5%	74.5%	779
112. Provide continuing education opportunities to enhance staff skills and meet statutory requirements.	37.5%	62.5%	475
113. Review local, state and federal codes for changes that may impact design and construction.	37.7%	62.3%	920
114. Make staff assignments based on knowledge and skill of staff members	29.0%	71.0%	283

Total N = number of respondents

CONTINUED

IDP B

Data Table C5. Percentage Distribution of Ratings for Whether Supplemental Education/Experience Would be Acceptable in Lieu of On-the-Job Performance

Survey Population: IDP Supervisors and mentors + Architects licensed 2-10 years

TASK STATEMENT	Supplemental Experience Acceptable		
	YES	NO	TOTAL N
115. Monitor staff time and production costs for compliance with established goals.	31.7%	68.3%	461
116. Understand firm's legal structure to comply with jurisdictional rules and regulations.	50.0%	50.0%	494
117. Understand implications of evolving sustainable design strategies and technologies.	60.2%	39.8%	886
118. Establish human resource procedures that comply with regulations.	58.1%	41.9%	160
119. Understand implications of project delivery technologies.	55.4%	44.6%	885
120. Understand implications of project delivery methods.	56.5%	43.5%	951
121. Maintain professional and business licenses and certifications for legal compliance and mobility.	51.5%	48.5%	307
122. Participate in community activities that may provide opportunities for design of facilities that reflect community needs.	33.3%	66.7%	715
123. Prepare marketing documents that accurately communicate firm's experience and capabilities.	34.9%	65.1%	661
124. Adhere to ethical standards and codes of professional conduct.	36.2%	63.8%	1,081
125. Comply with laws and regulations governing the practice of architecture.	38.7%	61.3%	1,074
126. Review proposed projects for appropriateness of fit for firm.	33.9%	66.1%	378
127. Institute procedures to manage firm's internal and external correspondence.	47.3%	52.7%	207
128. Institute procedures for the firm to prevent losses resulting from natural and manmade disasters.	62.7%	37.3%	126
129. Institute procedures to manage alternative work scenarios, e.g., offshore, home.	55.7%	44.3%	122
130. Evaluate appropriateness of building information modeling (BIM) for proposed project.	46.9%	53.1%	614
131. Evaluate appropriateness of alternative project delivery systems to make recommendations to the client.	47.2%	52.8%	563
132. Establish procedures to balance individual employee workloads.	38.2%	61.8%	267
133. Participate in professional development activities that offer exchanges with other design professionals.	34.8%	65.2%	853
134. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.	34.2%	65.8%	824
135. Monitor performance of design team consultants.	18.1%	81.9%	794
136. Establish network of design and construction consultants.	28.3%	71.7%	357
MEAN	37.6%	62.4%	701.3
MIN	15.2%	34.1%	122
MAX	65.9%	84.8%	1,152

IDP C

Data Table C6. Percentage Distribution of Ratings for How Survey Respondents Performed Tasks During Their IDP Experiences

Survey Population: Interns who completed the IDP within the past year + Architects licensed in the past year who completed the IDP in the past two years

TASK STATEMENT	How Performed						
	PERFORMED WITH NO ASSISTANCE	PERFORMED WITH ASSISTANCE	OBSERVED OTHERS PERFORMING	GAINED EXPOSURE THROUGH SUPP. ED. OR EXP	DID NOT HAVE ANY EXPOSURE	PERCENT OBSERVED OR PERFORMED	TOTAL N
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	18.4%	54.4%	18.4%	4.1%	4.8%	95.2%	147
2. Prepare design alternatives for client review.	40.8%	54.4%	2.0%	1.4%	1.4%	98.6%	147
3. Establish methods for Architect-Client communication based on project scope of work.	21.8%	38.8%	25.9%	2.7%	10.9%	89.1%	147
4. Assist client in determining delivery method for construction of project.	8.8%	22.4%	35.4%	10.9%	22.4%	77.6%	147
5. Determine impact of applicable zoning and development ordinances to determine project constraints.	40.1%	38.8%	11.6%	3.4%	6.1%	93.9%	147
6. Define roles and responsibilities of team members.	21.8%	31.3%	38.1%	1.4%	7.5%	92.5%	147
7. Determine scope of services.	8.8%	27.9%	40.1%	6.8%	16.3%	83.7%	147
8. Determine design fee budget.	5.4%	24.5%	40.1%	6.8%	23.1%	76.9%	147
9. Determine project schedule.	9.5%	34.0%	42.2%	4.1%	10.2%	89.8%	147
10. Evaluate results of feasibility studies to determine project's financial viability.	7.5%	25.9%	26.5%	10.9%	29.3%	70.7%	147
11. Evaluate results of feasibility studies to determine project's technical viability.	4.8%	28.6%	27.2%	7.5%	32.0%	68.0%	147
12. Determine impact of existing utilities infrastructure on site.	12.2%	46.9%	27.2%	3.4%	10.2%	89.8%	147
13. Determine impact of existing transportation infrastructure on site.	20.4%	34.0%	19.0%	3.4%	23.1%	76.9%	147
14. Assess environmental impact to formulate design decisions.	14.3%	38.1%	20.4%	10.9%	16.3%	83.7%	147
15. Determine impact of environmental, zoning and other regulations on site.	32.7%	46.3%	12.2%	4.1%	4.8%	95.2%	147
16. Assess socio-cultural context of the proposed site.	19.0%	17.0%	11.6%	4.8%	47.6%	52.4%	147
17. Define requirements for site survey based on established project scope.	14.3%	38.1%	19.0%	5.4%	23.1%	76.9%	147
18. Analyze existing site conditions to determine impact on facility layout.	33.3%	44.9%	11.6%	2.0%	8.2%	91.8%	147
19. Consider recommendations from geotechnical studies when establishing design parameters.	8.8%	39.5%	26.5%	3.4%	21.8%	78.2%	147
20. Develop sustainability goals based on existing environmental conditions.	15.6%	30.6%	23.1%	13.6%	17.0%	83.0%	147
21. Establish sustainability goals affecting building performance.	15.6%	37.4%	24.5%	8.8%	13.6%	86.4%	147
22. Consider results of environmental studies when developing site alternatives.	6.1%	29.3%	16.3%	8.8%	39.5%	60.5%	147
23. Develop mitigation options to address adverse site conditions.	5.4%	31.3%	20.4%	4.1%	38.8%	61.2%	147
24. Review legal documents related to site to determine project constraints.	19.0%	30.6%	11.6%	4.8%	34.0%	66.0%	147
25. Perform building code analysis.	56.5%	37.4%	4.1%	0.7%	1.4%	98.6%	147
26. Present design ideas to client orally.	40.8%	36.1%	14.3%	2.0%	6.8%	93.2%	147

Total N = number of respondents

CONTINUED

Data Table C6. Percentage Distribution of Ratings for How Survey Respondents Performed Tasks During Their IDP Experiences

Survey Population: Interns who completed the IDP within the past year + Architects licensed in the past year who completed the IDP in the past two years

TASK STATEMENT	How Performed						
	PERFORMED WITH NO ASSISTANCE	PERFORMED WITH ASSISTANCE	OBSERVED OTHERS PERFORMING	GAINED EXPOSURE THROUGH SUPP. ED. OR EXP	DID NOT HAVE ANY EXPOSURE	PERCENT OBSERVED OR PERFORMED	TOTAL N
27. Prepare written communications related to design ideas, project documentation and contracts.	53.1%	37.4%	8.2%	0.0%	1.4%	98.6%	147
28. Communicate design ideas to the client graphically.	68.0%	27.9%	2.7%	0.7%	0.7%	99.3%	147
29. Communicate design ideas to the client using hand drawings.	53.7%	17.0%	12.9%	2.0%	14.3%	85.7%	147
30. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	77.6%	17.0%	2.0%	0.0%	3.4%	96.6%	147
31. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	70.1%	19.0%	4.8%	1.4%	4.8%	95.2%	147
32. Determine design parameters for building engineering systems.	15.0%	42.2%	25.9%	2.0%	15.0%	85.0%	147
33. Develop conceptual budget.	9.5%	34.7%	27.2%	5.4%	23.1%	76.9%	147
34. Prepare submittals for regulatory approval.	40.1%	40.8%	8.2%	2.0%	8.8%	91.2%	147
35. Evaluate opportunities and constraints of alternative sites.	8.8%	29.3%	15.6%	5.4%	40.8%	59.2%	147
36. Gather information about community concerns and issues that may impact proposed project.	8.2%	25.2%	19.0%	8.8%	38.8%	61.2%	147
37. Assist Owner in preparing building program including list of spaces and their characteristics.	24.5%	37.4%	18.4%	4.8%	15.0%	85.0%	147
38. Establish project design goals.	16.3%	40.8%	28.6%	2.7%	11.6%	88.4%	147
39. Prepare site analysis diagrams to document existing conditions, features, infrastructure and regulatory requirements.	38.8%	36.7%	10.2%	3.4%	10.9%	89.1%	147
40. Prepare diagrams illustrating spatial relationships and functional adjacencies.	49.0%	34.0%	4.8%	3.4%	8.8%	91.2%	147
41. Submit schedule of Architect's services to Owner for each phase.	8.2%	15.0%	40.8%	5.4%	30.6%	69.4%	147
42. Prepare code analysis documentation.	44.9%	42.9%	6.1%	1.4%	4.8%	95.2%	147
43. Select technologies to develop and produce design and construction documentation.	34.7%	32.7%	13.6%	2.7%	16.3%	83.7%	147
44. Coordinate design work of in-house team members.	53.7%	34.7%	6.8%	0.0%	4.8%	95.2%	147
45. Manage project close-out procedures and documentation.	26.5%	37.4%	20.4%	0.7%	15.0%	85.0%	147
46. Perform quality control reviews throughout the documentation process.	33.3%	44.9%	14.3%	2.0%	5.4%	94.6%	147
47. Institute procedures to ensure privacy and security of project documentation and information technology.	15.6%	24.5%	14.3%	2.0%	43.5%	56.5%	147
48. Prepare Cost of Work estimates.	12.9%	31.3%	22.4%	7.5%	25.9%	74.1%	147
49. Update Cost of Work estimates.	14.3%	27.9%	22.4%	2.7%	32.7%	67.3%	147
50. Design building structural system.	6.1%	39.5%	36.1%	2.0%	16.3%	83.7%	147
51. Design civil components of site.	7.5%	34.0%	32.7%	1.4%	24.5%	75.5%	147
52. Design mechanical, electrical, and plumbing systems.	6.8%	29.9%	41.5%	2.0%	19.7%	80.3%	147
53. Design landscape elements for site.	10.9%	41.5%	26.5%	2.7%	18.4%	81.6%	147
54. Oversee design integration of building components and systems.	27.2%	60.5%	8.8%	0.0%	3.4%	96.6%	147

Total N = number of respondents

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IDP C

Data Table C6. Percentage Distribution of Ratings for How Survey Respondents Performed Tasks During Their IDP Experiences

Survey Population: Interns who completed the IDP within the past year + Architects licensed in the past year who completed the IDP in the past two years

TASK STATEMENT	How Performed						
	PERFORMED WITH NO ASSISTANCE	PERFORMED WITH ASSISTANCE	OBSERVED OTHERS PERFORMING	GAINED EXPOSURE THROUGH SUPP. ED. OR EXP	DID NOT HAVE ANY EXPOSURE	PERCENT OBSERVED OR PERFORMED	TOTAL N
55. Select materials, finishes, and systems based on technical properties and aesthetic requirements.	37.4%	50.3%	7.5%	0.0%	4.8%	95.2%	147
56. Select building performance modeling technologies to guide building design.	15.0%	21.1%	18.4%	6.1%	39.5%	60.5%	147
57. Prepare life cycle cost analysis.	3.4%	10.2%	17.7%	13.6%	55.1%	44.9%	147
58. Perform constructability review to determine buildability, bidability, and construction sequencing of proposed project.	5.4%	28.6%	23.8%	6.8%	35.4%	64.6%	147
59. Perform constructability reviews throughout the design process.	8.8%	30.6%	23.8%	2.0%	34.7%	65.3%	147
60. Prepare final procurement and contract documents.	34.0%	39.5%	15.6%	2.0%	8.8%	91.2%	147
61. Establish procedures to process documentation during contract administration.	30.6%	29.9%	21.8%	1.4%	16.3%	83.7%	147
62. Determine specific insurance requirements to meet contract or business needs.	2.0%	8.2%	23.1%	5.4%	61.2%	38.8%	147
63. Review results from field reports, third-party inspections, and other test results for conformance with contract documents.	35.4%	40.1%	12.9%	0.7%	10.9%	89.1%	147
64. Manage modifications to the construction contract.	23.1%	28.6%	26.5%	0.0%	21.8%	78.2%	147
65. Assist Owner in preparing Owner-Contractor Agreement.	6.8%	13.6%	27.9%	7.5%	44.2%	55.8%	147
66. Respond to Contractor Requests for Information.	64.6%	29.9%	2.7%	0.7%	2.0%	98.0%	147
67. Prepare proposals for services in response to client requirements.	12.2%	42.2%	29.3%	0.0%	16.3%	83.7%	147
68. Prepare Owner-Architect Agreement.	2.7%	19.7%	32.0%	10.2%	35.4%	64.6%	147
69. Prepare Architect-Consultant Agreement.	6.8%	19.0%	29.3%	9.5%	35.4%	64.6%	147
70. Negotiate terms and conditions outlined in Owner-Architect Agreement.	2.7%	11.6%	31.3%	8.2%	46.3%	53.7%	147
71. Apply principles of historic preservation for projects involving building restoration or renovation.	12.9%	33.3%	8.8%	7.5%	37.4%	62.6%	147
72. Collaborate with stakeholders during design process to maintain design intent and comply with Owner specifications.	14.3%	37.4%	12.2%	2.7%	33.3%	66.7%	147
73. Present design concept to stakeholders.	17.0%	32.7%	19.0%	0.7%	30.6%	69.4%	147
74. Coordinate design work of consultants.	61.2%	34.0%	2.0%	0.7%	2.0%	98.0%	147
75. Select furniture, fixtures and equipment that meet client's design requirements and needs.	36.1%	36.7%	20.4%	0.7%	6.1%	93.9%	147
76. Establish procedures for providing post-occupancy services.	2.0%	12.2%	20.4%	5.4%	59.9%	40.1%	147
77. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	6.8%	10.9%	28.6%	6.8%	46.9%	53.1%	147
78. Establish financial controls within firm to monitor profitability of individual projects.	6.1%	11.6%	23.1%	4.1%	55.1%	44.9%	147
79. Prepare staffing plan to meet project goals.	6.1%	25.9%	32.0%	2.7%	33.3%	66.7%	147
80. Establish procedures for documenting project decisions.	24.5%	32.7%	15.0%	1.4%	26.5%	73.5%	147

Total N = number of respondents

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IDP C

Data Table C6. Percentage Distribution of Ratings for How Survey Respondents Performed Tasks During Their IDP Experiences

Survey Population: Interns who completed the IDP within the past year + Architects licensed in the past year who completed the IDP in the past two years

TASK STATEMENT	How Performed						
	PERFORMED WITH NO ASSISTANCE	PERFORMED WITH ASSISTANCE	OBSERVED OTHERS PERFORMING	GAINED EXPOSURE THROUGH SUPP. ED. OR EXP	DID NOT HAVE ANY EXPOSURE	PERCENT OBSERVED OR PERFORMED	TOTAL N
81. Monitor project schedule to maintain compliance with established milestones.	31.3%	36.7%	21.8%	0.7%	9.5%	90.5%	147
82. Evaluate staffing plan to ensure compliance with established milestones.	10.9%	23.8%	33.3%	0.0%	32.0%	68.0%	147
83. Manage client expectations to align with established milestones and final decision points.	14.3%	36.1%	36.7%	1.4%	11.6%	88.4%	147
84. Assist client in selecting contractors.	12.9%	28.6%	32.0%	2.0%	24.5%	75.5%	147
85. Manage implementation of sustainability criteria.	17.7%	23.1%	22.4%	8.2%	28.6%	71.4%	147
86. Identify changes in project scope that require additional services.	21.1%	42.9%	27.9%	0.7%	7.5%	92.5%	147
87. Assist Owner in obtaining necessary permits and approvals.	32.0%	36.1%	17.0%	2.0%	12.9%	87.1%	147
88. Coordinate testing of building performance and materials.	6.1%	17.7%	26.5%	4.8%	44.9%	55.1%	147
89. Review Application and Certificate for Payment.	23.8%	29.9%	23.1%	2.7%	20.4%	79.6%	147
90. Review shop drawings and submittals during construction for conformance with design intent.	63.9%	30.6%	1.4%	1.4%	2.7%	97.3%	147
91. Complete field reports to document field observations from construction site visit.	56.5%	27.9%	6.8%	1.4%	7.5%	92.5%	147
92. Manage information exchange during construction.	54.4%	30.6%	8.8%	0.0%	6.1%	93.9%	147
93. Resolve conflicts that may arise during design and construction process.	30.6%	55.8%	10.2%	0.0%	3.4%	96.6%	147
94. Manage project-specific bidding process.	10.2%	33.3%	33.3%	4.1%	19.0%	81.0%	147
95. Establish procedures for building commissioning.	2.0%	11.6%	22.4%	6.8%	57.1%	42.9%	147
96. Manage post-occupancy issues, e.g., evaluation of building performance, warranty issues.	6.8%	13.6%	22.4%	4.8%	52.4%	47.6%	147
97. Select design team consultants.	6.8%	21.8%	42.2%	0.7%	28.6%	71.4%	147
98. Conduct periodic progress meetings with design and project team.	32.7%	45.6%	16.3%	0.0%	5.4%	94.6%	147
99. Participate in pre-construction, pre-installation and regular progress meetings with design team.	38.8%	47.6%	6.8%	0.0%	6.8%	93.2%	147
100. Maintain insurance policies related to general, automobile, workers' compensation, and professional liability.	2.7%	6.1%	16.3%	5.4%	69.4%	30.6%	147
101. Develop procedures to control risk and manage liability.	2.0%	10.2%	24.5%	7.5%	55.8%	44.2%	147
102. Determine billing rates.	2.0%	9.5%	27.2%	3.4%	57.8%	42.2%	147
103. Develop business plan for firm.	2.0%	8.2%	22.4%	4.8%	62.6%	37.4%	147
104. Develop and maintain effective and productive relationships with clients.	40.1%	31.3%	19.7%	2.0%	6.8%	93.2%	147
105. Develop procedures for responding to changes in project scope.	13.6%	38.8%	21.8%	1.4%	24.5%	75.5%	147
106. Develop procedures for responding to contractor requests (Requests for Information).	37.4%	34.0%	17.0%	0.7%	10.9%	89.1%	147
107. Develop procedures for responding to Owner requests for proposal (Requests for Proposal, Requests for Qualifications).	12.2%	42.9%	22.4%	2.0%	20.4%	79.6%	147

Total N = number of respondents

CONTINUED

Data Table C6. Percentage Distribution of Ratings for How Survey Respondents Performed Tasks During Their IDP Experiences

Survey Population: Interns who completed the IDP within the past year + Architects licensed in the past year who completed the IDP in the past two years

TASK STATEMENT	How Performed						
	PERFORMED WITH NO ASSISTANCE	PERFORMED WITH ASSISTANCE	OBSERVED OTHERS PERFORMING	GAINED EXPOSURE THROUGH SUPP. ED. OR EXP	DID NOT HAVE ANY EXPOSURE	PERCENT OBSERVED OR PERFORMED	TOTAL N
108. Develop professional and leadership skills within firm.	36.1%	38.8%	9.5%	4.1%	11.6%	88.4%	147
109. Establish policies to support participation in Intern Development Program (IDP).	17.0%	14.3%	17.0%	0.7%	51.0%	49.0%	147
110. Establish policies to encourage licensure.	14.3%	9.5%	19.0%	2.0%	55.1%	44.9%	147
111. Maintain positive work environment within firm that facilitates cooperation, teamwork, and staff morale.	55.1%	22.4%	8.2%	1.4%	12.9%	87.1%	147
112. Provide continuing education opportunities to enhance staff skills and meet statutory requirements.	21.1%	23.1%	24.5%	3.4%	27.9%	72.1%	147
113. Review local, state and federal codes for changes that may impact design and construction.	40.1%	36.1%	11.6%	1.4%	10.9%	89.1%	147
114. Make staff assignments based on knowledge and skill of staff members.	12.2%	19.0%	34.0%	0.7%	34.0%	66.0%	147
115. Monitor staff time and production costs for compliance with established goals.	10.2%	22.4%	27.9%	1.4%	38.1%	61.9%	147
116. Understand firm's legal structure to comply with jurisdictional rules and regulations.	5.4%	12.9%	21.8%	8.2%	51.7%	48.3%	147
117. Understand implications of evolving sustainable design strategies and technologies.	27.9%	24.5%	13.6%	14.3%	19.7%	80.3%	147
118. Establish human resource procedures that comply with regulations.	4.1%	4.8%	17.7%	2.0%	71.4%	28.6%	147
119. Understand implications of project delivery technologies.	18.4%	36.1%	16.3%	10.9%	18.4%	81.6%	147
120. Understand implications of project delivery methods.	17.0%	38.8%	16.3%	10.9%	17.0%	83.0%	147
121. Maintain professional and business licenses and certifications for legal compliance and mobility.	13.6%	8.2%	30.6%	3.4%	44.2%	55.8%	147
122. Participate in community activities that may provide opportunities for design of facilities that reflect community needs.	39.5%	23.8%	8.2%	8.2%	20.4%	79.6%	147
123. Prepare marketing documents that accurately communicate firm's experience and capabilities.	26.5%	42.2%	17.7%	1.4%	12.2%	87.8%	147
124. Adhere to ethical standards and codes of professional conduct.	73.5%	15.0%	4.8%	2.0%	4.8%	95.2%	147
125. Comply with laws and regulations governing the practice of architecture.	58.5%	26.5%	10.2%	1.4%	3.4%	96.6%	147
126. Review proposed projects for appropriateness of fit for firm.	8.8%	23.1%	32.7%	0.7%	34.7%	65.3%	147
127. Institute procedures to manage firm's internal and external correspondence.	10.2%	21.1%	25.9%	0.7%	42.2%	57.8%	147
128. Institute procedures for the firm to prevent losses resulting from natural and manmade disasters.	2.7%	5.4%	9.5%	1.4%	81.0%	19.0%	147
129. Institute procedures to manage alternative work scenarios, e.g., offshore, home.	5.4%	8.2%	11.6%	1.4%	73.5%	26.5%	147
130. Evaluate appropriateness of building information modeling (BIM) for proposed project.	30.6%	23.1%	12.9%	3.4%	29.9%	70.1%	147

Total N = number of respondents

CONTINUED

IDP C

Data Table C6. Percentage Distribution of Ratings for How Survey Respondents Performed Tasks During Their IDP Experiences

Survey Population: Interns who completed the IDP within the past year + Architects licensed in the past year who completed the IDP in the past two years

TASK STATEMENT	How Performed						
	PERFORMED WITH NO ASSISTANCE	PERFORMED WITH ASSISTANCE	OBSERVED OTHERS PERFORMING	GAINED EXPOSURE THROUGH SUPP. ED. OR EXP	DID NOT HAVE ANY EXPOSURE	PERCENT OBSERVED OR PERFORMED	TOTAL N
131. Evaluate appropriateness of alternative project delivery systems to make recommendations to the client.	4.1%	17.0%	26.5%	6.1%	46.3%	53.7%	147
132. Establish procedures to balance individual employee workloads.	11.6%	17.7%	34.7%	0.7%	35.4%	64.6%	147
133. Participate in professional development activities that offer exchanges with other design professionals.	59.2%	12.9%	4.1%	4.1%	19.7%	80.3%	147
134. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/ control.	32.7%	34.7%	15.0%	4.1%	13.6%	86.4%	147
135. Monitor performance of design team consultants.	34.0%	44.2%	15.0%	0.7%	6.1%	93.9%	147
136. Establish network of design and construction consultants.	24.5%	36.1%	25.2%	0.0%	14.3%	85.7%	147
MEAN	22.9%	29.3%	19.8%	3.6%	24.4%	75.6%	147.0
MIN	2.0%	4.8%	1.4%	0.0%	0.7%	19.0%	147
MAX	77.6%	60.5%	42.2%	14.3%	81.0%	99.3%	147

Total N = number of respondents

Data Table C7. Percentage Distribution of Ratings on the Frequency at Which Survey Respondents Performed (or Observed Others Performing) Tasks During Their IDP Experiences

Survey Population: Interns who completed the IDP within the past year + Architects licensed in the past year who completed the IDP in the past two years

TASK STATEMENT	Frequency at Which Task Performed				
	RARELY (1-2 TIMES)	SOMETIMES (MONTHLY OR LESS)	OFTEN (WEEKLY)	REGULARLY	TOTAL N
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	22.9%	49.3%	19.3%	8.6%	140
2. Prepare design alternatives for client review.	5.5%	38.6%	33.1%	22.8%	145
3. Establish methods for Architect-Client communication based on project scope of work.	22.1%	40.5%	21.4%	16.0%	131
4. Assist client in determining delivery method for construction of project.	44.7%	39.5%	11.4%	4.4%	114
5. Determine impact of applicable zoning and development ordinances to determine project constraints.	23.9%	55.1%	11.6%	9.4%	138
6. Define roles and responsibilities of team members.	16.9%	46.3%	30.1%	6.6%	136
7. Determine scope of services.	30.9%	50.4%	14.6%	4.1%	123
8. Determine design fee budget.	46.9%	39.8%	8.8%	4.4%	113
9. Determine project schedule.	28.0%	54.5%	9.1%	8.3%	132
10. Evaluate results of feasibility studies to determine project's financial viability.	48.1%	42.3%	4.8%	4.8%	104
11. Evaluate results of feasibility studies to determine project's technical viability.	44.0%	45.0%	8.0%	3.0%	100
12. Determine impact of existing utilities infrastructure on site.	35.6%	52.3%	9.1%	3.0%	132
13. Determine impact of existing transportation infrastructure on site.	52.2%	38.1%	8.0%	1.8%	113
14. Assess environmental impact to formulate design decisions.	44.7%	43.9%	8.9%	2.4%	123
15. Determine impact of environmental, zoning and other regulations on site.	24.3%	61.4%	8.6%	5.7%	140
16. Assess socio-cultural context of the proposed site.	53.2%	37.7%	6.5%	2.6%	77
17. Define requirements for site survey based on established project scope.	42.5%	51.3%	3.5%	2.7%	113
18. Analyze existing site conditions to determine impact on facility layout.	29.6%	51.1%	14.1%	5.2%	135
19. Consider recommendations from geotechnical studies when establishing design parameters.	53.9%	39.1%	2.6%	4.3%	115
20. Develop sustainability goals based on existing environmental conditions.	50.8%	39.3%	9.0%	0.8%	122
21. Establish sustainability goals affecting building performance.	44.1%	44.9%	7.9%	3.1%	127
22. Consider results of environmental studies when developing site alternatives.	56.2%	30.3%	11.2%	2.2%	89
23. Develop mitigation options to address adverse site conditions.	53.3%	38.9%	5.6%	2.2%	90
24. Review legal documents related to site to determine project constraints.	48.5%	38.1%	11.3%	2.1%	97
25. Perform building code analysis.	6.9%	44.1%	33.1%	15.9%	145
26. Present design ideas to client orally.	21.2%	48.9%	24.8%	5.1%	137
27. Prepare written communications related to design ideas, project documentation and contracts.	9.7%	33.8%	37.2%	19.3%	145
28. Communicate design ideas to the client graphically.	3.4%	32.2%	37.7%	26.7%	146
29. Communicate design ideas to the client using hand drawings.	29.4%	46.8%	15.9%	7.9%	126
30. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	3.5%	25.4%	36.6%	34.5%	142
31. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	14.3%	36.4%	24.3%	25.0%	140
32. Determine design parameters for building engineering systems.	16.8%	52.8%	25.6%	4.8%	125
33. Develop conceptual budget.	38.9%	46.0%	11.5%	3.5%	113
34. Prepare submittals for regulatory approval.	14.2%	57.5%	13.4%	14.9%	134
35. Evaluate opportunities and constraints of alternative sites.	49.4%	37.9%	10.3%	2.3%	87
36. Gather information about community concerns and issues that may impact proposed project.	64.4%	32.2%	3.3%	0.0%	90

Total N = number of respondents

CONTINUED

Data Table C7. Percentage Distribution of Ratings on the Frequency at Which Survey Respondents Performed (or Observed Others Performing) Tasks During Their IDP Experiences

Survey Population: Interns who completed the IDP within the past year + Architects licensed in the past year who completed the IDP in the past two years

TASK STATEMENT	Frequency at Which Task Performed				
	RARELY (1-2 TIMES)	SOMETIMES (MONTHLY OR LESS)	OFTEN (WEEKLY)	REGULARLY	TOTAL N
37. Assist Owner in preparing building program including list of spaces and their characteristics.	32.8%	54.4%	9.6%	3.2%	125
38. Establish project design goals.	27.7%	53.1%	16.2%	3.1%	130
39. Prepare site analysis diagrams to document existing conditions, features, infrastructure and regulatory requirements.	32.1%	49.6%	16.0%	2.3%	131
40. Prepare diagrams illustrating spatial relationships and functional adjacencies.	26.9%	49.3%	19.4%	4.5%	134
41. Submit schedule of Architect's services to Owner for each phase.	34.3%	56.9%	7.8%	1.0%	102
42. Prepare code analysis documentation.	14.3%	58.6%	17.9%	9.3%	140
43. Select technologies to develop and produce design and construction documentation.	23.6%	39.0%	18.7%	18.7%	123
44. Coordinate design work of in-house team members.	7.1%	35.7%	35.0%	22.1%	140
45. Manage project close-out procedures and documentation.	32.0%	52.8%	8.0%	7.2%	125
46. Perform quality control reviews throughout the documentation process.	12.2%	53.2%	27.3%	7.2%	139
47. Institute procedures to ensure privacy and security of project documentation and information technology.	31.3%	43.4%	16.9%	8.4%	83
48. Prepare Cost of Work estimates.	36.7%	47.7%	11.9%	3.7%	109
49. Update Cost of Work estimates.	38.4%	52.5%	5.1%	4.0%	99
50. Design building structural system.	23.6%	56.1%	15.4%	4.9%	123
51. Design civil components of site.	36.9%	52.3%	9.9%	0.9%	111
52. Design mechanical, electrical, and plumbing systems.	22.9%	54.2%	17.8%	5.1%	118
53. Design landscape elements for site.	43.3%	45.0%	9.2%	2.5%	120
54. Oversee design integration of building components and systems.	8.5%	52.8%	31.0%	7.7%	142
55. Select materials, finishes, and systems based on technical properties and aesthetic requirements.	6.4%	45.7%	35.0%	12.9%	140
56. Select building performance modeling technologies to guide building design.	46.1%	38.2%	9.0%	6.7%	89
57. Prepare life cycle cost analysis.	60.6%	31.8%	4.5%	3.0%	66
58. Perform constructibility review to determine buildability, bidability, and construction sequencing of proposed project.	38.9%	46.3%	11.6%	3.2%	95
59. Perform constructibility reviews throughout the design process.	29.2%	50.0%	15.6%	5.2%	96
60. Prepare final procurement and contract documents.	11.9%	39.6%	20.1%	28.4%	134
61. Establish procedures to process documentation during contract administration.	20.3%	46.3%	18.7%	14.6%	123
62. Determine specific insurance requirements to meet contract or business needs.	61.4%	35.1%	3.5%	0.0%	57
63. Review results from field reports, third-party inspections, and other test results for conformance with contract documents.	24.4%	50.4%	16.8%	8.4%	131
64. Manage modifications to the construction contract.	33.9%	40.0%	16.5%	9.6%	115
65. Assist Owner in preparing Owner-Contractor Agreement.	50.0%	43.9%	3.7%	2.4%	82
66. Respond to Contractor Requests for Information.	3.5%	38.9%	34.7%	22.9%	144
67. Prepare proposals for services in response to client requirements.	22.8%	58.5%	14.6%	4.1%	123
68. Prepare Owner-Architect Agreement.	49.5%	40.0%	8.4%	2.1%	95
69. Prepare Architect-Consultant Agreement.	52.6%	41.1%	4.2%	2.1%	95
70. Negotiate terms and conditions outlined in Owner-Architect Agreement.	57.0%	35.4%	5.1%	2.5%	79

Total N = number of respondents

CONTINUED

Data Table C7. Percentage Distribution of Ratings on the Frequency at Which Survey Respondents Performed (or Observed Others Performing) Tasks During Their IDP Experiences

Survey Population: Interns who completed the IDP within the past year + Architects licensed in the past year who completed the IDP in the past two years

TASK STATEMENT	Frequency at Which Task Performed				
	RARELY (1-2 TIMES)	SOMETIMES (MONTHLY OR LESS)	OFTEN (WEEKLY)	REGULARLY	TOTAL N
71. Apply principles of historic preservation for projects involving building restoration or renovation.	52.2%	33.7%	9.8%	4.3%	92
72. Collaborate with stakeholders during design process to maintain design intent and comply with Owner specifications.	26.5%	48.0%	20.4%	5.1%	98
73. Present design concept to stakeholders.	29.4%	61.8%	6.9%	2.0%	102
74. Coordinate design work of consultants.	3.5%	29.9%	40.3%	26.4%	144
75. Select furniture, fixtures and equipment that meet client's design requirements and needs.	17.4%	49.3%	21.7%	11.6%	138
76. Establish procedures for providing post-occupancy services.	55.9%	39.0%	5.1%	0.0%	59
77. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	48.7%	43.6%	5.1%	2.6%	78
78. Establish financial controls within firm to monitor profitability of individual projects.	40.9%	42.4%	13.6%	3.0%	66
79. Prepare staffing plan to meet project goals.	29.6%	50.0%	16.3%	4.1%	98
80. Establish procedures for documenting project decisions.	26.9%	41.7%	18.5%	13.0%	108
81. Monitor project schedule to maintain compliance with established milestones.	9.0%	49.6%	29.3%	12.0%	133
82. Evaluate staffing plan to ensure compliance with established milestones.	17.0%	61.0%	16.0%	6.0%	100
83. Manage client expectations to align with established milestones and final decision points.	17.7%	56.2%	14.6%	11.5%	130
84. Assist client in selecting contractors.	39.6%	52.3%	3.6%	4.5%	111
85. Manage implementation of sustainability criteria.	32.4%	51.4%	11.4%	4.8%	105
86. Identify changes in project scope that require additional services.	24.3%	60.3%	9.6%	5.9%	136
87. Assist Owner in obtaining necessary permits and approvals.	29.7%	52.3%	7.8%	10.2%	128
88. Coordinate testing of building performance and materials.	49.4%	45.7%	3.7%	1.2%	81
89. Review Application and Certificate for Payment.	35.0%	48.7%	11.1%	5.1%	117
90. Review shop drawings and submittals during construction for conformance with design intent.	4.2%	35.0%	35.7%	25.2%	143
91. Complete field reports to document field observations from construction site visit	14.0%	51.5%	20.6%	14.0%	136
92. Manage information exchange during construction.	4.3%	39.1%	34.8%	21.7%	138
93. Resolve conflicts that may arise during design and construction process.	7.7%	43.0%	31.0%	18.3%	142
94. Manage project-specific bidding process.	36.1%	52.9%	8.4%	2.5%	119
95. Establish procedures for building commissioning.	63.5%	33.3%	3.2%	0.0%	63
96. Manage post-occupancy issues, e.g., evaluation of building performance, warranty issues.	52.9%	40.0%	7.1%	0.0%	70
97. Select design team consultants.	30.5%	61.9%	6.7%	1.0%	105
98. Conduct periodic progress meetings with design and project team.	7.2%	57.6%	25.9%	9.4%	139
99. Participate in pre-construction, pre-installation and regular progress meetings with design team.	13.9%	49.6%	26.3%	10.2%	137
100. Maintain insurance policies related to general, automobile, workers' compensation, and professional liability.	57.8%	31.1%	8.9%	2.2%	45
101. Develop procedures to control risk and manage liability.	63.1%	26.2%	6.2%	4.6%	65
102. Determine billing rates.	41.9%	50.0%	1.6%	6.5%	62
103. Develop business plan for firm.	67.3%	23.6%	7.3%	1.8%	55
104. Develop and maintain effective and productive relationships with clients.	9.5%	43.1%	26.3%	21.2%	137
105. Develop procedures for responding to changes in project scope.	20.7%	59.5%	12.6%	7.2%	111

Total N = number of respondents

CONTINUED

Data Table C7. Percentage Distribution of Ratings on the Frequency at Which Survey Respondents Performed (or Observed Others Performing) Tasks During Their IDP Experiences

Survey Population: Interns who completed the IDP within the past year + Architects licensed in the past year who completed the IDP in the past two years

TASK STATEMENT	Frequency at Which Task Performed				
	RARELY (1-2 TIMES)	SOMETIMES (MONTHLY OR LESS)	OFTEN (WEEKLY)	REGULARLY	TOTAL N
106. Develop procedures for responding to contractor requests (Requests for Information).	13.7%	53.4%	22.9%	9.9%	131
107. Develop procedures for responding to Owner requests for proposal (Requests for Proposal, Requests for Qualifications).	32.5%	53.8%	9.4%	4.3%	117
108. Develop professional and leadership skills within firm.	11.5%	42.3%	28.5%	17.7%	130
109. Establish policies to support participation in Intern Development Program (IDP).	34.7%	50.0%	12.5%	2.8%	72
110. Establish policies to encourage licensure.	45.5%	36.4%	12.1%	6.1%	66
111. Maintain positive work environment within firm that facilitates cooperation, teamwork, and staff morale.	7.8%	20.3%	27.3%	44.5%	128
112. Provide continuing education opportunities to enhance staff skills and meet statutory requirements.	8.5%	55.7%	24.5%	11.3%	106
113. Review local, state and federal codes for changes that may impact design and construction.	16.8%	57.3%	13.7%	12.2%	131
114. Make staff assignments based on knowledge and skill of staff members.	11.3%	52.6%	26.8%	9.3%	97
115. Monitor staff time and production costs for compliance with established goals.	15.4%	49.5%	25.3%	9.9%	91
116. Understand firm's legal structure to comply with jurisdictional rules and regulations.	57.7%	31.0%	5.6%	5.6%	71
117. Understand implications of evolving sustainable design strategies and technologies.	29.7%	42.4%	18.6%	9.3%	118
118. Establish human resource procedures that comply with regulations.	42.9%	45.2%	4.8%	7.1%	42
119. Understand implications of project delivery technologies.	31.7%	55.8%	8.3%	4.2%	120
120. Understand implications of project delivery methods.	27.9%	61.5%	6.6%	4.1%	122
121. Maintain professional and business licenses and certifications for legal compliance and mobility.	43.9%	39.0%	7.3%	9.8%	82
122. Participate in community activities that may provide opportunities for design of facilities that reflect community needs.	35.9%	42.7%	15.4%	6.0%	117
123. Prepare marketing documents that accurately communicate firm's experience and capabilities.	31.0%	49.6%	10.9%	8.5%	129
124. Adhere to ethical standards and codes of professional conduct.	5.7%	15.0%	12.9%	66.4%	140
125. Comply with laws and regulations governing the practice of architecture.	5.6%	11.3%	14.1%	69.0%	142
126. Review proposed projects for appropriateness of fit for firm.	36.5%	40.6%	13.5%	9.4%	96
127. Institute procedures to manage firm's internal and external correspondence	35.3%	40.0%	11.8%	12.9%	85
128. Institute procedures for the firm to prevent losses resulting from natural and man-made disasters.	39.3%	42.9%	14.3%	3.6%	28
129. Institute procedures to manage alternative work scenarios, e.g., offshore, home.	48.7%	38.5%	5.1%	7.7%	39
130. Evaluate appropriateness of building information modeling (BIM) for proposed project.	36.9%	32.0%	15.5%	15.5%	103
131. Evaluate appropriateness of alternative project delivery systems to make recommendations to the client.	49.4%	40.5%	5.1%	5.1%	79
132. Establish procedures to balance individual employee workloads.	23.2%	41.1%	26.3%	9.5%	95
133. Participate in professional development activities that offer exchanges with other design professionals.	19.5%	60.2%	9.3%	11.0%	118
134. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.	8.7%	40.9%	26.0%	24.4%	127
135. Monitor performance of design team consultants.	10.9%	46.4%	33.3%	9.4%	138
136. Establish network of design and construction consultants.	13.5%	51.6%	22.2%	12.7%	126
MEAN	30.6%	44.9%	15.3%	9.2%	111.1
MIN	3.4%	11.3%	1.6%	0.0%	28
MAX	67.3%	61.9%	40.3%	69.0%	146

Total N = number of respondents

EXAMINATION REPORT

EXECUTIVE SUMMARY

THE EXAMINATION SURVEY

This *Examination Report* encompasses extensive data collected from the three examination-specific surveys:

EXAMINATION A Survey
Architects were asked to indicate how frequently they performed a specific task in the past year and to rate the level of importance of the competent performance of the task by a recently licensed architect practicing independently.

EXAMINATION B Survey
In this survey, architects were presented with two similar, but distinct questions. The first question is very common in practice analyses and asks when each knowledge/skill was acquired. The second question asked the same respondents to identify when each knowledge/skill should be acquired.

EXAMINATION C Survey
In the third survey, architects were asked to rate the importance of each knowledge/skill to a recently licensed architect practicing independently and at what level they typically use the knowledge/skill when performing their job.

KEY FINDINGS

The data resulting from the Examination Survey of the *2012 NCARB Practice Analysis of Architecture* represents the views of a broad sample of architects. The Examination Committee and the Test Specification Task Force, consisting of NCARB Member Board Members, recently licensed architects, and other subject-matter experts will continue to analyze the data in support of the current ARE. Findings will also drive the research and development of new testing innovations and item types to be introduced in future versions of the examination.

- **Level of Importance** – The survey indicates that 129 of the 132 knowledge/skills and 106 of the 110 tasks were rated as "*important*" or greater by architects who completed the survey. Three of these K/S and tasks were rated as "*critically important*" and are directly related to the protection of the public health, safety, and welfare—building code analysis, the impact of building codes on building design, and compliance with laws and regulations governing the practice of architecture.
- **Point of Knowledge/Skill Acquisition** – When comparing level of importance with point of acquisition, 15 knowledge/skills were identified as "*importan*t" or greater and also identified as being acquired after licensure by more than 50 percent of architects completing the survey. These 15 knowledge/skills primarily deal with practice and project management issues and are vital to competent practice; therefore, their acquisition should be better supported during education and internship.
- **Level of Knowledge/Skill Use** – Architects were asked to rate the level at which they use each knowledge/skill. "*Apply*" was the most frequently selected response at 42.5 percent. "*Evaluate*" and "*Understand*" were evenly split at 26.0 percent and 25.7 percent, respectively. Only 5.8 percent of architects indicated they did not use the knowledge/skill in their job. This data will be used to support item writers in the creation of more relevant items/questions for the examination.
- **Frequency of Task Performance** – Over 70 percent of the tasks included in the survey were indicated by architects as being performed in the past year. Most tasks were rated as being performed "*quarterly*" (20.4 percent) or "*monthly*" (19.0 percent). This data will be used to refine the content and distribution of items included in the ARE. Ten tasks rated "*important*" or greater were identified as "*not performed*" in the past year by more than 50 percent of architects. Additional analysis by various NCARB committees is warranted to better understand the nature of those tasks.

- **Subgroup Analysis** – Respondent characteristics such as years of licensed practice and firm size had minimal influence on responses; however, a couple of differences are worth noting. More experienced practitioners tended to report a slightly higher level of ability than those recently licensed, underscoring the important role continuing education plays after licensure. Additionally, architects working in smaller firms rated their typical level of knowledge/skill use at "*evaluate*" more frequently than those working in medium and larger firms, reinforcing that the small-firm practitioner is typically responsible for performing a broader range of tasks in their daily work.

CONCLUSION

The ARE plays a critical role in assessing the knowledge, skills, and abilities to provide the various services required for the independent practice of architecture. The exam is required by all 54 U.S. jurisdictions and helps ensure that NCARB's Member Boards and licensed practitioners can meet their obligation to protect the public health, safety, and welfare. Further analysis and application of Practice Analysis data will help ensure the ARE remains psychometrically justifiable, legally defensible, and relevant to current practice.

USE AND APPLICATION

The *2012 NCARB Practice Analysis of Architecture* will inform interim updates to the current version of the ARE as well as serve as a foundation for the development of future versions of the examination. The findings will also have a significant impact on the Council's exploration of alternative pathways to licensure that further blend the three traditional components of education, internship, and examination.

SHORT-TERM USE

The 2012 Practice Analysis has already had a meaningful influence on the immediate future of the ARE as a guide for refreshing the existing exam item databank. The survey's ongoing impact will be seen throughout its application over the next few years, as the Council continues to explore new means and methods for examination development and delivery.

Refinement of ARE Test Specification

The ARE Test Specification is the document that outlines the content areas of the ARE as well as the overall requirements to assemble multiple versions (forms) for each division of the exam. The current test specification is based on the findings of the *2007 Practice Analysis of Architecture.* The Test Specification Task Force, a specially-formed committee of subject-matter experts, comprehensively reviewed the current test specification during early 2013. The committee's goal was to identify potential short-term updates to the test specification based on the findings of the 2012 Practice Analysis without modifying the overall structure of the ARE. Committee members attempted to align the knowledge, skill, and task statements of the 2012 Practice Analysis to the current test specification and as a result, identified 11 knowledge/skill (K/S) statements that were not in alignment. It was determined that although these 11 K/S are not assessed by the current examination, they are covered in the education and/or internship components of the path to licensure. The committee also aligned the task statements to the knowledge/skill statements to allow for better refinement of each content area within the examination. The result was the identification of four task statements that did not align with any of the K/S statements. Each of these tasks related to the use of various drawing methodologies including hand drawing, computer-aided design (CAD), and building information modeling (BIM).

This short-term update to the current ARE test specification will also be used to complete a full review of the item databank in preparation for exam forms scheduled to be released in July 2014. More detailed information on the slightly updated version of the ARE will be released in early 2014, well in advance of its launch.

Item Type Analysis

The tasks identified in the 2012 Practice Analysis were recently used in a Research & Development Subcommittee study to evaluate current and potential examination item types that could be incorporated into the ARE. Each item type was evaluated based on its ability to appropriately assess each of the 110 tasks identified in the Practice Analysis. The findings of the study confirmed that current ARE item types adequately cover all tasks identified. The study also identified potential new item types that could be incorporated into the ARE to either complement or replace current item types. The findings of the item type study were also used to evaluate options and inform decisions regarding the future structure of the ARE.

CURRENT ARE ITEM TYPES

Single-select Multiple Choice

A candidate must choose the one correct answer from a list of possible options (typically out of four options).

Multi-select Multiple Choice (Check-all-that-apply)

A candidate must choose the multiple correct answers from a list of possible options (typically two to four correct out of six options).

Constructed Response – Numeric (Quantitative Fill-In-The-Blank)

A candidate is presented a question asking him/her to identify a correct numerical response. The candidate must determine and then enter the correct number.

Figural Response (Vignette)

A candidate is presented a problem statement (program requirements, code requirements, etc.) along with a base drawing. Using the CAD toolset available, the candidate must create a solution that is responsive to the various aspects of the problem statement.

LONG-TERM APPLICATION

In addition to the short-term uses of the 2012 Practice Analysis data, survey results will also inform future versions of the ARE.

Numerous subject-matter experts—including experienced architects, recently licensed architects, educators, and testing consultants—will reference the Practice Analysis data to help determine the specific content areas to be included within a new divisional structure to be proposed for the next version of the ARE, known as ARE 5.0. Additionally, survey results will help inform the weightings of content areas within each division. For example, if a particular content area received a high mean importance and/or frequency rating, that content area will likely be weighted more heavily within a particular division. While each division's content areas and weightings are ultimately determined by the subject-matter experts, the survey data serves as the empirical evidence to inform and validate their decisions.

It is important to note that the Practice Analysis findings inform *what* should be assessed in the ARE; however, they do <u>not</u> determine *how* it is to be assessed. NCARB relies on the informed judgment of subject-matter experts, consultants, and other specialists in the testing industry to assist in designing the most appropriate testing methodology. For example, subject-matter experts, informed by the Practice Analysis data, will determine the composition and cognitive complexity of each division's content areas. These experts will also determine the practical feasibility of an assessment within the given constraints of the examination's domain. It is possible that some K/S or tasks that received high ratings by survey respondents may not be appropriate for assessment in the ARE and therefore should be incorporated in greater depth in the education and/or internship components of the path to licensure.

Computer-based testing in general, and specifically the convenience of year-round administration, requires a deep and robust database of items/questions from which to draw upon to create each division of the exam. The survey responses regarding the cognitive level of use of each K/S will be used to support item writers in the creation of more relevant items to populate this database.

Finally, a supplement to this *Examination Report*, further identifying the long-term application of the Practice Analysis data, will be released in early 2014 following further research and analysis by various NCARB committees and task forces.

EXAMINATION SURVEY

Each examination (ARE) survey was designed to gather information from licensed architects, who reviewed the K/S and task statements and indicated:

- Importance of the K/S and task to independent practice for recently licensed architects;
- Frequency of task performance in the past year;
- Level at which they typically use the K/S in their job; and
- When each K/S was acquired and when it should be acquired.

A total of 2,695 ARE surveys were included in the data analysis. The number of survey responses for each ARE survey included in the final data analysis ranged from 60 percent to 74 percent, based on the 90 percent completion rule (participants who responded to at least 90 percent of the items in the survey were included).

ARE SURVEY	RESPONSES RECEIVED	RESPONSES INCLUDED IN DATA ANALYSIS	PERCENTAGE INCLUDED IN DATA ANALYSIS
ARE A	1,169	865	74%
ARE B	1,429	1,008	71%
ARE C	1,376	822	60%

The chart below summarizes the survey population and the research questions related to the task and knowledge/skill (K/S) statements, as well as the various rating scales for the examination surveys. The chart also references the related Examination (ARE) Data Tables.

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
ARE A	All licensed architects	Task	How frequently have you performed the task during the past year? • Not performed or does not apply • Yearly • Quarterly • Monthly • Weekly • Daily	D2
			How important is competent performance of the task by a recently licensed architect practicing independently? • Of little or no importance • Somewhat important • Important • Very important • Critically important	D3

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
ARE B	All licensed architects	Knowledge/ Skill	When did you acquire the knowledge/skill? • Not acquired • By completion of accredited architecture degree program • During internship • After licensure	D8
			When should the knowledge/skill be acquired? • Not relevant, does not apply • By completion of accredited architecture degree program • During internship • After licensure	D9
ARE C	All licensed architects	Knowledge/ Skill	How important is the knowledge/skill to a recently licensed architect practicing independently? • Of little or no importance • Somewhat important • Important • Very important • Critically important	D6
			At what level do you typically use the knowledge/skill in your job? • Do not use knowledge/skill • Understand: General understanding; no specific details are used on the job • Apply: Application of general principles, procedures, skills to typical job scenarios • Evaluate: Use of knowledge/skill to evaluate and refine solutions for job scenarios or designs	D7
			Indicate why you do not use the knowledge/skill. (Select all that apply.) • Not used in my practice • Not allowed by my jurisdiction • Not recommended by my legal counsel or insurance carrier • Provided by consultant(s) • Lack of experience • Other	D10

NCARB'S KEY FINDINGS

No single licensure examination, or combination of examinations, can comprehensively test for all of the knowledge, skills, and tasks of a profession. Therefore, methods for defining and prioritizing the content are important steps in the examination development and validation process. NCARB relies on the Practice Analysis to help prioritize the practice-related knowledge, skills, and tasks of the profession that should be demonstrated competently prior to licensure.

The identification and prioritization of test content is based on several factors:

- Level of Importance
- Point of Acquisition
- Frequency of Performance
- Level of Use

As noted earlier, Practice Analysis findings will inform *what* should be measured by the ARE, not *how* it should be tested. The key findings on the following pages offer valuable insights that both validate current examination content and drive development of content for a future version of the ARE.

LEVEL OF IMPORTANCE

One of the most frequently asked questions when conducting a Practice Analysis of any profession relates to the level of importance of a knowledge/skill or task in relation to the recently licensed, independent practitioner.

IMPORTANT KNOWLEDGE/SKILLS (K/S)

Architects completing the ARE Survey were asked to rate "*How important is the knowledge/skill to a recently licensed architect practicing independently?*" The data indicates that 129 of 132 K/S were rated "*important*" or greater (an importance rating of 1.5 or above). Of these, 11 K/S were rated 3.0 or greater and include:

ARE K/S #	KNOWLEDGE/SKILL STATEMENT	IMPORTANCE RATING 0 1 2 3 4
20	Building codes and their impact on building design.	3.53
1	Oral, written, and visual presentation techniques to communicate project information.	3.40
102	Appropriate documentation level required for construction documents.	3.37
15	Designing facility layout and site plan that responds to site constraints.	3.24
3	Method for project controls, e.g., scope of services, budget, billing, compensation.	3.18
19	Protocols and procedures for conducting a code analysis.	3.17
122	Design decisions and their impact on constructability.	3.16
71	Relationship between constructability and aesthetics.	3.06
62	Functional requirements for thermal and moisture control systems.	3.04
110	Methods for production of construction documentation and drawings.	3.02
10	Factors involved in selection of building systems and components.	3.02
0 = Of little or no importance 1 = Somewhat important 2 = Important 3 = Very important 4 = Critically important		

The three lowest rated K/S were:

ARE K/S #	KNOWLEDGE/SKILL STATEMENT	IMPORTANCE RATING 0 1 2 3 4
49	Methods and strategies for evidence-based design (EBD).	1.35
27	Producing physical scale models.	1.28
130	Factors involved in conducting architectural practice in international markets.	0.97
0 = Of little or no importance 1 = Somewhat important 2 = Important 3 = Very important 4 = Critically important		

IMPORTANT TASKS

Architects rated 106 of the 110 tasks surveyed as "*important*" or greater (an importance rating of 1.5 or greater) when asked a similar question, "*How important is competent performance of the task by a recently licensed architect practicing independently?*" Twelve tasks were rated 3.0 or greater and include:

ARE TASK #	TASK STATEMENT	IMPORTANCE RATING 0 1 2 3 4
25	Perform building code analysis.	3.55
107	Comply with laws and regulations governing the practice of architecture.	3.50
106	Adhere to ethical standards and codes of professional conduct.	3.46
96	Develop and maintain effective and productive relationships with clients.	3.33
26	Communicate design ideas to the client graphically.	3.25
1	Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	3.25
67	Coordinate design work of consultants.	3.21
5	Determine impact of applicable zoning and development ordinances to determine project constraints.	3.20
2	Prepare design alternatives for client review.	3.08
7	Determine scope of services.	3.05
39	Prepare code analysis documentation.	3.05
60	Respond to contractor Requests for Information (RFI).	3.00
0 = Of little or no importance 1 = Somewhat important 2 = Important 3 = Very important 4 = Critically important		

The four lowest rated tasks were:

ARE TASK #	TASK STATEMENT	IMPORTANCE RATING 0 1 2 3 4
49	Design landscape elements for site.	1.46
53	Prepare life cycle cost analysis.	1.36
16	Assess socio-cultural context of the proposed site.	1.33
87	Establish procedures for building commissioning.	1.32
0 = Of little or no importance 1 = Somewhat important 2 = Important 3 = Very important 4 = Critically important		

POINT OF KNOWLEDGE/SKILL ACQUISITION

A second, common question asked when conducting a practice analysis is "*When did you acquire the knowledge/skill?*" For our purposes, the *2012 NCARB Practice Analysis of Architecture* asked the question in order to determine if the K/S was acquired by completion of an accredited architecture degree program, during internship, or after licensure. Ideally, if a K/S is rated as important for the competent practice of architecture, it stands to reason that it should be acquired prior to licensure.

As a point of comparison, architects completing the 2012 survey were also asked a slightly different version of that question, "*When should the knowledge/skill be acquired?*" The response to the second question across all K/S statements was predominantly "*before completion of the accredited degree program*." The scatter plot below contrasts the "*did*" vs. "*should*" responses to the two questions. With only one exception, every K/S had a higher rating for "*was acquired after licensure*" than "*should be acquired after licensure*." **These responses, as illustrated by the dots falling below the diagonal line, both reinforce the importance of acquiring the K/S prior to licensure and highlight a knowledge gap, as architects acquired the K/S later than they believe is necessary.**

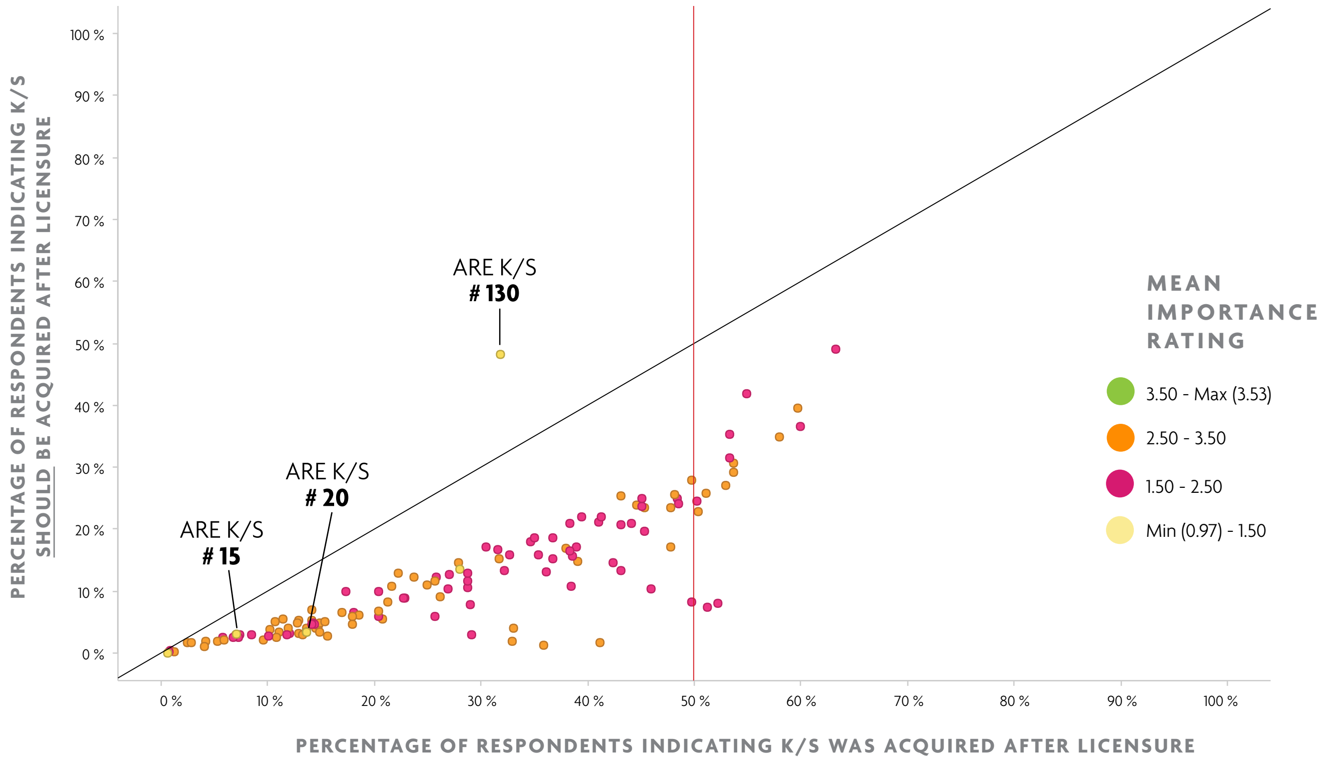
Each dot on this scatter plot represents a specific K/S, with position on the x-axis determined by the percentage of responses from architects who indicated that the K/S "*was acquired after licensure.*"

The y-axis represents the percentage of responses from architects who indicated that the same K/S "*should be acquired after licensure.*"

The diagonal line represents perfect agreement among responses to the two questions. If architects reported a K/S as being "*acquired after licensure*" to the same degree as they indicated it "*should be acquired after licensure,*" it will appear on or close to this line.

The dots that fall to the right of the vertical dashed line are the K/S that were identified by more than 50 percent of architects completing the survey as being "*acquired after licensure.*"

K/S WAS ACQUIRED AFTER LICENSURE VS. K/S SHOULD BE ACQUIRED AFTER LICENSURE



For example, ARE K/S #20 "*Knowledge of Building codes and their impact on building design*" had the highest mean importance rating, and while 13.7 percent of architects indicated they acquired the K/S after licensure, only 3.4 percent indicated it should be acquired after licensure. For ARE K/S #15 "*Skill in designing facility layout and site plan that responds to site constraints,*" 6.9 percent of architects said they acquired it after licensure, with only 3.0 percent saying it should be acquired after licensure. The single exception was ARE K/S #130 "*Knowledge of factors involved in conducting architectural practice in international markets,*" for which a higher percentage of architects (48.1 percent) indicated it should be acquired after licensure than their actual experience (31.8 percent). This result is not surprising as this knowledge was rated as the least important of all K/S and primarily impacts only those architects pursuing work internationally.

IMPORTANCE VS. ACQUISITION

Comparing level of importance and point of acquisition readily identifies several K/S that were rated as "*important*" (or greater) and that were acquired after licensure—an imbalance that is less than ideal.

The scatter plot presented earlier illustrates that 15 K/S were identified by more than 50 percent of architects completing the survey as being acquired after licensure (represented by the dots that fall to the right of the vertical, dashed line, in the lower right quadrant of the scatter plot). These 15 K/S (listed in the table below) also were rated as "*important*" or greater by respondents. It is encouraging to note, however, that none of these K/S were rated as "*critical*" (3.5 or greater).

ARE K/S #	KNOWLEDGE/SKILL STATEMENT	ALL LICENSED ARCHITECTS	
		ACQUIRED "*AFTER LICENSURE*"	IMPORTANCE RATING 0 1 2 3 4
132	Financial planning methods to manage revenues, staffing, and overhead expenses.	63.3%	2.49
86	Business development strategies.	59.9%	2.47
87	Relationship between staffing capabilities and hours, and internal project budget to meet established milestones and profitability.	59.7%	2.60
88	Purposes and types of professional liability insurance related to architectural practice.	58.0%	2.53
123	Methods to manage human resources.	54.9%	1.95
6	Client and project characteristics that influence contract agreements.	53.7%	2.96
101	Procedures for processing requests for additional services.	53.7%	2.55
126	Purposes of and legal implications for different types of business entities.	53.3%	1.96
131	Methods and procedures for risk management.	53.3%	2.40
37	Strategies for anticipating, managing, and preventing disputes and conflicts.	53.0%	2.56
97	Sustainability strategies and/or rating systems.	52.2%	2.20
98	Sustainability considerations related to building materials and construction processes.	51.2%	2.27
82	Fee structures, their attributes and implications for schedule, scope, and profit.	51.1%	2.68
100	Methods to identify scope changes that may require additional services.	50.4%	2.77
77	Processes and procedures for building commissioning.	50.3%	1.66

0 = Of little or no importance 1 = Somewhat important 2 = Important 3 = Very important 4 = Critically important

Most of the 15 K/S are related to practice and project management issues, which aligns with findings from the Education-related survey of the Practice Analysis that indicated a need for more focus in these areas. Future committees responsible for the development of various NCARB programs will be charged with determining the best way to support the introduction and acquisition of these important K/S during education and/or internship.

IMPACT ON THE TEST SPECIFICATION

As explained in the Use and Application section of this report, the results of the Practice Analysis drive the development and refinement of the test specification for the ARE. Eleven K/S included in the survey are not covered in the current test specification.

ARE K/S #	KNOWLEDGE/SKILL STATEMENT	IMPORTANCE RATING 0 1 2 3 4
25	Using software to produce two-dimensional (2-D) drawings.	2.98
30	Computer aided design and drafting (CADD) software for producing two-dimensional (2-D) drawings.	2.96
106	Principles of computer-assisted design and drafting (CADD) software and its uses in communicating design ideas.	2.75
26	Using software to produce three-dimensional (3-D) models of building design.	2.37
22	Producing hand drawings of design ideas.	2.31
24	Producing two-dimensional (2-D) drawings using hand methods.	2.00
31	Factors involved in selecting computer-based design technologies.	1.99
28	Use of building information modeling (BIM) to develop and manage databases of building and construction information.	1.96
105	Building information modeling (BIM) and its impact on planning, financial management, and construction documentation.	1.82
27	Producing physical scale models.	1.28
130	Factors involved in conducting architectural practice in international markets.	0.97

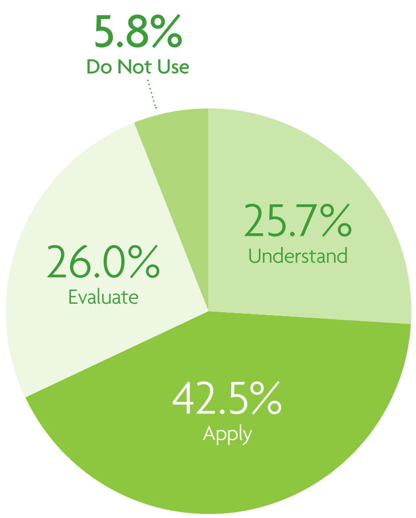
0 = Of little or no importance 1 = Somewhat important 2 = Important 3 = Very important 4 = Critically important

Even though the ARE does not assess these skills, many were rated as "*important*" (mean importance rating of 1.5 or greater) to competent practice. NCARB committees will continue to analyze this data to determine its impact on future versions of the examination. The majority of these K/S are technology based and require early introduction and continuous learning over the course of an architect's career. Therefore, education, internship, and continuing education all share the responsibility in the early introduction of and training in the use of these important tools. Software vendors and their educational resources also play a supporting role in the process.

LEVEL OF KNOWLEDGE/SKILL USE

The Practice Analysis survey also asked architects "*At what level do you typically use the knowledge/skill in your job?*" Based on the mean average rating across all K/S, the most frequently self-reported level of knowledge/skill use by architects was "*apply*."

LEVEL OF K/S USE: MEAN RESPONSE FOR ALL ITEMS



LEVEL OF USE AND IMPORTANCE

When factoring importance ratings into data analysis, 129 of the 132 K/S surveyed were rated as "*important*" or greater, and 98 of these were indicated as used at the "*apply*" level by respondents.

COUNT OF K/S ITEMS IN LEVEL OF USE AND IMPORTANCE CATEGORIES

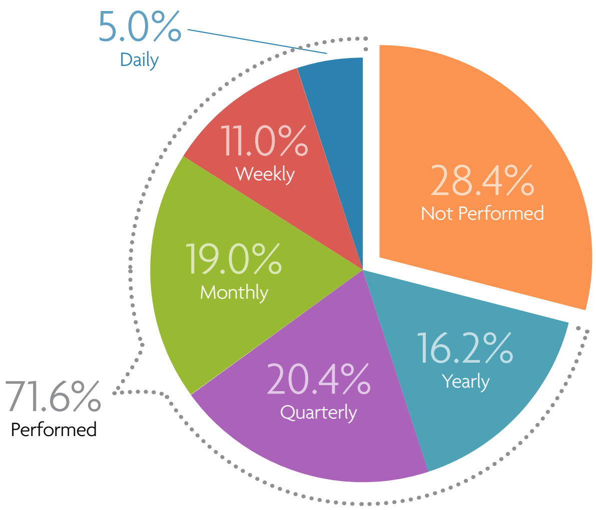
MODAL LEVEL CATEGORY	OF LITTLE OR NO IMPORTANCE	SOMEWHAT IMPORTANT	IMPORTANT	VERY IMPORTANT	CRITICALLY IMPORTANT
Do Not Use	0	2	0	0	0
Understand	0	1	22	1	0
Apply	0	0	41	57	0
Evaluate	0	0	0	**4**	**1**
Multiple Values	0	0	2	1	0

In the table above, the single K/S categorized as "*evaluate*" and "*critically important*" is ARE K/S #20 "*Knowledge of building codes and their impact on building design.*" The other four K/S categorized as "*evaluate*" and rated "*very important*" are: ARE K/S #1 "*Knowledge of oral, written, and visual presentation techniques to communicate project information;*" ARE K/S #15 "*Skill in designing facility layout and site plan that responds to site constraints;*" ARE K/S #71 "*Knowledge of relationship between constructability and aesthetics;*" and ARE K/S #122 "*Knowledge of design decisions and their impact on constructability.*"

FREQUENCY OF TASK PERFORMANCE

For the first time in the history of architecture practice analyses, architects were asked "*How frequently have you performed the task during the past year*?" As identified in the pie chart below, 28.4 percent of responses indicated the task was "*not performed or does not apply*," while 71.6 percent of responses indicated the task was "*performed*" in the past year. When examining the mean response rates in greater detail, the largest number of responses indicated that tasks were performed "*quarterly*" or "*monthly*" at nearly the same rate.

FREQUENCY OF PERFORMANCE



The table below identifies the eight tasks that were rated as "*performed*" by more than 90 percent of respondents. The two most frequently performed tasks, by a significant margin, were ARE Task #106 "*Adhere to ethical standards and codes of professional conduct*" and ARE Task #107 "*Comply with laws and regulations governing the practice of architecture*." The nature of these two tasks is clearly related to the architect's responsibility to protect the public health, safety, and welfare.

ARE TASK #	TASK STATEMENT	FREQUENCY OF PERFORMANCE					PERCENT "PERFORMED"	PERCENT "NOT PERFORMED"
		YEARLY	QUARTERLY	MONTHLY	WEEKLY	DAILY		
106	Adhere to ethical standards and codes of professional conduct.	6.9%	5.2%	5.9%	6.5%	70.8%	95.3%	4.7%
107	Comply with laws and regulations governing the practice of architecture.	8.2%	4.7%	6.4%	6.1%	69.1%	94.6%	5.4%
26	Communicate design ideas to the client graphically.	5.3%	16.0%	27.1%	33.1%	10.6%	92.0%	8.0%
25	Perform building code analysis.	8.2%	21.8%	32.1%	20.3%	9.2%	91.8%	8.2%
67	Coordinate design work of consultants.	5.1%	16.3%	23.7%	32.3%	13.4%	90.8%	9.2%
2	Prepare design alternatives for client review.	4.6%	20.2%	34.5%	25.0%	6.4%	90.6%	9.4%
96	Develop and maintain effective and productive relationships with clients.	5.3%	9.8%	18.4%	25.2%	31.8%	90.5%	9.5%
51	Select materials, finishes and systems based on technical properties and aesthetic requirements.	7.1%	22.2%	29.6%	22.4%	9.1%	90.4%	9.6%

A closer examination of the tasks that were rated by the largest number of architects as performed "*yearly,*" identified in the table below, reveals a few interesting findings. In many instances, these tasks have an even higher rating for "*not performed*" when compared to "*yearly*" performance. These annually performed tasks all relate to practice management issues that are more likely performed by the senior partners or principals of a firm, or by architects practicing in smaller firms where they may be required to assume broader responsibilities than they would in larger firms.

ARE TASK #	TASK STATEMENT	FREQUENCY OF PERFORMANCE					PERCENT "PERFORMED"	PERCENT "NOT PERFORMED"
		YEARLY	QUARTERLY	MONTHLY	WEEKLY	DAILY		
95	Develop business plan for firm.	41.0%	6.2%	2.4%	0.9%	0.1%	50.8%	49.2%
103	Understand firm's legal structure to comply with jurisdictional rules and regulations.	40.7%	11.0%	4.3%	2.0%	1.4%	59.3%	40.7%
94	Determine billing rates.	39.8%	14.0%	7.4%	3.0%	0.6%	64.7%	35.3%
92	Secure insurance policies related to general, automobile, workers' compensation, and professional liability.	39.8%	6.6%	2.9%	0.5%	0.1%	49.8%	50.2%
56	Determine specific insurance requirements to meet contract or business needs.	29.7%	11.9%	5.8%	1.2%	0.3%	48.9%	51.1%
93	Develop strategies to control risk and manage liability.	29.2%	19.1%	11.0%	3.0%	2.9%	65.2%	34.8%

FREQUENCY AND IMPORTANCE

The chart below categorizes the tasks by frequency of performance and level of importance. This comparison will be helpful in refining the content distribution of future versions of the ARE test specification. For example, if two statements are equally rated on the importance scale, and it is not feasible to measure both, it is logical to prioritize the one that is performed more frequently in practice.

COUNT OF TASKS IN FREQUENCY AND IMPORTANCE CATEGORIES

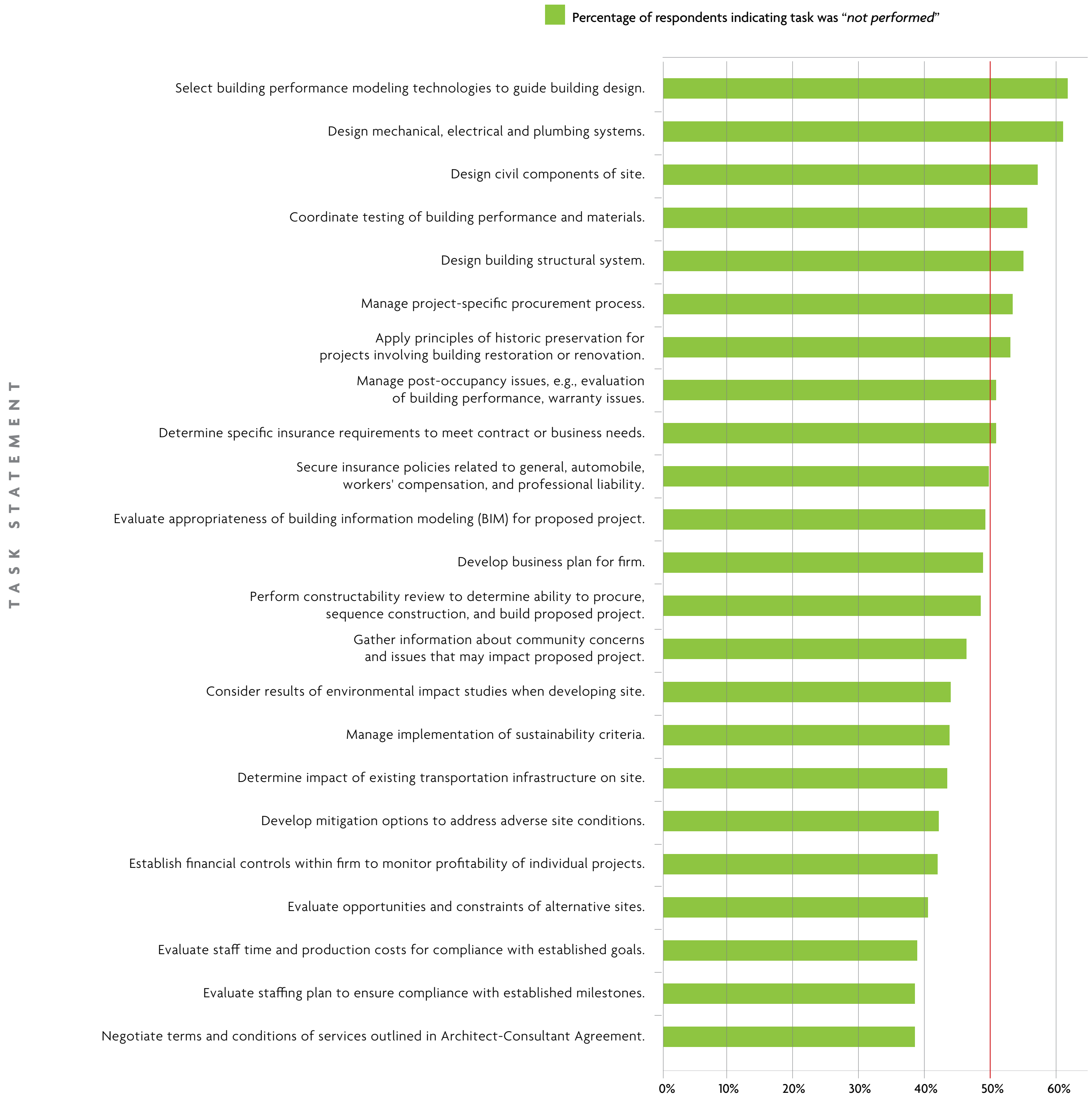
MODAL FREQUENCY CATEGORY	OF LITTLE OR NO IMPORTANCE	SOMEWHAT IMPORTANT	IMPORTANT	VERY IMPORTANT	CRITICALLY IMPORTANT
Multiple Values	0	0	2	0	0
Performed Daily	0	0	0	2	**1**
Performed Weekly	0	0	0	10	0
Performed Monthly	0	0	2	21	**1**
Performed Quarterly	0	0	8	11	0
Performed Yearly	0	0	2	0	0
Not Performed	0	4	**42**	**4**	0

The two tasks identified below were rated "*critically important,*" with one performed daily and the other performed monthly. Once again, it is not surprising that these frequently performed and "*critically important*" tasks are directly tied to public health, safety, and welfare.

ARE TASK #	TASK STATEMENT	FREQUENCY OF PERFORMANCE		IMPORTANCE RATING 0 1 2 3 4
107	Comply with laws and regulations governing the practice of architecture.	Daily	69.1%	3.50
25	Perform building code analysis.	Monthly	32.1%	3.55
0 = Of little or no importance 1 = Somewhat important 2 = Important 3 = Very important 4 = Critically important				

Looking more closely at the frequency vs. importance data, the following 46 tasks were identified as "*not performed*" during the past year yet were also rated as "*very important*" or "*important*."

TASKS IDENTIFIED AS "*IMPORTANT*" OR "*VERY IMPORTANT*" AND ALSO IDENTIFIED AS "*NOT PERFORMED*"



CONTINUED

TASKS IDENTIFIED AS "*IMPORTANT*" OR "*VERY IMPORTANT*" AND ALSO IDENTIFIED AS "*NOT PERFORMED*" (CONT.)

Ten of these 46 tasks were identified as "*not performed*" by 50 percent or more of respondents, as noted in the table below. ARE Task #48 "*Design mechanical, electrical, and plumbing systems,*" ARE Task #47 "*Design civil components of site,*" and ARE Task #46 "*Design building structural system*" received a high percentage of responses indicating the tasks were "*not performed.*" This may be because most architects rely on consultants to "*design*" these significant building systems, with the architect performing important review and critical coordination efforts. Those tasks related to practice management issues such as ARE Task #56 "*Determine specific insurance requirements to meet contract or business needs*" and ARE Task #92 "*Secure insurance policies related to general, automobile, workers' compensation, and professional liability*" may have received a higher percentage of "*not performed*" responses because these annual responsibilities are often only carried out by select principals in the firm and therefore not performed by the majority of staff architects.

ARE TASK #	TASK STATEMENT	PERCENT "NOT PERFORMED"
52	Select building performance modeling technologies to guide building design.	62.2%
48	Design mechanical, electrical, and plumbing systems.	61.5%
47	Design civil components of site.	57.7%
80	Coordinate testing of building performance and materials.	56.0%
46	Design building structural system.	55.5%
86	Manage project-specific procurement process.	53.8%
65	Apply principles of historic preservation for projects involving building restoration or renovation.	53.4%
88	Manage post-occupancy issues, e.g., evaluation of building performance, warranty issues.	51.2%
56	Determine specific insurance requirements to meet contract or business needs.	51.1%
92	Secure insurance policies related to general, automobile, workers' compensation, and professional liability.	50.2%

Regardless of interpretation, these results warrant further research by NCARB's committees to better understand why so many important K/S received a high percentage of "*not performed*" survey responses.

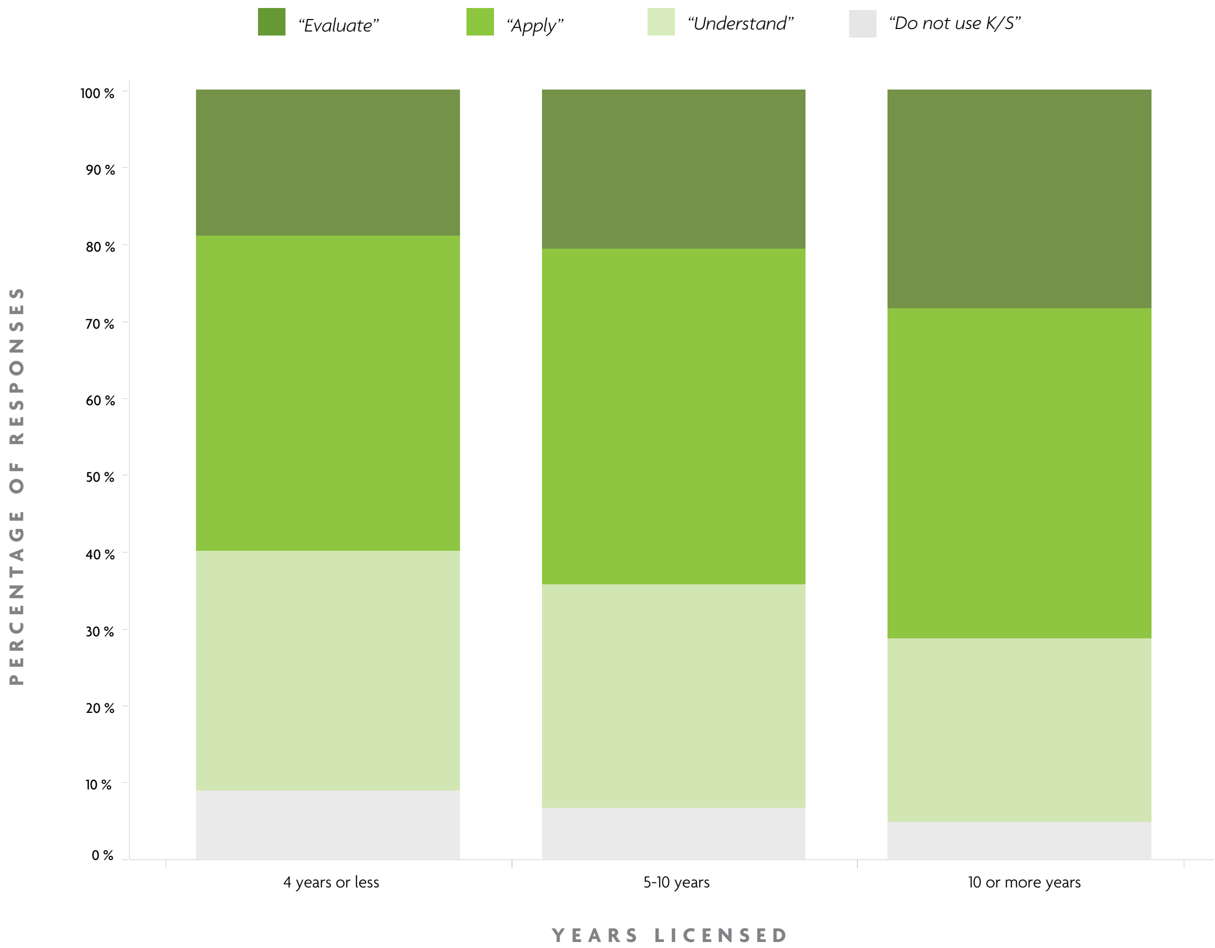
SUBGROUP ANALYSIS

There is little variation in responses when analyzing the data for level of K/S use across two distinct subgroups–years of experience and firm size, although a few differences are worth noting.

KNOWLEDGE/SKILL USE VS. YEARS OF EXPERIENCE

The chart below illustrates responses regarding the level of K/S use ("*understand*," "*apply*," or "*evaluate*") broken down by years licensed. The largest percentage of responses indicating K/S use at the "*understand*" level (31.2 percent) was from architects licensed less than four years. Responses from mid-range practitioners, those licensed five to 10 years, indicated K/S use at the "*apply*" level at the highest rate (43.6 percent). And responses from those licensed more than 10 years indicated the highest K/S use at the "*evaluate*" level (28.3 percent).

LEVEL OF K/S USE, BY YEARS LICENSED

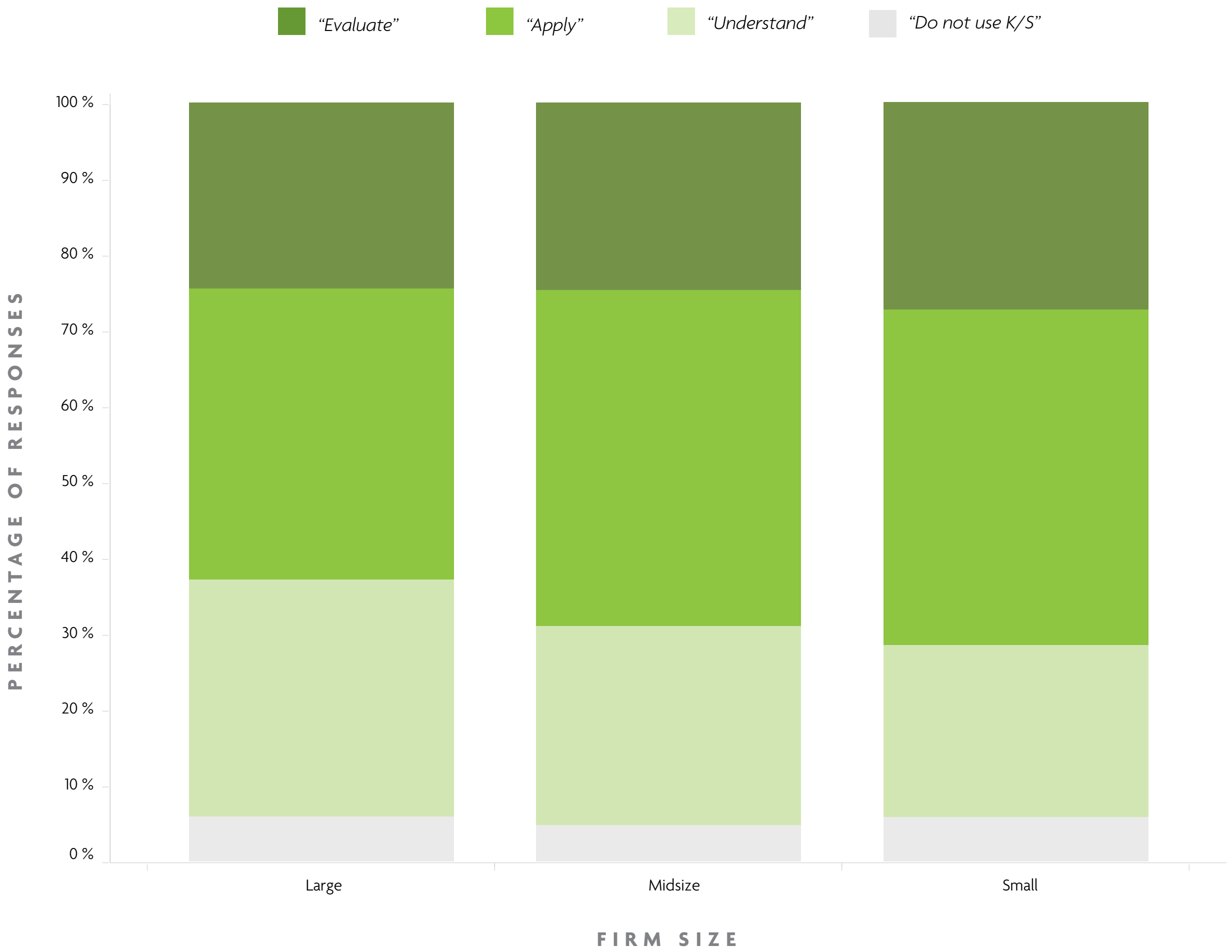


These results are not surprising and clearly indicate that more experienced practitioners tend to have a higher level of ability than more recently licensed architects. Comparing experience across the progression of ability reinforces the need for life-long learning and the value of continuing education to an architect's development over the course of a career.

KNOWLEDGE/SKILL USE VS. SIZE OF FIRM

A second comparison, which looks at level of performance by firm size, also illustrates limited variation in responses. Interestingly, architects practicing in smaller firms (fewer than 10 architects) reported using the K/S at the "*evaluate*" level at a slightly higher rate (27.3 percent) than those in medium (24.6 percent) and large firms (24.5 percent).

LEVEL OF K/S USE, BY FIRM SIZE



While this certainly does not reflect a lesser ability of architects working in larger firms, it does reinforce that architects in smaller practices are typically responsible for performing a broader range of tasks in their daily work. Architects practicing in larger firms may also be more likely to focus on areas of special expertise rather than areas of general practice.

EXAMINATION SURVEY RESULTS

ARE TASK RATINGS

A total of 865 licensed architects responded to the Examination (ARE) task survey and indicated the frequency at which each ARE task was performed and the importance for competent performance by a recently licensed architect practicing independently.

TASK FREQUENCY

Participants rated the frequency with which they perform each of the tasks listed in the ARE A survey by selecting one of the following scale points: "*not performed or does not apply*," "*yearly*," "*quarterly*," "*monthly*," "*weekly*," or "*daily*."

For some of the analyses, task frequency categories higher than "*not performed*" were aggregated (with equal weighting to each category) to derive an overall "*performed*" category.

Data Table D2 lists the percent of architects who rated each task at each level of task frequency. For example, with ARE Task #1 "*Gather information about client's vision, goals, budget, and schedule to validate project scope and program*," 89.6 percent of the architects indicated they perform the task at least once "*yearly*." Specifically, 9.5 percent of the architects indicated "*daily*," 19.5 percent indicated "*weekly*," 28.9 percent indicated "*monthly*," 22.1 percent indicated "*quarterly*," and 9.6 percent indicated "*yearly*."

The chart below displays the distribution of task ratings with respect to the percentage of architects who indicated they performed each of the tasks. For example, 34 tasks were rated as performed by 80 to 90 percent of the responding architects; eight tasks were rated as performed by 90 percent or more of responding architects.

DISTRIBUTION OF ARE TASK RATINGS: PERCENT OF LICENSED ARCHITECTS WHO PERFORM EACH TASK

TASK IMPORTANCE

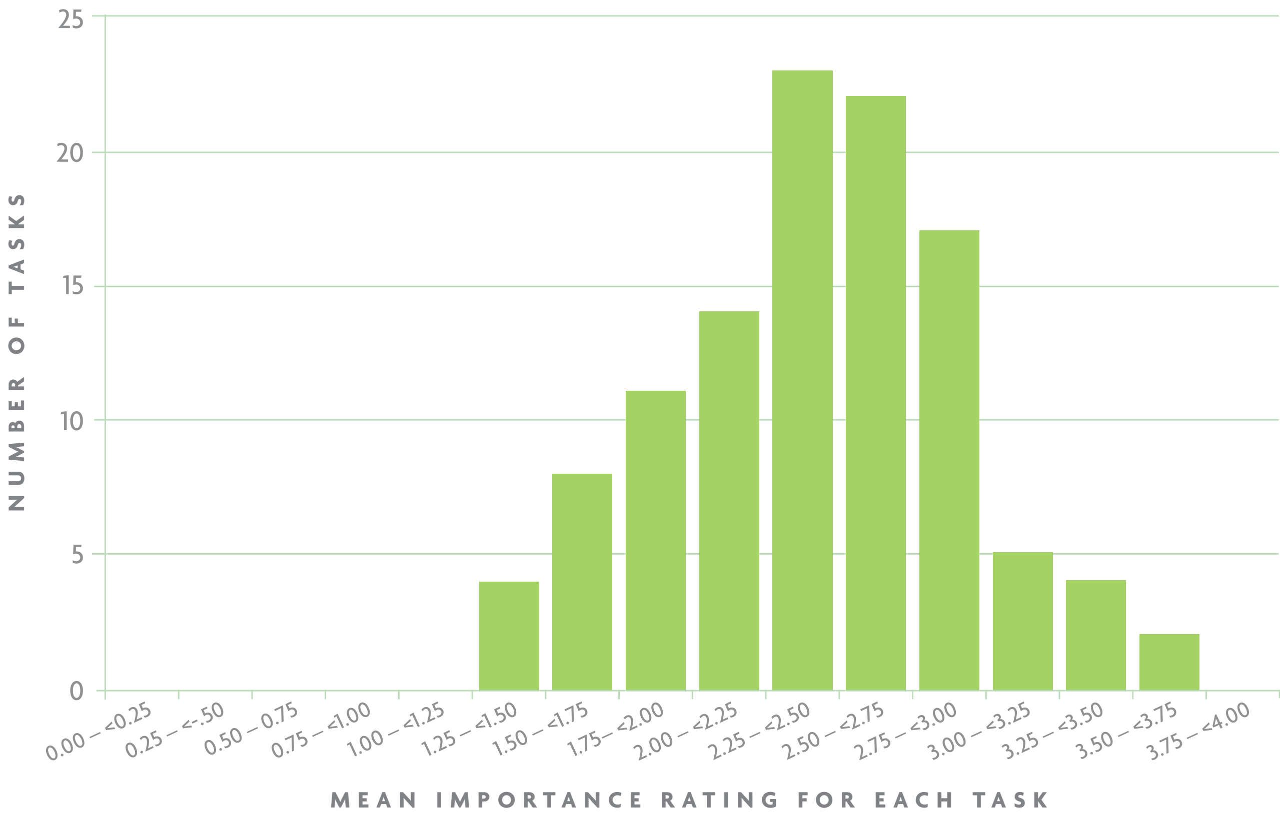
Participants rated the importance of the tasks listed in the ARE A survey by selecting one of the following scale points: "*of little or no importance*," "*somewhat important*," "*important*," "*very important*," or "*critically important*."

Data Table D3 lists the percent of architects who rated each task for each level of task importance. The column labeled "*Percent Imp.*" represents the aggregate percent of ratings of "*important,*" "*very important,*" and "*critically important*." The mean importance rating is also reported in the column labeled "*Mean Imp.*" and the standard deviation of the importance ratings is reported in the column labeled "*SD Imp.*"

For example, with ARE Task #1 "*Gather information about client's vision, goals, budget, and schedule to validate project scope and program*," 51.3 percent of the architects rated the task as "*critically important*" and 29.6 percent rated the task as "*very important*." The mean importance rating was 3.25 and the standard deviation was 0.94.

The chart below displays the distribution of task mean importance ratings. In this figure, each interval includes the lower bound value, e.g., the interval of 3.50 to 3.75 includes the value 3.50 and excludes the upper bound value. The only exception is with the interval of 3.75 to 4.00, which includes both 3.75 and 4.00. For example, five tasks had a mean importance rating between 3.00 and 3.24.

DISTRIBUTION OF ARE TASK RATINGS: MEAN IMPORTANCE FOR LICENSED ARCHITECTS



TASKS RECOMMENDED FOR ARE CONTENT OUTLINE

The practice analysis ratings were analyzed to identify the ARE tasks that are recommended for consideration to be represented in the content outline and test specification. Tasks were initially recommended for inclusion in the examination if they met each of the following criteria[1] :

1. Mean task importance ≥ 1.5 (between "*somewhat important*" and "*important*")[2], and
2. Percent performed task ≥ 50 percent of architects.

Data Table D4 lists mean importance ratings and percent performed values for each task. As seen in Data Table D4, 87.3 percent of the ARE tasks met both of the above criteria.

The table below displays a cross tabulation of mean task importance with percent performed for 110 ARE tasks that met the above criteria for recommended inclusion. The results indicate that 60.9 percent of the ARE tasks had a mean importance greater than or equal to 2.00 as well as a percent performed of greater than or equal to 66.7 percent. Moreover, 7.3 percent of ARE tasks had a mean importance greater than or equal to 1.50, but less than 2.00, and a percent performed greater than or equal to 50.0 percent but less than 66.7 percent.

		PERCENT PERFORMED TASK				
		<33.0%	33.0% –< 50.0%	50.0% –< 66.7%	>66.7%	ROW SUBTOTAL
MEAN IMPORTANCE	<1.40	1.8%	0.9%	0.0%	0.0%	2.7%
	1.40 –< 1.50	0.0%	0.0%	0.9%	0.0%	0.9%
	1.50 –< 2.00	0.0%	9.1%	7.3%	0.9%	17.3%
	≥ 2.00	0.0%	0.0%	18.2%	60.9%	79.1%
COLUMN SUBTOTAL		1.8%	10.0%	26.4%	61.8%	

Note: The shaded cells represent the percent of ARE tasks that met the criteria for recommended inclusion (mean importance of 1.5 or greater and a percent performed task of 50 percent or greater).

[1] Initial recommended criteria for task inclusion are subject to committee review and modification during the test specification development process.

[2] A mean task importance of 1.5 corresponds to the lower limit of a rating of "*important*" in the present study; this is equivalent to the cut point on mean task importance that was utilized in the *2007 Practice Analysis of Architecture*.

ARE KNOWLEDGE/SKILLS

KNOWLEDGE/SKILL IMPORTANCE RATINGS

A total of 822 licensed architects responded to the Examination (ARE) knowledge/skill (K/S) survey and indicated the importance of each K/S for competent performance by a recently licensed architect practicing independently.

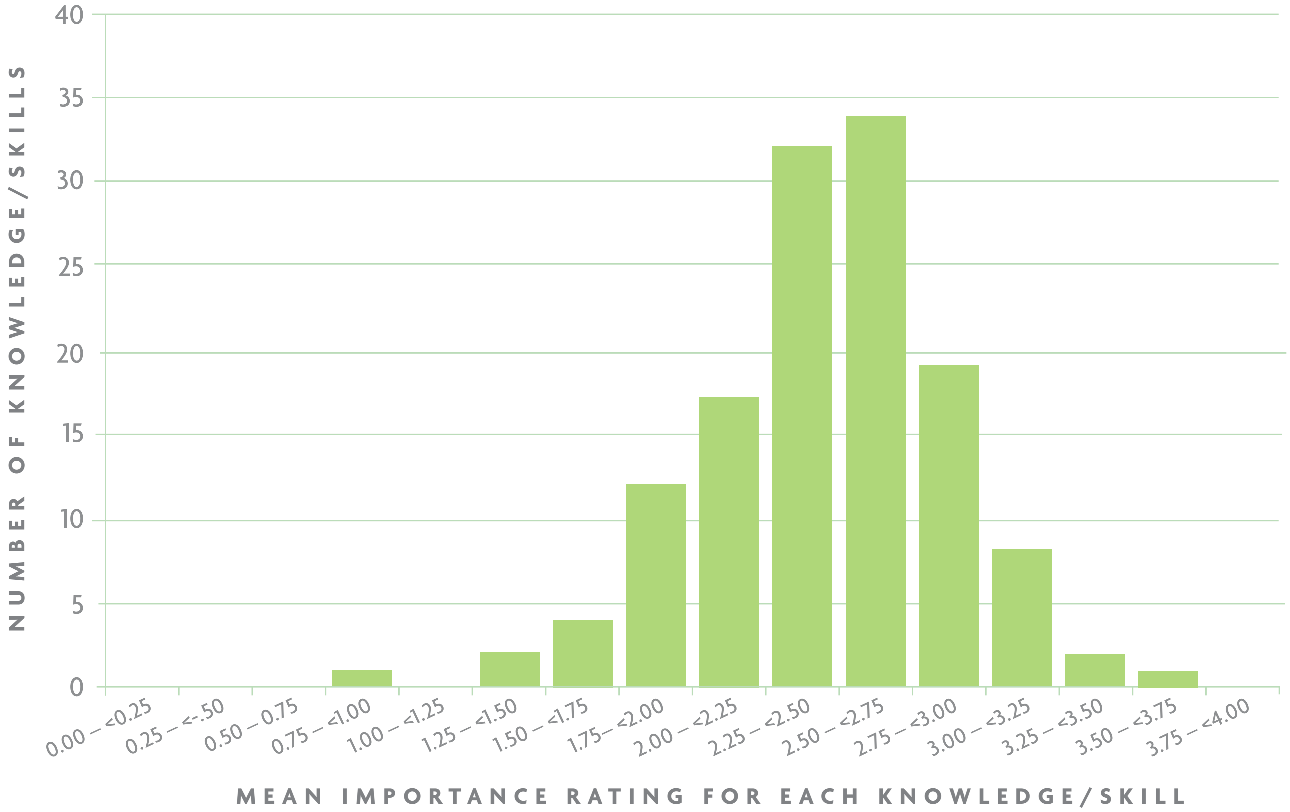
Participants rated the importance of the K/S listed in the ARE C survey by selecting one of the following scale points: "*of little or no importance*," "*somewhat important*," "*important*," "*very important*," or "*critically important*."

Data Table D6 lists the percent of architects who rated each K/S at each level on the importance rating scale. In Data Table D6, the column labeled "*Percent Imp.*" represents the aggregate percent of ratings of "*important*," "*very important*," and "*critically important*." The mean importance rating is also reported in the column labeled "*Mean Imp.*" and the standard deviation of the importance ratings is reported in the column labeled "*SD Imp.*"

For example, with ARE K/S #1 "*Knowledge of oral, written, and visual presentation techniques to communicate project information*," 54.3 percent of the architects rated the K/S as "*critically important*," and 34.1 percent rated the K/S as "*very important*." The mean importance rating was 3.40 and the standard deviation was 0.75.

The chart below displays the distribution of K/S importance ratings. For example, eight K/S items had a mean importance rating between 3.00 and 3.24.

DISTRIBUTION OF ARE K/S RATINGS: MEAN IMPORTANCE FOR LICENSED ARCHITECTS



COGNITIVE LEVELS FOR ARE KNOWLEDGE/SKILLS

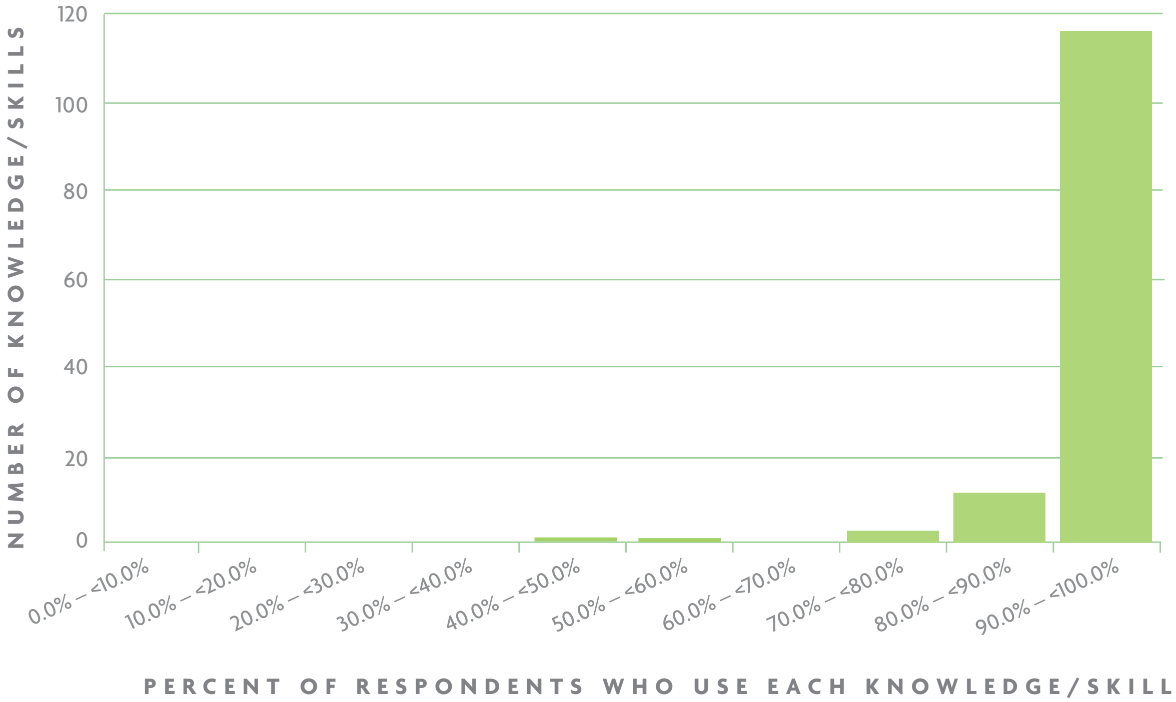
The same group of 822 licensed architects indicated the cognitive level at which they use each of the K/S by selecting one of the following scale categories: *"understand," "apply," "evaluate,"* or *"do not use."*

Data Table D7 lists the percent of architects who indicated the cognitive level for each K/S. The column *"Percent Used,"* contains the percent of architects who used the K/S, calculated as the combined percent of ratings of the three cognitive levels.

For example, for ARE K/S #1 *"Knowledge of oral, written, and visual presentation techniques to communicate project information,"* 50.6 percent of the architects indicated a cognitive level of *"evaluate,"* 45.3 percent indicated *"apply,"* 3.6 percent indicated *"understand,"* and 0.5 percent indicated *"do not use."* Accordingly, 99.5 percent of architects indicated that they used the task at one of the three cognitive levels.

The chart below displays the distribution of K/S ratings with respect to the percentage of responding architects who indicated they use the K/S. As seen in the figure, the vast majority of the K/S were reportedly used by 90 percent or more architects. (Accordingly, there were very few responses to the follow-up question regarding why a K/S was not used.)

DISTRIBUTION OF ARE K/S RATINGS: PERCENT OF LICENSED ARCHITECTS WHO USE EACH K/S



REASONS WHY ARE KNOWLEDGE/SKILLS WERE NOT USED BY LICENSED ARCHITECTS

The responding architects who indicated they did not use a K/S were asked to indicate why they did not use that K/S by choosing among six reasons. Data Table D10 summarizes the percentage of respondents indicating each reason, as well as the mean, minimum (min) and maximum (max) percentage indicating each reason across the K/S. For example, with ARE K/S #1 "*Knowledge of oral, written, and visual presentation techniques to communicate project information*," all respondents cited "*other*" and were given the chance to type in a reason. None of the following reasons were indicated for not using ARE K/S #1: "*not used in practice*," "*not allowed by jurisdiction*," "*not recommended by legal counsel or insurance carrier*," "*provided by consultant(s)*," or "*lack of experience*."

Data Table D10 also reports the mean percent of ratings across all K/S statements for each of six reasons why they were not used (see bottom section of the table). Of the reasons cited, the most common was "not used in practice" (25.9 percent of ratings), followed by "*lack of experience*" (10.0 percent), and "*provided by consultant(s)*" (9.9 percent). Of all reasons selected, "*not allowed by jurisdiction*" and "*not recommended by legal counsel or insurance carrier*" were the least commonly observed (0.1 percent and 0.5 percent, respectively).

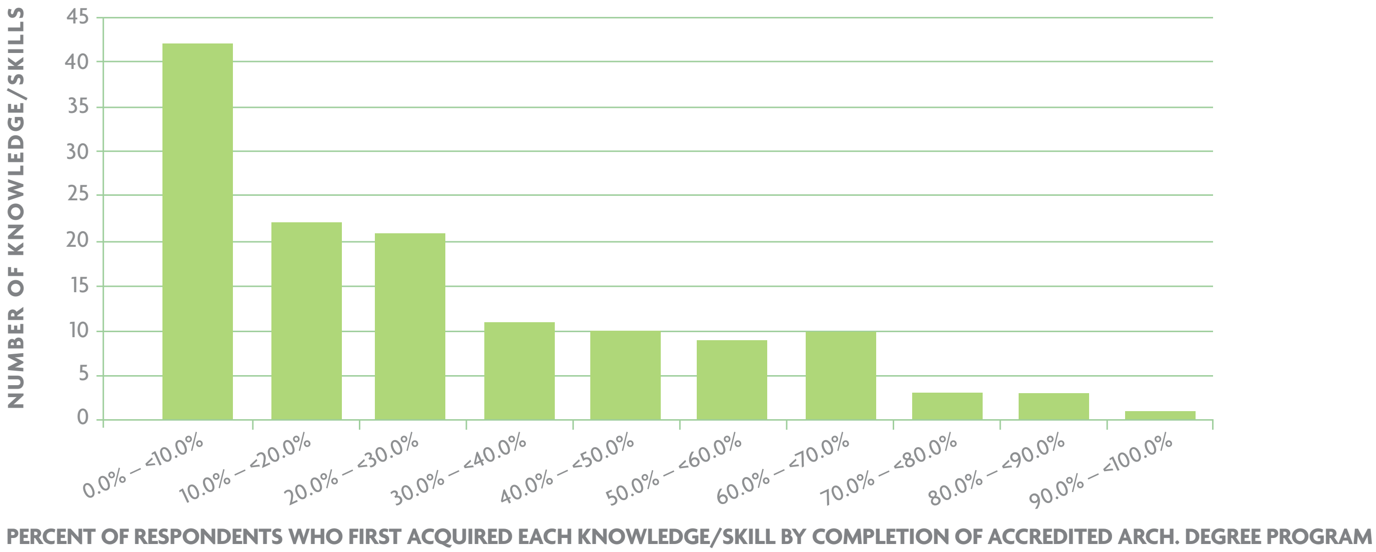
WHEN KNOWLEDGE/SKILLS WERE ACQUIRED

A total of 1,008 licensed architects responded to the ARE B survey and indicated when they acquired each K/S by choosing one of the following categories: "*not acquired*," "*by completion of accredited architecture degree program*," "*during internship*," or "*after licensure*."

Data Table D8 lists the percent of architects who indicated when each K/S was acquired. For example, with ARE K/S #1 "*Knowledge of oral, written, and visual presentation techniques to communicate project information*," 60.4 percent of the architects indicated they acquired the task "*by completion of accredited architecture degree program*," 26.5 percent indicated "*during internship*," 12.9 percent indicated "*after licensure*," and 0.2 percent indicated "*not acquired*."

The chart below displays the distribution of K/S with respect to the percentage of architects who indicated each K/S was acquired "*by completion of accredited architecture degree program*." For example, one K/S was rated by 90 percent or more architects as being acquired "*by completion of accredited architecture degree program*." Three K/S were rated by 80 to 90 percent of architects as being acquired "*by completion of the degree program*."

DISTRIBUTION OF ARE RATINGS: PERCENT OF LICENSED ARCHITECTS WHO INDICATED K/S IS ACQUIRED "BY COMPLETION OF ACCREDITED ARCHITECTURE DEGREE PROGRAM"



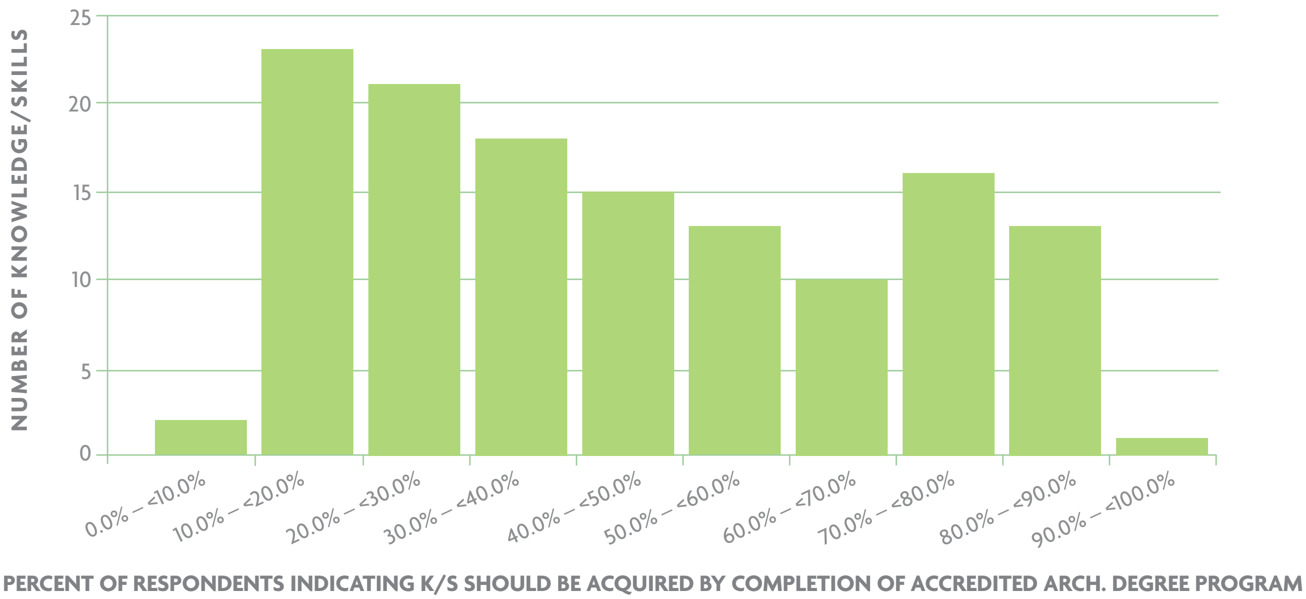
WHEN KNOWLEDGE/SKILLS SHOULD BE ACQUIRED

The same group of 1,008 licensed architects indicated when each K/S should be acquired by selecting one of the following scale values: "*not relevant*," "*by completion of accredited architecture degree program*," "*during internship*," or "*after licensure*."

Data Table D9 lists the percent of licensed architects who rated each K/S. For example, with ARE K/S #1 "*Knowledge of oral, written, and visual presentation techniques to communicate project information*," 70.5 percent of the architects indicated that the K/S should be acquired "*by completion of accredited architecture degree program*," 25.6 percent selected "*during internship*," 3.1 percent indicated "*after licensure*," and 0.8 percent indicated "*not relevant*."

The chart below displays the distribution of K/S with respect to the percentage of architects who indicated each K/S should be acquired "*by completion of accredited architecture degree program.*" For example, one K/S was rated by 90 percent or more of the architects as something that should be acquired by completion of their degree program. Additionally, 13 K/S were rated by 80 to 90 percent of responding architects as something that should be acquired by completion of their degree program.

DISTRIBUTION OF K/S RATINGS: MEAN PERCENT OF LICENSED ARCHITECTS INDICATING THE K/S SHOULD BE ACQUIRED BY COMPLETION OF ACCREDITED ARCHITECTURE DEGREE PROGRAM



KNOWLEDGE/SKILLS RECOMMENDED FOR ARE CONTENT OUTLINE

Knowledge/skills are recommended for possible inclusion in the ARE if the K/S has a mean importance rating greater than or equal to 1.50. The table below displays the percent of K/S statements within four intervals on the importance scale.

PERCENTAGE BREAKDOWN OF ARE K/S MEAN IMPORTANCE RATINGS

	Mean Knowledge/Skill Importance*			
	<1.40	1.40-1.49	1.50-1.99	>=2.00
Percent of Knowledge/Skill Statements	2.3%	0.0%	12.1%	85.6%

*Importance scale: 0 = of little or no importance; 1 = somewhat important; 2 = important; 3 = very important; or 4 = critically important

QUALITATIVE FINDINGS

Three open-ended questions were included at the end of each Practice Analysis survey.

> *"How do you expect your job in the field of architecture to change over the next few years?"*
> *"What tasks will be performed and what knowledge/skills will be needed to meet changing job demands?"*
> *"If you could change the field of architecture, what is the most important change you would make?"*

Nearly 6,000 survey participants provided qualitative feedback, with many similarities emerging from their responses. The summary below represents the comments and suggestions received from those respondents completing the examination survey.

CHANGES OVER THE NEXT FEW YEARS AND MEETING CHANGING JOB DEMANDS

A total of 2,072 licensed architects who completed the Examination (ARE) survey replied to the questions "*How do you expect your job in the field of architecture to change over the next few years*?" and "*What tasks will be performed and what knowledge/skills will be needed to meet changing job demands*?"

Respondents focused on knowledge and skills architects need and shared thoughts on the future trends of architecture. They addressed topics such as technology and business development. Some mentioned a future increase in the use of BIM and suggested that all architects should learn BIM. Respondents also stated that there will be a trend toward more 3-D drawings (and fewer 2-D drawings), along with the elimination of paper drawings and other documents in favor of electronic documentation.

Respondents also noted several other trends within the profession: they expect to see an increase in outsourcing, life cycle costing, LEED, energy efficiency, and other sustainable design practices.

Some of the knowledge or skills identified as being necessary to thrive in the field of architecture included business skills (business development, management, marketing, communication, and people skills), programming and computer skills (including BIM), keeping current with codes and new materials, and greater collaboration with contractors and coordination with other design professionals.

Respondents also mentioned several challenges they envision, including the architect's increased level of risk in a project and improving public perception about an architect's role throughout the project.

MOST IMPORTANT CHANGES TO MAKE

A total of 2,055 licensed architects responded to the question "I*f you could change the field of architecture, what is the most important change you would make*?" The comments received were similar to the themes that appeared in the *NCARB 2012 Focus Group Report*, and have been grouped into six major categories:

1. Changing role of the architect
2. Adapting to changing demands
3. Impact of technology on the profession
4. Knowledge and/or skills needed now and in the future
5. Professional practice, accreditation, and licensure
6. NCARB opportunities

Changing Role of the Architect

Respondents suggested that training should adopt a holistic approach and emphasize the practice of architecture rather than architectural style, building type, and narrowly focused specializations. Other respondents suggested offering graduates the option of pursuing general practice or specialty fields as is done in the field of medicine, law, and engineering. Some indicated that architects should act as a "master architect/master builder" and assume a leadership role in the project management/construction management process and reclaim control of the final outcome rather than imposing a design-build process that subordinates the architect to the contractor. Many of the respondents identified the need for architects to educate the public with respect to the skills and responsibilities involved in projects in order to better understand the basis of cost estimates for services.

Adapting to Changing Demands

An overwhelming majority of respondents indicated that educational curricula should include more hands-on experience in the field so that graduates can apply their knowledge and experience to actual construction situations. Some respondents commented that flexible work options should be available to accommodate work-life balance. Opinions were mixed with respect to integration of new standards for energy efficiency, sustainability, LEED, and other green technologies into design. Respondents seemed to be evenly split regarding what should drive the design of buildings—either the fundamentals of good design or the new standards for green technologies.

Impact of Technology on the Profession

The majority of architects recognized BIM, CAD, and other technologies as tools that facilitate workflow; however, they cautioned that these tools should be used to supplement, not replace, an architect's design expertise and understanding of design fundamentals.

Knowledge and/or Skills Needed Now and in the Future

Respondents cited a number of knowledge and skills that are valuable when performing day to day activities such as the understanding of conceptual design, construction sequencing, constructability, building performance, working knowledge of building construction, specification writing and code review, and communication skills.

Professional Practice, Accreditation, and Licensure

Several respondents commented that uniform codes, encompassing IBC, LEED, ASTM, ANSI, and OSHA should be created to simplify compliance. Such codes would assist in standardizing the code review process. A few respondents indicated that architects should approve plans for all residential and commercial buildings.

NCARB Opportunities

The majority of the comments related to future opportunities for NCARB addressed internship and the IDP. Some suggested extending the program to five years. Some suggested using the IDP as a sole pathway to licensure. Others suggested that the IDP should be integrated with the educational curriculum, thus extending the years spent in undergraduate curriculum.

EXAMINATION DATA TABLES

The chart below summarizes the survey population and the research questions related to the task and knowledge/skill (K/S) statements, as well as the various rating scales for the examination surveys. The chart also references the related Examination (ARE) Data Tables.

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
ARE A	All licensed architects	Task	How frequently have you performed the task during the past year? • Not performed or does not apply • Yearly • Quarterly • Monthly • Weekly • Daily	D2
			How important is competent performance of the task by a recently licensed architect practicing independently? • Of little or no importance • Somewhat important • Important • Very important • Critically important	D3

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
ARE B	All licensed architects	Knowledge/ Skill	When did you acquire the knowledge/skill? • Not acquired • By completion of accredited architecture degree program • During internship • After licensure	D8
			When should the knowledge/skill be acquired? • Not relevant, does not apply • By completion of accredited architecture degree program • During internship • After licensure	D9
ARE C	All licensed architects	Knowledge/ Skill	How important is the knowledge/skill to a recently licensed architect practicing independently? • Of little or no importance • Somewhat important • Important • Very important • Critically important	D6
			At what level do you typically use the knowledge/skill in your job? • Do not use knowledge/skill • Understand: General understanding; no specific details are used on the job • Apply: Application of general principles, procedures, skills to typical job scenarios • Evaluate: Use of knowledge/skill to evaluate and refine solutions for job scenarios or designs	D7
			Indicate why you do not use the knowledge/skill. (Select all that apply.) • Not used in my practice • Not allowed by my jurisdiction • Not recommended by my legal counsel or insurance carrier • Provided by consultant(s) • Lack of experience • Other	D10

Data Table D1. List of All ARE Task Statements

TASK #	TASK STATEMENT
1	Gather information about client's vision, goals, budget, and schedule to validate project scope and program.
2	Prepare design alternatives for client review.
3	Establish methods for Architect-Client communication based on project scope of work.
4	Assist client in determining delivery method for construction of project.
5	Determine impact of applicable zoning and development ordinances to determine project constraints.
6	Define roles and responsibilities of team members.
7	Determine scope of services.
8	Determine design fees.
9	Determine project schedule.
10	Evaluate results of feasibility studies to determine project's financial viability.
11	Evaluate results of feasibility studies to determine project's technical viability.
12	Determine impact of existing utilities infrastructure on site.
13	Determine impact of existing transportation infrastructure on site.
14	Assess environmental impact of design decisions.
15	Determine impact of environmental, zoning and other regulations on site.
16	Assess socio-cultural context of the proposed site.
17	Define requirements for site survey based on established project scope.
18	Analyze existing site conditions to determine impact on facility layout.
19	Consider recommendations from geotechnical studies when establishing design parameters.
20	Develop sustainability goals based on existing site environmental conditions.
21	Establish sustainability goals affecting building performance.
22	Consider results of environmental impact studies when developing site.
23	Develop mitigation options to address adverse site conditions.
24	Review legal documents related to site to determine project constraints.
25	Perform building code analysis.
26	Communicate design ideas to the client graphically.
27	Communicate design ideas to the client using hand drawings.
28	Communicate design ideas to client with two-dimensional (2-D) computer aided design software.
29	Communicate design ideas to client with three-dimensional (3-D) computer aided design software.
30	Determine design parameters for building systems.
31	Prepare submittals for regulatory approval.
32	Evaluate opportunities and constraints of alternative sites.
33	Gather information about community concerns and issues that may impact proposed project.
34	Assist Owner in preparing building program including list of spaces and their characteristics.
35	Establish project design goals.
36	Prepare site analysis diagrams to document existing conditions, features, infrastructure, and regulatory requirements.
37	Prepare diagrams illustrating spatial relationships and functional adjacencies.
38	Submit schedule of Architect's services to Owner for each phase.
39	Prepare code analysis documentation.
40	Select technologies to develop and produce design and construction documentation.
41	Coordinate documentation of design team members.
42	Manage project close-out procedures and documentation.
43	Perform quality control reviews throughout the documentation process.
44	Prepare Cost of Work estimates.
45	Update Cost of Work estimates.
46	Design building structural system.
47	Design civil components of site.
48	Design mechanical, electrical and plumbing systems.
49	Design landscape elements for site.
50	Oversee design integration of building components and systems.
51	Select materials, finishes and systems based on technical properties and aesthetic requirements.
52	Select building performance modeling technologies to guide building design.
53	Prepare life cycle cost analysis.
54	Perform constructability review to determine ability to procure, sequence construction, and build proposed project.
55	Prepare final procurement and contract documents.
56	Determine specific insurance requirements to meet contract or business needs.

CONTINUED

Data Table D1. List of All ARE Task Statements

TASK #	TASK STATEMENT
57	Review results from field reports, third-party inspections, and other test results for conformance with contract documents.
58	Manage modifications to the construction contract.
59	Assist Owner in preparing Owner-Contractor Agreement.
60	Respond to Contractor Requests for Information.
61	Prepare proposals for services in response to client requirements.
62	Prepare Owner-Architect agreement.
63	Prepare Architect-Consultant agreement.
64	Negotiate terms and conditions outlined in Owner-Architect Agreement.
65	Apply principles of historic preservation for projects involving building restoration or renovation.
66	Collaborate with stakeholders during design process to maintain design intent and comply with Owner requirements.
67	Coordinate design work of consultants.
68	Select furniture, fixtures and equipment that meet client's design requirements and needs.
69	Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.
70	Establish financial controls within firm to monitor profitability of individual projects.
71	Prepare staffing plan to meet project goals.
72	Establish procedures for documenting project decisions.
73	Monitor project schedule to maintain compliance with established milestones.
74	Evaluate staffing plan to ensure compliance with established milestones.
75	Manage client expectations to align with established milestones and final decision points.
76	Assist client in selecting contractors.
77	Manage implementation of sustainability criteria.
78	Identify changes in project scope that require additional services.
79	Assist Owner in obtaining necessary permits and approvals.
80	Coordinate testing of building performance and materials.
81	Review Application and Certificate for Payment.
82	Review shop drawings and submittals during construction for conformance with design intent.
83	Complete field reports to document field observations from site visit.
84	Manage information exchange during construction.

TASK #	TASK STATEMENT
85	Resolve conflicts that may arise during design and construction process.
86	Manage project-specific procurement process.
87	Establish procedures for building commissioning.
88	Manage post-occupancy issues, e.g., evaluation of building performance, warranty issues.
89	Select design team consultants.
90	Conduct periodic progress meetings with design and project team.
91	Participate in pre-construction, pre-installation and regular progress meetings with design team.
92	Secure insurance policies related to general, automobile, workers' compensation, and professional liability.
93	Develop strategies to control risk and manage liability.
94	Determine billing rates.
95	Develop business plan for firm.
96	Develop and maintain effective and productive relationships with clients.
97	Develop procedures for responding to changes in project scope.
98	Develop procedures for responding to contractor requests (Requests for Information).
99	Develop strategies for responding to Owner requests for proposal (Requests for Proposal, Requests for Qualifications).
100	Review local, state, and federal codes for changes that may impact design and construction.
101	Make staff assignments based on knowledge and skill of staff members.
102	Evaluate staff time and production costs for compliance with established goals.
103	Understand firm's legal structure to comply with jurisdictional rules and regulations.
104	Understand implications of evolving sustainable design strategies and technologies.
105	Understand implications of project delivery methods.
106	Adhere to ethical standards and codes of professional conduct.
107	Comply with laws and regulations governing the practice of architecture.
108	Evaluate appropriateness of building information modeling (BIM) for proposed project.
109	Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.
110	Monitor performance of design team consultants.

ARE A

Data Table D2. Percentage Distribution of Task Frequency Ratings

Survey Population: All Licensed Architects

TASK STATEMENT	NOT PERFORMED	Performed					PERCENT PERFORMED	TOTAL N
		YEARLY	QUARTERLY	MONTHLY	WEEKLY	DAILY		
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	10.4%	9.6%	22.1%	28.9%	19.5%	9.5%	89.6%	865
2. Prepare design alternatives for client review.	9.4%	4.6%	20.2%	34.5%	25.0%	6.4%	90.6%	865
3. Establish methods for Architect-Client communication based on project scope of work.	13.3%	8.8%	23.7%	25.0%	21.6%	7.6%	86.7%	865
4. Assist client in determining delivery method for construction of project.	20.9%	17.7%	30.5%	21.0%	8.3%	1.5%	79.1%	865
5. Determine impact of applicable zoning and development ordinances to determine project constraints.	12.7%	14.6%	27.7%	29.0%	12.6%	3.4%	87.3%	865
6. Define roles and responsibilities of team members.	17.5%	10.2%	24.3%	24.3%	16.2%	7.6%	82.5%	865
7. Determine scope of services.	12.8%	7.2%	25.0%	34.0%	17.1%	3.9%	87.2%	865
8. Determine design fees.	20.2%	9.6%	22.1%	28.3%	16.5%	3.2%	79.8%	865
9. Determine project schedule.	11.8%	8.3%	26.4%	32.6%	16.8%	4.2%	88.2%	865
10. Evaluate results of feasibility studies to determine project's financial viability.	38.5%	18.7%	22.8%	14.6%	4.7%	0.7%	61.5%	865
11. Evaluate results of feasibility studies to determine project's technical viability.	32.1%	17.5%	26.0%	16.8%	6.5%	1.2%	67.9%	865
12. Determine impact of existing utilities infrastructure on site.	17.9%	21.0%	31.9%	22.2%	6.4%	0.6%	82.1%	865
13. Determine impact of existing transportation infrastructure on site.	43.6%	23.1%	21.5%	9.6%	2.1%	0.1%	56.4%	865
14. Assess environmental impact of design decisions.	25.2%	19.7%	26.8%	18.6%	7.9%	1.8%	74.8%	865
15. Determine impact of environmental, zoning and other regulations on site.	15.1%	16.9%	29.2%	25.8%	11.0%	2.0%	84.9%	865
16. Assess socio-cultural context of the proposed site.	59.5%	18.2%	13.8%	6.9%	1.5%	0.1%	40.5%	865
17. Define requirements for site survey based on established project scope.	22.0%	25.3%	30.8%	16.9%	4.4%	0.7%	78.0%	865
18. Analyze existing site conditions to determine impact on facility layout.	12.3%	18.5%	34.9%	23.4%	8.4%	2.5%	87.7%	865
19. Consider recommendations from geotechnical studies when establishing design parameters.	22.0%	26.7%	30.4%	17.2%	3.7%	0.0%	78.0%	865
20. Develop sustainability goals based on existing site environmental conditions.	35.6%	23.5%	25.1%	12.7%	2.4%	0.7%	64.4%	865
21. Establish sustainability goals affecting building performance.	29.5%	22.1%	26.8%	15.6%	5.0%	1.0%	70.5%	865
22. Consider results of environmental impact studies when developing site.	44.3%	25.7%	19.1%	8.7%	2.3%	0.0%	55.7%	865
23. Develop mitigation options to address adverse site conditions.	42.3%	28.6%	16.9%	8.4%	3.2%	0.6%	57.7%	865
24. Review legal documents related to site to determine project constraints.	33.5%	25.4%	22.1%	13.5%	4.5%	0.9%	66.5%	865
25. Perform building code analysis.	8.2%	8.2%	21.8%	32.1%	20.3%	9.2%	91.8%	865
26. Communicate design ideas to the client graphically.	8.0%	5.3%	16.0%	27.1%	33.1%	10.6%	92.0%	865
27. Communicate design ideas to the client using hand drawings.	17.6%	11.0%	20.8%	24.2%	21.4%	5.1%	82.4%	865
28. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	18.4%	3.5%	12.9%	23.0%	29.7%	12.5%	81.6%	865
29. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	31.6%	10.6%	20.0%	20.9%	12.4%	4.5%	68.4%	865

Total N = number of respondents

CONTINUED

ARE A

Data Table D2. Percentage Distribution of Task Frequency Ratings

Survey Population: All Licensed Architects

TASK STATEMENT	NOT PERFORMED	Performed					PERCENT PERFORMED	TOTAL N
		YEARLY	QUARTERLY	MONTHLY	WEEKLY	DAILY		
30. Determine design parameters for building systems.	16.6%	13.6%	30.4%	24.9%	11.0%	3.5%	83.4%	865
31. Prepare submittals for regulatory approval.	15.8%	14.9%	33.3%	25.1%	8.8%	2.1%	84.2%	865
32. Evaluate opportunities and constraints of alternative sites.	40.8%	27.3%	19.9%	9.0%	2.4%	0.6%	59.2%	865
33. Gather information about community concerns and issues that may impact proposed project.	46.6%	28.7%	17.2%	5.5%	1.8%	0.1%	53.4%	865
34. Assist Owner in preparing building program including list of spaces and their characteristics.	18.5%	23.4%	31.0%	19.1%	6.7%	1.4%	81.5%	865
35. Establish project design goals.	13.5%	17.2%	31.0%	24.0%	11.0%	3.2%	86.5%	865
36. Prepare site analysis diagrams to document existing conditions, features, infrastructure, and regulatory requirements.	27.1%	23.7%	29.7%	14.7%	3.9%	0.9%	72.9%	865
37. Prepare diagrams illustrating spatial relationships and functional adjacencies.	22.9%	21.3%	27.7%	17.1%	9.0%	2.0%	77.1%	865
38. Submit schedule of Architect's services to Owner for each phase.	34.1%	12.6%	27.1%	21.7%	4.0%	0.5%	65.9%	865
39. Prepare code analysis documentation.	13.5%	16.3%	27.7%	28.7%	10.2%	3.6%	86.5%	865
40. Select technologies to develop and produce design and construction documentation.	31.2%	27.1%	16.9%	13.6%	7.3%	3.9%	68.8%	865
41. Coordinate documentation of design team members.	14.1%	5.7%	16.9%	19.3%	27.6%	16.4%	85.9%	865
42. Manage project close-out procedures and documentation.	21.8%	27.3%	30.8%	14.3%	5.0%	0.8%	78.2%	865
43. Perform quality control reviews throughout the documentation process.	17.0%	7.5%	20.9%	27.3%	19.4%	7.9%	83.0%	865
44. Prepare Cost of Work estimates.	33.5%	14.1%	27.5%	19.2%	4.4%	1.3%	66.5%	865
45. Update Cost of Work estimates.	36.4%	13.2%	25.1%	20.5%	4.2%	0.7%	63.6%	865
46. Design building structural system.	55.5%	12.4%	16.5%	11.0%	4.2%	0.5%	44.5%	865
47. Design civil components of site.	57.7%	15.7%	15.8%	7.6%	2.8%	0.3%	42.3%	865
48. Design mechanical, electrical and plumbing systems.	61.5%	10.4%	15.3%	8.7%	3.1%	1.0%	38.5%	865
49. Design landscape elements for site.	46.9%	24.9%	18.6%	7.1%	2.0%	0.6%	53.1%	865
50. Oversee design integration of building components and systems.	14.3%	9.2%	23.7%	25.3%	16.4%	11.0%	85.7%	865
51. Select materials, finishes and systems based on technical properties and aesthetic requirements.	9.6%	7.1%	22.2%	29.6%	22.4%	9.1%	90.4%	865
52. Select building performance modeling technologies to guide building design.	62.2%	14.1%	13.6%	7.3%	1.6%	1.2%	37.8%	865
53. Prepare life cycle cost analysis.	69.7%	17.3%	8.3%	3.4%	1.2%	0.1%	30.3%	865
54. Perform constructability review to determine ability to procure, sequence construction, and build proposed project.	48.8%	17.0%	17.3%	10.6%	4.7%	1.5%	51.2%	865
55. Prepare final procurement and contract documents.	20.8%	13.6%	21.4%	23.4%	11.8%	9.0%	79.2%	865
56. Determine specific insurance requirements to meet contract or business needs.	51.1%	29.7%	11.9%	5.8%	1.2%	0.3%	48.9%	865
57. Review results from field reports, third-party inspections, and other test results for conformance with contract documents.	19.4%	15.5%	22.8%	25.1%	13.4%	3.8%	80.6%	865
58. Manage modifications to the construction contract.	25.3%	12.1%	19.4%	25.4%	13.2%	4.5%	74.7%	865

Total N = number of respondents

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ARE A

Data Table D2. Percentage Distribution of Task Frequency Ratings

Survey Population: All Licensed Architects

TASK STATEMENT	NOT PERFORMED	Performed					PERCENT PERFORMED	TOTAL N
		YEARLY	QUARTERLY	MONTHLY	WEEKLY	DAILY		
59. Assist Owner in preparing Owner-Contractor Agreement.	38.6%	20.2%	26.5%	12.6%	1.8%	0.2%	61.4%	865
60. Respond to Contractor Requests for Information.	10.1%	4.2%	12.1%	23.2%	33.8%	16.6%	89.9%	865
61. Prepare proposals for services in response to client requirements.	19.3%	9.8%	23.1%	29.6%	15.3%	2.9%	80.7%	865
62. Prepare Owner-Architect agreement.	28.2%	17.1%	25.0%	23.5%	5.4%	0.8%	71.8%	865
63. Prepare Architect-Consultant agreement.	34.7%	18.2%	23.1%	19.9%	3.9%	0.2%	65.3%	865
64. Negotiate terms and conditions outlined in Owner-Architect Agreement.	34.7%	17.6%	25.0%	17.2%	5.0%	0.6%	65.3%	865
65. Apply principles of historic preservation for projects involving building restoration or renovation.	53.4%	24.0%	12.1%	6.2%	2.8%	1.4%	46.6%	865
66. Collaborate with stakeholders during design process to maintain design intent and comply with Owner requirements.	26.4%	12.6%	22.1%	23.5%	12.9%	2.5%	73.6%	865
67. Coordinate design work of consultants.	9.2%	5.1%	16.3%	23.7%	32.3%	13.4%	90.8%	865
68. Select furniture, fixtures and equipment that meet client's design requirements and needs.	36.2%	18.4%	20.3%	15.5%	7.9%	1.7%	63.8%	865
69. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	38.7%	17.8%	23.1%	16.3%	3.1%	0.9%	61.3%	865
70. Establish financial controls within firm to monitor profitability of individual projects.	42.2%	12.1%	15.3%	18.0%	9.2%	3.1%	57.8%	865
71. Prepare staffing plan to meet project goals.	36.8%	10.9%	13.1%	18.8%	17.8%	2.7%	63.2%	865
72. Establish procedures for documenting project decisions.	24.0%	19.3%	19.8%	19.5%	11.8%	5.5%	76.0%	865
73. Monitor project schedule to maintain compliance with established milestones.	13.6%	7.2%	15.6%	25.2%	33.5%	4.9%	86.4%	865
74. Evaluate staffing plan to ensure compliance with established milestones.	38.7%	7.1%	10.8%	20.9%	20.1%	2.4%	61.3%	865
75. Manage client expectations to align with established milestones and final decision points.	18.2%	8.2%	17.0%	28.3%	22.7%	5.7%	81.8%	865
76. Assist client in selecting contractors.	23.6%	21.0%	33.1%	18.6%	3.2%	0.5%	76.4%	865
77. Manage implementation of sustainability criteria.	44.0%	14.9%	21.2%	14.3%	4.0%	1.5%	56.0%	865
78. Identify changes in project scope that require additional services.	13.4%	10.9%	25.1%	32.6%	14.3%	3.7%	86.6%	865
79. Assist Owner in obtaining necessary permits and approvals.	17.1%	14.9%	30.9%	25.7%	8.7%	2.7%	82.9%	864
80. Coordinate testing of building performance and materials.	56.0%	17.2%	16.0%	8.3%	1.8%	0.7%	44.0%	865
81. Review Application and Certificate for Payment.	24.5%	8.4%	12.5%	49.7%	4.5%	0.3%	75.5%	865
82. Review shop drawings and submittals during construction for conformance with design intent.	13.2%	6.9%	16.0%	28.2%	29.5%	6.2%	86.8%	865
83. Complete field reports to document field observations from site visit.	19.9%	8.0%	14.5%	30.2%	26.1%	1.4%	80.1%	865
84. Manage information exchange during construction.	17.9%	4.0%	12.3%	19.5%	27.2%	19.1%	82.1%	865
85. Resolve conflicts that may arise during design and construction process.	11.8%	9.8%	16.4%	23.5%	24.4%	14.1%	88.2%	865
86. Manage project-specific procurement process.	53.8%	10.8%	15.1%	13.3%	6.2%	0.8%	46.2%	865
87. Establish procedures for building commissioning.	69.6%	14.0%	11.9%	3.5%	1.0%	0.0%	30.4%	865

Total N = number of respondents

CONTINUED

Data Table D2. Percentage Distribution of Task Frequency Ratings

Survey Population: All Licensed Architects

TASK STATEMENT	NOT PERFORMED	Performed					PERCENT PERFORMED	TOTAL N
		YEARLY	QUARTERLY	MONTHLY	WEEKLY	DAILY		
88. Manage post-occupancy issues, e.g., evaluation of building performance, warranty issues.	51.2%	27.7%	14.0%	5.0%	1.7%	0.3%	48.8%	865
89. Select design team consultants.	21.8%	18.2%	30.6%	24.0%	4.3%	1.0%	78.2%	865
90. Conduct periodic progress meetings with design and project team.	11.4%	5.3%	14.9%	35.5%	31.7%	1.2%	88.6%	865
91. Participate in pre-construction, pre-installation and regular progress meetings with design team.	16.0%	8.1%	20.0%	34.0%	20.6%	1.4%	84.0%	865
92. Secure insurance policies related to general, automobile, workers' compensation, and professional liability.	50.2%	39.8%	6.6%	2.9%	0.5%	0.1%	49.8%	865
93. Develop strategies to control risk and manage liability.	34.8%	29.2%	19.1%	11.0%	3.0%	2.9%	65.2%	865
94. Determine billing rates.	35.3%	39.8%	14.0%	7.4%	3.0%	0.6%	64.7%	865
95. Develop business plan for firm.	49.2%	41.0%	6.2%	2.4%	0.9%	0.1%	50.8%	865
96. Develop and maintain effective and productive relationships with clients.	9.5%	5.3%	9.8%	18.4%	25.2%	31.8%	90.5%	865
97. Develop procedures for responding to changes in project scope.	21.5%	20.8%	21.0%	22.8%	11.1%	2.8%	78.5%	865
98. Develop procedures for responding to contractor requests (Requests for Information).	23.6%	24.4%	18.0%	13.8%	13.6%	6.6%	76.4%	865
99. Develop strategies for responding to Owner requests for proposal (Requests for Proposal, Requests for Qualifications).	28.0%	23.2%	23.4%	15.1%	8.6%	1.7%	72.0%	865
100. Review local, state, and federal codes for changes that may impact design and construction.	11.0%	26.5%	28.4%	22.0%	8.0%	4.2%	89.0%	865
101. Make staff assignments based on knowledge and skill of staff members.	36.8%	6.7%	12.8%	19.7%	18.8%	5.2%	63.2%	865
102. Evaluate staff time and production costs for compliance with established goals.	39.1%	7.9%	13.4%	24.0%	14.1%	1.5%	60.9%	865
103. Understand firm's legal structure to comply with jurisdictional rules and regulations.	40.7%	40.7%	11.0%	4.3%	2.0%	1.4%	59.3%	865
104. Understand implications of evolving sustainable design strategies and technologies.	26.7%	24.3%	25.3%	17.3%	4.3%	2.1%	73.3%	865
105. Understand implications of project delivery methods.	21.5%	25.5%	27.4%	18.5%	5.4%	1.6%	78.5%	865
106. Adhere to ethical standards and codes of professional conduct.	4.7%	6.9%	5.2%	5.9%	6.5%	70.8%	95.3%	865
107. Comply with laws and regulations governing the practice of architecture.	5.4%	8.2%	4.7%	6.4%	6.1%	69.1%	94.6%	865
108. Evaluate appropriateness of building information modeling (BIM) for proposed project.	49.5%	10.9%	19.9%	12.3%	5.1%	2.4%	50.5%	865
109. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.	26.1%	13.1%	11.4%	14.5%	13.6%	21.3%	73.9%	865
110. Monitor performance of design team consultants.	11.0%	5.8%	11.9%	31.1%	33.1%	7.2%	89.0%	865
MEAN	28.4%	16.2%	20.4%	19.0%	11.0%	5.0%	71.6%	865
MIN	4.7%	3.5%	4.7%	2.4%	0.5%	0.0%	30.3%	864
MAX	69.7%	41.0%	34.9%	49.7%	33.8%	70.8%	95.3%	865

Total N = number of respondents

ARE A

Data Table D3. Percentage Distribution of Task Importance Ratings

Survey Population: All Licensed Architects

TASK STATEMENT	Task Importance					MEAN IMP.	SD IMP	PERCENT IMP.	TOTAL N
	0 OF LITTLE OR NO IMP.	1 SOMEWHAT IMP.	2 IMP.	3 VERY IMP.	4 CRITICALLY IMP.				
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	1.3%	4.6%	13.2%	29.6%	51.3%	3.25	0.94	94.1%	865
2. Prepare design alternatives for client review.	0.2%	3.7%	19.3%	41.6%	35.1%	3.08	0.84	96.1%	865
3. Establish methods for Architect-Client communication based on project scope of work.	2.9%	8.4%	27.2%	34.5%	27.1%	2.74	1.04	88.7%	865
4. Assist client in determining delivery method for construction of project.	3.1%	15.6%	37.2%	30.8%	13.3%	2.35	1.00	81.3%	865
5. Determine impact of applicable zoning and development ordinances to determine project constraints.	1.0%	3.9%	16.5%	31.0%	47.5%	3.20	0.92	95.0%	865
6. Define roles and responsibilities of team members.	4.5%	15.1%	32.1%	33.1%	15.1%	2.39	1.06	80.3%	865
7. Determine scope of services.	1.7%	5.2%	17.8%	36.8%	38.5%	3.05	0.96	93.1%	865
8. Determine design fees.	3.2%	6.1%	18.3%	34.7%	37.7%	2.97	1.05	90.6%	865
9. Determine project schedule.	1.7%	7.6%	28.7%	41.0%	20.9%	2.72	0.94	90.6%	865
10. Evaluate results of feasibility studies to determine project's financial viability.	7.6%	26.2%	30.2%	22.9%	13.1%	2.08	1.15	66.1%	865
11. Evaluate results of feasibility studies to determine project's technical viability.	5.1%	16.6%	32.9%	29.8%	15.5%	2.34	1.08	78.3%	865
12. Determine impact of existing utilities infrastructure on site.	3.5%	15.3%	34.3%	32.5%	14.5%	2.39	1.02	81.3%	865
13. Determine impact of existing transportation infrastructure on site.	14.6%	32.4%	34.5%	14.3%	4.3%	1.61	1.04	53.1%	865
14. Assess environmental impact of design decisions.	6.8%	16.1%	35.6%	31.0%	10.5%	2.22	1.06	77.1%	865
15. Determine impact of environmental, zoning and other regulations on site.	2.3%	8.3%	25.8%	35.8%	27.7%	2.78	1.02	89.4%	865
16. Assess socio-cultural context of the proposed site.	23.9%	35.1%	27.4%	10.6%	2.9%	1.33	1.04	40.9%	865
17. Define requirements for site survey based on established project scope.	3.1%	18.3%	35.7%	29.7%	13.2%	2.32	1.02	78.6%	865
18. Analyze existing site conditions to determine impact on facility layout.	1.2%	6.1%	22.8%	42.4%	27.5%	2.89	0.92	92.7%	865
19. Consider recommendations from geotechnical studies when establishing design parameters.	3.9%	11.7%	31.0%	32.0%	21.4%	2.55	1.07	84.4%	865
20. Develop sustainability goals based on existing site environmental conditions.	8.7%	23.0%	36.3%	25.3%	6.7%	1.98	1.05	68.3%	865
21. Establish sustainability goals affecting building performance.	7.2%	20.9%	32.3%	30.6%	9.0%	2.13	1.07	71.9%	865
22. Consider results of environmental impact studies when developing site.	6.9%	20.2%	38.3%	25.3%	9.2%	2.10	1.05	72.8%	865
23. Develop mitigation options to address adverse site conditions.	7.9%	23.9%	33.8%	24.9%	9.6%	2.04	1.09	68.2%	865
24. Review legal documents related to site to determine project constraints.	5.9%	15.5%	28.9%	31.4%	18.3%	2.41	1.13	78.6%	865
25. Perform building code analysis.	0.3%	0.9%	7.5%	26.0%	65.2%	3.55	0.70	98.7%	865
26. Communicate design ideas to the client graphically.	0.7%	1.4%	11.1%	45.7%	41.2%	3.25	0.76	97.9%	865
27. Communicate design ideas to the client using hand drawings.	7.4%	15.8%	26.2%	33.8%	16.8%	2.37	1.15	76.8%	865
28. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	3.9%	8.0%	26.0%	39.7%	22.4%	2.69	1.03	88.1%	865
29. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	6.6%	16.3%	29.1%	33.4%	14.6%	2.33	1.11	77.1%	865

Total N = number of respondents

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ARE A

Data Table D3. Percentage Distribution of Task Importance Ratings

Survey Population: All Licensed Architects

TASK STATEMENT	Task Importance					MEAN IMP.	SD IMP	PERCENT IMP.	TOTAL N
	0 OF LITTLE OR NO IMP.	1 SOMEWHAT IMP.	2 IMP.	3 VERY IMP.	4 CRITICALLY IMP.				
30. Determine design parameters for building systems.	1.8%	7.7%	35.4%	37.9%	17.1%	2.61	0.92	90.4%	865
31. Prepare submittals for regulatory approval.	2.2%	6.9%	20.9%	37.0%	32.9%	2.92	1.00	90.9%	865
32. Evaluate opportunities and constraints of alternative sites.	8.4%	21.3%	38.4%	25.9%	6.0%	2.00	1.03	70.3%	865
33. Gather information about community concerns and issues that may impact proposed project.	9.1%	31.0%	34.6%	19.0%	6.4%	1.82	1.04	59.9%	865
34. Assist Owner in preparing building program including list of spaces and their characteristics.	1.5%	6.1%	25.7%	40.1%	26.6%	2.84	0.94	92.4%	865
35. Establish project design goals.	1.7%	4.5%	29.7%	38.6%	25.4%	2.82	0.92	93.8%	865
36. Prepare site analysis diagrams to document existing conditions, features, infrastructure, and regulatory requirements.	3.4%	12.8%	32.6%	34.6%	16.6%	2.48	1.02	83.8%	865
37. Prepare diagrams illustrating spatial relationships and functional adjacencies.	3.9%	12.0%	30.2%	37.0%	16.9%	2.51	1.03	84.0%	865
38. Submit schedule of Architect's services to Owner for each phase.	5.3%	16.6%	29.8%	33.6%	14.6%	2.35	1.08	78.0%	865
39. Prepare code analysis documentation.	1.8%	4.6%	18.4%	37.0%	38.2%	3.05	0.96	93.5%	865
40. Select technologies to develop and produce design and construction documentation.	8.8%	20.7%	33.3%	26.7%	10.5%	2.09	1.11	70.5%	865
41. Coordinate documentation of design team members.	2.2%	5.7%	20.6%	36.1%	35.5%	2.97	0.99	92.1%	865
42. Manage project close-out procedures and documentation.	3.0%	14.3%	32.9%	36.3%	13.4%	2.43	0.99	82.7%	865
43. Perform quality control reviews throughout the documentation process.	2.9%	8.1%	23.0%	36.6%	29.4%	2.82	1.04	89.0%	865
44. Prepare Cost of Work estimates.	7.7%	18.7%	33.8%	28.8%	11.0%	2.17	1.09	73.5%	865
45. Update Cost of Work estimates.	9.2%	21.7%	34.3%	25.8%	8.9%	2.03	1.10	69.0%	865
46. Design building structural system.	13.6%	23.7%	26.7%	22.4%	13.5%	1.98	1.24	62.7%	865
47. Design civil components of site.	17.6%	29.4%	29.9%	17.1%	6.0%	1.65	1.13	53.1%	865
48. Design mechanical, electrical and plumbing systems.	17.7%	31.1%	25.7%	17.6%	8.0%	1.67	1.19	51.2%	865
49. Design landscape elements for site.	15.7%	38.7%	32.1%	10.5%	2.9%	1.46	0.97	45.5%	865
50. Oversee design integration of building components and systems.	2.3%	4.7%	23.0%	37.2%	32.7%	2.93	0.98	92.9%	865
51. Select materials, finishes and systems based on technical properties and aesthetic requirements.	1.0%	4.3%	24.6%	46.5%	23.6%	2.87	0.86	94.7%	865
52. Select building performance modeling technologies to guide building design.	18.3%	31.8%	33.2%	13.1%	3.7%	1.52	1.05	49.9%	865
53. Prepare life cycle cost analysis.	20.0%	38.8%	28.1%	11.1%	2.0%	1.36	0.99	41.2%	865
54. Perform constructability review to determine ability to procure, sequence construction, and build proposed project.	13.8%	30.2%	30.1%	18.4%	7.6%	1.76	1.13	56.1%	865
55. Prepare final procurement and contract documents.	3.1%	7.2%	22.7%	32.6%	34.5%	2.88	1.06	89.7%	865
56. Determine specific insurance requirements to meet contract or business needs.	15.1%	26.4%	31.3%	17.9%	9.2%	1.80	1.17	58.5%	865
57. Review results from field reports, third-party inspections, and other test results for conformance with contract documents.	2.8%	15.5%	34.2%	33.3%	14.2%	2.41	1.00	81.7%	865
58. Manage modifications to the construction contract.	3.0%	14.0%	29.6%	36.1%	17.3%	2.51	1.03	83.0%	865
59. Assist Owner in preparing Owner-Contractor Agreement.	7.6%	19.4%	35.4%	25.8%	11.8%	2.15	1.10	72.9%	865

Total N = number of respondents

CONTINUED

Data Table D3. Percentage Distribution of Task Importance Ratings

Survey Population: All Licensed Architects

TASK STATEMENT	Task Importance 0 OF LITTLE OR NO IMP.	1 SOMEWHAT IMP.	2 IMP.	3 VERY IMP.	4 CRITICALLY IMP.	MEAN IMP.	SD IMP	PERCENT IMP.	TOTAL N
60. Respond to Contractor Requests for Information.	0.9%	3.4%	20.1%	46.5%	29.1%	3.00	0.84	95.7%	865
61. Prepare proposals for services in response to client requirements.	2.7%	7.5%	28.8%	39.2%	21.8%	2.70	0.98	89.8%	865
62. Prepare Owner-Architect agreement.	3.1%	5.2%	21.3%	33.2%	37.2%	2.96	1.04	91.7%	865
63. Prepare Architect-Consultant agreement.	5.3%	9.6%	27.9%	34.8%	22.4%	2.59	1.10	85.1%	865
64. Negotiate terms and conditions outlined in Owner-Architect Agreement.	4.2%	9.7%	26.2%	33.8%	26.1%	2.68	1.09	86.1%	865
65. Apply principles of historic preservation for projects involving building restoration or renovation.	10.2%	24.7%	35.7%	23.7%	5.7%	1.90	1.05	65.1%	865
66. Collaborate with stakeholders during design process to maintain design intent and comply with Owner requirements.	5.1%	13.3%	29.1%	35.3%	17.2%	2.46	1.08	81.6%	865
67. Coordinate design work of consultants.	0.8%	2.0%	14.1%	42.1%	41.0%	3.21	0.81	97.2%	865
68. Select furniture, fixtures and equipment that meet client's design requirements and needs.	11.4%	24.7%	35.1%	22.9%	5.8%	1.87	1.07	63.8%	865
69. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	5.5%	15.6%	33.4%	30.2%	15.3%	2.34	1.08	78.8%	865
70.Establish financial controls within firm to monitor profitability of individual projects.	7.3%	14.1%	29.1%	27.2%	22.3%	2.43	1.19	78.6%	865
71. Prepare staffing plan to meet project goals.	8.8%	14.3%	30.4%	30.8%	15.7%	2.30	1.16	76.9%	865
72. Establish procedures for documenting project decisions.	5.8%	14.2%	29.4%	31.8%	18.8%	2.44	1.12	80.0%	865
73. Monitor project schedule to maintain compliance with established milestones.	2.5%	9.4%	32.0%	39.3%	16.8%	2.58	0.96	88.1%	865
74. Evaluate staffing plan to ensure compliance with established milestones.	9.1%	17.7%	34.2%	27.9%	11.1%	2.14	1.12	73.2%	865
75. Manage client expectations to align with established milestones and final decision points.	4.2%	8.8%	30.6%	35.3%	21.2%	2.60	1.04	87.1%	865
76. Assist client in selecting contractors.	3.6%	19.1%	36.3%	31.4%	9.6%	2.24	0.99	77.3%	865
77. Manage implementation of sustainability criteria.	13.2%	24.5%	36.4%	20.6%	5.3%	1.80	1.07	62.3%	865
78. Identify changes in project scope that require additional services.	1.5%	7.2%	33.3%	39.2%	18.8%	2.67	0.91	91.3%	865
79. Assist Owner in obtaining necessary permits and approvals.	1.7%	11.0%	28.0%	36.3%	22.9%	2.68	1.00	87.3%	864
80. Coordinate testing of building performance and materials.	16.8%	31.1%	34.0%	13.9%	4.3%	1.58	1.06	52.1%	865
81. Review Application and Certificate for Payment.	3.2%	10.9%	31.7%	37.9%	16.3%	2.53	0.99	85.9%	865
82. Review shop drawings and submittals during construction for conformance with design intent.	1.2%	4.7%	20.7%	43.6%	29.8%	2.96	0.89	94.1%	865
83. Complete field reports to document field observations from site visit.	1.5%	9.4%	33.6%	39.1%	16.4%	2.60	0.92	89.1%	865
84. Manage information exchange during construction.	2.1%	8.3%	32.3%	36.6%	20.7%	2.66	0.97	89.6%	865
85. Resolve conflicts that may arise during design and construction process.	0.9%	3.9%	22.3%	40.7%	32.1%	2.99	0.89	95.1%	865
86. Manage project-specific procurement process.	19.2%	28.8%	34.5%	13.4%	4.2%	1.55	1.07	52.0%	865
87. Establish procedures for building commissioning.	24.0%	34.8%	28.9%	9.7%	2.5%	1.32	1.02	41.2%	865
88. Manage post-occupancy issues, e.g., evaluation of building performance, warranty issues.	15.0%	35.4%	32.3%	12.9%	4.4%	1.56	1.03	49.6%	865

Total N = number of respondents

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Data Table D3. Percentage Distribution of Task Importance Ratings

Survey Population: All Licensed Architects

TASK STATEMENT	Task Importance					MEAN IMP.	SD IMP	PERCENT IMP.	TOTAL N
	0 OF LITTLE OR NO IMP.	1 SOMEWHAT IMP.	2 IMP.	3 VERY IMP.	4 CRITICALLY IMP.				
89. Select design team consultants.	2.8%	9.9%	29.0%	38.6%	19.7%	2.62	1.00	87.3%	865
90. Conduct periodic progress meetings with design and project team.	1.3%	6.2%	32.8%	41.4%	18.3%	2.69	0.88	92.5%	865
91. Participate in pre-construction, pre-installation and regular progress meetings with design team.	2.0%	9.9%	37.9%	35.7%	14.5%	2.51	0.93	88.1%	865
92. Secure insurance policies related to general, automobile, workers' compensation, and professional liability.	15.7%	23.9%	30.2%	17.7%	12.5%	1.87	1.24	60.3%	865
93. Develop strategies to control risk and manage liability.	6.8%	16.6%	31.0%	27.4%	18.2%	2.33	1.15	76.5%	865
94. Determine billing rates.	5.9%	12.6%	31.6%	33.1%	16.9%	2.42	1.09	81.5%	865
95. Develop business plan for firm.	9.2%	15.6%	28.6%	29.9%	16.6%	2.29	1.19	75.1%	865
96. Develop and maintain effective and productive relationships with clients.	1.2%	2.1%	12.4%	31.6%	52.8%	3.33	0.86	96.8%	865
97. Develop procedures for responding to changes in project scope.	2.1%	10.8%	36.4%	36.3%	14.5%	2.50	0.94	87.2%	865
98. Develop procedures for responding to contractor requests (Requests for Information).	3.2%	11.9%	35.8%	33.2%	15.8%	2.46	1.00	84.9%	865
99. Develop strategies for responding to Owner requests for proposal (Requests for Proposal, Requests for Qualifications).	4.3%	12.9%	34.2%	32.5%	16.1%	2.43	1.04	82.8%	865
100. Review local, state, and federal codes for changes that may impact design and construction.	1.5%	6.6%	26.6%	33.9%	31.4%	2.87	0.98	91.9%	865
101. Make staff assignments based on knowledge and skill of staff members.	7.7%	10.8%	32.1%	34.5%	14.9%	2.38	1.10	81.5%	865
102. Evaluate staff time and production costs for compliance with established goals.	8.3%	15.1%	35.3%	29.0%	12.3%	2.22	1.10	76.5%	865
103. Understand firm's legal structure to comply with jurisdictional rules and regulations.	9.2%	18.7%	33.4%	22.2%	16.4%	2.18	1.19	72.0%	865
104. Understand implications of evolving sustainable design strategies and technologies.	10.6%	21.6%	37.6%	24.4%	5.8%	1.93	1.06	67.7%	865
105. Understand implications of project delivery methods.	4.6%	19.0%	37.1%	30.8%	8.6%	2.20	0.99	76.4%	865
106. Adhere to ethical standards and codes of professional conduct.	0.9%	2.4%	9.6%	23.9%	63.1%	3.46	0.84	96.6%	865
107. Comply with laws and regulations governing the practice of architecture.	1.2%	1.7%	10.1%	19.8%	67.3%	3.50	0.83	97.1%	865
108. Evaluate appropriateness of building information modeling (BIM) for proposed project.	16.0%	26.4%	34.7%	17.9%	5.1%	1.70	1.09	57.7%	865
109. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.	4.7%	10.2%	28.8%	28.4%	27.9%	2.65	1.13	85.1%	865
110. Monitor performance of design team consultants.	1.4%	4.6%	28.6%	47.4%	18.0%	2.76	0.85	94.0%	865
MEAN	6.2%	14.8%	29.0%	30.5%	19.5%	2.42	1.02	79.0%	865
MIN	0.2%	0.9%	7.5%	9.7%	2.0%	1.32	0.70	40.9%	864
MAX	24.0%	38.8%	38.4%	47.4%	67.3%	3.55	1.24	98.7%	865

Total N = number of respondents

Data Table D4. Summary Statistics of Task Importance and Task Frequency Ratings

Survey Population: All Licensed Architects

TASK STATEMENT	MEAN IMP.	SD IMP.	PERCENT PERFORMED	TOTAL N
1. Gather information about client's vision, goals, budget, and schedule to validate project scope and program.	3.25	0.94	89.6%	865
2. Prepare design alternatives for client review.	3.08	0.84	90.6%	865
3. Establish methods for Architect-Client communication based on project scope of work.	2.74	1.04	86.7%	865
4. Assist client in determining delivery method for construction of project.	2.35	1.00	79.1%	865
5. Determine impact of applicable zoning and development ordinances to determine project constraints.	3.20	0.92	87.3%	865
6. Define roles and responsibilities of team members.	2.39	1.06	82.5%	865
7. Determine scope of services.	3.05	0.96	87.2%	865
8. Determine design fees.	2.97	1.05	79.8%	865
9. Determine project schedule.	2.72	0.94	88.2%	865
10. Evaluate results of feasibility studies to determine project's financial viability.	2.08	1.15	61.5%	865
11. Evaluate results of feasibility studies to determine project's technical viability.	2.34	1.08	67.9%	865
12. Determine impact of existing utilities infrastructure on site.	2.39	1.02	82.1%	865
13. Determine impact of existing transportation infrastructure on site.	1.61	1.04	56.4%	865
14. Assess environmental impact of design decisions.	2.22	1.06	74.8%	865
15. Determine impact of environmental, zoning and other regulations on site.	2.78	1.02	84.9%	865
16. Assess socio-cultural context of the proposed site.	1.33	1.04	40.5%	865
17. Define requirements for site survey based on established project scope.	2.32	1.02	78.0%	865
18. Analyze existing site conditions to determine impact on facility layout.	2.89	0.92	87.7%	865
19. Consider recommendations from geotechnical studies when establishing design parameters.	2.55	1.07	78.0%	865
20. Develop sustainability goals based on existing site environmental conditions.	1.98	1.05	64.4%	865
21. Establish sustainability goals affecting building performance.	2.13	1.07	70.5%	865
22. Consider results of environmental impact studies when developing site.	2.10	1.05	55.7%	865
23. Develop mitigation options to address adverse site conditions.	2.04	1.09	57.7%	865
24. Review legal documents related to site to determine project constraints.	2.41	1.13	66.5%	865
25. Perform building code analysis.	3.55	0.70	91.8%	865
26. Communicate design ideas to the client graphically.	3.25	0.76	92.0%	865
27. Communicate design ideas to the client using hand drawings.	2.37	1.15	82.4%	865
28. Communicate design ideas to client with two-dimensional (2-D) computer aided design software.	2.69	1.03	81.6%	865
29. Communicate design ideas to client with three-dimensional (3-D) computer aided design software.	2.33	1.11	68.4%	865
30. Determine design parameters for building systems.	2.61	0.92	83.4%	865
31. Prepare submittals for regulatory approval.	2.92	1.00	84.2%	865
32. Evaluate opportunities and constraints of alternative sites.	2.00	1.03	59.2%	865
33. Gather information about community concerns and issues that may impact proposed project.	1.82	1.04	53.4%	865
34. Assist Owner in preparing building program including list of spaces and their characteristics.	2.84	0.94	81.5%	865
35. Establish project design goals.	2.82	0.92	86.5%	865
36. Prepare site analysis diagrams to document existing conditions, features, infrastructure, and regulatory requirements.	2.48	1.02	72.9%	865
37. Prepare diagrams illustrating spatial relationships and functional adjacencies.	2.51	1.03	77.1%	865
38. Submit schedule of Architect's services to Owner for each phase.	2.35	1.08	65.9%	865

Total N = number of respondents

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Data Table D4. Summary Statistics of Task Importance and Task Frequency Ratings

Survey Population: All Licensed Architects

TASK STATEMENT	MEAN IMP.	SD IMP.	PERCENT PERFORMED	TOTAL N
39. Prepare code analysis documentation.	3.05	0.96	86.5%	865
40. Select technologies to develop and produce design and construction documentation.	2.09	1.11	68.8%	865
41. Coordinate documentation of design team members.	2.97	0.99	85.9%	865
42. Manage project close-out procedures and documentation.	2.43	0.99	78.2%	865
43. Perform quality control reviews throughout the documentation process.	2.82	1.04	83.0%	865
44. Prepare Cost of Work estimates.	2.17	1.09	66.5%	865
45. Update Cost of Work estimates.	2.03	1.10	63.6%	865
46. Design building structural system.	1.98	1.24	44.5%	865
47. Design civil components of site.	1.65	1.13	42.3%	865
48. Design mechanical, electrical and plumbing systems.	1.67	1.19	38.5%	865
49. Design landscape elements for site.	1.46	0.97	53.1%	865
50. Oversee design integration of building components and systems.	2.93	0.98	85.7%	865
51. Select materials, finishes and systems based on technical properties and aesthetic requirements.	2.87	0.86	90.4%	865
52. Select building performance modeling technologies to guide building design.	1.52	1.05	37.8%	865
53. Prepare life cycle cost analysis.	1.36	0.99	30.3%	865
54. Perform constructability review to determine ability to procure, sequence construction, and build proposed project.	1.76	1.13	51.2%	865
55. Prepare final procurement and contract documents.	2.88	1.06	79.2%	865
56. Determine specific insurance requirements to meet contract or business needs.	1.80	1.17	48.9%	865
57. Review results from field reports, third-party inspections, and other test results for conformance with contract documents.	2.41	1.00	80.6%	865
58. Manage modifications to the construction contract.	2.51	1.03	74.7%	865
59. Assist Owner in preparing Owner-Contractor Agreement.	2.15	1.10	61.4%	865
60. Respond to Contractor Requests for Information.	3.00	0.84	89.9%	865
61. Prepare proposals for services in response to client requirements.	2.70	0.98	80.7%	865
62. Prepare Owner-Architect agreement.	2.96	1.04	71.8%	865
63. Prepare Architect-Consultant agreement.	2.59	1.10	65.3%	865
64. Negotiate terms and conditions outlined in Owner-Architect Agreement.	2.68	1.09	65.3%	865
65. Apply principles of historic preservation for projects involving building restoration or renovation.	1.90	1.05	46.6%	865
66. Collaborate with stakeholders during design process to maintain design intent and comply with Owner requirements.	2.46	1.08	73.6%	865
67. Coordinate design work of consultants.	3.21	0.81	90.8%	865
68. Select furniture, fixtures and equipment that meet client's design requirements and needs.	1.87	1.07	63.8%	865
69. Negotiate terms and conditions of services outlined in Architect-Consultant Agreement.	2.34	1.08	61.3%	865
70. Establish financial controls within firm to monitor profitability of individual projects.	2.43	1.19	57.8%	865
71. Prepare staffing plan to meet project goals.	2.30	1.16	63.2%	865
72. Establish procedures for documenting project decisions.	2.44	1.12	76.0%	865
73. Monitor project schedule to maintain compliance with established milestones.	2.58	0.96	86.4%	865
74. Evaluate staffing plan to ensure compliance with established milestones.	2.14	1.12	61.3%	865
75. Manage client expectations to align with established milestones and final decision points.	2.60	1.04	81.8%	865
76. Assist client in selecting contractors.	2.24	0.99	76.4%	865

Total N = number of respondents

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Data Table D4. Summary Statistics of Task Importance and Task Frequency Ratings

Survey Population: All Licensed Architects

TASK STATEMENT	MEAN IMP.	SD IMP.	PERCENT PERFORMED	TOTAL N
77. Manage implementation of sustainability criteria.	1.80	1.07	56.0%	865
78. Identify changes in project scope that require additional services.	2.67	0.91	86.6%	865
79. Assist Owner in obtaining necessary permits and approvals.	2.68	1.00	82.9%	864
80. Coordinate testing of building performance and materials.	1.58	1.06	44.0%	865
81. Review Application and Certificate for Payment.	2.53	0.99	75.5%	865
82. Review shop drawings and submittals during construction for conformance with design intent.	2.96	0.89	86.8%	865
83. Complete field reports to document field observations from site visit.	2.60	0.92	80.1%	865
84. Manage information exchange during construction.	2.66	0.97	82.1%	865
85. Resolve conflicts that may arise during design and construction process.	2.99	0.89	88.2%	865
86. Manage project-specific procurement process.	1.55	1.07	46.2%	865
87. Establish procedures for building commissioning.	1.32	1.02	30.4%	865
88. Manage post-occupancy issues, e.g., evaluation of building performance, warranty issues.	1.56	1.03	48.8%	865
89. Select design team consultants.	2.62	1.00	78.2%	865
90. Conduct periodic progress meetings with design and project team.	2.69	0.88	88.6%	865
91. Participate in pre-construction, pre-installation and regular progress meetings with design team.	2.51	0.93	84.0%	865
92. Secure insurance policies related to general, automobile, workers' compensation, and professional liability.	1.87	1.24	49.8%	865
93. Develop strategies to control risk and manage liability.	2.33	1.15	65.2%	865
94. Determine billing rates.	2.42	1.09	64.7%	865
95. Develop business plan for firm.	2.29	1.19	50.8%	865
96. Develop and maintain effective and productive relationships with clients.	3.33	0.86	90.5%	865
97. Develop procedures for responding to changes in project scope.	2.50	0.94	78.5%	865
98. Develop procedures for responding to contractor requests (Requests for Information).	2.46	1.00	76.4%	865
99. Develop strategies for responding to Owner requests for proposal (Requests for Proposal, Requests for Qualifications).	2.43	1.04	72.0%	865
100. Review local, state, and federal codes for changes that may impact design and construction.	2.87	0.98	89.0%	865
101. Make staff assignments based on knowledge and skill of staff members.	2.38	1.10	63.2%	865
102. Evaluate staff time and production costs for compliance with established goals.	2.22	1.10	60.9%	865
103. Understand firm's legal structure to comply with jurisdictional rules and regulations.	2.18	1.19	59.3%	865
104. Understand implications of evolving sustainable design strategies and technologies.	1.93	1.06	73.3%	865
105. Understand implications of project delivery methods.	2.20	0.99	78.5%	865
106. Adhere to ethical standards and codes of professional conduct.	3.46	0.84	95.3%	865
107. Comply with laws and regulations governing the practice of architecture.	3.50	0.83	94.6%	865
108. Evaluate appropriateness of building information modeling (BIM) for proposed project.	1.70	1.09	50.5%	865
109. Understand implications of policies and procedures to ensure supervision of design work by architect in responsible charge/control.	2.65	1.13	73.9%	865
110. Monitor performance of design team consultants.	2.76	0.85	89.0%	865
MEAN	2.42	1.02	71.6%	865
MIN	1.32	0.70	30.3%	864
MAX	3.55	1.24	95.3%	865

Total N = number of respondents

Data Table D5. List of all ARE Survey Knowledge/Skill Statements

K/S #	KNOWLEDGE/SKILL STATEMENT
1	Knowledge of oral, written, and visual presentation techniques to communicate project information.
2	Knowledge of master plans and their impact on building design.
3	Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.
4	Knowledge of factors that affect selection of project consultants.
5	Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.
6	Knowledge of client and project characteristics that influence contract agreements.
7	Knowledge of types of contracts and their designated use.
8	Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.
9	Knowledge of effects of specific findings from feasibility studies on building design.
10	Knowledge of factors involved in selection of building systems and components.
11	Knowledge of effect of environmental factors on site development.
12	Knowledge of environmental policies and regulations and their implications for proposed construction.
13	Knowledge of processes involved in conducting a survey of existing conditions.
14	Knowledge of effects of specific findings from environmental impact studies on building design.
15	Skill in designing facility layout and site plan that responds to site constraints.
16	Knowledge of methods required to mitigate adverse site conditions.
17	Knowledge of elements of and processes for conducting a site analysis.
18	Knowledge of codes of professional conduct related to architectural practice.
19	Knowledge of protocols and procedures for conducting a code analysis.
20	Knowledge of building codes and their impact on building design.
21	Knowledge of land use codes and ordinances that govern land use decisions.
22	Skill in producing hand drawings of design ideas.
23	Knowledge of standards for graphic symbols and units of measurement in technical drawings.
24	Skill in producing two-dimensional (2-D) drawings using hand methods.
25	Skill in using software to produce two-dimensional (2-D) drawings.
26	Skill in using software to produce three-dimensional (3-D) models of building design.
27	Skill in producing physical scale models.
28	Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.
29	Knowledge of protocols and procedures for obtaining community input for proposed design.
30	Knowledge of computer aided design and drafting software for producing two-dimensional (2-D) drawings.
31	Knowledge of factors involved in selecting computer based design technologies.
32	Knowledge of engineering properties of soils and their effect on building foundations and building design.
33	Knowledge of factors to be considered in adaptive reuse of existing buildings.
34	Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.
35	Knowledge of effect of thermal envelope in design of building systems.
36	Knowledge of principles of integrated project design.
37	Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.
38	Knowledge of engineering principles and their application to design and construction.
39	Knowledge of properties of concrete products, materials, assemblies and their impact on building design and construction.
40	Knowledge of properties of stone and masonry products, materials, assemblies and their impact on building design and construction.
41	Knowledge of properties of metal products, materials, assemblies and their impact on building design and construction.
42	Knowledge of properties of wood and wood products, materials, assemblies and their impact on building design and construction.
43	Knowledge of properties of glass products, materials, assemblies and their impact on building design and construction.
44	Knowledge of means and methods for building construction.
45	Knowledge of benefits and limitations of "fast track" or other forms of construction delivery methods.
46	Knowledge of methods and techniques for estimating construction costs.
47	Knowledge of structural load and load conditions that affect building design.
48	Knowledge of energy codes that impact construction.
49	Knowledge of methods and strategies for evidence based design (EBD).
50	Knowledge of impact of design on human behavior.
51	Knowledge of functional requirements of heating, ventilation and air conditioning (HVAC) systems.

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Data Table D5. List of all ARE Survey Knowledge/Skill Statements

K/S #	KNOWLEDGE/SKILL STATEMENT
52	Knowledge of functional requirements of plumbing systems.
53	Knowledge of functional requirements of electrical systems.
54	Knowledge of functional requirements of special systems.
55	Knowledge of functional requirements of conveying systems.
56	Knowledge of functional requirements of structural systems.
57	Knowledge of functional requirements of roofing systems.
58	Knowledge of functional requirements of fire suppression systems.
59	Knowledge of functional requirements of communications systems.
60	Knowledge of functional requirements of electronic safety and security systems.
61	Knowledge of functional requirements of door and window systems.
62	Knowledge of functional requirements for thermal and moisture control systems.
63	Knowledge of hazardous materials mitigation at building site.
64	Knowledge of principles of building operation and function.
65	Knowledge of content and format of specifications.
66	Knowledge of principles of interior design and their influences on building design.
67	Knowledge of principles of landscape design and their influences on building design.
68	Knowledge of site design principles and practices.
69	Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.
70	Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.
71	Knowledge of relationship between constructability and aesthetics.
72	Knowledge of accepted standards for building materials and methods of construction, e.g., ASTM, ANSI.
73	Knowledge of methods to perform a life cycle cost analysis.
74	Knowledge of principles of value analysis and value engineering processes.
75	Knowledge of procedures and protocols of permit approval process.
76	Knowledge of principles of historic preservation.
77	Knowledge of processes and procedures for building commissioning.
78	Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).
79	Knowledge of methods and tools for space planning.

K/S #	KNOWLEDGE/SKILL STATEMENT
80	Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.
81	Knowledge of factors that impact construction management services.
82	Knowledge of fee structures, their attributes and implications for schedule, scope and profit.
83	Knowledge of consultant agreements and fee structures.
84	Knowledge of different building and construction types and their implications for design and construction schedules.
85	Knowledge of scheduling methods to establish project timeframes based on standard sequences of architectural services in each phase.
86	Knowledge of business development strategies.
87	Knowledge of relationship between staffing capabilities and hours, and internal project budget to meet established milestones and profitability.
88	Knowledge of purposes and types of professional liability insurance related to architectural practice.
89	Knowledge of format and protocols for efficient meeting management and information distribution.
90	Knowledge of strategies to assess project progress and verify its alignment with project schedule.
91	Knowledge of ways to translate project goals into specific tasks and measureable design criteria.
92	Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.
93	Knowledge of formats and protocols to produce and distribute field reports to document construction progress.
94	Knowledge of site requirements for a specific building type and scope to determine client's site needs.
95	Knowledge of site analysis techniques to determine project parameters affecting design.
96	Knowledge of methods to prioritize or objectively evaluate design options based on project goals.
97	Knowledge of sustainability strategies and/or rating systems.
98	Knowledge of sustainability considerations related to building materials and construction processes.
99	Knowledge of techniques to integrate renewable energy systems into building design.
100	Knowledge of methods to identify scope changes that may require additional services.
101	Knowledge of procedures for processing requests for additional services.
102	Knowledge of appropriate documentation level required for construction documents.
103	Knowledge of close-out document requirements and protocols.

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Data Table D5. List of all ARE Survey Knowledge/Skill Statements

K/S #	KNOWLEDGE/SKILL STATEMENT
104	Knowledge of construction document technologies and their standards and applications.
105	Knowledge of building information modeling (BIM) and its impact on planning, financial management and construction documentation.
106	Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.
107	Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.
108	Knowledge of techniques to integrate model contract forms and documents.
109	Knowledge of benefits and limitations of software for construction documentation.
110	Knowledge of methods for production of construction documentation and drawings.
111	Knowledge of standard methods for production of design development documentation.
112	Knowledge of standard methods for production of site plan documentation.
113	Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.
114	Knowledge of materials testing processes and protocols to be performed during the construction process.
115	Knowledge of building systems testing processes and protocols to be performed during the construction process.
116	Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.
117	Knowledge of protocols for responding to Requests for Information (RFI).
118	Knowledge of roles, responsibilities and authorities of project team members during construction.
119	Knowledge of conflict resolution techniques and their applications throughout project.
120	Knowledge of bidding processes and protocols for different project delivery methods and their applications.
121	Knowledge of requirements for post-occupancy evaluation.
122	Knowledge of design decisions and their impact on constructability.
123	Knowledge of methods to manage human resources.
124	Knowledge of state board guidelines for licensing and professional practice.
125	Knowledge of principles of universal design.
126	Knowledge of purposes of and legal implications for different types of business entities.
127	Knowledge of innovative and evolving technologies and their impact on architectural practice.
128	Knowledge of ethical standards relevant to architectural practice.
129	Knowledge of methods to facilitate information management in building design and construction.
130	Knowledge of factors involved in conducting architectural practice in international markets.
131	Knowledge of methods and procedures for risk management.
132	Knowledge of financial planning methods to manage revenues, staffing, and overhead expenses.

ARE C

Data Table D6. Percentage Distribution of Knowledge/Skill Importance Ratings

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Knowledge/Skill Importance					MEAN IMP.	SD IMP.	PERCENT IMP.	TOTAL N
	0	1	2	3	4				
	OF LITTLE OR NO IMP.	SOMEWHAT IMP.	IMP.	VERY IMP.	CRITICALLY IMP.				
1. Knowledge of oral, written, and visual presentation techniques to communicate project information.	0.1%	Imp.	9.6%	34.1%	54.3%	3.40	0.75	97.9%	822
2. Knowledge of master plans and their impact on building design.	1.3%	10.7%	28.2%	37.1%	22.6%	2.69	0.98	88.0%	822
3. Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.	0.6%	4.0%	16.8%	34.1%	44.5%	3.18	0.89	95.4%	822
4. Knowledge of factors that affect selection of project consultants.	1.0%	7.9%	30.2%	40.4%	20.6%	2.72	0.91	91.1%	822
5. Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.	1.1%	8.8%	26.9%	42.6%	20.7%	2.73	0.92	90.1%	822
6. Knowledge of client and project characteristics that influence contract agreements.	1.1%	6.4%	22.1%	36.1%	34.2%	2.96	0.96	92.5%	822
7. Knowledge of types of contracts and their designated use.	1.0%	10.1%	28.0%	36.1%	24.8%	2.74	0.98	88.9%	822
8. Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.	1.1%	9.5%	27.3%	38.7%	23.5%	2.74	0.96	89.4%	822
9. Knowledge of effects of specific findings from feasibility studies on building design.	2.2%	12.5%	35.8%	34.7%	14.8%	2.47	0.96	85.3%	822
10. Knowledge of factors involved in selection of building systems and components.	0.1%	3.4%	21.2%	45.3%	30.0%	3.02	0.81	96.5%	822
11. Knowledge of effect of environmental factors on site development.	1.0%	5.2%	30.7%	44.3%	18.9%	2.75	0.85	93.8%	822
12. Knowledge of environmental policies and regulations and their implications for proposed construction.	1.6%	9.7%	33.1%	35.3%	20.3%	2.63	0.96	88.7%	822
13. Knowledge of processes involved in conducting a survey of existing conditions.	0.9%	7.2%	32.2%	35.9%	23.8%	2.75	0.93	92.0%	822
14. Knowledge of effects of specific findings from environmental impact studies on building design.	2.9%	12.3%	39.5%	30.8%	14.5%	2.42	0.98	84.8%	822
15. Skill in designing facility layout and site plan that responds to site constraints.	0.2%	2.1%	13.7%	41.1%	42.8%	3.24	0.78	97.7%	822
16. Knowledge of methods required to mitigate adverse site conditions.	0.5%	9.2%	38.8%	36.4%	15.1%	2.56	0.87	90.3%	822
17. Knowledge of elements of and processes for conducting a site analysis.	0.7%	9.2%	38.0%	37.7%	14.4%	2.56	0.87	90.0%	822
18. Knowledge of codes of professional conduct related to architectural practice.	0.4%	7.1%	23.7%	34.8%	34.1%	2.95	0.94	92.6%	822
19. Knowledge of protocols and procedures for conducting a code analysis.	0.2%	3.5%	17.0%	37.5%	41.7%	3.17	0.85	96.2%	822
20. Knowledge of building codes and their impact on building design.	0.0%	0.7%	7.5%	29.9%	61.8%	3.53	0.67	99.3%	822
21. Knowledge of land use codes and ordinances that govern land use decisions.	0.6%	7.8%	26.8%	35.2%	29.7%	2.86	0.95	91.6%	822
22. Skill in producing hand drawings of design ideas.	3.4%	19.2%	34.7%	28.8%	13.9%	2.31	1.04	77.4%	822
23. Knowledge of standards for graphic symbols and units of measurement in technical drawings.	0.2%	7.5%	25.3%	41.6%	25.3%	2.84	0.90	92.2%	822
24. Skill in producing two-dimensional (2-D) drawings using hand methods.	11.8%	22.6%	31.3%	22.3%	12.0%	2.00	1.19	65.6%	822
25. Skill in using software to produce two-dimensional (2-D) drawings.	0.9%	3.6%	22.1%	43.2%	30.2%	2.98	0.86	95.5%	822

Total N = number of respondents

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ARE C

Data Table D6. Percentage Distribution of Knowledge/Skill Importance Ratings

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Knowledge/Skill Importance					MEAN IMP.	SD IMP.	PERCENT IMP.	TOTAL N
	0	1	2	3	4				
	OF LITTLE OR NO IMP.	SOMEWHAT IMP.	IMP.	VERY IMP.	CRITICALLY IMP.				
26. Skill in using software to produce three-dimensional (3-D) models of building design.	3.2%	17.5%	31.4%	34.8%	13.1%	2.37	1.02	79.3%	822
27. Skill in producing physical scale models.	22.4%	40.1%	26.8%	8.5%	2.2%	1.28	0.98	37.5%	822
28. Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	10.8%	24.3%	32.2%	23.6%	9.0%	1.96	1.13	64.8%	822
29. Knowledge of protocols and procedures for obtaining community input for proposed design.	4.7%	26.2%	38.7%	23.0%	7.4%	2.02	0.99	69.1%	822
30. Knowledge of computer aided design and drafting software for producing two-dimensional (2-D) drawings.	1.1%	6.0%	21.4%	38.9%	32.6%	2.96	0.94	92.9%	822
31. Knowledge of factors involved in selecting computer based design technologies.	4.9%	26.4%	39.2%	23.7%	5.8%	1.99	0.96	68.7%	822
32. Knowledge of engineering properties of soils and their effect on building foundations and building design.	1.7%	21.4%	38.6%	26.3%	12.0%	2.26	0.98	76.9%	822
33. Knowledge of factors to be considered in adaptive reuse of existing buildings.	1.3%	15.1%	39.2%	33.7%	10.7%	2.37	0.91	83.6%	822
34. Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.	0.1%	3.6%	23.8%	43.9%	28.5%	2.97	0.82	96.2%	822
35. Knowledge of effect of thermal envelope in design of building systems.	0.2%	4.1%	25.4%	45.7%	24.5%	2.90	0.82	95.6%	822
36. Knowledge of principles of integrated project design.	5.2%	19.5%	38.3%	26.6%	10.3%	2.17	1.03	75.3%	822
37. Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.	2.1%	11.7%	32.6%	35.3%	18.4%	2.56	0.99	86.3%	822
38. Knowledge of engineering principles and their application to design and construction.	0.0%	6.0%	35.5%	39.4%	19.1%	2.72	0.84	94.0%	822
39. Knowledge of properties of concrete products, materials, assemblies and their impact on building design and construction.	0.2%	11.9%	42.8%	34.1%	10.9%	2.44	0.85	87.8%	822
40. Knowledge of properties of stone and masonry products, materials, assemblies and their impact on building design and construction.	0.0%	11.9%	43.1%	33.9%	11.1%	2.44	0.84	88.1%	822
41. Knowledge of properties of metal products, materials, assemblies and their impact on building design and construction.	0.1%	9.5%	42.7%	36.1%	11.6%	2.50	0.82	90.4%	822
42. Knowledge of properties of wood and wood products, materials, assemblies and their impact on building design and construction.	0.1%	7.9%	40.5%	38.3%	13.1%	2.56	0.82	92.0%	822
43. Knowledge of properties of glass products, materials, assemblies and their impact on building design and construction.	0.1%	9.6%	43.6%	35.2%	11.6%	2.48	0.83	90.3%	822
44. Knowledge of means and methods for building construction.	0.6%	8.3%	25.7%	39.8%	25.7%	2.82	0.93	91.1%	822
45. Knowledge of benefits and limitations of “fast track” or other forms of construction delivery methods.	3.6%	22.5%	43.3%	24.2%	6.3%	2.07	0.93	73.8%	822
46. Knowledge of methods and techniques for estimating construction costs.	1.5%	22.6%	39.2%	27.6%	9.1%	2.20	0.94	75.9%	822
47. Knowledge of structural load and load conditions that affect building design.	0.5%	12.8%	35.4%	33.5%	17.9%	2.55	0.94	86.7%	822

Total N = number of respondents

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ARE C

Data Table D6. Percentage Distribution of Knowledge/Skill Importance Ratings

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Knowledge/Skill Importance 0 OF LITTLE OR NO IMP.	1 SOMEWHAT IMP.	2 IMP.	3 VERY IMP.	4 CRITICALLY IMP.	MEAN IMP.	SD IMP.	PERCENT IMP.	TOTAL N
48. Knowledge of energy codes that impact construction.	0.7%	8.2%	32.7%	39.9%	18.5%	2.67	0.89	91.1%	822
49. Knowledge of methods and strategies for evidence based design (EBD).	23.5%	32.5%	32.0%	9.6%	2.4%	1.35	1.02	44.0%	822
50. Knowledge of impact of design on human behavior.	2.3%	17.6%	35.3%	30.5%	14.2%	2.37	1.00	80.0%	822
51. Knowledge of functional requirements of heating, ventilation and air conditioning (HVAC) systems.	0.4%	9.0%	41.6%	37.7%	11.3%	2.51	0.82	90.6%	822
52. Knowledge of functional requirements of plumbing systems.	1.5%	12.3%	48.1%	29.4%	8.8%	2.32	0.85	86.2%	821
53. Knowledge of functional requirements of electrical systems.	1.2%	13.3%	48.5%	28.7%	8.3%	2.30	0.84	85.5%	822
54. Knowledge of functional requirements of special systems.	3.5%	24.6%	49.8%	18.4%	3.8%	1.94	0.85	71.9%	822
55. Knowledge of functional requirements of conveying systems.	8.2%	29.1%	42.0%	17.3%	3.5%	1.79	0.94	62.8%	822
56. Knowledge of functional requirements of structural systems.	0.2%	5.0%	29.0%	44.3%	21.5%	2.82	0.83	94.8%	822
57. Knowledge of functional requirements of roofing systems.	0.1%	3.5%	29.8%	43.2%	23.4%	2.86	0.82	96.4%	822
58. Knowledge of functional requirements of fire suppression systems.	1.6%	16.4%	41.8%	30.5%	9.6%	2.30	0.91	82.0%	822
59. Knowledge of functional requirements of communications systems.	6.2%	32.2%	42.8%	15.5%	3.3%	1.77	0.90	61.6%	822
60. Knowledge of functional requirements of electronic safety and security systems.	6.2%	33.6%	40.3%	16.5%	3.4%	1.77	0.91	60.2%	822
61. Knowledge of functional requirements of door and window systems.	0.2%	5.2%	33.3%	45.1%	16.1%	2.72	0.80	94.5%	822
62. Knowledge of functional requirements for thermal and moisture control systems.	0.1%	3.2%	22.7%	40.9%	33.1%	3.04	0.83	96.7%	822
63. Knowledge of hazardous materials mitigation at building site.	7.1%	29.4%	38.0%	19.6%	6.0%	1.88	1.00	63.5%	822
64. Knowledge of principles of building operation and function.	1.8%	15.5%	37.3%	30.3%	15.1%	2.41	0.98	82.7%	822
65. Knowledge of content and format of specifications.	0.2%	8.8%	33.9%	38.7%	18.4%	2.66	0.88	91.0%	822
66. Knowledge of principles of interior design and their influences on building design.	2.3%	16.3%	42.6%	31.3%	7.5%	2.25	0.90	81.4%	822
67. Knowledge of principles of landscape design and their influences on building design.	2.2%	24.2%	45.5%	24.0%	4.1%	2.04	0.86	73.6%	822
68. Knowledge of site design principles and practices.	0.2%	7.5%	32.4%	43.6%	16.3%	2.68	0.84	92.2%	822
69. Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.	0.6%	7.2%	23.7%	40.5%	28.0%	2.88	0.92	92.2%	822
70. Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.	2.1%	15.5%	36.7%	33.8%	11.9%	2.38	0.95	82.5%	822
71. Knowledge of relationship between constructability and aesthetics.	0.5%	3.4%	18.6%	44.4%	33.1%	3.06	0.83	96.1%	822
72. Knowledge of accepted standards for building materials and methods of construction, e.g., ASTM, ANSI.	1.8%	21.3%	37.7%	29.7%	9.5%	2.24	0.95	76.9%	822
73. Knowledge of methods to perform a life cycle cost analysis.	6.4%	37.8%	38.9%	12.8%	4.0%	1.70	0.91	55.7%	822
74. Knowledge of principles of value analysis and value engineering processes.	2.4%	20.7%	46.0%	25.1%	5.8%	2.11	0.88	76.9%	822
75. Knowledge of procedures and protocols of permit approval process.	0.6%	9.4%	34.3%	36.9%	18.9%	2.64	0.91	90.0%	822
76. Knowledge of principles of historic preservation.	5.7%	34.7%	36.9%	18.1%	4.6%	1.81	0.95	59.6%	822
77. Knowledge of processes and procedures for building commissioning.	7.3%	38.0%	38.9%	12.8%	3.0%	1.66	0.90	54.7%	822

Total N = number of respondents

CONTINUED

Data Table D6. Percentage Distribution of Knowledge/Skill Importance Ratings

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Knowledge/Skill Importance					MEAN IMP.	SD IMP.	PERCENT IMP.	TOTAL N
	0 OF LITTLE OR NO IMP.	1 SOMEWHAT IMP.	2 IMP.	3 VERY IMP.	4 CRITICALLY IMP.				
78. Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).	7.9%	40.8%	35.2%	13.3%	2.9%	1.63	0.91	51.3%	822
79. Knowledge of methods and tools for space planning.	1.7%	14.1%	37.2%	33.6%	13.4%	2.43	0.95	84.2%	822
80. Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.	2.8%	18.6%	40.4%	27.7%	10.5%	2.24	0.97	78.6%	822
81. Knowledge of factors that impact construction management services.	6.2%	29.3%	39.7%	20.2%	4.6%	1.88	0.96	64.5%	822
82. Knowledge of fee structures, their attributes and implications for schedule, scope and profit.	1.8%	12.0%	27.6%	33.8%	24.7%	2.68	1.03	86.1%	822
83. Knowledge of consultant agreements and fee structures.	2.1%	10.6%	31.0%	35.2%	21.2%	2.63	1.00	87.3%	822
84. Knowledge of different building and construction types and their implications for design and construction schedules.	0.4%	6.6%	28.7%	43.8%	20.6%	2.78	0.86	93.1%	822
85. Knowledge of scheduling methods to establish project timeframes based on standard sequences of architectural services in each phase.	2.3%	15.7%	36.0%	32.4%	13.6%	2.39	0.98	82.0%	822
86. Knowledge of business development strategies.	2.8%	17.3%	32.0%	25.5%	22.4%	2.47	1.10	79.9%	822
87. Knowledge of relationship between staffing capabilities and hours, and internal project budget to meet established milestones and profitability.	3.9%	13.9%	25.4%	31.8%	25.1%	2.60	1.12	82.2%	822
88. Knowledge of purposes and types of professional liability insurance related to architectural practice.	2.4%	12.7%	33.7%	31.9%	19.3%	2.53	1.02	84.9%	822
89. Knowledge of format and protocols for efficient meeting management and information distribution.	3.6%	19.2%	37.6%	30.0%	9.5%	2.23	0.98	77.1%	822
90. Knowledge of strategies to assess project progress and verify its alignment with project schedule.	2.3%	13.6%	40.6%	30.7%	12.8%	2.38	0.95	84.1%	822
91. Knowledge of ways to translate project goals into specific tasks and measureable design criteria.	2.6%	13.5%	36.5%	32.8%	14.6%	2.43	0.98	83.9%	822
92. Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.	1.1%	6.1%	26.2%	37.6%	29.1%	2.87	0.94	92.8%	822
93. Knowledge of formats and protocols to produce and distribute field reports to document construction progress.	2.9%	14.7%	39.9%	32.7%	9.7%	2.32	0.94	82.4%	822
94. Knowledge of site requirements for a specific building type and scope to determine client's site needs.	0.5%	9.0%	33.1%	38.8%	18.6%	2.66	0.90	90.5%	822
95. Knowledge of site analysis techniques to determine project parameters affecting design.	1.2%	8.4%	34.2%	38.0%	18.2%	2.64	0.92	90.4%	822
96. Knowledge of methods to prioritize or objectively evaluate design options based on project goals.	1.5%	6.4%	30.9%	40.0%	21.2%	2.73	0.92	92.1%	822
97. Knowledge of sustainability strategies and/or rating systems.	2.6%	18.7%	42.5%	28.2%	8.0%	2.20	0.92	78.7%	822
98. Knowledge of sustainability considerations related to building materials and construction processes.	1.3%	18.4%	39.9%	32.2%	8.2%	2.27	0.90	80.3%	822
99. Knowledge of techniques to integrate renewable energy systems into building design.	3.5%	25.5%	41.2%	24.1%	5.6%	2.03	0.93	70.9%	822
100. Knowledge of methods to identify scope changes that may require additional services.	0.9%	7.1%	28.8%	40.9%	22.4%	2.77	0.90	92.1%	822
101. Knowledge of procedures for processing requests for additional services.	1.1%	12.3%	34.8%	34.4%	17.4%	2.55	0.95	86.6%	822

Total N = number of respondents

CONTINUED

Data Table D6. Percentage Distribution of Knowledge/Skill Importance Ratings

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Knowledge/Skill Importance					MEAN IMP.	SD IMP.	PERCENT IMP.	TOTAL N
	0	1	2	3	4				
	OF LITTLE OR NO IMP.	SOMEWHAT IMP.	IMP.	VERY IMP.	CRITICALLY IMP.				
102. Knowledge of appropriate documentation level required for construction documents.	0.0%	1.0%	11.7%	36.6%	50.7%	3.37	0.73	99.0%	822
103. Knowledge of close-out document requirements and protocols.	1.6%	11.9%	37.2%	36.5%	12.8%	2.47	0.92	86.5%	822
104. Knowledge of construction document technologies and their standards and applications.	0.7%	7.7%	34.1%	37.8%	19.7%	2.68	0.90	91.6%	822
105. Knowledge of building information modeling (BIM) and its impact on planning, financial management and construction documentation.	10.5%	28.5%	34.8%	20.9%	5.4%	1.82	1.05	61.1%	822
106. Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.	1.2%	7.2%	28.2%	41.7%	21.7%	2.75	0.91	91.6%	822
107. Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.	2.6%	16.4%	39.1%	31.0%	10.9%	2.31	0.96	81.0%	822
108. Knowledge of techniques to integrate model contract forms and documents.	4.0%	20.4%	41.5%	24.8%	9.2%	2.15	0.98	75.5%	822
109. Knowledge of benefits and limitations of software for construction documentation.	2.8%	16.1%	38.3%	31.1%	11.7%	2.33	0.97	81.1%	822
110. Knowledge of methods for production of construction documentation and drawings.	0.1%	4.4%	22.6%	39.2%	33.7%	3.02	0.87	95.5%	822
111. Knowledge of standard methods for production of design development documentation.	0.5%	7.3%	33.3%	38.2%	20.7%	2.71	0.89	92.2%	822
112. Knowledge of standard methods for production of site plan documentation.	1.0%	13.9%	39.5%	32.6%	13.0%	2.43	0.92	85.2%	822
113. Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.	0.6%	10.3%	34.2%	35.3%	19.6%	2.63	0.93	89.1%	822
114. Knowledge of materials testing processes and protocols to be performed during the construction process.	2.2%	21.2%	42.0%	27.3%	7.4%	2.17	0.92	76.6%	822
115. Knowledge of building systems testing processes and protocols to be performed during the construction process.	1.7%	24.5%	43.3%	24.1%	6.4%	2.09	0.90	73.8%	822
116. Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	0.2%	6.7%	30.3%	40.9%	21.9%	2.77	0.87	93.1%	822
117. Knowledge of protocols for responding to Requests for Information (RFI).	1.3%	8.2%	32.1%	39.7%	18.7%	2.66	0.92	90.5%	822
118. Knowledge of roles, responsibilities and authorities of project team members during construction.	0.4%	5.1%	31.1%	38.4%	24.9%	2.82	0.88	94.5%	822
119. Knowledge of conflict resolution techniques and their applications throughout project.	1.5%	11.2%	35.5%	35.3%	16.5%	2.54	0.94	87.3%	822
120. Knowledge of bidding processes and protocols for different project delivery methods and their applications.	1.3%	11.9%	39.7%	35.4%	11.7%	2.44	0.89	86.7%	822
121. Knowledge of requirements for post-occupancy evaluation.	7.7%	34.7%	38.6%	16.3%	2.8%	1.72	0.92	57.7%	822
122. Knowledge of design decisions and their impact on constructability.	0.1%	2.2%	16.8%	43.1%	37.8%	3.16	0.79	97.7%	822
123. Knowledge of methods to manage human resources.	7.2%	25.5%	39.1%	21.4%	6.8%	1.95	1.01	67.3%	822
124. Knowledge of state board guidelines for licensing and professional practice.	2.7%	13.5%	30.4%	30.0%	23.4%	2.58	1.07	83.8%	822
125. Knowledge of principles of universal design.	6.9%	19.0%	33.5%	30.2%	10.5%	2.18	1.07	74.1%	822
126. Knowledge of purposes of and legal implications for different types of business entities.	6.6%	28.2%	37.7%	18.0%	9.5%	1.96	1.05	65.2%	822

Total N = number of respondents

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ARE C

Data Table D6. Percentage Distribution of Knowledge/Skill Importance Ratings

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Knowledge/Skill Importance					MEAN IMP.	SD IMP.	PERCENT IMP.	TOTAL N
	0	1	2	3	4				
	OF LITTLE OR NO IMP.	SOMEWHAT IMP.	IMP.	VERY IMP.	CRITICALLY IMP.				
127. Knowledge of innovative and evolving technologies and their impact on architectural practice.	1.2%	17.8%	43.2%	29.8%	8.0%	2.26	0.88	81.0%	822
128. Knowledge of ethical standards relevant to architectural practice.	0.6%	5.2%	22.9%	39.1%	32.2%	2.97	0.90	94.2%	822
129. Knowledge of methods to facilitate information management in building design and construction.	2.3%	20.9%	43.3%	26.2%	7.3%	2.15	0.91	76.8%	822
130. Knowledge of factors involved in conducting architectural practice in international markets.	38.2%	37.3%	16.7%	5.2%	2.6%	0.97	0.99	24.5%	822
131. Knowledge of methods and procedures for risk management.	3.5%	14.7%	34.8%	32.5%	14.5%	2.40	1.02	81.8%	822
132. Knowledge of financial planning methods to manage revenues, staffing, and overhead expenses.	3.4%	14.4%	32.4%	30.0%	19.8%	2.49	1.07	82.2%	822
MEAN	2.8%	14.5%	33.5%	32.2%	17.1%	2.46	0.92	82.7%	822
MIN	0.0%	0.7%	7.5%	5.2%	2.2%	0.97	0.67	24.5%	821
MAX	38.2%	40.8%	49.8%	45.7%	61.8%	3.53	1.19	99.3%	822

Total N = number of respondents

ARE C

Data Table D7. Percentage Distribution of Ratings for Level At Which Knowledge/Skills Were Used

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	DO NOT USE	Level at Which Used			PERCENT USED	TOTAL N
		UNDERSTAND	APPLY	EVALUATE		
1. Knowledge of oral, written, and visual presentation techniques to communicate project information.	0.5%	3.6%	45.3%	50.6%	99.5%	822
2. Knowledge of master plans and their impact on building design.	3.8%	18.2%	40.6%	37.3%	96.2%	822
3. Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.	1.6%	14.6%	45.4%	38.4%	98.4%	822
4. Knowledge of factors that affect selection of project consultants.	3.0%	16.1%	44.3%	36.6%	97.0%	822
5. Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.	2.9%	11.1%	53.8%	32.2%	97.1%	822
6. Knowledge of client and project characteristics that influence contract agreements.	2.8%	20.2%	41.6%	35.4%	97.2%	822
7. Knowledge of types of contracts and their designated use.	4.0%	22.7%	44.4%	28.8%	96.0%	822
8. Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.	5.1%	22.6%	47.1%	25.2%	94.9%	822
9. Knowledge of effects of specific findings from feasibility studies on building design.	5.8%	23.6%	43.2%	27.4%	94.2%	822
10. Knowledge of factors involved in selection of building systems and components.	1.2%	11.4%	43.7%	43.7%	98.8%	822
11. Knowledge of effect of environmental factors on site development.	1.9%	19.8%	45.3%	33.0%	98.1%	822
12. Knowledge of environmental policies and regulations and their implications for proposed construction.	3.4%	26.4%	40.8%	29.4%	96.6%	822
13. Knowledge of processes involved in conducting a survey of existing conditions.	1.6%	13.0%	47.9%	37.5%	98.4%	822
14. Knowledge of effects of specific findings from environmental impact studies on building design.	7.5%	29.2%	38.3%	24.9%	92.5%	822
15. Skill in designing facility layout and site plan that responds to site constraints.	2.1%	10.1%	41.1%	46.7%	97.9%	822
16. Knowledge of methods required to mitigate adverse site conditions.	3.9%	26.4%	42.0%	27.7%	96.1%	822
17. Knowledge of elements of and processes for conducting a site analysis.	2.8%	25.4%	43.9%	27.9%	97.2%	822
18. Knowledge of codes of professional conduct related to architectural practice.	1.1%	19.6%	49.1%	30.2%	98.9%	822
19. Knowledge of protocols and procedures for conducting a code analysis.	1.2%	9.7%	44.8%	44.3%	98.8%	822
20. Knowledge of building codes and their impact on building design.	0.6%	4.3%	39.1%	56.1%	99.4%	822
21. Knowledge of land use codes and ordinances that govern land use decisions.	2.7%	20.7%	41.5%	35.2%	97.3%	822
22. Skill in producing hand drawings of design ideas.	3.0%	14.8%	55.2%	26.9%	97.0%	822
23. Knowledge of standards for graphic symbols and units of measurement in technical drawings.	0.9%	10.1%	59.2%	29.8%	99.1%	822
24. Skill in producing two-dimensional (2-D) drawings using hand methods.	8.2%	21.9%	46.6%	23.4%	91.8%	822
25. Skill in using software to produce two-dimensional (2-D) drawings.	5.6%	12.8%	49.6%	32.0%	94.4%	822
26. Skill in using software to produce three-dimensional (3-D) models of building design.	14.4%	28.2%	35.3%	22.1%	85.6%	822
27. Skill in producing physical scale models.	23.5%	42.1%	23.8%	10.6%	76.5%	822
28. Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	27.4%	35.2%	24.1%	13.4%	72.6%	822
29. Knowledge of protocols and procedures for obtaining community input for proposed design.	10.3%	35.0%	34.2%	20.4%	89.7%	822
30. Knowledge of computer aided design and drafting software for producing two-dimensional (2-D) drawings.	6.4%	16.3%	45.6%	31.6%	93.6%	822
31. Knowledge of factors involved in selecting computer based design technologies.	10.1%	39.8%	29.4%	20.7%	89.9%	822
32. Knowledge of engineering properties of soils and their effect on building foundations and building design.	7.5%	34.8%	33.8%	23.8%	92.5%	822
33. Knowledge of factors to be considered in adaptive reuse of existing buildings.	3.6%	25.8%	41.2%	29.3%	96.4%	822
34. Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.	1.6%	12.5%	47.7%	38.2%	98.4%	822

Total N = number of respondents

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ARE C

Data Table D7. Percentage Distribution of Ratings for Level At Which Knowledge/Skills Were Used

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	DO NOT USE	Level at Which Used			PERCENT USED	TOTAL N
		UNDERSTAND	APPLY	EVALUATE		
35. Knowledge of effect of thermal envelope in design of building systems.	2.3%	14.7%	44.5%	38.4%	97.7%	822
36. Knowledge of principles of integrated project design.	10.0%	35.9%	35.9%	18.2%	90.0%	822
37. Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.	2.9%	26.3%	44.9%	25.9%	97.1%	822
38. Knowledge of engineering principles and their application to design and construction.	2.1%	21.7%	44.5%	31.8%	97.9%	822
39. Knowledge of properties of concrete products, materials, assemblies and their impact on building design and construction.	1.9%	23.7%	51.0%	23.4%	98.1%	822
40. Knowledge of properties of stone and masonry products, materials, assemblies and their impact on building design and construction.	1.3%	20.0%	52.4%	26.3%	98.7%	822
41. Knowledge of properties of metal products, materials, assemblies and their impact on building design and construction.	1.5%	18.4%	52.6%	27.6%	98.5%	822
42. Knowledge of properties of wood and wood products, materials, assemblies and their impact on building design and construction.	1.0%	15.8%	53.0%	30.2%	99.0%	822
43. Knowledge of properties of glass products, materials, assemblies and their impact on building design and construction.	1.2%	18.4%	52.3%	28.1%	98.8%	822
44. Knowledge of means and methods for building construction.	1.2%	18.2%	44.9%	35.6%	98.8%	822
45. Knowledge of benefits and limitations of “fast track” or other forms of construction delivery methods.	5.8%	38.2%	36.9%	19.1%	94.2%	822
46. Knowledge of methods and techniques for estimating construction costs.	7.3%	33.5%	36.6%	22.6%	92.7%	822
47. Knowledge of structural load and load conditions that affect building design.	4.1%	29.9%	39.4%	26.5%	95.9%	822
48. Knowledge of energy codes that impact construction.	3.8%	22.7%	44.6%	28.8%	96.2%	822
49. Knowledge of methods and strategies for evidence based design (EBD).	40.6%	38.2%	13.1%	8.0%	59.4%	822
50. Knowledge of impact of design on human behavior.	5.2%	30.2%	40.0%	24.6%	94.8%	822
51. Knowledge of functional requirements of heating, ventilation and air conditioning (HVAC) systems.	3.9%	26.6%	45.1%	24.3%	96.1%	822
52. Knowledge of functional requirements of plumbing systems.	3.8%	30.1%	45.2%	21.0%	96.2%	821
53. Knowledge of functional requirements of electrical systems.	4.1%	31.3%	45.4%	19.2%	95.9%	822
54. Knowledge of functional requirements of special systems.	7.1%	42.9%	33.2%	16.8%	92.9%	822
55. Knowledge of functional requirements of conveying systems.	9.7%	36.9%	36.9%	16.5%	90.3%	822
56. Knowledge of functional requirements of structural systems.	2.9%	18.6%	45.6%	32.8%	97.1%	822
57. Knowledge of functional requirements of roofing systems.	1.5%	10.8%	48.3%	39.4%	98.5%	822
58. Knowledge of functional requirements of fire suppression systems.	5.4%	35.2%	39.8%	19.7%	94.6%	822
59. Knowledge of functional requirements of communications systems.	8.6%	45.6%	31.5%	14.2%	91.4%	822
60. Knowledge of functional requirements of electronic safety and security systems.	9.4%	46.1%	30.5%	14.0%	90.6%	822
61. Knowledge of functional requirements of door and window systems.	1.0%	12.5%	50.1%	36.4%	99.0%	822
62. Knowledge of functional requirements for thermal and moisture control systems.	1.6%	10.2%	48.1%	40.1%	98.4%	822
63. Knowledge of hazardous materials mitigation at building site.	13.4%	46.7%	25.8%	14.1%	86.6%	822
64. Knowledge of principles of building operation and function.	3.3%	29.8%	40.8%	26.2%	96.7%	822
65. Knowledge of content and format of specifications.	2.1%	15.6%	54.3%	28.1%	97.9%	822
66. Knowledge of principles of interior design and their influences on building design.	3.3%	21.8%	49.3%	25.7%	96.7%	822
67. Knowledge of principles of landscape design and their influences on building design.	5.7%	34.9%	39.9%	19.5%	94.3%	822
68. Knowledge of site design principles and practices.	1.9%	17.6%	45.9%	34.5%	98.1%	822

Total N = number of respondents

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ARE C

Data Table D7. Percentage Distribution of Ratings for Level At Which Knowledge/Skills Were Used

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	DO NOT USE	Level at Which Used			PERCENT USED	TOTAL N
		UNDERSTAND	APPLY	EVALUATE		
69. Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.	2.6%	16.7%	42.7%	38.1%	97.4%	822
70. Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.	4.6%	27.7%	43.9%	23.7%	95.4%	822
71. Knowledge of relationship between constructability and aesthetics.	1.0%	10.3%	41.5%	47.2%	99.0%	822
72. Knowledge of accepted standards for building materials and methods of construction, e.g., ASTM, ANSI.	2.4%	30.2%	45.6%	21.8%	97.6%	822
73. Knowledge of methods to perform a life cycle cost analysis.	17.9%	49.8%	20.1%	12.3%	82.1%	822
74. Knowledge of principles of value analysis and value engineering processes.	6.0%	31.3%	40.3%	22.5%	94.0%	822
75. Knowledge of procedures and protocols of permit approval process.	2.2%	17.5%	51.2%	29.1%	97.8%	822
76. Knowledge of principles of historic preservation.	12.2%	40.1%	30.9%	16.8%	87.8%	822
77. Knowledge of processes and procedures for building commissioning.	19.7%	48.3%	24.6%	7.4%	80.3%	822
78. Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).	9.9%	42.5%	32.4%	15.3%	90.1%	822
79. Knowledge of methods and tools for space planning.	3.5%	22.9%	47.1%	26.5%	96.5%	822
80. Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.	5.7%	31.1%	39.5%	23.6%	94.3%	822
81. Knowledge of factors that impact construction management services.	8.2%	44.9%	30.5%	16.4%	91.8%	822
82. Knowledge of fee structures, their attributes and implications for schedule, scope and profit.	4.6%	25.5%	40.3%	29.6%	95.4%	822
83. Knowledge of consultant agreements and fee structures.	3.6%	24.5%	42.8%	29.1%	96.4%	822
84. Knowledge of different building and construction types and their implications for design and construction schedules.	1.5%	19.5%	45.0%	34.1%	98.5%	822
85. Knowledge of scheduling methods to establish project timeframes based on standard sequences of architectural services in each phase.	5.2%	27.5%	45.4%	21.9%	94.8%	822
86. Knowledge of business development strategies.	10.0%	35.2%	34.9%	20.0%	90.0%	822
87. Knowledge of relationship between staffing capabilities and hours, and internal project budget to meet established milestones and profitability.	8.6%	26.3%	40.6%	24.5%	91.4%	821
88. Knowledge of purposes and types of professional liability insurance related to architectural practice.	10.0%	37.0%	32.2%	20.8%	90.0%	822
89. Knowledge of format and protocols for efficient meeting management and information distribution.	3.0%	24.0%	54.6%	18.4%	97.0%	822
90. Knowledge of strategies to assess project progress and verify its alignment with project schedule.	3.8%	25.1%	50.9%	20.3%	96.2%	822
91. Knowledge of ways to translate project goals into specific tasks and measureable design criteria.	3.9%	23.2%	50.5%	22.4%	96.1%	822
92. Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.	1.2%	18.1%	52.1%	28.6%	98.8%	822
93. Knowledge of formats and protocols to produce and distribute field reports to document construction progress.	3.8%	20.4%	58.0%	17.8%	96.2%	822
94. Knowledge of site requirements for a specific building type and scope to determine client's site needs.	3.5%	22.5%	42.1%	31.9%	96.5%	822
95. Knowledge of site analysis techniques to determine project parameters affecting design.	3.5%	22.4%	43.4%	30.7%	96.5%	822
96. Knowledge of methods to prioritize or objectively evaluate design options based on project goals.	2.2%	17.0%	46.5%	34.3%	97.8%	822
97. Knowledge of sustainability strategies and/or rating systems.	6.1%	32.1%	39.5%	22.3%	93.9%	822
98. Knowledge of sustainability considerations related to building materials and construction processes.	3.5%	29.2%	42.5%	24.8%	96.5%	822
99. Knowledge of techniques to integrate renewable energy systems into building design.	8.3%	40.1%	33.5%	18.1%	91.7%	822
100. Knowledge of methods to identify scope changes that may require additional services.	1.2%	17.8%	49.6%	31.4%	98.8%	822

Total N = number of respondents

CONTINUED

ARE C

Data Table D7. Percentage Distribution of Ratings for Level At Which Knowledge/Skills Were Used

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	DO NOT USE	Level at Which Used			PERCENT USED	TOTAL N
		UNDERSTAND	APPLY	EVALUATE		
101. Knowledge of procedures for processing requests for additional services.	2.4%	23.0%	49.0%	25.5%	97.6%	822
102. Knowledge of appropriate documentation level required for construction documents.	0.9%	4.3%	48.2%	46.7%	99.1%	822
103. Knowledge of close-out document requirements and protocols.	3.4%	19.3%	57.7%	19.6%	96.6%	822
104. Knowledge of construction document technologies and their standards and applications.	1.1%	16.9%	54.9%	27.1%	98.9%	822
105. Knowledge of building information modeling (BIM) and its impact on planning, financial management and construction documentation.	27.1%	37.6%	24.0%	11.3%	72.9%	822
106. Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.	5.0%	17.0%	49.4%	28.6%	95.0%	822
107. Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.	5.0%	32.2%	44.2%	18.6%	95.0%	822
108. Knowledge of techniques to integrate model contract forms and documents.	9.7%	34.3%	39.4%	16.5%	90.3%	822
109. Knowledge of benefits and limitations of software for construction documentation.	5.5%	33.0%	39.9%	21.7%	94.5%	822
110. Knowledge of methods for production of construction documentation and drawings.	1.8%	12.2%	50.2%	35.8%	98.2%	822
111. Knowledge of standard methods for production of design development documentation.	1.8%	13.9%	55.0%	29.3%	98.2%	822
112. Knowledge of standard methods for production of site plan documentation.	4.3%	22.6%	49.8%	23.4%	95.7%	822
113. Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.	3.2%	22.5%	47.7%	26.6%	96.8%	822
115. Knowledge of building systems testing processes and protocols to be performed during the construction process.	5.4%	40.6%	38.9%	15.1%	94.6%	822
116. Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	1.5%	12.7%	58.0%	27.9%	98.5%	822
117. Knowledge of protocols for responding to Requests for Information (RFI).	2.8%	13.4%	57.7%	26.2%	97.2%	822
118. Knowledge of roles, responsibilities and authorities of project team members during construction.	1.3%	15.1%	54.7%	28.8%	98.7%	822
119. Knowledge of conflict resolution techniques and their applications throughout project.	2.4%	26.6%	49.3%	21.7%	97.6%	822
120. Knowledge of bidding processes and protocols for different project delivery methods and their applications.	3.4%	26.5%	49.6%	20.4%	96.6%	822
121. Knowledge of requirements for post-occupancy evaluation.	13.1%	47.0%	28.3%	11.6%	86.9%	822
122. Knowledge of design decisions and their impact on constructability.	0.9%	8.6%	42.9%	47.6%	99.1%	822
123. Knowledge of methods to manage human resources.	10.9%	39.5%	34.2%	15.3%	89.1%	822
124. Knowledge of state board guidelines for licensing and professional practice.	2.3%	33.0%	47.2%	17.5%	97.7%	822
125. Knowledge of principles of universal design.	10.2%	32.1%	38.3%	19.3%	89.8%	822
126. Knowledge of purposes of and legal implications for different types of business entities.	9.5%	51.6%	26.2%	12.8%	90.5%	822
127. Knowledge of innovative and evolving technologies and their impact on architectural practice.	2.3%	42.0%	34.4%	21.3%	97.7%	822
128. Knowledge of ethical standards relevant to architectural practice.	0.9%	19.7%	52.4%	27.0%	99.1%	822
129. Knowledge of methods to facilitate information management in building design and construction.	4.9%	36.9%	42.3%	15.9%	95.1%	822
130. Knowledge of factors involved in conducting architectural practice in international markets.	51.1%	32.4%	9.1%	7.4%	48.9%	822
131. Knowledge of methods and procedures for risk management.	6.2%	34.1%	39.1%	20.7%	93.8%	822
132. Knowledge of financial planning methods to manage revenues, staffing, and overhead expenses.	10.5%	34.5%	35.9%	19.1%	89.5%	822
MEAN	5.8%	25.7%	42.5%	26.0%	94.2%	822
MIN	0.5%	3.6%	9.1%	7.4%	48.9%	821
MAX	51.1%	51.6%	59.2%	56.1%	99.5%	822

Total N = number of respondents

ARE B

Data Table D8. Percentage Distribution of Ratings for When Knowledge/Skills Were Acquired

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	When Acquired				TOTAL N
	NOT ACQUIRED	BY COMPLETION OF ACCREDITED ARCH. DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	
1. Knowledge of oral, written, and visual presentation techniques to communicate project information.	0.2%	60.4%	26.5%	12.9%	1,008
2. Knowledge of master plans and their impact on building design.	1.9%	42.1%	35.3%	20.7%	1,008
3. Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.	1.8%	6.8%	43.6%	47.8%	1,008
4. Knowledge of factors that affect selection of project consultants.	2.6%	3.2%	48.9%	45.3%	1,008
5. Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.	1.8%	6.5%	48.5%	43.2%	1,008
6. Knowledge of client and project characteristics that influence contract agreements.	3.2%	5.9%	37.3%	53.7%	1,008
7. Knowledge of types of contracts and their designated use.	1.9%	23.1%	37.0%	38.0%	1,008
8. Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.	1.1%	27.7%	39.6%	31.6%	1,008
9. Knowledge of effects of specific findings from feasibility studies on building design.	5.5%	14.8%	47.1%	32.6%	1,008
10. Knowledge of factors involved in selection of building systems and components.	0.5%	41.2%	45.4%	12.9%	1,008
11. Knowledge of effect of environmental factors on site development.	1.4%	58.0%	26.1%	14.5%	1,008
12. Knowledge of environmental policies and regulations and their implications for proposed construction.	3.4%	13.2%	44.3%	39.1%	1,008
13. Knowledge of processes involved in conducting a survey of existing conditions.	1.1%	24.2%	60.5%	14.2%	1,008
14. Knowledge of effects of specific findings from environmental impact studies on building design.	7.6%	14.5%	38.9%	39.0%	1,008
15. Skill in designing facility layout and site plan that responds to site constraints.	0.0%	67.9%	25.2%	6.9%	1,008
16. Knowledge of methods required to mitigate adverse site conditions.	2.9%	26.9%	42.4%	27.9%	1,008
17. Knowledge of elements of and processes for conducting a site analysis.	1.4%	55.7%	30.2%	12.8%	1,008
18. Knowledge of codes of professional conduct related to architectural practice.	0.3%	40.0%	44.9%	14.8%	1,008
19. Knowledge of protocols and procedures for conducting a code analysis.	0.8%	15.9%	65.4%	18.0%	1,008
20. Knowledge of building codes and their impact on building design.	0.0%	26.4%	59.9%	13.7%	1,008
21. Knowledge of land use codes and ordinances that govern land use decisions.	1.9%	17.3%	56.0%	24.9%	1,008
22. Skill in producing hand drawings of design ideas.	2.2%	88.8%	8.1%	0.9%	1,008
23. Knowledge of standards for graphic symbols and units of measurement in technical drawings.	0.1%	68.9%	29.7%	1.3%	1,008
24. Skill in producing two-dimensional (2-D) drawings using hand methods.	0.8%	89.6%	8.9%	0.7%	1,008
25. Skill in using software to produce two-dimensional (2-D) drawings.	13.0%	33.5%	20.5%	32.9%	1,008
26. Skill in using software to produce three-dimensional (3-D) models of building design.	35.1%	23.1%	12.7%	29.1%	1,008
27. Skill in producing physical scale models.	2.8%	91.0%	5.7%	0.6%	1,008
28. Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	54.1%	4.4%	12.6%	29.0%	1,008
29. Knowledge of protocols and procedures for obtaining community input for proposed design.	10.1%	17.3%	38.0%	34.6%	1,008
30. Knowledge of computer aided design and drafting software for producing two-dimensional (2-D) drawings.	14.5%	28.3%	21.3%	35.9%	1,008
31. Knowledge of factors involved in selecting computer based design technologies.	20.6%	13.4%	22.8%	43.2%	1,008
32. Knowledge of engineering properties of soils and their effect on building foundations and building design.	3.4%	43.2%	35.4%	18.1%	1,008
33. Knowledge of factors to be considered in adaptive reuse of existing buildings.	4.4%	27.3%	41.5%	26.9%	1,008

Total N = number of respondents

CONTINUED

ARE B

Data Table D8. Percentage Distribution of Ratings for When Knowledge/Skills Were Acquired

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	When Acquired				TOTAL N
	NOT ACQUIRED	BY COMPLETION OF ACCREDITED ARCH. DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	
34. Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.	0.8%	49.0%	35.3%	14.9%	1,008
35. Knowledge of effect of thermal envelope in design of building systems.	1.6%	58.8%	24.0%	15.6%	1,008
36. Knowledge of principles of integrated project design.	12.0%	23.3%	26.2%	38.5%	1,008
37. Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.	4.7%	8.1%	34.2%	53.0%	1,008
38. Knowledge of engineering principles and their application to design and construction.	0.5%	71.8%	23.5%	4.2%	1,008
39. Knowledge of properties of concrete products, materials, assemblies and their impact on building design and construction.	1.2%	69.7%	23.3%	5.8%	1,008
40. Knowledge of properties of stone and masonry products, materials, assemblies and their impact on building design and construction.	1.2%	61.5%	30.0%	7.3%	1,008
41. Knowledge of properties of metal products, materials, assemblies and their impact on building design and construction.	1.2%	63.2%	28.4%	7.2%	1,008
42. Knowledge of properties of wood and wood products, materials, assemblies and their impact on building design and construction.	0.8%	68.5%	25.5%	5.3%	1,008
43. Knowledge of properties of glass products, materials, assemblies and their impact on building design and construction.	1.6%	51.2%	35.2%	12.0%	1,008
44. Knowledge of means and methods for building construction.	1.4%	45.0%	42.9%	10.7%	1,008
45. Knowledge of benefits and limitations of “fast track” or other forms of construction delivery methods.	2.7%	17.4%	44.5%	35.4%	1,008
46. Knowledge of methods and techniques for estimating construction costs.	5.4%	16.6%	45.9%	32.1%	1,008
47. Knowledge of structural load and load conditions that affect building design.	1.0%	81.2%	15.4%	2.5%	1,008
48. Knowledge of energy codes that impact construction.	2.8%	24.4%	39.8%	33.0%	1,008
49. Knowledge of methods and strategies for evidence based design (EBD).	51.8%	7.6%	12.6%	28.0%	1,008
50. Knowledge of impact of design on human behavior.	5.9%	68.6%	11.3%	14.3%	1,008
51. Knowledge of functional requirements of heating, ventilation and air conditioning (HVAC) systems.	0.8%	67.4%	26.0%	5.9%	1,008
52. Knowledge of functional requirements of plumbing systems.	1.5%	61.5%	30.3%	6.7%	1,008
53. Knowledge of functional requirements of electrical systems.	1.8%	57.9%	31.7%	8.5%	1,008
54. Knowledge of functional requirements of special systems.	6.0%	31.0%	42.8%	20.3%	1,008
55. Knowledge of functional requirements of conveying systems.	7.1%	30.5%	45.0%	17.4%	1,008
56. Knowledge of functional requirements of structural systems.	0.7%	76.6%	19.9%	2.8%	1,008
57. Knowledge of functional requirements of roofing systems.	0.8%	41.0%	47.2%	11.0%	1,008
58. Knowledge of functional requirements of fire suppression systems.	1.8%	26.8%	51.0%	20.4%	1,008
59. Knowledge of functional requirements of communications systems.	6.1%	16.8%	48.4%	28.8%	1,008
60. Knowledge of functional requirements of electronic safety and security systems.	8.6%	11.5%	43.2%	36.7%	1,008
61. Knowledge of functional requirements of door and window systems.	0.4%	39.4%	50.0%	10.2%	1,008
62. Knowledge of functional requirements for thermal and moisture control systems.	0.9%	44.2%	41.6%	13.3%	1,008
63. Knowledge of hazardous materials mitigation at building site.	11.0%	6.3%	37.3%	45.3%	1,008
64. Knowledge of principles of building operation and function.	4.1%	36.0%	34.1%	25.8%	1,008
65. Knowledge of content and format of specifications.	1.0%	25.7%	58.4%	14.9%	1,008

Total N = number of respondents

CONTINUED

ARE B

Data Table D8. Percentage Distribution of Ratings for When Knowledge/Skills Were Acquired

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	When Acquired				TOTAL N
	NOT ACQUIRED	BY COMPLETION OF ACCREDITED ARCH. DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	
66. Knowledge of principles of interior design and their influences on building design.	5.1%	49.7%	30.9%	14.4%	1,008
67. Knowledge of principles of landscape design and their influences on building design.	4.7%	55.3%	26.0%	14.1%	1,008
68. Knowledge of site design principles and practices.	0.7%	75.9%	19.3%	4.1%	1,008
69. Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.	1.7%	56.4%	30.0%	11.9%	1,008
70. Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.	3.4%	8.8%	51.0%	36.7%	1,007
71. Knowledge of relationship between constructability and aesthetics.	1.2%	40.7%	39.6%	18.6%	1,008
72. Knowledge of accepted standards for building materials and methods of construction, e.g., ASTM, ANSI.	1.6%	25.4%	50.2%	22.8%	1,008
73. Knowledge of methods to perform a life cycle cost analysis.	21.1%	12.2%	25.6%	41.1%	1,008
74. Knowledge of principles of value analysis and value engineering processes.	6.2%	7.2%	43.5%	43.2%	1,008
75. Knowledge of procedures and protocols of permit approval process.	0.8%	4.6%	68.9%	25.7%	1,008
76. Knowledge of principles of historic preservation.	13.0%	31.8%	28.1%	27.1%	1,008
77. Knowledge of processes and procedures for building commissioning.	20.1%	3.8%	25.8%	50.3%	1,008
78. Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).	10.8%	13.5%	44.1%	31.5%	1,008
79. Knowledge of methods and tools for space planning.	1.7%	57.7%	28.8%	11.8%	1,008
80. Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.	3.2%	15.3%	43.0%	38.6%	1,008
81. Knowledge of factors that impact construction management services.	7.7%	8.1%	35.7%	48.4%	1,008
82. Knowledge of fee structures, their attributes and implications for schedule, scope and profit.	5.3%	7.5%	36.1%	51.1%	1,008
83. Knowledge of consultant agreements and fee structures.	4.1%	7.0%	39.1%	49.8%	1,008
84. Knowledge of different building and construction types and their implications for design and construction schedules.	2.0%	29.7%	44.6%	23.7%	1,008
85. Knowledge of scheduling methods to establish project timeframes based on standard sequences of architectural services in each phase.	5.1%	7.1%	49.5%	38.3%	1,008
86. Knowledge of business development strategies.	12.2%	3.9%	24.0%	59.9%	1,008
87. Knowledge of relationship between staffing capabilities and hours, and internal project budget to meet established milestones and profitability.	9.4%	1.8%	29.1%	59.7%	1,008
88. Knowledge of purposes and types of professional liability insurance related to architectural practice.	8.4%	9.2%	24.3%	58.0%	1,008
89. Knowledge of format and protocols for efficient meeting management and information distribution.	5.6%	3.9%	46.4%	44.1%	1,008
90. Knowledge of strategies to assess project progress and verify its alignment with project schedule.	4.9%	2.6%	44.0%	48.5%	1,008
91. Knowledge of ways to translate project goals into specific tasks and measureable design criteria.	6.9%	12.3%	39.5%	41.3%	1,008
92. Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.	3.7%	7.0%	41.5%	47.8%	1,008
93. Knowledge of formats and protocols to produce and distribute field reports to document construction progress.	2.6%	3.4%	65.3%	28.8%	1,008
94. Knowledge of site requirements for a specific building type and scope to determine client's site needs.	2.4%	27.4%	48.0%	22.2%	1,008
95. Knowledge of site analysis techniques to determine project parameters affecting design.	2.3%	52.1%	31.5%	14.1%	1,008

Total N = number of respondents

CONTINUED

Data Table D8. Percentage Distribution of Ratings for When Knowledge/Skills Were Acquired

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	When Acquired				TOTAL N
	NOT ACQUIRED	BY COMPLETION OF ACCREDITED ARCH. DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	
96. Knowledge of methods to prioritize or objectively evaluate design options based on project goals.	3.2%	35.9%	39.3%	21.6%	1,008
97. Knowledge of sustainability strategies and/or rating systems.	10.9%	16.1%	20.8%	52.2%	1,008
98. Knowledge of sustainability considerations related to building materials and construction processes.	7.0%	19.2%	22.5%	51.2%	1,008
99. Knowledge of techniques to integrate renewable energy systems into building design.	9.2%	22.2%	18.8%	49.7%	1,008
100. Knowledge of methods to identify scope changes that may require additional services.	1.4%	3.0%	45.2%	50.4%	1,008
101. Knowledge of procedures for processing requests for additional services.	4.0%	2.3%	40.1%	53.7%	1,008
102. Knowledge of appropriate documentation level required for construction documents.	0.3%	9.8%	71.9%	18.0%	1,008
103. Knowledge of close-out document requirements and protocols.	5.1%	3.7%	53.0%	38.3%	1,008
104. Knowledge of construction document technologies and their standards and applications.	2.9%	14.6%	62.2%	20.3%	1,008
105. Knowledge of building information modeling (BIM) and its impact on planning, financial management and construction documentation.	42.4%	3.1%	12.2%	42.4%	1,008
106. Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.	11.2%	23.0%	24.6%	41.2%	1,008
107. Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.	1.7%	31.9%	43.7%	22.7%	1,008
108. Knowledge of techniques to integrate model contract forms and documents.	10.4%	11.6%	38.6%	39.4%	1,008
109. Knowledge of benefits and limitations of software for construction documentation.	11.1%	6.6%	36.3%	45.9%	1,008
110. Knowledge of methods for production of construction documentation and drawings.	0.5%	23.7%	65.0%	10.8%	1,008
111. Knowledge of standard methods for production of design development documentation.	0.3%	26.2%	64.0%	9.5%	1,008
112. Knowledge of standard methods for production of site plan documentation.	1.4%	27.6%	61.0%	10.0%	1,008
113. Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.	2.3%	2.5%	50.6%	44.6%	1,008
114. Knowledge of materials testing processes and protocols to be performed during the construction process.	4.3%	13.3%	52.0%	30.5%	1,008
115. Knowledge of building systems testing processes and protocols to be performed during the construction process.	5.9%	8.5%	50.6%	35.0%	1,008
116. Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	0.5%	3.1%	79.5%	17.0%	1,008
117. Knowledge of protocols for responding to Requests for Information (RFI).	2.0%	2.7%	69.1%	26.2%	1,008
118. Knowledge of roles, responsibilities and authorities of project team members during construction.	0.8%	9.5%	68.5%	21.2%	1,008
119. Knowledge of conflict resolution techniques and their applications throughout project.	5.8%	6.2%	40.0%	48.1%	1,008
120. Knowledge of bidding processes and protocols for different project delivery methods and their applications.	1.8%	8.9%	60.5%	28.8%	1,008
121. Knowledge of requirements for post-occupancy evaluation.	15.7%	6.4%	32.8%	45.0%	1,008
122. Knowledge of design decisions and their impact on constructability.	0.2%	33.5%	50.9%	15.4%	1,008
123. Knowledge of methods to manage human resources.	14.7%	3.5%	27.0%	54.9%	1,008
124. Knowledge of state board guidelines for licensing and professional practice.	0.4%	21.9%	66.3%	11.4%	1,008
125. Knowledge of principles of universal design.	17.2%	34.2%	22.9%	25.7%	1,008
126. Knowledge of purposes of and legal implications for different types of business entities.	11.9%	13.9%	20.9%	53.3%	1,008

Total N = number of respondents

CONTINUED

ARE B

Data Table D8. Percentage Distribution of Ratings for When Knowledge/Skills Were Acquired

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	When Acquired				TOTAL N
	NOT ACQUIRED	BY COMPLETION OF ACCREDITED ARCH. DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	
127. Knowledge of innovative and evolving technologies and their impact on architectural practice.	3.2%	19.7%	31.9%	45.1%	1,008
128. Knowledge of ethical standards relevant to architectural practice.	0.6%	47.9%	37.8%	13.7%	1,008
129. Knowledge of methods to facilitate information management in building design and construction.	10.1%	8.3%	45.4%	36.1%	1,008
130. Knowledge of factors involved in conducting architectural practice in international markets.	57.4%	1.3%	9.4%	31.8%	1,008
131. Knowledge of methods and procedures for risk management.	14.0%	5.6%	27.2%	53.3%	1,008
132. Knowledge of financial planning methods to manage revenues, staffing, and overhead expenses.	16.6%	2.5%	17.7%	63.3%	1,008
MEAN	6.3%	27.7%	37.9%	28.1%	1,008
MIN	0.0%	1.3%	5.7%	0.6%	1,007
MAX	57.4%	91.0%	79.5%	63.3%	1,008

Total N = number of respondents

Data Table D9. Percentage Distribution of Ratings for When Knowledge/Skills Should be Acquired

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	When Should Be Acquired				TOTAL N
	NOT RELEVANT	BY COMPLETION OF ACCREDITED ARCH. DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	
1. Knowledge of oral, written, and visual presentation techniques to communicate project information.	0.8%	70.5%	25.6%	3.1%	1,008
2. Knowledge of master plans and their impact on building design.	1.1%	60.5%	32.8%	5.6%	1,008
3. Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.	0.5%	23.9%	58.5%	17.1%	1,008
4. Knowledge of factors that affect selection of project consultants.	0.8%	11.8%	64.0%	23.4%	1,008
5. Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.	0.6%	13.2%	60.8%	25.4%	1,008
6. Knowledge of client and project characteristics that influence contract agreements.	0.9%	14.5%	54.1%	30.6%	1,008
7. Knowledge of types of contracts and their designated use.	0.4%	37.7%	44.9%	17.0%	1,008
8. Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.	0.3%	39.9%	44.5%	15.3%	1,008
9. Knowledge of effects of specific findings from feasibility studies on building design.	2.3%	28.2%	53.7%	15.9%	1,008
10. Knowledge of factors involved in selection of building systems and components.	0.3%	58.0%	36.4%	5.3%	1,008
11. Knowledge of effect of environmental factors on site development.	0.4%	73.8%	21.7%	4.1%	1,008
12. Knowledge of environmental policies and regulations and their implications for proposed construction.	0.8%	31.9%	52.5%	14.8%	1,008
13. Knowledge of processes involved in conducting a survey of existing conditions.	0.8%	35.5%	58.4%	5.3%	1,008
14. Knowledge of effects of specific findings from environmental impact studies on building design.	2.1%	31.1%	49.7%	17.2%	1,008
15. Skill in designing facility layout and site plan that responds to site constraints.	0.2%	77.5%	19.3%	3.0%	1,008
16. Knowledge of methods required to mitigate adverse site conditions.	0.8%	41.7%	42.9%	14.7%	1,008
17. Knowledge of elements of and processes for conducting a site analysis.	0.5%	68.3%	26.4%	4.9%	1,008
18. Knowledge of codes of professional conduct related to architectural practice.	0.1%	56.7%	38.7%	4.5%	1,008
19. Knowledge of protocols and procedures for conducting a code analysis.	0.3%	42.8%	52.3%	4.7%	1,008
20. Knowledge of building codes and their impact on building design.	0.1%	55.5%	41.1%	3.4%	1,008
21. Knowledge of land use codes and ordinances that govern land use decisions.	0.6%	39.6%	48.8%	11.0%	1,008
22. Skill in producing hand drawings of design ideas.	3.2%	92.7%	3.8%	0.4%	1,008
23. Knowledge of standards for graphic symbols and units of measurement in technical drawings.	0.2%	81.2%	18.4%	0.3%	1,008
24. Skill in producing two-dimensional (2-D) drawings using hand methods.	7.2%	88.3%	4.3%	0.2%	1,008
25. Skill in using software to produce two-dimensional (2-D) drawings.	2.4%	85.6%	10.0%	2.0%	1,008
26. Skill in using software to produce three-dimensional (3-D) models of building design.	2.9%	82.2%	11.9%	3.0%	1,008
27. Skill in producing physical scale models.	7.2%	89.0%	3.8%	0.0%	1,008
28. Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	6.4%	44.2%	41.6%	7.7%	1,008
29. Knowledge of protocols and procedures for obtaining community input for proposed design.	2.3%	25.0%	54.8%	18.0%	1,008
30. Knowledge of computer aided design and drafting software for producing two-dimensional (2-D) drawings.	1.4%	86.6%	10.8%	1.2%	1,008
31. Knowledge of factors involved in selecting computer based design technologies.	7.0%	45.7%	33.9%	13.3%	1,008
32. Knowledge of engineering properties of soils and their effect on building foundations and building design.	2.0%	59.3%	32.2%	6.4%	1,008

Total N = number of respondents

CONTINUED

Data Table D9. Percentage Distribution of Ratings for When Knowledge/Skills Should be Acquired

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	When Should Be Acquired				TOTAL N
	NOT RELEVANT	BY COMPLETION OF ACCREDITED ARCH. DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	
33. Knowledge of factors to be considered in adaptive reuse of existing buildings.	1.1%	48.4%	40.2%	10.3%	1,008
34. Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.	0.2%	70.0%	26.3%	3.5%	1,008
35. Knowledge of effect of thermal envelope in design of building systems.	0.2%	80.3%	16.8%	2.8%	1,008
36. Knowledge of principles of integrated project design.	2.8%	47.7%	38.7%	10.8%	1,008
37. Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.	1.3%	18.8%	52.9%	27.0%	1,008
38. Knowledge of engineering principles and their application to design and construction.	0.2%	81.8%	16.0%	2.0%	1,008
39. Knowledge of properties of concrete products, materials, assemblies and their impact on building design and construction.	0.3%	77.6%	19.6%	2.5%	1,008
40. Knowledge of properties of stone and masonry products, materials, assemblies and their impact on building design and construction.	0.3%	74.9%	21.8%	3.0%	1,008
41. Knowledge of properties of metal products, materials, assemblies and their impact on building design and construction.	0.3%	75.7%	21.4%	2.6%	1,008
42. Knowledge of properties of wood and wood products, materials, assemblies and their impact on building design and construction.	0.2%	77.5%	20.3%	2.0%	1,008
43. Knowledge of properties of glass products, materials, assemblies and their impact on building design and construction.	0.1%	72.8%	24.0%	3.1%	1,008
44. Knowledge of means and methods for building construction.	1.2%	57.3%	36.4%	5.1%	1,008
45. Knowledge of benefits and limitations of “fast track” or other forms of construction delivery methods.	1.6%	32.2%	50.3%	15.9%	1,008
46. Knowledge of methods and techniques for estimating construction costs.	1.7%	36.8%	48.2%	13.3%	1,008
47. Knowledge of structural load and load conditions that affect building design.	1.1%	85.5%	11.6%	1.8%	1,008
48. Knowledge of energy codes that impact construction.	0.5%	59.8%	35.7%	4.0%	1,008
49. Knowledge of methods and strategies for evidence based design (EBD).	20.0%	32.7%	33.6%	13.6%	1,008
50. Knowledge of impact of design on human behavior.	2.6%	83.6%	9.0%	4.8%	1,008
51. Knowledge of functional requirements of heating, ventilation and air conditioning (HVAC) systems.	0.4%	79.2%	18.3%	2.2%	1,008
52. Knowledge of functional requirements of plumbing systems.	1.0%	74.9%	21.5%	2.6%	1,008
53. Knowledge of functional requirements of electrical systems.	1.1%	73.1%	22.8%	3.0%	1,008
54. Knowledge of functional requirements of special systems.	3.8%	46.9%	39.4%	9.9%	1,008
55. Knowledge of functional requirements of conveying systems.	3.6%	47.2%	39.3%	9.9%	1,008
56. Knowledge of functional requirements of structural systems.	0.8%	83.3%	14.3%	1.6%	1,008
57. Knowledge of functional requirements of roofing systems.	0.2%	62.5%	33.8%	3.5%	1,008
58. Knowledge of functional requirements of fire suppression systems.	0.8%	51.0%	42.4%	5.9%	1,008
59. Knowledge of functional requirements of communications systems.	4.2%	38.0%	47.2%	10.6%	1,008
60. Knowledge of functional requirements of electronic safety and security systems.	4.7%	30.0%	50.1%	15.3%	1,008
61. Knowledge of functional requirements of door and window systems.	0.2%	55.6%	40.5%	3.8%	1,008
62. Knowledge of functional requirements for thermal and moisture control systems.	0.2%	65.2%	31.6%	3.0%	1,008
63. Knowledge of hazardous materials mitigation at building site.	5.6%	23.9%	50.8%	19.7%	1,008

Total N = number of respondents

CONTINUED

ARE B

Data Table D9. Percentage Distribution of Ratings for When Knowledge/Skills Should be Acquired

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	When Should Be Acquired				TOTAL N
	NOT RELEVANT	BY COMPLETION OF ACCREDITED ARCH. DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	
64. Knowledge of principles of building operation and function.	2.7%	50.5%	34.5%	12.3%	1,008
65. Knowledge of content and format of specifications.	0.5%	48.8%	45.9%	4.8%	1,008
66. Knowledge of principles of interior design and their influences on building design.	2.9%	70.0%	22.4%	4.7%	1,008
67. Knowledge of principles of landscape design and their influences on building design.	2.3%	74.3%	18.8%	4.6%	1,008
68. Knowledge of site design principles and practices.	0.2%	87.7%	11.0%	1.1%	1,008
69. Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.	0.7%	72.0%	23.3%	4.0%	1,008
70. Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.	1.3%	21.6%	58.5%	18.6%	1,008
71. Knowledge of relationship between constructability and aesthetics.	0.8%	64.1%	29.0%	6.2%	1,008
72. Knowledge of accepted standards for building materials and methods of construction, e.g., ASTM, ANSI.	0.8%	43.6%	46.7%	8.9%	1,008
73. Knowledge of methods to perform a life cycle cost analysis.	4.2%	34.1%	40.5%	21.2%	1,008
74. Knowledge of principles of value analysis and value engineering processes.	2.7%	24.0%	52.6%	20.7%	1,008
75. Knowledge of procedures and protocols of permit approval process.	0.3%	13.4%	74.7%	11.6%	1,008
76. Knowledge of principles of historic preservation.	5.1%	51.7%	30.7%	12.6%	1,008
77. Knowledge of processes and procedures for building commissioning.	6.2%	18.4%	51.0%	24.5%	1,008
78. Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).	8.4%	24.6%	50.2%	16.8%	1,008
79. Knowledge of methods and tools for space planning.	1.2%	74.8%	21.1%	2.9%	1,008
80. Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.	1.4%	34.2%	48.8%	15.6%	1,008
81. Knowledge of factors that impact construction management services.	3.0%	21.3%	50.8%	24.9%	1,008
82. Knowledge of fee structures, their attributes and implications for schedule, scope and profit.	0.7%	22.1%	51.3%	25.9%	1,008
83. Knowledge of consultant agreements and fee structures.	0.7%	18.6%	52.8%	28.0%	1,008
84. Knowledge of different building and construction types and their implications for design and construction schedules.	0.2%	47.5%	40.1%	12.2%	1,008
85. Knowledge of scheduling methods to establish project timeframes based on standard sequences of architectural services in each phase.	1.1%	19.6%	58.3%	20.9%	1,008
86. Knowledge of business development strategies.	2.4%	24.0%	37.1%	36.5%	1,008
87. Knowledge of relationship between staffing capabilities and hours, and internal project budget to meet established milestones and profitability.	2.1%	12.6%	45.8%	39.5%	1,008
88. Knowledge of purposes and types of professional liability insurance related to architectural practice.	1.3%	24.1%	39.7%	34.9%	1,008
89. Knowledge of format and protocols for efficient meeting management and information distribution.	2.6%	16.5%	60.0%	20.9%	1,008
90. Knowledge of strategies to assess project progress and verify its alignment with project schedule.	1.1%	11.1%	63.8%	24.0%	1,008
91. Knowledge of ways to translate project goals into specific tasks and measureable design criteria.	2.0%	21.9%	54.2%	21.9%	1,008
92. Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.	0.6%	20.4%	55.5%	23.5%	1,008
93. Knowledge of formats and protocols to produce and distribute field reports to document construction progress.	1.1%	11.7%	75.6%	11.6%	1,008

Total N = number of respondents

CONTINUED

Data Table D9. Percentage Distribution of Ratings for When Knowledge/Skills Should be Acquired

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	When Should Be Acquired				TOTAL N
	NOT RELEVANT	BY COMPLETION OF ACCREDITED ARCH. DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	
94. Knowledge of site requirements for a specific building type and scope to determine client's site needs.	0.7%	39.2%	47.3%	12.8%	1,008
95. Knowledge of site analysis techniques to determine project parameters affecting design.	0.4%	64.2%	28.4%	7.0%	1,008
96. Knowledge of methods to prioritize or objectively evaluate design options based on project goals.	0.8%	51.0%	37.4%	10.8%	1,008
97. Knowledge of sustainability strategies and/or rating systems.	3.3%	57.6%	31.0%	8.1%	1,008
98. Knowledge of sustainability considerations related to building materials and construction processes.	2.2%	60.2%	30.3%	7.3%	1,008
99. Knowledge of techniques to integrate renewable energy systems into building design.	2.4%	64.3%	25.1%	8.2%	1,008
100. Knowledge of methods to identify scope changes that may require additional services.	0.4%	10.0%	66.8%	22.8%	1,008
101. Knowledge of procedures for processing requests for additional services.	0.7%	9.6%	60.4%	29.3%	1,008
102. Knowledge of appropriate documentation level required for construction documents.	0.2%	23.7%	70.2%	5.9%	1,008
103. Knowledge of close-out document requirements and protocols.	0.9%	12.3%	70.2%	16.6%	1,008
104. Knowledge of construction document technologies and their standards and applications.	1.4%	31.0%	60.8%	6.8%	1,008
105. Knowledge of building information modeling (BIM) and its impact on planning, financial management and construction documentation.	6.3%	34.6%	44.4%	14.7%	1,008
106. Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.	2.0%	80.2%	16.1%	1.8%	1,008
107. Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.	1.8%	43.7%	45.7%	8.8%	1,008
108. Knowledge of techniques to integrate model contract forms and documents.	2.9%	22.4%	52.8%	21.9%	1,008
109. Knowledge of benefits and limitations of software for construction documentation.	2.2%	32.8%	54.6%	10.4%	1,008
110. Knowledge of methods for production of construction documentation and drawings.	0.4%	44.0%	53.1%	2.5%	1,008
111. Knowledge of standard methods for production of design development documentation.	0.7%	43.4%	53.9%	2.1%	1,008
112. Knowledge of standard methods for production of site plan documentation.	1.0%	44.6%	51.7%	2.7%	1,008
113. Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.	0.5%	9.1%	66.6%	23.8%	1,008
114. Knowledge of materials testing processes and protocols to be performed during the construction process.	0.9%	22.1%	59.8%	17.2%	1,008
115. Knowledge of building systems testing processes and protocols to be performed during the construction process.	1.7%	18.8%	61.0%	18.6%	1,008
116. Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	0.2%	11.7%	81.5%	6.5%	1,008
117. Knowledge of protocols for responding to Requests for Information (RFI).	0.6%	10.7%	79.7%	9.0%	1,008
118. Knowledge of roles, responsibilities and authorities of project team members during construction.	0.2%	23.6%	68.0%	8.2%	1,008
119. Knowledge of conflict resolution techniques and their applications throughout project.	1.5%	18.7%	54.3%	25.6%	1,008
120. Knowledge of bidding processes and protocols for different project delivery methods and their applications.	0.8%	22.7%	63.7%	12.8%	1,008
121. Knowledge of requirements for post-occupancy evaluation.	4.9%	15.2%	56.3%	23.6%	1,008
122. Knowledge of design decisions and their impact on constructability.	0.3%	55.5%	39.1%	5.2%	1,008
123. Knowledge of methods to manage human resources.	6.1%	10.9%	41.3%	41.8%	1,008
124. Knowledge of state board guidelines for licensing and professional practice.	0.3%	37.6%	56.5%	5.6%	1,008

Total N = number of respondents

CONTINUED

ARE B

Data Table D9. Percentage Distribution of Ratings for When Knowledge/Skills Should be Acquired

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	When Should Be Acquired				TOTAL N
	NOT RELEVANT	BY COMPLETION OF ACCREDITED ARCH. DEGREE PROGRAM	DURING INTERNSHIP	AFTER LICENSURE	
125. Knowledge of principles of universal design.	9.2%	65.1%	19.7%	6.0%	1,008
126. Knowledge of purposes of and legal implications for different types of business entities.	6.0%	28.4%	30.5%	35.2%	1,008
127. Knowledge of innovative and evolving technologies and their impact on architectural practice.	1.6%	36.7%	36.7%	25.0%	1,008
128. Knowledge of ethical standards relevant to architectural practice.	0.4%	67.3%	28.4%	4.0%	1,008
129. Knowledge of methods to facilitate information management in building design and construction.	3.7%	26.0%	57.1%	13.2%	1,008
130. Knowledge of factors involved in conducting architectural practice in international markets.	19.3%	10.6%	21.9%	48.1%	1,008
131. Knowledge of methods and procedures for risk management.	3.8%	19.3%	45.3%	31.5%	1,008
132. Knowledge of financial planning methods to manage revenues, staffing, and overhead expenses.	3.0%	15.7%	32.2%	49.1%	1,008
MEAN	2.1%	44.8%	40.7%	12.4%	1,008
MIN	0.1%	9.1%	3.8%	0.0%	1,008
MAX	20.0%	92.7%	81.5%	49.1%	1,008

Total N = number of respondents

ARE C

Data Table D10. Percentage Distribution of Ratings for Reason(s) a Knowledge/Skill Was Not Used

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used						N – TOTAL REASONS NOT USED[1] OTHER	N – INDIVIDUALS NOT USED[2]
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER		
1. Knowledge of oral, written, and visual presentation techniques to communicate project information.	0	0	0	0	0	5	5	4
2. Knowledge of master plans and their impact on building design.	20	0	0	2	3	7	32	31
3. Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.	3	0	0	0	5	5	13	13
4. Knowledge of factors that affect selection of project consultants.	7	1	1	0	8	12	29	25
5. Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.	18	0	0	1	2	5	26	24
6. Knowledge of client and project characteristics that influence contract agreements.	3	0	0	0	11	11	25	23
7. Knowledge of types of contracts and their designated use.	10	0	0	1	7	16	34	33
8. Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.	18	0	0	0	6	18	42	42
9. Knowledge of effects of specific findings from feasibility studies on building design.	33	0	0	6	8	4	51	48
10. Knowledge of factors involved in selection of building systems and components.	4	0	0	2	0	4	10	10
11. Knowledge of effect of environmental factors on site development.	8	0	0	2	1	5	16	16
12. Knowledge of environmental policies and regulations and their implications for proposed construction.	11	0	0	9	3	7	30	28
13. Knowledge of processes involved in conducting a survey of existing conditions.	5	0	0	4	1	3	13	13
14. Knowledge of effects of specific findings from environmental impact studies on building design.	39	0	2	12	6	6	65	62
15. Skill in designing facility layout and site plan that responds to site constraints.	13	0	0	1	0	3	17	17
16. Knowledge of methods required to mitigate adverse site conditions.	14	0	2	10	7	2	35	32
17. Knowledge of elements of and processes for conducting a site analysis.	9	0	0	11	2	3	25	23
18. Knowledge of codes of professional conduct related to architectural practice.	4	0	0	0	1	5	10	9
19. Knowledge of protocols and procedures for conducting a code analysis.	4	0	0	3	1	3	11	10

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[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

ARE C

Data Table D10. Percentage Distribution of Ratings for Reason(s) a Knowledge/Skill Was Not Used

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used						N – TOTAL REASONS NOT USED[1] OTHER	N – INDIVIDUALS NOT USED[2]
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER		
20. Knowledge of building codes and their impact on building design.	2	0	0	1	0	2	5	5
21. Knowledge of land use codes and ordinances that govern land use decisions.	13	0	0	4	3	4	24	22
22. Skill in producing hand drawings of design ideas.	15	0	0	4	3	7	29	25
23. Knowledge of standards for graphic symbols and units of measurement in technical drawings.	4	0	0	2	0	3	9	7
24. Skill in producing two-dimensional (2-D) drawings using hand methods.	50	0	0	4	2	15	71	67
25. Skill in using software to produce two-dimensional (2-D) drawings.	19	0	0	8	13	12	52	46
26. Skill in using software to produce three-dimensional (3-D) models of building design.	49	0	0	14	60	20	143	118
27. Skill in producing physical scale models.	145	0	1	31	10	30	217	193
28. Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	150	0	2	9	87	27	275	225
29. Knowledge of protocols and procedures for obtaining community input for proposed design.	59	1	1	6	9	15	91	85
30. Knowledge of computer aided design and drafting software for producing two-dimensional (2-D) drawings.	24	0	0	12	13	9	58	53
31. Knowledge of factors involved in selecting computer based design technologies.	36	0	0	12	23	22	93	83
32. Knowledge of engineering properties of soils and their effect on building foundations and building design.	12	0	3	48	1	4	68	62
33. Knowledge of factors to be considered in adaptive reuse of existing buildings.	22	0	0	2	3	3	30	30
34. Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.	5	0	0	6	0	2	13	13
35. Knowledge of effect of thermal envelope in design of building systems.	8	0	0	7	2	3	20	19
36. Knowledge of principles of integrated project design.	56	0	0	3	17	14	90	82
37. Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.	12	0	1	4	6	4	27	24
38. Knowledge of engineering principles and their application to design and construction.	4	0	0	12	0	2	18	17
39. Knowledge of properties of concrete products, materials, assemblies and their impact on building design and construction.	5	0	0	10	0	2	17	16

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[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

ARE C

Data Table D10. Percentage Distribution of Ratings for Reason(s) a Knowledge/Skill Was Not Used

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used						N – TOTAL REASONS NOT USED[1] OTHER	N – INDIVIDUALS NOT USED[2]
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER		
40. Knowledge of properties of stone and masonry products, materials, assemblies and their impact on building design and construction.	4	0	0	5	0	3	12	11
41. Knowledge of properties of metal products, materials, assemblies and their impact on building design and construction.	5	0	0	6	0	2	13	12
42. Knowledge of properties of wood and wood products, materials, assemblies and their impact on building design and construction.	4	0	0	2	0	2	8	8
43. Knowledge of properties of glass products, materials, assemblies and their impact on building design and construction.	5	0	0	3	0	2	10	10
44. Knowledge of means and methods for building construction.	4	1	2	2	1	2	12	10
45. Knowledge of benefits and limitations of “fast track” or other forms of construction delivery methods.	40	0	1	1	7	6	55	48
46. Knowledge of methods and techniques for estimating construction costs.	20	0	3	29	15	5	72	60
47. Knowledge of structural load and load conditions that affect building design.	9	0	0	25	0	3	37	34
48. Knowledge of energy codes that impact construction.	10	0	0	15	4	3	32	31
49. Knowledge of methods and strategies for evidence based design (EBD).	205	0	0	12	117	41	375	334
50. Knowledge of impact of design on human behavior.	29	0	0	4	11	4	48	43
51. Knowledge of functional requirements of heating, ventilation and air conditioning (HVAC) systems.	6	0	0	25	1	2	34	32
52. Knowledge of functional requirements of plumbing systems.	6	0	0	23	2	3	34	31
53. Knowledge of functional requirements of electrical systems.	7	0	0	25	2	4	38	34
54. Knowledge of functional requirements of special systems.	13	0	0	35	3	10	61	58
55. Knowledge of functional requirements of conveying systems.	54	0	0	21	3	4	82	80
56. Knowledge of functional requirements of structural systems.	3	0	0	19	0	2	24	24
57. Knowledge of functional requirements of roofing systems.	6	0	0	5	0	3	14	12
58. Knowledge of functional requirements of fire suppression systems.	10	1	0	30	3	6	50	44
59. Knowledge of functional requirements of communications systems.	26	0	0	40	4	5	75	71
60. Knowledge of functional requirements of electronic safety and security systems.	23	0	0	52	4	3	82	77

CONTINUED

[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

Data Table D10. Percentage Distribution of Ratings for Reason(s) a Knowledge/Skill Was Not Used

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used						N – TOTAL REASONS NOT USED[1] OTHER	N – INDIVIDUALS NOT USED[2]
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER		
61. Knowledge of functional requirements of door and window systems.	4	0	0	2	0	2	8	8
62. Knowledge of functional requirements for thermal and moisture control systems.	7	0	0	4	0	2	13	13
63. Knowledge of hazardous materials mitigation at building site.	43	2	23	49	15	8	140	110
64. Knowledge of principles of building operation and function.	15	0	0	5	3	4	27	27
65. Knowledge of content and format of specifications.	9	0	0	4	2	3	18	17
66. Knowledge of principles of interior design and their influences on building design.	14	0	1	11	3	2	31	27
67. Knowledge of principles of landscape design and their influences on building design.	14	0	0	33	2	3	52	47
68. Knowledge of site design principles and practices.	8	0	0	7	0	2	17	16
69. Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.	12	0	0	3	2	4	21	21
70. Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.	16	0	0	10	13	7	46	38
71. Knowledge of relationship between constructability and aesthetics.	4	0	0	3	0	2	9	8
72. Knowledge of accepted standards for building materials and methods of construction, e.g., ASTM, ANSI.	10	0	0	2	6	2	20	20
73. Knowledge of methods to perform a life cycle cost analysis.	83	0	1	40	45	7	176	147
74. Knowledge of principles of value analysis and value engineering processes.	26	0	1	14	11	4	56	49
75. Knowledge of procedures and protocols of permit approval process.	7	0	0	6	2	4	19	18
76. Knowledge of principles of historic preservation.	75	0	0	11	14	4	104	100
77. Knowledge of processes and procedures for building commissioning.	88	0	0	59	33	8	188	162
78. Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).	43	0	0	38	12	4	97	81
79. Knowledge of methods and tools for space planning.	14	0	0	7	5	5	31	29
80. Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.	30	0	0	10	9	7	56	47
81. Knowledge of factors that impact construction management services.	37	0	2	16	11	10	76	67
82. Knowledge of fee structures, their attributes and implications for schedule, scope and profit.	16	0	0	3	10	11	40	38
83. Knowledge of consultant agreements and fee structures.	8	0	0	1	13	10	32	30

CONTINUED

[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

ARE C

Data Table D10. Percentage Distribution of Ratings for Reason(s) a Knowledge/Skill Was Not Used

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used						N – TOTAL REASONS NOT USED[1] OTHER	N – INDIVIDUALS NOT USED[2]
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER		
84. Knowledge of different building and construction types and their implications for design and construction schedules.	6	0	0	2	2	3	13	12
85. Knowledge of scheduling methods to establish project timeframes based on standard sequences of architectural services in each phase.	22	0	0	9	11	7	49	43
86. Knowledge of business development strategies.	34	0	0	6	33	17	90	82
87. Knowledge of relationship between staffing capabilities and hours, and internal project budget to meet established milestones and profitability.	37	0	0	8	21	13	79	71
88. Knowledge of purposes and types of professional liability insurance related to architectural practice.	23	0	2	14	33	15	87	82
89. Knowledge of format and protocols for efficient meeting management and information distribution.	17	0	0	1	5	4	27	25
90. Knowledge of strategies to assess project progress and verify its alignment with project schedule.	17	0	0	5	6	6	34	31
91. Knowledge of ways to translate project goals into specific tasks and measureable design criteria.	21	0	0	1	5	5	32	32
92. Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.	4	0	0	1	2	3	10	10
93. Knowledge of formats and protocols to produce and distribute field reports to document construction progress.	19	0	0	6	3	3	31	31
94. Knowledge of site requirements for a specific building type and scope to determine client's site needs.	13	0	0	11	3	3	30	29
95. Knowledge of site analysis techniques to determine project parameters affecting design.	14	0	0	11	4	4	33	29
96. Knowledge of methods to prioritize or objectively evaluate design options based on project goals.	9	0	0	3	3	5	20	19
97. Knowledge of sustainability strategies and/or rating systems.	34	0	0	7	13	6	60	49
98. Knowledge of sustainability considerations related to building materials and construction processes.	19	0	0	4	8	2	33	29
99. Knowledge of techniques to integrate renewable energy systems into building design.	40	0	1	18	19	7	85	68
100. Knowledge of methods to identify scope changes that may require additional services.	3	0	0	1	3	3	10	10
101. Knowledge of procedures for processing requests for additional services.	4	0	0	3	9	5	21	20
102. Knowledge of appropriate documentation level required for construction documents.	3	0	0	1	0	3	7	7
103. Knowledge of close-out document requirements and protocols.	14	0	0	3	5	9	31	29

CONTINUED

[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

Data Table D10. Percentage Distribution of Ratings for Reason(s) a Knowledge/Skill Was Not Used

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used						N – TOTAL REASONS NOT USED[1] OTHER	N – INDIVIDUALS NOT USED[2]
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER		
104. Knowledge of construction document technologies and their standards and applications.	3	0	0	3	0	3	9	9
105. Knowledge of building information modeling (BIM) and its impact on planning, financial management and construction documentation.	160	0	2	12	82	22	278	223
106. Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.	21	0	0	11	10	7	49	41
107. Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.	26	2	1	3	4	8	44	40
108. Knowledge of techniques to integrate model contract forms and documents.	39	1	3	4	28	9	84	80
109. Knowledge of benefits and limitations of software for construction documentation.	23	0	0	10	12	5	50	45
110. Knowledge of methods for production of construction documentation and drawings.	8	0	0	5	0	2	15	15
111. Knowledge of standard methods for production of design development documentation.	7	0	0	4	0	5	16	14
112. Knowledge of standard methods for production of site plan documentation.	9	0	0	23	1	5	38	35
113. Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.	12	0	1	6	6	2	27	26
114. Knowledge of materials testing processes and protocols to be performed during the construction process.	17	0	1	22	10	3	53	48
115. Knowledge of building systems testing processes and protocols to be performed during the construction process.	14	0	0	24	10	3	51	44
116. Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	6	0	0	3	0	4	13	13
117. Knowledge of protocols for responding to Requests for Information (RFI).	17	0	0	2	3	4	26	23
118. Knowledge of roles, responsibilities and authorities of project team members during construction.	7	0	0	1	1	3	12	11
119. Knowledge of conflict resolution techniques and their applications throughout project.	6	0	0	1	12	2	21	20
120. Knowledge of bidding processes and protocols for different project delivery methods and their applications.	15	0	0	5	7	5	32	27
121. Knowledge of requirements for post-occupancy evaluation.	80	0	0	11	23	11	125	108
122. Knowledge of design decisions and their impact on constructability.	2	0	0	3	0	4	9	9

[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

CONTINUED

ARE C

Data Table D10. Percentage Distribution of Ratings for Reason(s) a Knowledge/Skill Was Not Used

Survey Population: All Licensed Architects

KNOWLEDGE/SKILL STATEMENT	Reason(s) Not Used						N – TOTAL REASONS NOT USED[1] OTHER	N – INDIVIDUALS NOT USED[2]
	NOT USED IN PRACTICE	NOT ALLOWED BY JURIS.	NOT REC. BY LEGAL COUNSEL OR INSURANCE CARRIER	PROVIDED BY CONSULTANT(S)	LACK OF EXP.	OTHER		
123. Knowledge of methods to manage human resources.	51	0	0	5	19	21	96	90
124. Knowledge of state board guidelines for licensing and professional practice.	7	0	0	3	1	8	19	18
125. Knowledge of principles of universal design.	53	1	0	6	20	14	94	84
126. Knowledge of purposes of and legal implications for different types of business entities.	34	0	0	8	30	12	84	78
127. Knowledge of innovative and evolving technologies and their impact on architectural practice.	8	0	0	5	3	4	20	18
128. Knowledge of ethical standards relevant to architectural practice.	4	0	0	0	1	2	7	7
129. Knowledge of methods to facilitate information management in building design and construction.	25	0	0	6	9	5	45	41
130. Knowledge of factors involved in conducting architectural practice in international markets.	369	2	4	5	72	17	469	419
131. Knowledge of methods and procedures for risk management.	27	0	0	6	18	6	57	51
132. Knowledge of financial planning methods to manage revenues, staffing, and overhead expenses.	27	0	0	12	34	17	90	86
MEAN	25.87	0.09	0.47	9.88	9.97	6.74	53.02	-
MIN	0	0	0	0	0	2	5	-
MAX	369	2	23	59	117	41	469	-

[1] This column is a sum of all the reasons participants did not use a knowledge or skill. Respondents were allowed to select as many of the reasons not used as applicable; therefore the reason a knowledge was not used may exceed the number of participants who do not use a particular knowledge or skill.

[2] This column represents the number of individuals who indicated that they do not use the knowledge or skill.

CONTINUING EDUCATION REPORT

EXECUTIVE SUMMARY

BACKGROUND

Historically, the Council's efforts around continuing education (CE) have focused on providing practitioners with high-quality resources for fulfilling licensure renewal requirements through the NCARB Monograph Program. In an effort to increase the quality of continuing education offerings at the American Institute of Architecture's (AIA) national conventions, the Continuing Education Committee (CEC) reviewed hundreds of AIA Convention courses over the past four years to identify those that met health, safety, and welfare (HSW) criteria. More recently, the Council's efforts have turned to establishing and promoting a national model for continuing education for use by its Member Boards. That model—12 hours of HSW CE each calendar year—has been adopted by 15 jurisdictions and is currently under review by an additional 16 jurisdictions.

THE CONTINUING EDUCATION SURVEY

The 2012 Practice Analysis marks NCARB's first effort to collect information on the continuing education needs of practitioners. This *Continuing Education Report* encompasses data collected from licensed architects who were asked to review a list of knowledge/skill statements and indicate whether they consider the knowledge/skill to be essential to their ability to protect the public HSW. Additionally, they were asked to indicate their current continuing education needs in those areas.

KEY FINDINGS

Overall, the survey results indicated licensed architects do <u>not</u> consider the vast majority of the knowledge/skills surveyed as essential to protect the public HSW, although many of these knowledge/skills comply with current HSW CE standards. The knowledge/skills that respondents did consider to be essential for protecting the public included knowledge of codes, engineering technologies, and environmental issues.

Regarding current CE needs, 65 percent of responses indicated that practitioners had some need for CE in order to learn the basics, keep current, or expand their knowledge to a more advanced level. The remaining 35 percent of responses indicated that they either had sufficient understanding or that the knowledge/skill was not critical.

When comparing the two rating scales (essentialness to HSW vs. CE need), only eight of the 127 knowledge/skills were identified by 50 percent or more of architects as being both essential to public protection and as areas in which they need continuing education.

Survey data and these key findings will lead to several short- and long-term activities and applications, such as expanding or modifying the terminology used for continuing education subject areas, particularly those related to health, safety, and welfare; revising and updating NCARB's *Model Law* and *Model Regulations* as they relate to continuing education; helping inform efforts to improve the quality and range of course offerings by providers; and potentially expanding the Council's CE recordkeeping and audit functions.

CONCLUSION

The results of the *2012 NCARB Practice Analysis of Architecture* will help support and refine existing continuing education efforts as well as set the stage for the future as the Council continues to explore its most appropriate roles and responsibilities related to continuing education as a requirement for licensure renewal.

USE AND APPLICATION

For the first time, the results of the Practice Analysis will strategically guide the Council's approach to continuing education (CE). NCARB and its CEC reviewed the Practice Analysis survey responses to better understand the CE-related perceptions and needs of architects. Findings will influence NCARB's CE policies and programs as well as support the Council's collaborative efforts with the AIA and other collateral organizations.

SHORT-TERM USE

Architects licensed in 45 of the 54 NCARB jurisdictions are required to complete a specified number of continuing education hours (CEHs) for licensure renewal over a defined period of time. The number of hours per time period varies by jurisdiction; however, most requirements include achieving a minimum number of CEHs in subject areas that are related to HSW. Survey findings will be used in the short-term to update, maintain, and expand relevant sections of the *NCARB Model Law* and *Model Regulations* in support of these Member Board requirements.

Survey results will also enable the Council to better engage with broader efforts to respond to architects' CE needs and help underscore the important relationship between lifelong learning and the practitioner's obligation to protect the public. In response to the survey results and feedback from Member Boards, the CEC believes that additional study is warranted to help clarify and better define what is meant by "health, safety, and welfare." Further research in this area may lead to the adoption and possible expansion of more concise definitions and/or lists of subjects for use by Member Boards and collateral organizations. Such a study could help achieve a better understanding and appreciation of HSW continuing education by practitioners, Member Boards, CE providers, and the public.

LONG-TERM APPLICATION

Over the next several years, the results of the survey will guide the Council's continued cross-collateral discussions with the AIA on ways to improve CE courses, responding to the concerns of Member Boards regarding the criteria for license renewal. These discussions may lead to the joint development of new standards that support registered providers in the creation and delivery of higher-quality CE courses that are more relevant to practitioners' expanding needs and varying knowledge/skill levels.

Survey findings and feedback from NCARB's Member Boards and Record holders further indicate that expanding the Council's support and participation in a wide range of CE-related initiatives would be welcomed by the profession. Suggestions for such support cover a wide range of areas, including:

- Collaborating with collateral organizations to improve current CE standards;
- Clarifying the meaning of "health, safety, and welfare (HSW)" through the adoption of a more succinct definition and list of subjects;
- Creating a centralized data bank for architects to track their CE records; and perhaps
- Reviewing, accrediting, and/or auditing HSW CE offerings;

In both the short- and long-term, the Council has many opportunities to explore and apply this initial research. Some initiatives involve internal activities and others will require collaboration with various external stakeholders. Regardless of the time frame, all efforts will focus on coordinating and improving the various aspects of continuing education for the benefit the profession and public-at-large through development of products and services that support the regulatory role of our Member Boards.

CONTINUING EDUCATION SURVEY

The continuing education (CE) survey was designed to gather information from licensed architects regarding whether they consider specific knowledge/skills essential to their ability to protect the public health, safety, and welfare (HSW). Participants were also asked to indicate the professional knowledge/skills (K/S) necessary to support the continued professional development of practitioners.

A total of 1,232 CE surveys were received. The number of survey responses for the CE survey included in the final data analysis was 855 (participants who responded to at least 90 percent of the items in the survey were included).

SURVEY	RESPONSES RECEIVED	RESPONSES INCLUDED IN DATA ANALYSIS	PERCENTAGE INCLUDED IN DATA ANALYSIS
CE	1,232	855	69%

The chart below summarizes the survey population, the research questions related to the knowledge/skill statements, as well as the rating scales for the continuing education survey. The chart also references the related Continuing Education (CE) Data Tables.

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
CE	All licensed architects	Knowledge/ Skill	What are your current continuing education needs to perform your job responsibilities? • I need to learn the basic concepts and applications • I need to keep current on this knowledge/skill • I need to expand my current knowledge/skill to an advanced level • I do not need to learn this because my knowledge or skill level is sufficient • I do not need to learn this because the knowledge or skill level is not critical	E2
			Please check the box if you consider this knowledge/ skill essential to your ability to protect the public health, safety, and welfare.	E3

In order to answer the survey questions more completely, respondents were provided with a list of the technical and professional subjects identified by NCARB as appropriate for safeguarding the public HSW. The following HSW subject areas and definitions were incorporated into NCARB's *Legislative Guidelines and Model Law, Model Regulations* at the 2011 NCARB Annual Meeting and were subsequently adopted by the AIA.

HEALTH, SAFETY AND WELFARE (HSW) SUBJECTS

Technical and professional subjects that the Member Board deems appropriate to safeguard the public and that are within the following enumerated areas are necessary for the proper evaluation, design, construction, and utilization of buildings and the built environment.

Building Systems:
Structural, Mechanical, Electrical, Plumbing, Communications, Security, Fire Protection

Construction Contract Administration:
Contracts, Bidding, Contract Negotiations

Construction Documents:
Drawings, Specifications, Deliver Methods

Design:
Urban Planning, Master Planning, Building Design, Site Design, Interiors, Safety and Security Measures

Environmental:
Energy Efficiency, Sustainability, Natural Resources, Natural Hazards, Hazardous Materials, Weatherproofing, Insulation

Legal:
Laws, Codes, Zoning, Regulations, Standards, Life Safety, Accessibility, Ethics, Insurance to protect Owners and Public

Materials and Methods:
Constructions Systems, Products, Finishes, Furnishings, Equipment

Occupant Comfort:
Air Quality, Lighting, Acoustics, Ergonomics

Pre-Design:
Land Use Analysis, Programming, Site Selection, Site and Soils Analysis, Surveying

Preservation: Historic, Reuse, Adaptation

DEFINITIONS

Continuing Education (CE):

Continuing education is post-licensure learning that enables a registered architect to increase or update knowledge of and competence in technical and professional subjects related to the practice of architecture to safeguard the public health, safety, and welfare.

Continuing Education Hour (CEH):

One continuous instructional hour (50 to 60 minutes of contact) spent in structured educational activities intended to increase or update the architect's knowledge and competence in health, safety, and welfare subjects. If the provider of the structured educational activities prescribes a customary time for completion of such an activity, then such prescribed time shall, unless the Board finds the prescribed time to be unreasonable, be accepted as the architect's time for continuing education hour purposes irrespective of actual time spent on the activity.

Structured Educational Activities:

Educational activities in which at least 75 percent of an activity's content and instructional time must be devoted to health, safety, and welfare subjects related to the practice of architecture, including courses of study or other activities under the areas identified as health, safety and welfare subjects and provided by qualified individuals or organizations, whether delivered by direct contact or distance learning methods.

NCARB'S KEY FINDINGS

This section of the report includes several charts and tables resulting from the Continuing Education Committee's review of the Practice Analysis data, including some surprising key findings regarding architects' perceptions about the knowledge/skills essential for protecting the public. Additionally, the committee compared and contrasted architects' responses to better understand their varying levels of continuing education need.

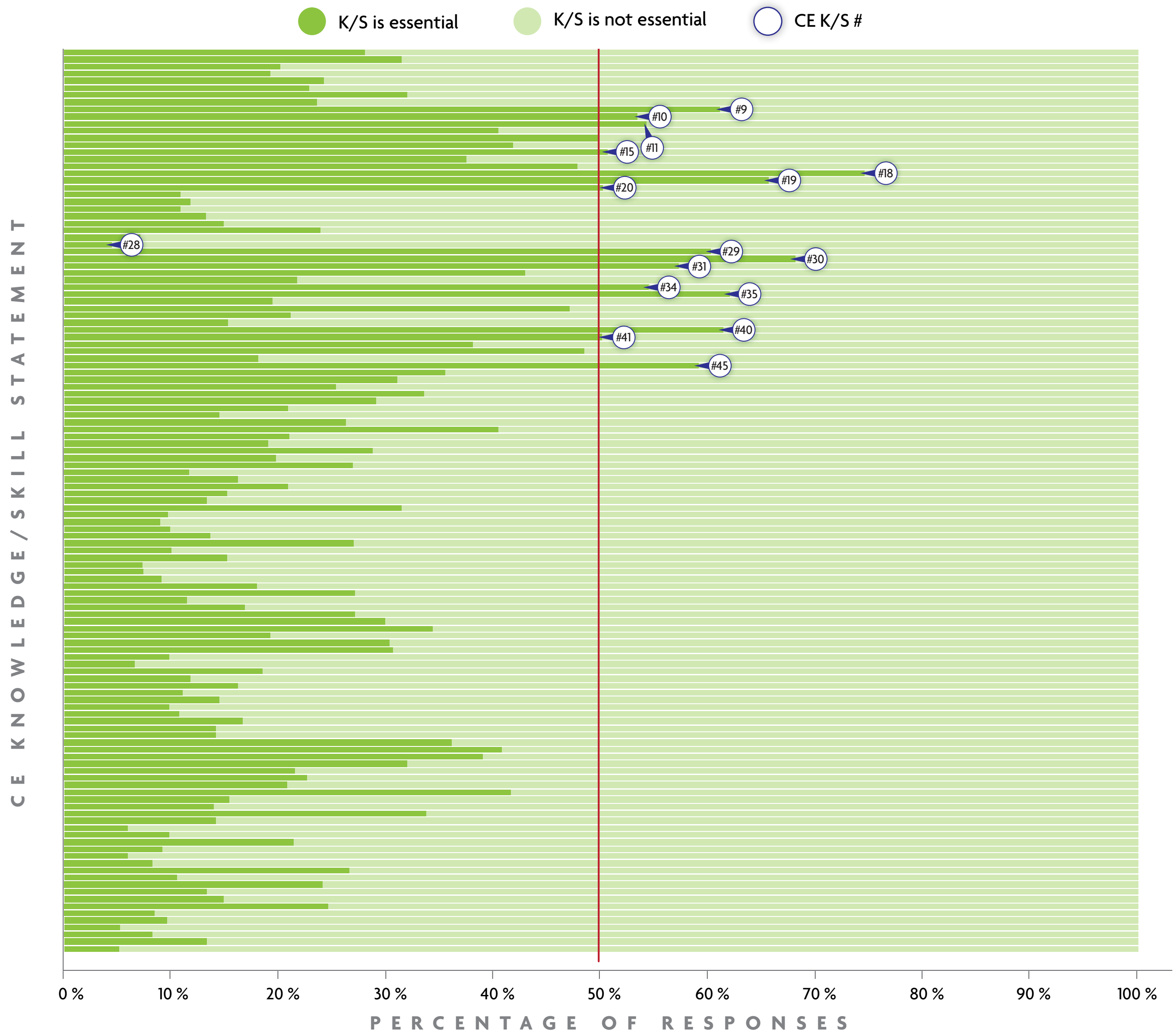
While the extent of this initial research effort is limited, it will assist the Council in planning and strategically responding to the future continuing education needs of practitioners.

PROTECTING THE PUBLIC HSW

The CEC initiated its analysis of the CE survey data by examining which knowledge and skills (K/S) respondents considered essential to the architect's ability to protect the public HSW, as this information is most pertinent to NCARB's mission.

As illustrated by the bar chart below, a majority of architects surprisingly considered **only 12 percent** of the K/S as essential for protecting the public HSW. This includes 15 K/S that were rated as essential by more than 50 percent of respondents. For example, CE K/S #18, "*Knowledge of protocols and procedures for conducting a building code analysis*" was rated by 74.6 percent of respondents as essential. At the opposite end of the spectrum, 95.6 percent of respondents rated CE K/S #28, "*Knowledge of factors involved in selecting project appropriate computer-based design technologies*" as not essential.

PERCENTAGE OF ARCHITECTS INDICATING THE K/S IS ESSENTIAL TO THEIR ABILITY TO PROTECT THE PUBLIC HSW



The table below lists the 15 CE K/S that were identified by more than 50 percent of respondents as essential for the protection of the public HSW.

CE K/S #	KNOWLEDGE/SKILL STATEMENT	PERCENTAGE OF RESPONDENTS INDICATING K/S IS "*ESSENTIAL*"
18	Knowledge of protocols and procedures for conducting a building code analysis.	74.6 %
30	Knowledge of factors to be considered in adaptive reuse of existing buildings and materials.	68.2%
19	Knowledge of building codes and their impact on building design.	65.7%
35	Knowledge of engineering principles and their application to design and construction.	62.1%
40	Knowledge of structural load and load conditions that affect building design.	61.4%
9	Knowledge of factors involved in selection of building systems and components.	61.2%
29	Knowledge of engineering properties of soils and their effect on building foundations and building design.	60.4%
45	Knowledge of hazardous materials mitigation at building site.	59.2%
31	Knowledge of building technologies, which provide solutions for comfort, life safety, and energy efficiency.	57.3%
34	Knowledge of strategies for anticipating, managing, and preventing disputes and conflicts.	54.5%
11	Knowledge of environmental policies and regulations and their implications for proposed construction.	54.3%
10	Knowledge of effect of environmental factors on site development.	53.5%
15	Knowledge of methods required to mitigate adverse site conditions.	50.6%
20	Knowledge of land use codes and ordinances that govern land use decisions.	50.3%
41	Knowledge of energy codes that impact construction.	50.2%

Five of the 15 K/S above relate to knowledge of codes; five relate to engineering technologies; four deal with environmental issues; and one deals with conflict/dispute management. The rating for CE K/S #34 "*Knowledge of strategies for anticipating, managing and preventing disputes and conflicts*," seems atypical, since most of the other CE K/S related to conflict management issues (i.e., CE K/S #104 "*Knowledge of conflict resolution techniques and their applications throughout project*") were considered by the majority of respondents as not essential. In this case, 54.5 percent of those surveyed perceived that anticipating, managing, and preventing conflicts is essential for HSW, while only 20 percent indicated that the knowledge and application of conflict resolution techniques is essential.

The majority of the respondents classified 88 percent (112 of 127) of the K/S surveyed as not essential to protect the public HSW. A number of these K/S deemed non-essential by respondents comply with NCARB's *Model Regulations* and AIA's HSW Guidelines, indicating the need to better define certain subject areas and further explain their relationship to public safety:

- CE K/S #2 "*Knowledge of master plans and their impact on building design*"
- CE K/S #27 "*Knowledge of protocols and procedures for obtaining community input for proposed design*"
- CE K/S #36 "*Knowledge of structural properties of construction products, materials and assemblies, and their impact on building design and construction*"
- CE K/S #48 "*Knowledge of principles of interior design and their influences on building design*"
- CE K/S #50 "*Knowledge of site design principles and practices*"
- CE K/S #53 "*Knowledge of relationship between constructability and aesthetics*"
- CE K/S #58 "*Knowledge of principles of historic preservation*"
- CE K/S #79 "*Knowledge of site requirements for specific building types to determine client's site needs*"
- CE K/S #80 "*Knowledge of site analysis techniques to determine project parameters affecting design*"
- CE K/S #83 "*Knowledge of sustainability considerations relating to building materials and construction processes*"
- CE K/S #84 "*Knowledge of techniques to integrate renewable energy systems into building design*"
- CE K/S #121 "*Knowledge of ethical standards relevant to architectural practice*"

Additional subject areas considered not essential by survey respondents included: computer software, business development, professional risk management, construction costs and schedules, construction documentation, drawings/specifications and project delivery methods, contract agreements, and permitting.

The top five CE K/S rated by respondents as not essential to protecting the public were:

CE K/S #	KNOWLEDGE/SKILL STATEMENT	PERCENTAGE OF RESPONDENTS INDICATING K/S IS "*NOT ESSENTIAL*"
28	Knowledge of factors involved in selecting project appropriate computer-based design technologies.	95.6%
127	Knowledge of financial planning methods to manage revenues, staffing, and overhead expenses.	94.9%
124	Knowledge of factors involved in conducting an architectural practice in international markets.	94.7%
114	Knowledge of state board guidelines for licensing and professional practice.	94.0%
110	Knowledge of marketing planning and strategies to procure business.	94.0%

The CEC believes that the results of the survey warrant additional study to help clarify the meaning of "health, safety, and welfare." Such a study could help achieve a better appreciation of continuing education by practitioners and NCARB Member Boards.

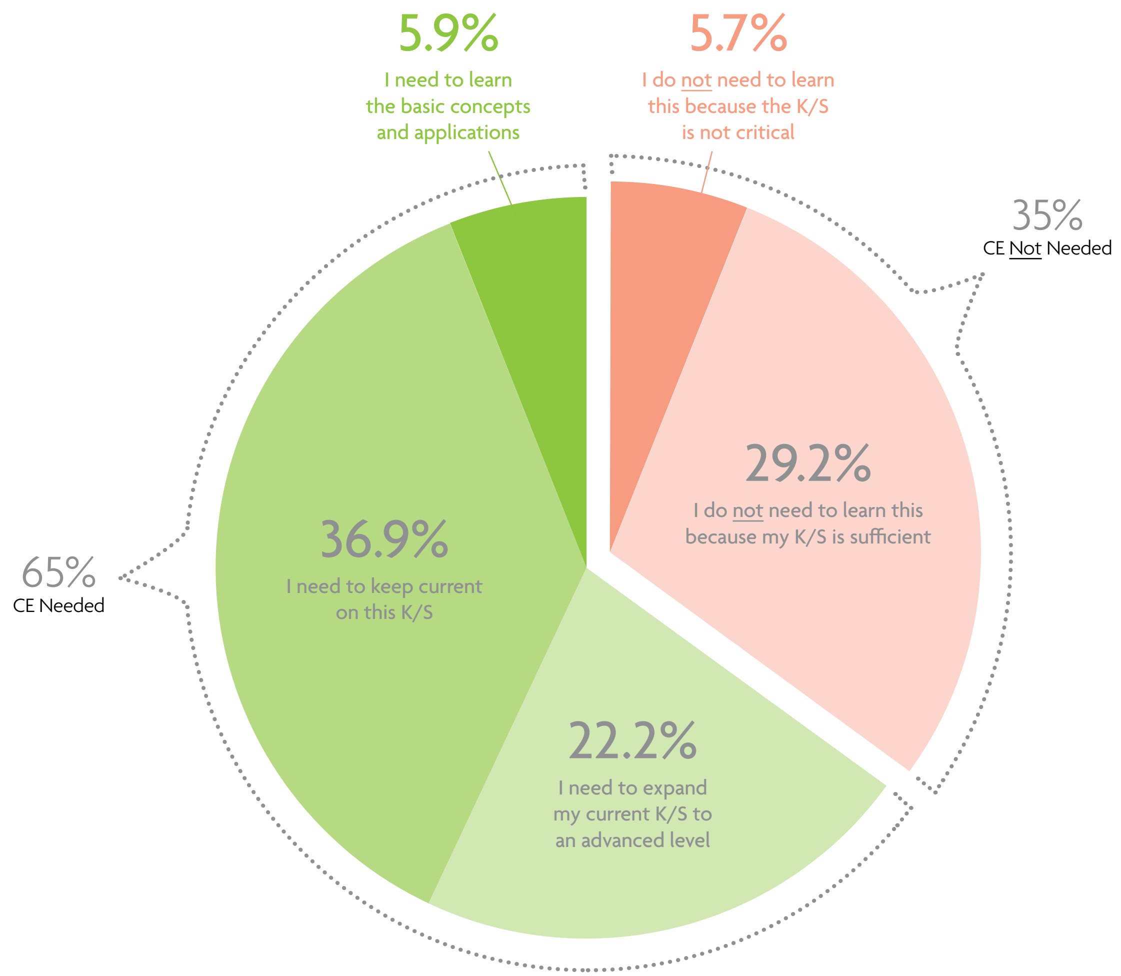
LEVEL OF CE NEED

Architects completing the survey were asked to identify their continuing education needs based on the following rating scale:

- I need to learn the basic concepts and applications
- I need to keep current on this knowledge/skill
- I need to expand my current knowledge/skill to an advanced level
- I do not need to learn this because my knowledge/skill is sufficient
- I do not need to learn this because the knowledge/skill is not critical

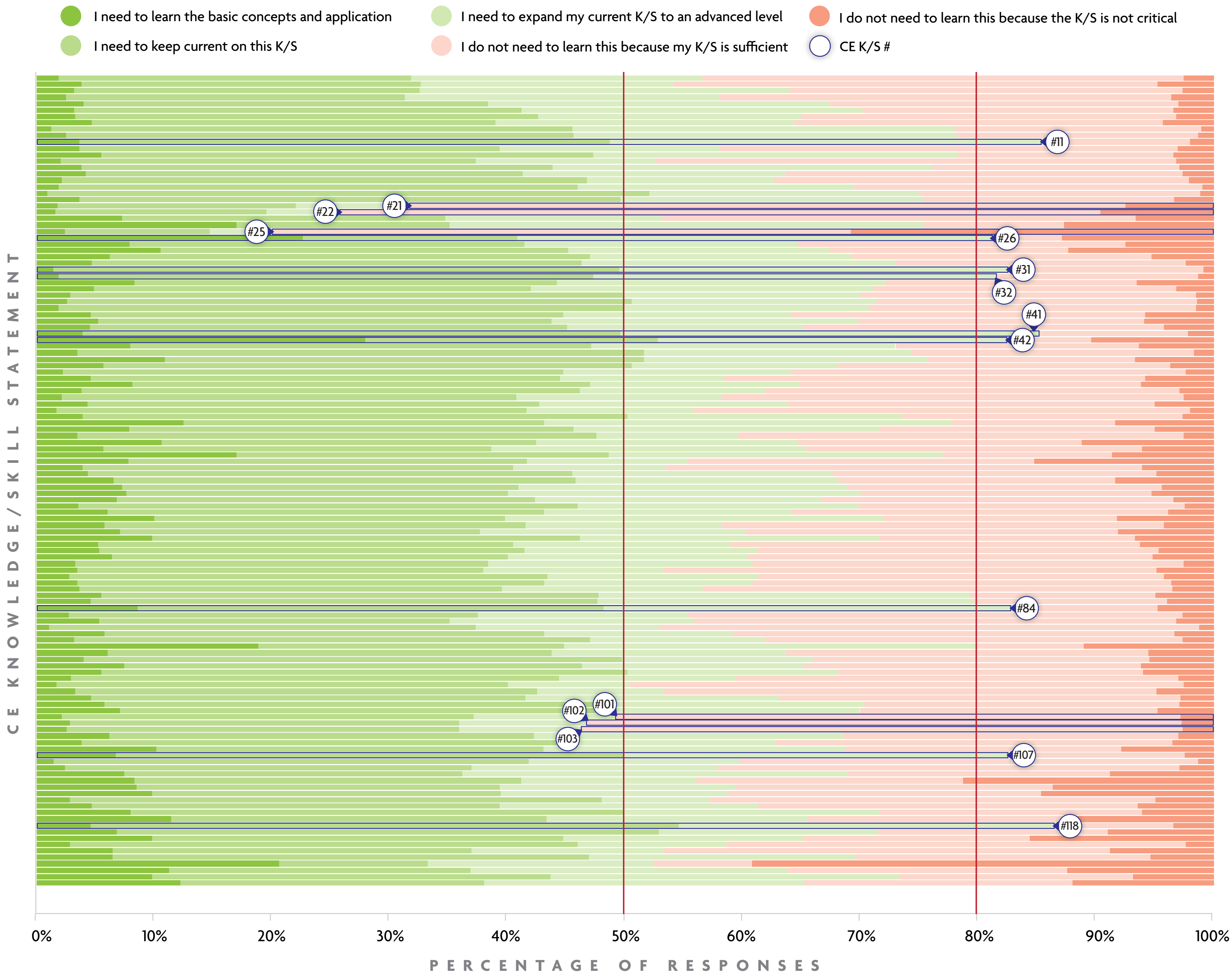
The pie chart below represents the mean response rate across all K/S regarding the level of CE need. A majority of responses (65 percent) indicated some need for additional CE, while 35 percent of responses indicated there was either a sufficient understanding of the K/S or that the K/S was not critical.

LEVEL OF CE NEED



As illustrated on the bar chart below, the vast majority of respondents expressed a need to learn, keep current, or expand their understanding of 96 percent of the K/S surveyed in order to perform their job responsibilities. More than 80 percent of respondents indicated some level of CE need for the nine K/S called out on the chart. In reviewing this data, the CEC concluded that providers and collateral organizations should consider offering a broader range of courses to better address the varied learning needs of those recently licensed as well as more advanced practitioners.

LEVEL OF CE NEED



The range of CE need for these nine K/S is identified in more detail in the table below. Three of the K/S deal with energy and the environment, two correspond to knowledge of codes and regulations, two relate to risk management, and two involve new project delivery methods (BIM and EBD). These responses indicate that a significant majority of respondents are interested in expanding their knowledge of technology.

The vast majority of respondents expressed a need to learn, keep current, or expand their understanding of 96 percent of the K/S surveyed.

CE K/S #	KNOWLEDGE/SKILL STATEMENT	LEARN BASIC CONCEPTS	KEEP CURRENT	EXPAND TO ADVANCED LEVEL	TOTAL NEED
118	Knowledge of innovative and evolving technologies and their impact on architectural practice.	4.7%	49.9%	31.8%	86.4%
11	Knowledge of environmental policies and regulations and their implications for proposed construction.	3.7%	45.0%	36.6%	85.4%
41	Knowledge of energy codes that impact construction.	4.0%	45.7%	35.6%	85.3%
84	Knowledge of techniques to integrate renewable energy systems into building design.	8.7%	39.6%	35.9%	84.2%
31	Knowledge of building technologies, which provide solutions for comfort, life safety, and energy efficiency.	1.5%	48.1%	33.0%	82.6%
42	Knowledge of methods and strategies for evidence based design (EBD).	28.1%	24.8%	29.6%	82.5%
107	Knowledge of project risks for new and innovative products, materials, methods, and technologies.	6.8%	43.2%	32.5%	82.5%
32	Knowledge of effect of thermal envelope in design of building systems.	2.0%	45.4%	34.3%	81.6%
26	Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	22.7%	18.2%	40.4%	81.3%

At the opposite end of the spectrum, 50 percent or more respondents identified six K/S for which they didn't identify a CE need because their current level of knowledge was sufficient or because they felt the K/S was not critical. Of the six K/S identified, three relate to model making and hand drawings, and three relate to construction documentation.

CE K/S #	KNOWLEDGE/SKILL STATEMENT	DO NOT NEED *"K/S LEVEL SUFFICIENT"*	DO NOT NEED *"K/S NOT CRITICAL"*	TOTAL DO NOT NEED
25	Skill in producing physical scale models.	49.2%	30.8%	80.0%
22	Skill in producing (2-D) drawings using hand methods.	64.7%	9.6%	74.3%
21	Skill in producing hand drawings of design ideas.	60.9%	7.4%	68.2%
103	Knowledge of roles, responsibilities, and authorities of project team members during construction.	51.2%	2.6%	53.8%
102	Knowledge of protocols for responding to requests for information.	50.6%	2.7%	53.3%
101	Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	48.1%	2.8%	50.9%

As noted earlier in the key findings, only 12 percent (15 of 127) of the K/S were considered by respondents as essential for protecting the public HSW; however, 96 percent (122 of the 127) of the K/S were identified by respondents as areas for which they have some level of CE need. For example, 86 percent of respondents indicated continuing education is needed for CE K/S #118 "*Knowledge of innovative and evolving technologies and their impact on architectural practice*," while over 75 percent of respondents rated the same K/S as not essential for protecting the public HSW. CE K/S #25 "*Skill in producing physical scale models*" was considered by 85 percent of respondents as non-essential for HSW and by 80 percent of respondents as a K/S for which CE is also not needed.

When comparing these two important sets of responses, only eight K/S were rated by over 50 percent of respondents as both essential to protecting the public HSW and as an area for which they have a continuing education need. As identified below, four relate to environmental issues, two deal with building and land use codes, and two relate to building systems.

Overall, survey respondents agreed that they need continuing education for most of the K/S identified in the survey, in both HSW and non-HSW subject areas. The survey results also indicate that continuing education courses should range from basic to advanced, in order to address varying learning needs.

CE K/S #	KNOWLEDGE/SKILL STATEMENT	ESSENTIAL FOR HSW	CE NEED
9	Knowledge of factors involved in selection of building systems and components.	61.2%	78.0%
10	Knowledge of effect of environmental factors on site development.	53.5%	78.2%
11	Knowledge of environmental policies and regulations and their implications for proposed construction.	54.3%	85.3%
15	Knowledge of methods required to mitigate adverse site conditions.	50.6%	76.0%
19	Knowledge of building codes and their impact on building design.	65.7%	74.9%
20	Knowledge of land use codes and ordinances that govern land use decisions.	50.3%	75.3%
31	Knowledge of building technologies which provide solutions for comfort, life safety, and energy efficiency.	57.3%	82.6%
45	Knowledge of hazardous materials mitigation at building site.	59.2%	75.7%

Overall, survey respondents agreed that they need continuing education for most of the K/S identified in the survey, in both HSW and non-HSW subject areas. The survey results also indicate that continuing education courses should range from basic to advanced, in order to address varying learning needs, with particular emphasis on new technologies, environmental/energy issues, and compliance with codes and regulations.

CONTINUING EDUCATION SURVEY RESULTS

CE KNOWLEDGE/SKILL RATINGS

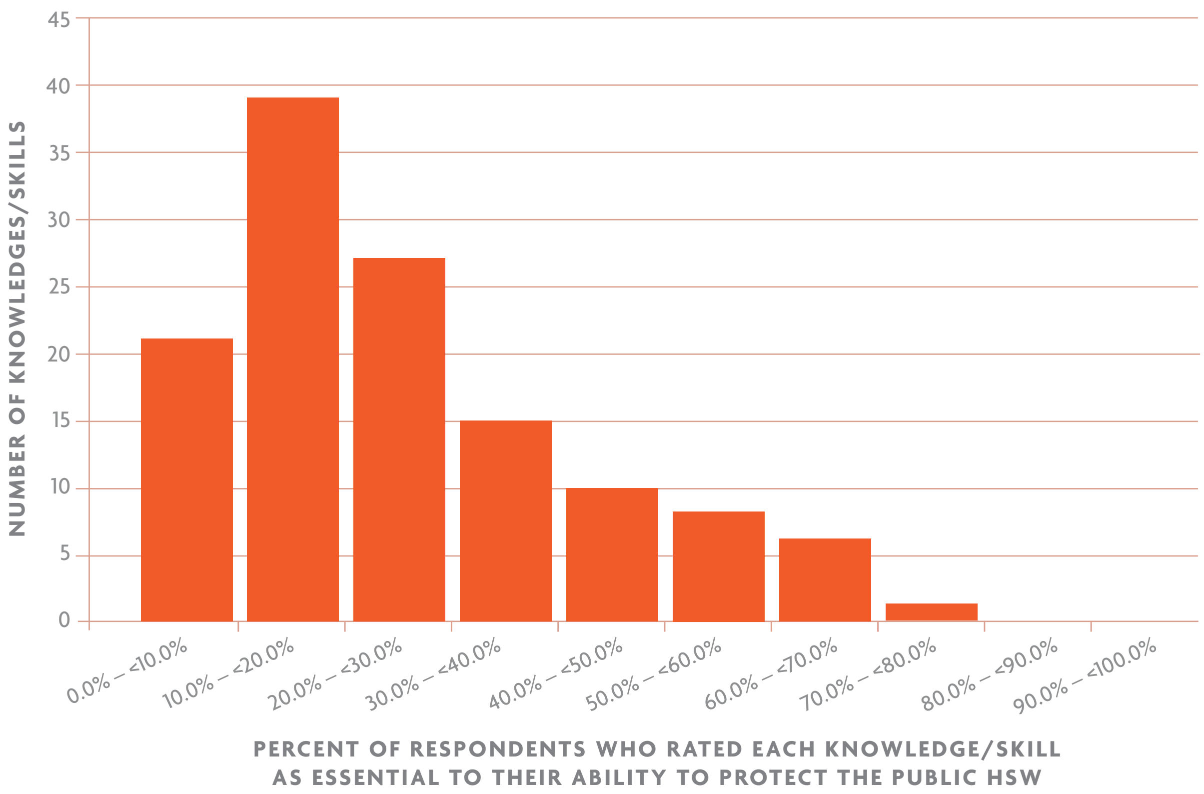
ABILITY TO PROTECT THE PUBLIC HSW

A total of 855 licensed architects indicated whether each CE K/S was essential to their ability to protect the public health, safety, and welfare (HSW).

Data Table E3 lists the percentage of the architects who indicated whether or not each K/S was essential to protect the public HSW. For example, with CE K/S #1 "*Knowledge of oral, written, and visual presentation techniques to communicate project information*," 71.9 percent of the architects indicated *"no,"* while 28.1 percent indicated *"yes."*

The chart below displays the distribution of K/S ratings with respect to the percentage of architects indicating the K/S is essential to their ability to protect the public HSW. For example, 39 of the K/S were each rated as essential to protecting HSW by 10.0 percent to 20.0 percent of licensed architects; and 27 knowledge/skills were rated as essential by 20.0 percent to 30.0 percent of responding licensed architects.

DISTRIBUTION OF CE RATINGS: PERCENT OF RESPONDENTS WHO RATED EACH KNOWLEDGE/SKILL AS ESSENTIAL TO THEIR ABILITY TO PROTECT THE PUBLIC HSW



NEED FOR EACH CE KNOWLEDGE/SKILL (K/S)

The same group of 855 licensed architects provided ratings on their continuing education needs for each K/S. The rating options for CE need were as follows:

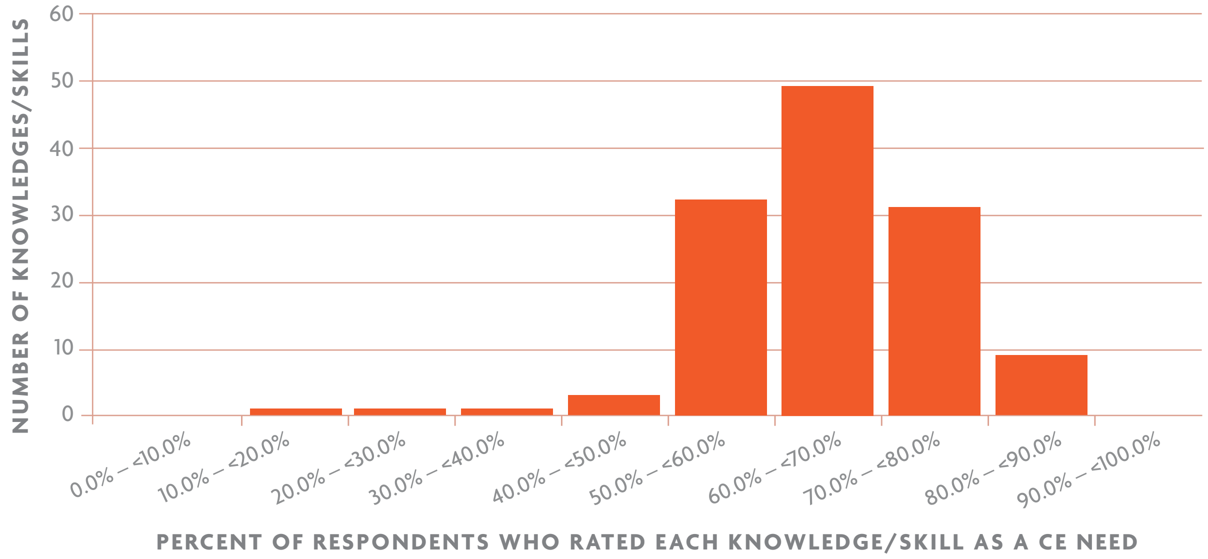
- I need to learn the basic concepts and applications
- I need to keep current on this knowledge/skill
- I need to expand my current knowledge/skill to an advanced level
- I do not need to learn this because my knowledge/skill is sufficient
- I do not need to learn this because the knowledge/skill is not critical

The first three of the above options represented a type of CE need and in some analyses were aggregated to represent a general category of CE needs that can be contrasted against the do not need classifications. Data Table E2 lists the percentage of architects who selected each type of CE need for each K/S.

For example, with CE K/S #1 "*Knowledge of oral, written, and visual presentation techniques to communicate project information*," 2.0 percent of the architects indicated the need to *"learn basic concepts and applications*," 29.9 percent indicated the need to "*keep current*," 24.7 percent indicated the need to "*expand to advanced level*," 40.9 percent indicated "*do not need - current level sufficient*," and 2.5 percent indicated they "*do not need - knowledge not critical.*" Data Table E2 also lists the "*percent needed*" for each K/S, which was calculated as the sum of the three options that represented a type of CE need. Accordingly, 56.6 percent indicated they have a CE need for CE K/S #1.

The chart below displays the distribution of K/S ratings with respect to the percentage of architects indicating CE is needed. For example, nine K/S were identified as a CE need by 80.0 percent to 90.0 percent of responding architects. The vast majority of K/S (more than 100) were identified by a majority (50 percent or more) of the responding architects as areas of CE need.

DISTRIBUTION OF CE RATINGS: PERCENT OF ARCHITECTS WHO INDICATED NEED FOR K/S IN CONTINUING EDUCATION



QUALITATIVE FINDINGS

Three open-ended questions were included at the end of each Practice Analysis survey.

> *"How do you expect your job in the field of architecture to change over the next few years?"*
> *"What tasks will be performed and what knowledge/skills will be needed to meet changing job demands?"*
> *"If you could change the field of architecture, what is the most important change you would make?"*

Nearly 6,000 survey participants provided qualitative feedback, with many similarities emerging from their responses. The summary below represents the comments and suggestions received from those respondents completing the continuing education survey.

CHANGES OVER THE NEXT FEW YEARS AND MEETING CHANGING JOB DEMANDS

A total of 661 licensed architects who completed the continuing education survey replied to the questions "*How do you expect your job in the field of architecture to change over the next few years?*" and "*What tasks will be performed and what knowledge/skills will be needed to meet changing job demands?*"

In general, respondents stressed the importance of technology, specifically BIM and Integrated Project Delivery (IPD), and they mentioned the prevalence of 3-D modeling and Revit as well. Furthermore, many respondents stated the importance of keeping up with changing building codes due to energy conservation, life cycle principles, and sustainable design principles.

Respondents acknowledged that architects need business development, marketing, management, and negotiating skills as well as skills in collaborating with and understanding the role of all project team members. Respondents also noted the need to improve the public perception of the architect and to better explain the architect's role throughout the design-build process.

MOST IMPORTANT CHANGES TO MAKE

A total of 656 licensed architects who responded to the question "*If you could change the field of architecture, what is the most important change you would make?*" The comments received were similar to the themes that appeared in the *NCARB 2012 Focus Group Report* and have been grouped into six major categories:

1. Changing role of the architect
2. Adapting to changing demands
3. Impact of technology on the profession
4. Knowledge and/or skills needed now and in the future
5. Professional practice, accreditation, and licensure
6. NCARB opportunities

Changing Role of the Architect

Many respondents felt that the architecture and design process and what goes into it should be emphasized in educational curriculum rather than specialty topics such as green technology. Some respondents indicated that architects should act as master architects/master builders and assume the leadership role in all building projects, particularly in design decisions that would otherwise be made by contractors and engineers. Other respondents indicated that architects should restore close relationships with owners and assume the owner's interests in design decisions. Still others mentioned that architects should educate the public with respect to the type of services provided, the basis of value of those services, and how the design process works.

Adapting to Changing Demands

An overwhelming majority of respondents felt that hands-on experience, particularly in construction specialties, were important to understanding how designs are implemented in the field. Many respondents indicated that there should be greater emphasis on analytic thinking, materials and methods, specifications, contract documents, and communication skills in the architectural curriculum. A number of respondents commented that architects should resist the temptation to rush through a project and allow sufficient time during design development to ensure quality work.

Impact of Technology on the Profession

Many respondents felt that hand drawing is still an essential part of the design process because the architect can better engage in the creative process and visualize the design and explore how it should be built. Some felt that the technology should be integrated with the principles of design while others felt that architects should design first and then use technology for documentation.

Knowledge and/or Skills Needed Now and in the Future

Many respondents suggested that the roles and responsibilities of team members should be clearly outlined. Some respondents suggested that there should be a uniform educational curriculum that provides consistent opportunities for mentoring students throughout their degree program and the IDP. The curriculum should include coursework in design basics, constructability, construction documentation, construction drawings, and sustainability and that hands-on experience in an architectural firm or in the field should be required so that graduates understand how designs are actually built. Many felt that architects should understand design implications and methods of mitigation across a variety of settings. Almost all respondents acknowledged that good communication skills are essential for working with others at the job site.

Professional Practice, Accreditation, and Licensure

Several respondents commented that uniform codes should be implemented to simplify code compliance. Respondents suggested that architects should structure standard agreements that outline the work to be performed by architects, engineers, and related professionals. Others suggested that each of the professions should stamp and seal their own drawings.

NCARB Opportunities

Many respondents suggested that the educational curriculum should be integrated with the IDP such that teamwork, collaborative design, and project delivery experiences can be acquired throughout degree programs and continuing through the IDP. Several respondents felt that the IDP should be used as a pathway to licensure in and of itself much like apprentice/journeyman systems are used for electricians and plumbers.

CONTINUING EDUCATION DATA TABLES

The chart below summarizes the survey population, the research questions related to the knowledge/skill statements, as well as the rating scales for the continuing education survey. The chart also references the related Continuing Education Data Tables.

SURVEY	SURVEY POPULATION	STATEMENT TYPE	RESEARCH QUESTIONS AND RATING SCALES	DATA TABLE
CE	All licensed architects	Knowledge/ Skill	What are your current continuing education needs to perform your job responsibilities? • I need to learn the basic concepts and applications • I need to keep current on this knowledge/skill • I need to expand my current knowledge/skill to an advanced level • I do not need to learn this because my knowledge or skill level is sufficient • I do not need to learn this because the knowledge or skill level is not critical	E2
			Please check the box if you consider this knowledge/ skill essential to your ability to protect the public health, safety, and welfare.	E3

Data Table E1. List of all CE Survey Knowledge/Skill (K/S) Statements

K/S #	KNOWLEDGE/SKILL STATEMENT
1	Knowledge of oral, written, and visual presentation techniques to communicate project information.
2	Knowledge of master plans and their impact on building design.
3	Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.
4	Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.
5	Knowledge of client and project characteristics that influence contract agreements.
6	Knowledge of types of contracts and their designated uses.
7	Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.
8	Knowledge of effects of specific findings from feasibility studies on building design.
9	Knowledge of factors involved in selection of building systems and components.
10	Knowledge of effect of environmental factors on site development.
11	Knowledge of environmental policies and regulations and their implications for proposed construction.
12	Knowledge of processes involved in conducting a survey of existing conditions.
13	Knowledge of effects of specific findings from environmental impact studies on building design.
14	Skill in designing facility layout and site plan that meets site constraints.
15	Knowledge of methods required to mitigate adverse site conditions.
16	Knowledge of elements and processes for conducting a site analysis.
17	Knowledge of codes of professional conduct as related to architectural practice.
18	Knowledge of protocols and procedures for conducting a building code analysis.
19	Knowledge of building codes and their impact on building design.
20	Knowledge of land use codes and ordinances that govern land use decisions.
21	Skill in producing hand drawings of design ideas.
22	Skill in producing two-dimensional (2-D) drawings using hand methods.
23	Skill in using software to produce two-dimensional (2-D) drawings.
24	Skill in using software to produce three-dimensional (3-D) models of building design.
25	Skill in producing physical scale models.

K/S #	KNOWLEDGE/SKILL STATEMENT
26	Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.
27	Knowledge of protocols and procedures for obtaining community input for proposed design.
28	Knowledge of factors involved in selecting project appropriate computer based design technologies.
29	Knowledge of engineering properties of soils and their effect on building foundations and building design.
30	Knowledge of factors to be considered in adaptive reuse of existing buildings and materials.
31	Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.
32	Knowledge of effect of thermal envelope in design of building systems.
33	Knowledge of principles of integrated project design.
34	Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.
35	Knowledge of engineering principles and their application to design and construction.
36	Knowledge of structural properties of construction products, materials and assemblies and their impact on building design and construction.
37	Knowledge of means and methods for building construction.
38	Knowledge of benefits and limitations of fast track or other forms of construction delivery methods.
39	Knowledge of methods and techniques for estimating construction costs.
40	Knowledge of structural load and load conditions that affect building design.
41	Knowledge of energy codes that impact construction.
42	Knowledge of methods and strategies for evidence based design (EBD).
43	Knowledge of impact of design on human behavior.
44	Knowledge of functional requirements of all building systems.
45	Knowledge of hazardous materials mitigation at building site.
46	Knowledge of principles of building operation and function.
47	Knowledge of content and format of specifications.
48	Knowledge of principles of interior design and their influences on building design.
49	Knowledge of principles of landscape design and their influences on building design.

CONTINUED

Data Table E1. List of all CE Survey Knowledge/Skill (K/S) Statements

K/S #	KNOWLEDGE/SKILL STATEMENT
50	Knowledge of site design principles and practices.
51	Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.
52	Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.
53	Knowledge of relationship between constructability and aesthetics.
54	Knowledge of accepted specifications for building materials and methods of construction, e.g., ASTM, ANSI.
55	Knowledge of methods to perform life cycle cost analysis.
56	Knowledge of principles of value analysis and value engineering processes.
57	Knowledge of procedures and protocols of permit approval process.
58	Knowledge of principles of historic preservation.
59	Knowledge of leadership skills necessary to create quality management processes.
60	Knowledge of processes and procedures for building commissioning.
61	Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).
62	Knowledge of methods and tools for space planning.
63	Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.
64	Knowledge of factors that impact construction management services.
65	Knowledge of fee structures, their attributes and implications for schedule, scope and profit.
66	Knowledge of methods to analyze project and business costs to establish fees and internal project budget.
67	Knowledge of consultant agreements and fee structures.
68	Knowledge of different building and construction types and their implications on design and construction schedules.
69	Knowledge of scheduling methods to establish project time frames based on standard sequences of architectural operations in each phase.
70	Knowledge of business development strategies.
71	Knowledge of relationship between project scope and consultant capabilities to assemble project team.
72	Knowledge of relationships between staffing capabilities and hours, and internal project budget, to meet milestones and profitability.
73	Knowledge of purposes and types of professional liability insurance related to architectural practice.
74	Knowledge of format and protocols for efficient meeting management and information distribution.

K/S #	KNOWLEDGE/SKILL STATEMENT
75	Knowledge of strategies to assess project progress and verify its alignment with project schedule.
76	Knowledge of ways to translate project goals into specific tasks and measurable design criteria.
77	Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.
78	Knowledge of formats and protocols to produce and distribute field reports to document construction progress.
79	Knowledge of site requirements for a specific building types to determine client's site needs.
80	Knowledge of site analysis techniques to determine project parameters affecting design.
81	Knowledge of methods to prioritize or objectively evaluate design options based on project goals.
82	Knowledge of sustainability strategies and/or rating systems.
83	Knowledge of sustainability considerations related to building materials and construction processes.
84	Knowledge of techniques to integrate renewable energy systems into building design.
85	Knowledge of methods to identify scope changes that may require additional services.
86	Skill in processing requests for additional services.
87	Knowledge of appropriate documentation level required for construction documents.
88	Knowledge of close-out document requirements and protocols.
89	Knowledge of construction document technologies and their standards and applications.
90	Knowledge of building information modeling (BIM) and its impact on planning, financial management, and construction documentation.
91	Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.
92	Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.
93	Knowledge of techniques to integrate model contract forms and documents.
94	Knowledge of benefits and limitations of software for construction documentation.
95	Knowledge of methods for production of construction documentation and drawings.
96	Knowledge of standard methods for production of design development documentation.
97	Knowledge of standard methods for production of site plan documentation.

CONTINUED

Data Table E1. List of all CE Survey Knowledge/Skill (K/S) Statements

K/S #	KNOWLEDGE/SKILL STATEMENT
98	Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.
99	Knowledge of materials testing processes and protocols to be performed during the construction process.
100	Knowledge of building systems testing processes and protocols to be performed during the construction process.
101	Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.
102	Knowledge of protocols for responding to Requests for Information (RFI).
103	Knowledge of roles, responsibilities and authorities of project team members during construction.
104	Knowledge of conflict resolution techniques and their applications throughout project.
105	Knowledge of bidding processes and protocols for different project delivery methods and their applications.
106	Knowledge of requirements for post-occupancy evaluation.
107	Knowledge of project risks for new and innovative products, materials, methods and technologies.
108	Knowledge of design decisions and their impact on constructability.
109	Knowledge of interpersonal skills necessary to elicit client needs and desired scope of services.
110	Knowledge of marketing planning and strategies to procure business.
111	Knowledge of requirements of Intern Development Program (IDP).
112	Knowledge of techniques for staff development in architectural firms.

K/S #	KNOWLEDGE/SKILL STATEMENT
113	Knowledge of methods to manage human resources.
114	Knowledge of state board guidelines for licensing and professional practice.
115	Knowledge of strategies to create positive work environment that builds trust and encourages cooperation and teamwork.
116	Knowledge of principles of universal design.
117	Knowledge of purposes of and legal implications for different types of business entities.
118	Knowledge of innovative and evolving technologies and their impact on architectural practice.
119	Knowledge of training programs for professional development.
120	Knowledge of community and public service organizations which offer opportunities for design and construction services.
121	Knowledge of ethical standards relevant to architectural practice.
122	Knowledge of techniques to match staff skills sets with project tasks.
123	Knowledge of methods to facilitate information management in building design and construction.
124	Knowledge of factors involved conducting an architectural practice in international markets.
125	Knowledge of components of standard business plan, e.g., revenue projection, staffing plan, overhead, profit plan.
126	Knowledge of methods and procedures for risk management.
127	Knowledge of financial planning methods to manage revenues, staffing and overhead expenses.

Data Table E2. Percentage Distributions of Ratings on CE Needs for Knowledge/Skills

Survey Population: Licensed architects

KNOWLEDGE/SKILL STATEMENT	CE Need						
	LEARN BASIC CONCEPTS AND APPLICATIONS	KEEP CURRENT	EXPAND TO ADVANCED LEVEL	DO NOT NEED — CURRENT LEVEL SUFFICIENT	DO NOT NEED — KNOWLEDGE NOT CRITICAL	PERCENT NEEDED	TOTAL N
1. Knowledge of oral, written, and visual presentation techniques to communicate project information.	2.0%	29.9%	24.7%	40.9%	2.5%	56.6%	855
2. Knowledge of master plans and their impact on building design.	3.9%	28.9%	21.4%	41.2%	4.7%	54.2%	855
3. Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.	3.3%	29.4%	31.3%	33.5%	2.6%	64.0%	855
4. Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.	2.6%	28.8%	26.7%	38.5%	3.5%	58.0%	855
5. Knowledge of client and project characteristics that influence contract agreements.	4.1%	34.4%	28.9%	29.7%	2.9%	67.4%	855
6. Knowledge of types of contracts and their designated uses.	3.3%	38.0%	28.9%	26.4%	3.4%	70.2%	855
7. Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.	3.4%	39.3%	22.3%	31.9%	3.0%	65.0%	855
8. Knowledge of effects of specific findings from feasibility studies on building design.	4.8%	34.3%	25.3%	31.3%	4.3%	64.3%	855
9. Knowledge of factors involved in selection of building systems and components.	1.3%	44.3%	32.4%	21.1%	0.9%	78.0%	855
10. Knowledge of effect of environmental factors on site development.	2.6%	43.2%	32.4%	20.6%	1.3%	78.1%	855
11. Knowledge of environmental policies and regulations and their implications for proposed construction.	3.7%	45.0%	36.6%	12.5%	2.1%	85.4%	855
12. Knowledge of processes involved in conducting a survey of existing conditions.	3.7%	35.7%	18.6%	38.9%	3.0%	58.0%	855
13. Knowledge of effects of specific findings from environmental impact studies on building design.	5.6%	41.8%	30.9%	18.4%	3.4%	78.2%	855
14. Skill in designing facility layout and site plan that meets site constraints.	2.1%	35.3%	15.2%	44.3%	3.0%	52.6%	855
15. Knowledge of methods required to mitigate adverse site conditions.	3.9%	40.1%	32.0%	21.2%	2.8%	76.0%	855
16. Knowledge of elements and processes for conducting a site analysis.	4.2%	37.2%	22.2%	33.8%	2.6%	63.6%	855
17. Knowledge of codes of professional conduct as related to architectural practice.	2.2%	44.7%	15.8%	35.3%	2.0%	62.7%	855
18. Knowledge of protocols and procedures for conducting a building code analysis.	2.0%	44.1%	23.4%	29.6%	0.9%	69.5%	855
19. Knowledge of building codes and their impact on building design.	0.9%	51.2%	22.8%	24.0%	1.1%	75.0%	855
20. Knowledge of land use codes and ordinances that govern land use decisions.	3.7%	46.0%	25.6%	21.4%	3.3%	75.3%	855
21. Skill in producing hand drawings of design ideas.	1.9%	20.2%	9.6%	60.9%	7.4%	31.7%	855
22. Skill in producing two-dimensional (2-D) drawings using hand methods.	1.6%	18.0%	6.1%	64.7%	9.6%	25.7%	855

Total N = number of respondents

CONTINUED

Data Table E2. Percentage Distributions of Ratings on CE Needs for Knowledge/Skills

Survey Population: Licensed architects

KNOWLEDGE/SKILL STATEMENT	CE Need						
	LEARN BASIC CONCEPTS AND APPLICATIONS	KEEP CURRENT	EXPAND TO ADVANCED LEVEL	DO NOT NEED — CURRENT LEVEL SUFFICIENT	DO NOT NEED — KNOWLEDGE NOT CRITICAL	PERCENT NEEDED	TOTAL N
23. Skill in using software to produce two-dimensional (2-D) drawings.	7.4%	27.5%	18.2%	39.4%	7.5%	53.1%	855
24. Skill in using software to produce three-dimensional (3-D) models of building design.	17.1%	18.1%	40.2%	11.9%	12.6%	75.4%	855
25. Skill in producing physical scale models.	2.5%	12.3%	5.3%	49.2%	30.8%	20.0%	855
26. Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	22.7%	18.2%	40.4%	5.8%	12.9%	81.3%	855
27. Knowledge of protocols and procedures for obtaining community input for proposed design.	8.0%	33.6%	23.2%	28.8%	6.5%	64.7%	855
28. Knowledge of factors involved in selecting project appropriate computer based design technologies.	10.6%	34.6%	22.1%	20.4%	12.3%	67.4%	855
29. Knowledge of engineering properties of soils and their effect on building foundations and building design.	6.3%	40.8%	22.2%	25.5%	5.1%	69.4%	855
30. Knowledge of factors to be considered in adaptive reuse of existing buildings and materials.	4.8%	41.6%	26.5%	24.8%	2.2%	73.0%	855
31. Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.	1.5%	48.1%	33.0%	16.6%	0.8%	82.6%	855
32. Knowledge of effect of thermal envelope in design of building systems.	2.0%	45.4%	34.3%	17.2%	1.2%	81.6%	855
33. Knowledge of principles of integrated project design.	8.4%	35.9%	27.8%	21.4%	6.4%	72.2%	855
34. Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.	4.9%	37.2%	29.0%	25.8%	3.0%	71.1%	855
35. Knowledge of engineering principles and their application to design and construction.	2.9%	46.9%	20.2%	28.5%	1.4%	70.1%	855
36. Knowledge of structural properties of construction products, materials and assemblies and their impact on building design and construction.	2.7%	48.0%	20.8%	27.3%	1.3%	71.5%	855
37. Knowledge of means and methods for building construction.	2.0%	48.0%	20.8%	27.8%	1.4%	70.8%	855
38. Knowledge of benefits and limitations of fast track or other forms of construction delivery methods.	4.7%	40.1%	19.3%	30.2%	5.7%	64.1%	855
39. Knowledge of methods and techniques for estimating construction costs.	5.3%	38.6%	26.0%	24.3%	5.8%	69.8%	855
40. Knowledge of structural load and load conditions that affect building design.	4.6%	40.6%	20.0%	30.6%	4.2%	65.1%	855
41. Knowledge of energy codes that impact construction.	4.0%	45.7%	35.6%	12.6%	2.1%	85.3%	855
42. Knowledge of methods and strategies for evidence based design (EBD).	28.1%	24.8%	29.6%	7.1%	10.4%	82.5%	855
43. Knowledge of impact of design on human behavior.	8.1%	39.2%	25.7%	20.8%	6.2%	73.0%	855
44. Knowledge of functional requirements of all building systems.	3.5%	48.2%	22.7%	24.1%	1.5%	74.4%	855
45. Knowledge of hazardous materials mitigation at building site.	11.0%	40.7%	24.0%	17.7%	6.7%	75.7%	855
46. Knowledge of principles of building operation and function.	5.7%	44.9%	17.4%	28.3%	3.6%	68.1%	855

Total N = number of respondents

CONTINUED

CE Survey

Data Table E2. Percentage Distributions of Ratings on CE Needs for Knowledge/Skills

Survey Population: Licensed architects

KNOWLEDGE/SKILL STATEMENT	CE Need						
	LEARN BASIC CONCEPTS AND APPLICATIONS	KEEP CURRENT	EXPAND TO ADVANCED LEVEL	DO NOT NEED — CURRENT LEVEL SUFFICIENT	DO NOT NEED — KNOWLEDGE NOT CRITICAL	PERCENT NEEDED	TOTAL N
47. Knowledge of content and format of specifications.	2.3%	42.5%	19.3%	33.6%	2.3%	64.1%	855
48. Knowledge of principles of interior design and their influences on building design.	4.7%	39.9%	13.9%	35.8%	5.7%	58.5%	855
49. Knowledge of principles of landscape design and their influences on building design.	8.2%	38.9%	17.7%	29.1%	6.1%	64.8%	855
50. Knowledge of site design principles and practices.	3.9%	42.3%	15.8%	35.2%	2.8%	62.0%	855
51. Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.	2.2%	38.6%	17.4%	39.3%	2.5%	58.2%	855
52. Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.	4.4%	38.4%	21.1%	31.2%	4.9%	63.9%	855
53. Knowledge of relationship between constructability and aesthetics.	1.8%	40.0%	14.0%	42.2%	2.0%	55.8%	855
54. Knowledge of accepted specifications for building materials and methods of construction, e.g., ASTM, ANSI.	4.0%	46.3%	23.3%	23.9%	2.6%	73.6%	855
55. Knowledge of methods to perform life cycle cost analysis.	12.5%	30.8%	34.5%	13.9%	8.3%	77.8%	855
56. Knowledge of principles of value analysis and value engineering processes.	8.0%	37.8%	25.8%	23.4%	5.0%	71.6%	855
57. Knowledge of procedures and protocols of permit approval process.	3.5%	44.1%	12.1%	37.8%	2.5%	59.7%	854
58. Knowledge of principles of historic preservation.	10.7%	31.9%	22.1%	24.2%	11.1%	64.6%	854
59. Knowledge of leadership skills necessary to create quality management processes.	5.7%	33.0%	26.6%	28.7%	6.0%	65.3%	854
60. Knowledge of processes and procedures for building commissioning.	17.1%	31.6%	28.3%	14.4%	8.5%	77.0%	854
61. Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).	7.8%	33.9%	13.7%	29.4%	15.2%	55.4%	855
62. Knowledge of methods and tools for space planning.	4.0%	36.6%	12.9%	40.5%	6.1%	53.5%	855
63. Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.	4.4%	41.2%	22.0%	27.6%	4.8%	67.6%	855
64. Knowledge of factors that impact construction management services.	6.7%	39.2%	22.3%	23.5%	8.3%	68.2%	855
65. Knowledge of fee structures, their attributes and implications for schedule, scope and profit.	7.4%	33.7%	27.8%	26.8%	4.3%	68.9%	855
66. Knowledge of methods to analyze project and business costs to establish fees and internal project budget.	7.7%	32.4%	29.9%	24.8%	5.1%	70.1%	855
67. Knowledge of consultant agreements and fee structures.	6.9%	35.6%	24.2%	29.9%	3.4%	66.7%	855
68. Knowledge of different building and construction types and their implications on design and construction schedules.	3.6%	42.5%	23.7%	27.7%	2.5%	69.8%	855
69. Knowledge of scheduling methods to establish project time frames based on standard sequences of architectural operations in each phase.	6.1%	37.2%	20.9%	32.0%	3.7%	64.2%	855

Total N = number of respondents

CONTINUED

Data Table E2. Percentage Distributions of Ratings on CE Needs for Knowledge/Skills

Survey Population: Licensed architects

KNOWLEDGE/SKILL STATEMENT	CE Need						
	LEARN BASIC CONCEPTS AND APPLICATIONS	KEEP CURRENT	EXPAND TO ADVANCED LEVEL	DO NOT NEED — CURRENT LEVEL SUFFICIENT	DO NOT NEED — KNOWLEDGE NOT CRITICAL	PERCENT NEEDED	TOTAL N
70. Knowledge of business development strategies.	10.1%	29.8%	32.0%	19.9%	8.2%	71.9%	855
71. Knowledge of relationship between project scope and consultant capabilities to assemble project team.	5.8%	35.8%	16.6%	37.5%	4.2%	58.2%	855
72. Knowledge of relationships between staffing capabilities and hours, and internal project budget, to meet milestones and profitability.	7.1%	30.6%	22.6%	31.6%	8.1%	60.4%	855
73. Knowledge of purposes and types of professional liability insurance related to architectural practice.	9.9%	36.3%	25.4%	21.8%	6.7%	71.6%	855
74. Knowledge of format and protocols for efficient meeting management and information distribution.	5.3%	35.3%	18.4%	34.9%	6.2%	58.9%	855
75. Knowledge of strategies to assess project progress and verify its alignment with project schedule.	5.4%	36.1%	19.8%	34.2%	4.6%	61.3%	855
76. Knowledge of ways to translate project goals into specific tasks and measurable design criteria.	6.4%	33.7%	20.4%	34.4%	5.1%	60.5%	855
77. Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.	3.4%	35.1%	22.3%	36.7%	2.5%	60.8%	855
78. Knowledge of formats and protocols to produce and distribute field reports to document construction progress.	3.5%	34.5%	15.2%	42.0%	4.8%	53.2%	855
79. Knowledge of site requirements for a specific building types to determine client's site needs.	2.8%	40.7%	17.9%	34.5%	4.1%	61.4%	855
80. Knowledge of site analysis techniques to determine project parameters affecting design.	3.5%	39.8%	17.5%	35.7%	3.5%	60.8%	855
81. Knowledge of methods to prioritize or objectively evaluate design options based on project goals.	3.7%	35.9%	17.0%	40.0%	3.4%	56.6%	855
82. Knowledge of sustainability strategies and/or rating systems.	5.6%	42.2%	31.5%	15.8%	4.9%	79.3%	855
83. Knowledge of sustainability considerations related to building materials and construction processes.	4.7%	43.0%	31.8%	16.5%	4.0%	79.5%	855
84. Knowledge of techniques to integrate renewable energy systems into building design.	8.7%	39.6%	35.9%	11.1%	4.7%	84.2%	855
85. Knowledge of methods to identify scope changes that may require additional services.	2.8%	34.7%	17.8%	42.1%	2.6%	55.3%	855
86. Skill in processing requests for additional services.	5.4%	29.8%	20.7%	41.1%	3.0%	55.9%	855
87. Knowledge of appropriate documentation level required for construction documents.	1.2%	36.3%	15.6%	45.8%	1.2%	53.0%	855
88. Knowledge of close-out document requirements and protocols.	5.8%	37.4%	15.9%	37.5%	3.3%	59.2%	855
89. Knowledge of construction document technologies and their standards and applications.	3.3%	43.9%	14.7%	35.6%	2.6%	61.9%	855
90. Knowledge of building information modeling (BIM) and its impact on planning, financial management, and construction documentation.	18.9%	26.0%	34.9%	9.2%	11.0%	79.8%	855
91. Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.	6.1%	37.8%	19.8%	30.9%	5.5%	63.6%	855

Total N = number of respondents

CONTINUED

Data Table E2. Percentage Distributions of Ratings on CE Needs for Knowledge/Skills

Survey Population: Licensed architects

KNOWLEDGE/SKILL STATEMENT	CE Need						
	LEARN BASIC CONCEPTS AND APPLICATIONS	KEEP CURRENT	EXPAND TO ADVANCED LEVEL	DO NOT NEED — CURRENT LEVEL SUFFICIENT	DO NOT NEED — KNOWLEDGE NOT CRITICAL	PERCENT NEEDED	TOTAL N
92. Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.	4.1%	45.7%	16.1%	28.7%	5.4%	66.0%	855
93. Knowledge of techniques to integrate model contract forms and documents.	7.5%	38.9%	18.8%	28.7%	6.1%	65.3%	855
94. Knowledge of benefits and limitations of software for construction documentation.	5.6%	44.7%	17.8%	26.0%	6.0%	68.1%	855
95. Knowledge of methods for production of construction documentation and drawings.	3.0%	41.4%	15.1%	37.5%	2.9%	59.5%	855
96. Knowledge of standard methods for production of design development documentation.	1.8%	38.4%	10.3%	47.1%	2.5%	50.4%	855
97. Knowledge of standard methods for production of site plan documentation.	3.4%	39.2%	10.8%	41.9%	4.8%	53.3%	855
98. Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.	4.7%	37.0%	21.5%	34.2%	2.7%	63.2%	855
99. Knowledge of materials testing processes and protocols to be performed during the construction process.	5.8%	42.6%	22.0%	26.8%	2.8%	70.4%	855
100. Knowledge of building systems testing processes and protocols to be performed during the construction process.	7.1%	41.3%	21.5%	25.4%	4.7%	69.9%	855
101. Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	2.2%	35.0%	11.9%	48.1%	2.8%	49.1%	855
102. Knowledge of protocols for responding to Requests for Information (RFI).	2.9%	33.1%	10.6%	50.6%	2.7%	46.7%	855
103. Knowledge of roles, responsibilities and authorities of project team members during construction.	2.7%	33.3%	10.2%	51.2%	2.6%	46.2%	855
104. Knowledge of conflict resolution techniques and their applications throughout project.	6.3%	36.0%	26.2%	28.5%	2.9%	68.5%	855
105. Knowledge of bidding processes and protocols for different project delivery methods and their applications.	3.9%	40.5%	18.5%	33.8%	3.4%	62.8%	855
106. Knowledge of requirements for post-occupancy evaluation.	10.3%	32.9%	25.6%	23.4%	7.8%	68.8%	855
107. Knowledge of project risks for new and innovative products, materials, methods and technologies.	6.8%	43.2%	32.5%	15.1%	2.5%	82.5%	855
108. Knowledge of design decisions and their impact on constructability.	1.5%	40.4%	17.8%	39.1%	1.3%	59.6%	855
109. Knowledge of interpersonal skills necessary to elicit client needs and desired scope of services.	2.5%	34.6%	20.8%	39.3%	2.8%	57.9%	855
110. Knowledge of marketing planning and strategies to procure business.	7.5%	28.8%	32.6%	22.3%	8.8%	68.9%	855
111. Knowledge of requirements of Intern Development Program (IDP).	8.4%	32.9%	14.7%	22.7%	21.3%	56.0%	855
112. Knowledge of techniques for staff development in architectural firms.	8.5%	30.9%	19.9%	27.0%	13.7%	59.3%	855
113. Knowledge of methods to manage human resources.	9.9%	29.6%	19.2%	26.7%	14.6%	58.7%	855

Total N = number of respondents

CONTINUED

CE Survey

Data Table E2. Percentage Distributions of Ratings on CE Needs for Knowledge/Skills

Survey Population: Licensed architects

KNOWLEDGE/SKILL STATEMENT	CE Need						
	LEARN BASIC CONCEPTS AND APPLICATIONS	KEEP CURRENT	EXPAND TO ADVANCED LEVEL	DO NOT NEED — CURRENT LEVEL SUFFICIENT	DO NOT NEED — KNOWLEDGE NOT CRITICAL	PERCENT NEEDED	TOTAL N
114. Knowledge of state board guidelines for licensing and professional practice.	2.9%	45.1%	9.1%	37.9%	4.9%	57.2%	855
115. Knowledge of strategies to create positive work environment that builds trust and encourages cooperation and teamwork.	4.8%	34.6%	21.9%	32.4%	6.3%	61.3%	855
116. Knowledge of principles of universal design.	8.1%	41.9%	21.6%	22.3%	6.1%	71.6%	855
117. Knowledge of purposes of and legal implications for different types of business entities.	11.5%	31.9%	22.1%	22.2%	12.3%	65.5%	855
118. Knowledge of innovative and evolving technologies and their impact on architectural practice.	4.7%	49.9%	31.8%	10.2%	3.4%	86.4%	855
119. Knowledge of training programs for professional development.	6.9%	46.1%	18.5%	19.6%	8.9%	71.5%	855
120. Knowledge of community and public service organizations which offer opportunities for design and construction services.	9.9%	34.9%	20.4%	19.3%	15.6%	65.1%	855
121. Knowledge of ethical standards relevant to architectural practice.	2.9%	43.2%	12.5%	39.1%	2.3%	58.6%	855
122. Knowledge of techniques to match staff skills sets with project tasks.	6.5%	30.5%	16.3%	37.9%	8.8%	53.3%	855
123. Knowledge of methods to facilitate information management in building design and construction.	6.5%	40.5%	22.7%	25.0%	5.3%	69.7%	855
124. Knowledge of factors involved conducting an architectural practice in international markets.	20.7%	12.6%	19.2%	8.3%	39.2%	52.5%	855
125. Knowledge of components of standard business plan, e.g., revenue projection, staffing plan, overhead, profit plan.	11.3%	25.6%	26.9%	23.7%	12.4%	63.9%	855
126. Knowledge of methods and procedures for risk management.	9.9%	33.8%	29.6%	19.9%	6.8%	73.3%	855
127. Knowledge of financial planning methods to manage revenues, staffing and overhead expenses.	12.3%	25.8%	27.1%	22.8%	11.9%	65.3%	855
MEAN	5.9%	37.0%	22.2%	29.3%	5.6%	65.1%	855.0
MIN	0.9%	12.3%	5.3%	5.8%	0.8%	20.0%	854
MAX	28.1%	51.2%	40.4%	64.7%	39.2%	86.4%	855

Total N = number of respondents

CONTINUED

CE Survey

Data Table E3. Percentage Distribution of Ratings for Whether Knowledge/Skills Are Essential to Ability to Protect the Public HSW

Survey Population: Licensed architects

KNOWLEDGE/SKILL STATEMENT	Essential to Ability to Protect Public HSW		
	NO	YES	TOTAL N
1. Knowledge of oral, written, and visual presentation techniques to communicate project information.	71.9%	28.1%	855
2. Knowledge of master plans and their impact on building design.	68.5%	31.5%	855
3. Knowledge of method for project controls, e.g., scope of services, budget, billing, compensation.	79.8%	20.2%	855
4. Knowledge of strategies for delegating and monitoring task assignments, accountability and deadlines for project team.	80.7%	19.3%	855
5. Knowledge of client and project characteristics that influence contract agreements.	75.8%	24.2%	855
6. Knowledge of types of contracts and their designated uses.	77.1%	22.9%	855
7. Knowledge of standard forms of architectural service agreements for Owner-Architect, Architect-Consultant and Owner-Contractor.	68.0%	32.0%	855
8. Knowledge of effects of specific findings from feasibility studies on building design.	76.4%	23.6%	855
9. Knowledge of factors involved in selection of building systems and components.	38.8%	61.2%	855
10. Knowledge of effect of environmental factors on site development.	46.5%	53.5%	855
11. Knowledge of environmental policies and regulations and their implications for proposed construction.	45.7%	54.3%	855
12. Knowledge of processes involved in conducting a survey of existing conditions.	59.5%	40.5%	855
13. Knowledge of effects of specific findings from environmental impact studies on building design.	50.3%	49.7%	855
14. Skill in designing facility layout and site plan that meets site constraints.	58.1%	41.9%	855
15. Knowledge of methods required to mitigate adverse site conditions.	49.4%	50.6%	855
16. Knowledge of elements and processes for conducting a site analysis.	62.5%	37.5%	855
17. Knowledge of codes of professional conduct as related to architectural practice.	52.2%	47.8%	855
18. Knowledge of protocols and procedures for conducting a building code analysis.	25.4%	74.6%	855
19. Knowledge of building codes and their impact on building design.	34.3%	65.7%	855
20. Knowledge of land use codes and ordinances that govern land use decisions.	49.7%	50.3%	855
21. Skill in producing hand drawings of design ideas.	89.1%	10.9%	855
22. Skill in producing two-dimensional (2-D) drawings using hand methods.	88.2%	11.8%	855
23. Skill in using software to produce two-dimensional (2-D) drawings.	89.1%	10.9%	855
24. Skill in using software to produce three-dimensional (3-D) models of building design.	86.8%	13.2%	855
25. Skill in producing physical scale models.	85.0%	15.0%	855
26. Skill in use of building information modeling (BIM) to develop and manage databases of building and construction information.	76.0%	24.0%	855
27. Knowledge of protocols and procedures for obtaining community input for proposed design.	92.9%	7.1%	855
28. Knowledge of factors involved in selecting project appropriate computer based design technologies.	95.6%	4.4%	855
29. Knowledge of engineering properties of soils and their effect on building foundations and building design.	39.6%	60.4%	855
30. Knowledge of factors to be considered in adaptive reuse of existing buildings and materials.	31.8%	68.2%	855
31. Knowledge of building technologies which provide solutions for comfort, life safety and energy efficiency.	42.7%	57.3%	855
32. Knowledge of effect of thermal envelope in design of building systems.	57.0%	43.0%	855
33. Knowledge of principles of integrated project design.	78.2%	21.8%	855
34. Knowledge of strategies for anticipating, managing and preventing disputes and conflicts.	45.5%	54.5%	855
35. Knowledge of engineering principles and their application to design and construction.	37.9%	62.1%	855

Total N = number of respondents

CONTINUED

CE Survey

Data Table E3. Percentage Distribution of Ratings for Whether Knowledge/Skills Are Essential to Ability to Protect the Public HSW

Survey Population: Licensed architects

KNOWLEDGE/SKILL STATEMENT	Essential to Ability to Protect Public HSW		
	NO	YES	TOTAL N
36. Knowledge of structural properties of construction products, materials and assemblies and their impact on building design and construction.	80.5%	19.5%	855
37. Knowledge of means and methods for building construction.	52.9%	47.1%	855
38. Knowledge of benefits and limitations of fast track or other forms of construction delivery methods.	78.8%	21.2%	855
39. Knowledge of methods and techniques for estimating construction costs.	84.7%	15.3%	855
40. Knowledge of structural load and load conditions that affect building design.	38.6%	61.4%	855
41. Knowledge of energy codes that impact construction.	49.8%	50.2%	855
42. Knowledge of methods and strategies for evidence based design (EBD).	61.9%	38.1%	855
43. Knowledge of impact of design on human behavior.	51.5%	48.5%	855
44. Knowledge of functional requirements of all building systems.	81.9%	18.1%	855
45. Knowledge of hazardous materials mitigation at building site.	40.8%	59.2%	855
46. Knowledge of principles of building operation and function.	64.4%	35.6%	855
47. Knowledge of content and format of specifications.	68.9%	31.1%	855
48. Knowledge of principles of interior design and their influences on building design.	74.6%	25.4%	855
49. Knowledge of principles of landscape design and their influences on building design.	66.4%	33.6%	855
50. Knowledge of site design principles and practices.	70.9%	29.1%	855
51. Knowledge of techniques for architectural programming to identify functional and operational requirements of scope of work.	79.1%	20.9%	855
52. Knowledge of procedures to develop project scheduling, phasing and deliverables for various building types.	85.5%	14.5%	855
53. Knowledge of relationship between constructability and aesthetics.	73.7%	26.3%	855
54. Knowledge of accepted specifications for building materials and methods of construction, e.g., ASTM, ANSI.	59.5%	40.5%	855
55. Knowledge of methods to perform life cycle cost analysis.	78.9%	21.1%	855
56. Knowledge of principles of value analysis and value engineering processes.	80.9%	19.1%	855
57. Knowledge of procedures and protocols of permit approval process.	71.2%	28.8%	855
58. Knowledge of principles of historic preservation.	80.2%	19.8%	855
59. Knowledge of leadership skills necessary to create quality management processes.	73.1%	26.9%	855
60. Knowledge of processes and procedures for building commissioning.	88.3%	11.7%	855
61. Knowledge of design factors to consider in selecting furniture, fixtures and equipment (FFE).	83.7%	16.3%	855
62. Knowledge of methods and tools for space planning.	79.1%	20.9%	855
63. Knowledge of different project delivery methods and their impacts on project schedule, costs and project goals.	84.8%	15.2%	855
64. Knowledge of factors that impact construction management services.	86.7%	13.3%	855
65. Knowledge of fee structures, their attributes and implications for schedule, scope and profit.	68.5%	31.5%	855
66. Knowledge of methods to analyze project and business costs to establish fees and internal project budget.	90.3%	9.7%	855
67. Knowledge of consultant agreements and fee structures.	91.0%	9.0%	855
68. Knowledge of different building and construction types and their implications on design and construction schedules.	90.1%	9.9%	855
69. Knowledge of scheduling methods to establish project time frames based on standard sequences of architectural operations in each phase.	86.3%	13.7%	855
70. Knowledge of business development strategies.	73.0%	27.0%	855

Total N = number of respondents

CONTINUED

Data Table E3. Percentage Distribution of Ratings for Whether Knowledge/Skills Are Essential to Ability to Protect the Public HSW

Survey Population: Licensed architects

KNOWLEDGE/SKILL STATEMENT	Essential to Ability to Protect Public HSW		
	NO	YES	TOTAL N
71. Knowledge of relationship between project scope and consultant capabilities to assemble project team.	89.9%	10.1%	855
72. Knowledge of relationships between staffing capabilities and hours, and internal project budget, to meet milestones and profitability.	84.8%	15.2%	855
73. Knowledge of purposes and types of professional liability insurance related to architectural practice.	92.6%	7.4%	855
74. Knowledge of format and protocols for efficient meeting management and information distribution.	92.5%	7.5%	855
75. Knowledge of strategies to assess project progress and verify its alignment with project schedule.	90.9%	9.1%	855
76. Knowledge of ways to translate project goals into specific tasks and measurable design criteria.	82.0%	18.0%	855
77. Knowledge of effective communication techniques to educate client with respect to roles and responsibilities of all parties.	72.9%	27.1%	855
78. Knowledge of formats and protocols to produce and distribute field reports to document construction progress.	88.5%	11.5%	855
79. Knowledge of site requirements for a specific building types to determine client's site needs.	83.2%	16.8%	855
80. Knowledge of site analysis techniques to determine project parameters affecting design.	72.9%	27.1%	855
81. Knowledge of methods to prioritize or objectively evaluate design options based on project goals.	70.1%	29.9%	855
82. Knowledge of sustainability strategies and/or rating systems.	65.6%	34.4%	855
83. Knowledge of sustainability considerations related to building materials and construction processes.	80.7%	19.3%	855
84. Knowledge of techniques to integrate renewable energy systems into building design.	69.6%	30.4%	855
85. Knowledge of methods to identify scope changes that may require additional services.	69.4%	30.6%	855
86. Skill in processing requests for additional services.	90.2%	9.8%	855
87. Knowledge of appropriate documentation level required for construction documents.	93.3%	6.7%	855
88. Knowledge of close-out document requirements and protocols.	81.4%	18.6%	855
89. Knowledge of construction document technologies and their standards and applications.	88.2%	11.8%	855
90. Knowledge of building information modeling (BIM) and its impact on planning, financial management, and construction documentation.	83.7%	16.3%	855
91. Knowledge of principles of computer assisted design and drafting (CADD) software and its uses in communicating design ideas.	88.9%	11.1%	855
92. Knowledge of American Institute of Architects (AIA) guidelines for contract agreements.	85.5%	14.5%	855
93. Knowledge of techniques to integrate model contract forms and documents.	90.2%	9.8%	855
94. Knowledge of benefits and limitations of software for construction documentation.	89.2%	10.8%	855
95. Knowledge of methods for production of construction documentation and drawings.	83.3%	16.7%	855
96. Knowledge of standard methods for production of design development documentation.	85.8%	14.2%	855
97. Knowledge of standard methods for production of site plan documentation.	85.8%	14.2%	855
98. Knowledge of circumstances warranting further actions based on field reports, third party inspections and test results.	63.9%	36.1%	855
99. Knowledge of materials testing processes and protocols to be performed during the construction process.	59.2%	40.8%	855
100. Knowledge of building systems testing processes and protocols to be performed during the construction process.	60.9%	39.1%	855
101. Knowledge of formats and protocols to process shop drawings and submittals to ensure they meet design intent.	68.0%	32.0%	855
102. Knowledge of protocols for responding to Requests for Information (RFI).	78.5%	21.5%	855
103. Knowledge of roles, responsibilities and authorities of project team members during construction.	77.3%	22.7%	855
104. Knowledge of conflict resolution techniques and their applications throughout project.	79.2%	20.8%	855
105. Knowledge of bidding processes and protocols for different project delivery methods and their applications.	58.4%	41.6%	855

Total N = number of respondents

CONTINUED

CE Survey

Data Table E3. Percentage Distribution of Ratings for Whether Knowledge/Skills Are Essential to Ability to Protect the Public HSW

Survey Population: Licensed architects

KNOWLEDGE/SKILL STATEMENT	Essential to Ability to Protect Public HSW		
	NO	YES	TOTAL N
106. Knowledge of requirements for post-occupancy evaluation.	84.6%	15.4%	855
107. Knowledge of project risks for new and innovative products, materials, methods and technologies.	86.0%	14.0%	855
108. Knowledge of design decisions and their impact on constructability.	66.2%	33.8%	855
109. Knowledge of interpersonal skills necessary to elicit client needs and desired scope of services.	85.8%	14.2%	855
110. Knowledge of marketing planning and strategies to procure business.	94.0%	6.0%	855
111. Knowledge of requirements of Intern Development Program (IDP).	90.2%	9.8%	855
112. Knowledge of techniques for staff development in architectural firms.	78.6%	21.4%	855
113. Knowledge of methods to manage human resources.	90.8%	9.2%	855
114. Knowledge of state board guidelines for licensing and professional practice.	94.0%	6.0%	855
115. Knowledge of strategies to create positive work environment that builds trust and encourages cooperation and teamwork.	91.7%	8.3%	855
116. Knowledge of principles of universal design.	73.3%	26.7%	855
117. Knowledge of purposes of and legal implications for different types of business entities.	89.5%	10.5%	855
118. Knowledge of innovative and evolving technologies and their impact on architectural practice.	75.9%	24.1%	855
119. Knowledge of training programs for professional development.	86.7%	13.3%	855
120. Knowledge of community and public service organizations which offer opportunities for design and construction services.	85.0%	15.0%	855
121. Knowledge of ethical standards relevant to architectural practice.	75.3%	24.7%	855
122. Knowledge of techniques to match staff skills sets with project tasks.	91.5%	8.5%	855
123. Knowledge of methods to facilitate information management in building design and construction.	90.4%	9.6%	855
124. Knowledge of factors involved conducting an architectural practice in international markets.	94.7%	5.3%	855
125. Knowledge of components of standard business plan, e.g., revenue projection, staffing plan, overhead, profit plan.	91.7%	8.3%	855
126. Knowledge of methods and procedures for risk management.	86.7%	13.3%	855
127. Knowledge of financial planning methods to manage revenues, staffing and overhead expenses.	94.9%	5.1%	855
MEAN	74.6%	25.4%	855.0
MIN	25.4%	4.4%	855
MAX	95.6%	74.6%	855

Total N = number of respondents

CONTRIBUTORS

The *2012 NCARB Practice Analysis of Architecture* is the most comprehensive study of the profession ever undertaken by the Council. The extensive endeavor included a multi-year effort to research, plan, design, and conduct a study that would strategically support all four major NCARB program areas – education, internship, examination, and continuing education. Well over 100 NCARB volunteers answered the call to participate; many served in multiple capacities. This team, led by numerous NCARB staff members and consultants, devoted thousands of hours in support of the Practice Analysis and the profession. Their contribution is deeply appreciated.

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APPENDICES

APPENDIX A: **NCARB 2012 FOCUS GROUP REPORT**

In an effort to broaden the basis of the *2012 NCARB Practice Analysis of Architecture*, a series of focus groups were conducted with nine allied professional and client groups who closely work with architects on a regular basis. This supplemental focus group study was conducted to ensure that the knowledge, skill, and task statements included in the multiple surveys were comprehensive and reflective of the current practice of architecture. Findings regarding recent developments and future trends in the profession were closely aligned with the qualitative findings of practitioners who participated in the Practice Analysis survey.

EXECUTIVE SUMMARY

NCARB contracted with PSI Services, LLC (PSI) to obtain information from allied professionals and client groups regarding their views on the practice of architecture. This report provides an overview of the project methodology and key findings, including overarching themes identified among the participants. The results are also compared to those of the focus groups conducted as part of the 2001 Architecture Practice Analysis study.

A total of 80 participants representing nine allied professional and client groups provided information through online surveys, focus groups discussions and individual interviews. The participants answered a series of open-ended questions developed jointly by NCARB's Practice Analysis Steering Committee (PASC) and PSI. Participant groups were asked questions such as:

- In what context do you work with architects?
- What are the greatest changes that you have seen in architectural practice over the past 10 years?
- How has the role of the architect changed in the fast track/multiple-bid package delivery system?
- What do you see as future trends in the design, construction and delivery of architectural services?
- What additional knowledge and/or skills do you believe architects should have today?
- What problems have you encountered as a result of your work with architects?

The findings were generally consistent with those of the 2001 focus groups with respect to major themes raised by participants; however, some aspects were qualitatively different given the current economic conditions and the rapid influx of emerging technologies. First, architects are expected to provide more sophisticated services for cost conscious clients. Second, architects are expected be well rounded in terms of their knowledge and skill sets regarding sustainable design, green construction, BIM (Building Information Modeling) systems, IPD (Integrated Project Delivery), webinar-based communication systems, Internet file sharing, project management, and business skills. Third, architecture education and internship programs should prepare students for licensure and the professional practice of architecture.

METHODOLOGY

Participants

Participants for focus groups were nominated by NCARB Member Boards, NCARB staff, and other constituent groups. PSI received a list of potential participants for each focus group from NCARB. PSI reviewed the list and determined that it contained a reasonable representation of region, gender and occupations within each group. PSI drafted an e-mail invitation outlining the process and distributed it to all potential participants.

For four of the nine groups, PSI encountered difficulty recruiting participants for the focus group discussions that were originally scheduled as two-hour teleconferences. The primary reason that potential participants provided for declining the invitation was a lack of availability for a two-hour meeting. After discussion with NCARB, PSI suggested changing the format for several of the focus groups to 20-30 minute telephone interviews with individuals to encourage participation. A brief summary of the questions and responses obtained from the online survey was distributed to each participant prior to the telephone interview. As with the focus group format, the summaries were used to guide the discussion with the individual participants.

The participants represented nine separate allied professional or client groups:

- Clients of architects
- Civil/geotechnical consultants and landscape architects
- Structural, mechanical and electrical engineers
- Interior designers and specialty consultants
- General contractors (GC) and construction managers (CM)
- Senior building officials (SBO)
- CADD technology delivery groups and material/product manufacturers
- Liability carriers, lending institutions and attorneys
- Futurists and visionaries

Survey Questions

The participants answered a series of questions developed jointly by NCARB's PASC and PSI. Each survey contained background information questions and up to 15 open-ended questions about the practice of architecture. Some of the survey questions were taken directly from the 2001 focus group study. Several additional questions were added to the surveys to elicit information about new or emerging trends in the profession.

The questions were categorized as follows:

Background

- Contexts within which other design professionals work with architects
- Services that other design professionals have in common with architects

Changes in architectural practice

- How architecture education, internship, and the examination will need to change to adapt to future trends of the industry
- What additional knowledge and/or skills should architects have or need in the future
- The greatest change(s) that others have seen in the practice of architecture in the past 10 years
- How architectural firms will need to change and adapt in the coming 10 years
- Architects' understanding of building codes and zoning ordinances and the qualifications they should have to interpret building codes and zoning ordinances
- What additional services other design professionals would like architects to provide

Services provided

- Level of services that architects should provide during the construction phase
- Ways architects are different consumers of other design professionals' services than they were 10 years ago
- How the communication and coordination process between architects and other design professionals can be improved
- Services valued most or least by other design professionals
- Experiences with on-site observation by architects

Impact of external factors on architectural practice

- Effect of the design-build process on the relationship between architects and other design professionals
- Effect of economic challenges on the relationship between architects and other design professionals
- Effect of other design professionals on architectural practices
- Effect of BIM on architect's role
- Effect of sustainable design on architect's role
- Effect of computer technology on professional relationships and architectural services

Professional relationships

- Ideal relationship between architect, owner and contractor/construction manager
- Recurring issues in interactions with architects
- Problems encountered as a result of working with architects

Trends in architectural practice

- Future trends in design, construction, and delivery of architectural services
- Role of the architect in the next 10 years

Procedures

Online surveys. In the first phase of the study, PSI distributed separate online surveys to each of the nine allied professional or client groups. The surveys were deployed on 23 August 2011 and were available for response between five and seven days each.

Focus groups discussions. In the second phase of the study, PSI conducted webinar-based discussions with participant focus groups of five or more participants. Prior to the scheduled time for each focus group, a brief summary of the questions and responses obtained from the online survey results was distributed to each participant. The summaries were used to guide the discussions that transpired during each two-hour webinar.

Individual interviews. Also during the second phase of the study, PSI conducted teleconferences with individuals who were participants in a focus group that had less than five participants available. Prior to the scheduled time for each discussion, a brief summary of the questions and responses obtained from the online surveys was distributed to each participant. The summaries were used to guide the discussions that transpired during each 20-30 minute teleconference.

FINDINGS

Respondents by Participant Group

A total of 80 participants representing nine allied professional or client groups provided information through online surveys, focus group discussions and individual interviews. Of the 80 participants, 27 completed both the online survey and participated in either a focus group or an individual interview.

The table below describes the participants within each participant group.

PARTICIPANT GROUP	ONLINE SURVEY	INDIVIDUAL INTERVIEW	FOCUS GROUP
Clients of architects	5		9
Civil and geotechnical consultants and landscape architects	7	2	
Structural, mechanical and electrical engineers	8		4
Interior designers and specialty consultants	2	2	
General contractors and construction managers	7		6
Senior building officials	9	3	
CADD technology delivery groups and material/product manufacturers	7	2	
Liability carriers, lending institutions and attorneys	13		5
Futurists/visionaries	9		7
Total	**67**	**9**	**31**

Themes

While each of the nine allied professional or client groups represented a different perspective on the practice of architecture, several overarching themes emerged:

- The changing role of the architect;
- How the profession needs to adapt to changing demands;
- The impact of technology on the profession; and,
- Knowledge and skills that architects need now and will need in the future.

The Changing Role of the Architect

The role of the architect has undergone change in the past 10 years. This change will likely continue as technology, economic conditions, and building design methods impact the way that architects provide their services. In the 2001 focus group study, a major theme involved the increased demands on architects by both clients and contractors. In the current study, the role of the architect is not much different than it was in 2001. However, increased demands may be more significant today because sophisticated technology is more abundant, pricing for architectural services has become extremely competitive, and more design requirements are related to sustainable design and the environment.

From the perspective of the allied professionals and clients who participated in this study, the biggest change in the role of the architect has been the lessening of the architect's role in the building process. Several participants commented that the traditional role of architects was to manage the team throughout the building process. Now, the construction manager, not the architect, often acts as the project lead.

Some services traditionally provided by architects are now being provided by other design professionals or even the contractor. There were mixed opinions about whether this shift was the result of architects giving much of the control over the design process to contractors or construction managers, or whether the other members of the project team have taken control over much of the architect's realm because they now have sophisticated software and tools to do so.

Participants also indicated that architects are being asked to do more work for less money than ever before. By agreeing to stringent contract demands in order to secure work, or entering into business transactions with high liability, architects have assumed more risk.

Many participants felt that as clients become more savvy about design, architects are expected to provide services that include sustainable design, LEED certification, and other services that provide a greater return on investment. Moreover, clients are becoming more involved in the design phase of the process because sophisticated technologies (BIM) enable architects to quickly produce three-dimensional models in early phases of a project.

How the Profession Needs to Adapt to Changing Demands

Throughout the focus groups, there was much discussion about how the profession itself needs to adapt to changing demands. Generally speaking, most of the participants felt that the design process should reflect a "team oriented" approach that incorporates owners' needs as well as input from other design professionals. Oftentimes, if input from other design professionals is implemented early on in the process, issues regarding constructability, construction delays, or change orders can be minimized. Many participants commented that architects focus on achieving the "perfect design" and may not have considered factors that require modification later.

Several participants addressed architects' fees. With today's economic challenges, many architects have significantly reduced their fees in order to be more competitive and have a greater chance of securing contracts. Unfortunately, architects are typically not making the corresponding reductions in their scope of services. This results in two impacts on practice: first, a devaluation of the services that architects provide, and second, an unintentional transition of services to other design professionals or contractors.

Many participants thought architects should take on more of a leadership role, both during the design phase as a team leader and during the construction phase. From their perspective, architects should spend more time at the construction site to ensure the integrity of the design and their professional interests.

Finally, participants commented that architects have made great strides to embrace the technologies that have become available in the last 10 years. The full potential of BIM has not yet been realized because BIM is generally not cost effective for small- or medium-sized firms to fully implement. Some commented that architects will need to continue to integrate BIM into their practice to stay competitive and coordinate the efforts of the design and construction teams.

The Impact of Technology on the Profession

The impact of advances in technology on the profession played a large role in the participant discussions during this study. In the 2001 focus group study, several groups discussed the positive and negative impacts of CADD and electronic modes of communication.

By contrast, the technology discussion in the current study was devoted to BIM and its capability for modeling an almost infinite amount of information relevant to the design and construction of a building. From the perspective of owners and members of the project team, there is a demand for architects who are skilled at utilizing BIM technologies to the fullest. Technology has advanced so quickly that participants were concerned about the ability to maintain competence with software and other skills. Not only do architects need to be proficient in BIM, they must also become well versed about the roles and contributions of allied professionals and other participants. Given the current economic climate, the architects' knowledge and skill in using BIM and related technologies is expected to be demonstrated throughout a project within cost conscious means.

In addition to BIM, other electronic tools (e.g., e-mail, Internet, webinar-based communication, and file sharing) are now so commonplace that it is difficult to remember how business was conducted in the past. On one hand, most participants agreed that technological advances in communication, virtual (webinar) meetings and Internet-based file sharing have had a positive impact on practice and enabled architects to communicate faster with owners and other professionals, enact changes more quickly, and share drawings and other project documents instantaneously with participants on the other side of the globe as needed. On the other hand, some participants expressed the concern that e-mail has made communication too informal to the point that important details that would have been included in a formal contract document are now being discussed and agreed upon in emails.

Many participants commented that the advent of electronic communication has increased the volume of information that requires an architect's attention each day. This "information overload" has, in many cases, increased rather than decreased work for architects. Several participants stressed that, while e-mail and other modes of electronic communication can be efficient in many situations, electronic modes of communication should not replace face-to-face communication or telephone interaction.

Knowledge and/or Skills Needed Now and in the Future

Almost all groups in the study indicated that architecture education effectively prepares students in design; however, it does not prepare students well in the business of conducting a practice. The most frequently mentioned skills were: project planning (scheduling), cost estimation, marketing, project management, and oral presentation skills.

Participants indicated that schools need to be clearer about the importance of business skills for two reasons. First, students would enter the profession with a more realistic concept of and clear expectations for the duties involved in conducting a practice. Second, students would be encouraged to place a priority on honing their business skills, either through formal business courses while in school or through on-the-job experiences during their internship.

The other common theme that emerged was the need for enhanced knowledge of the construction process. Many participants indicated architects should receive more exposure to construction and building methods in the field during their formal education and during the Intern Development Program (IDP). Some individuals mentioned that, if all other factors are equal, they will always choose an architect who has had first-hand construction experience over one who has not.

Summary of Themes by Participant Group

Clients of Architects

- Need a more team oriented approach to design
- Need more consideration for what is best for the owner and the project
- Need more construction knowledge and hands-on field experience at construction sites
- Provide more educational opportunities and internships with hands-on field experience
- Need a better understanding and ability to implement sustainable design strategies, LEED certification
- Provide greater return on investment for owners
- Be more open to clients; become more involved in the design phase
- Implement BIM as delivery method with potential for increased efficiency and return on investment
- Understand technological advances and their effect on increased cost of providing architectural services and reduction of time to create and modify design

Civil/Geotechnical Consultants and Landscape Architects

- Consultant services are viewed as a commodity
- Need to pay consultants in a timely manner
- Need consultant involvement throughout the entire design and construction process
- Need for improvement of architects' interpersonal and communication skills
- Clients expect full scope of architectural services but at a reduced price in current economic climate
- Need to understand difference between traditional approach and other project delivery methods, e.g., design-bid-build, design-build versus fast track, etc.
- Flexibility and adaptability to change
- More energy efficient designs needed but may be limited to due cost of green construction

Structural, Mechanical and Electrical Engineers

- Need to enhance knowledge and skills pertaining to basic structural engineering requirements
- Improve communication and coordination skills for interacting with other design professionals
- Need to understand increase in costs that result from multiple plan revisions
- Need understanding of the total scope of BIM
- Need to become involved throughout the project to minimize project difficulties
- Should use qualifications-based criteria rather than fee-based criteria for selecting engineers
- Should interact directly with people rather than rely on electronic forms of communication

Interior Designers and Specialty Consultants

- Need to incorporate better compliance with disability regulations
- Need to focus more on universal design and sustainable design
- Need for additional training and education about the roles of other members of the construction team
- Need more experience with IPD
- Improve business management skills

General Contractors and Construction Managers

- Need for better collaboration between owners, contractors, construction managers, and architects
- Increase in efficiency due to technology; however, a shift in control of drawings and construction documents to contractors or construction management professionals
- Need to retain control over design and coordination process while using advanced technologies
- Need for business skills, particularly in using fee proposals that make sense to clients and result in adequate profit for the architect
- Need to embrace technology and broaden knowledge of construction
- Need to find ways to be compensated for services so that they can take on more responsibility and risk

Senior Building Officials

- Need to enhance knowledge of material properties
- Enhance understanding of principles, construction sequences/phases, building systems, and building codes
- Agree that architects possess strong skills in project oversight and development of construction documents
- Understand benefits of onsite observations by architects
- Need for understanding of corrections called for during inspection.
- Should not underestimate applicability of certain electronically stored details, specifications when using technology
- Need more comprehensive understanding of entire environmental impact of the design for projects with sustainable design
- Will be a greater use of BIM and IPD

CADD Technology Delivery Groups and Material/Product Manufacturers

- Build skills in technology, CADD, and BIM
- Increase marketing, written and verbal communication, and human relations skills
- Evaluate fee structure; architects' fees for services may be too low

Liability Carriers, Lending Institutions and Attorneys

- Acquire more hands-on training in construction administration to adequately observe the construction phase
- Increase in liability related to willingness to conduct site observation
- Understand construction processes
- Need business management skills
- Changes in practice have devalued architects' services
- Need to balance coordination and design with compensation in sustainable design
- Need to improve business management, contract negotiation, and risk management skills

Futurists and Visionaries

- Understand impact of technological changes on design and delivery process, collaborative process, and traditional intellectual property concepts
- Understand demands of technological changes on practice, e.g., new construction practices, new materials, innovative design, sustainability, computer technologies
- Need to recognize that limiting services to keep pace in a difficult economy may transition control of scope of services to other construction professionals
- Understand that BIM technologies do not replace good design
- Recognize sustainability is equivalent to good design
- Need better business skills, better communication skills, more knowledge about the construction process, and ability to provide adequate estimates
- Recognize that new technologies offer new opportunities for innovative design
- Need for more emphasis on practice management, construction, real estate development, and cost estimating in architecture education programs

MATRIX OF QUESTIONS BY GROUP

	CLIENTS OF ARCHITECTS	CIVIL, GEOTECHNICAL, AND LANDSCAPE ARCHITECTS	STRUCTURAL, MECHANICAL, ELECTRICAL ENGINEERS	INTERIOR DESIGNERS AND SPECIALTY CONSULTANTS	GENERAL CONTRACTORS CONSTRUCTION MANAGERS	SENIOR BUILDING OFFICIALS	CADD DELIVERY GROUPS AND MATERIAL/PRODUCT MANUFACTURERS	LIABILITY CARRIERS, LENDING INSTITUTIONS AND ATTORNEYS	FUTURISTS AND VISIONARIES
1. What services have you engaged architects to provide?	X								
2. What do your services have in common with those provided by architects?				X					
3. In what context do you work with architects?				X		X			
4. In what ways has your industry changed architectural practices?					X		X	X	
5. What do you value most in the professional services provided by architects?	X								
6. What do you value least in the professional services provided by architects?	X								
7. What should be the relationship among the architect, the owner and the contractor or construction manager?	X				X			X	
8. How has the design-build process affected the relationship between architects and liability carriers, lending institutions and attorneys?			X					X	
9. What are your experiences with the design-build process?			X						
10. What additional knowledge and/or skills do you believe architects should have?	X	X	X	X	X	X	X	X	X
11. In what ways are you a different consumer of architectural services than you were 10 years ago?	X	X	X		X		X		
12. In what ways are architects different consumers of your services than they were 10 years ago?				X					
13. What level of service should the architect provide during the construction phase?						X		X	
14. What are the greatest changes that you have seen in architectural practice over the past 10 years?	X	X	X	X	X	X	X	X	X
15. How do the skills of architects compare with those of other design professionals you encounter?		X	X			X	X		X
16. What is the most critical information that an architect should know about building codes and zoning ordinances?						X			
17. How well do you think architects understand building codes and zoning ordinances?						X			
18. What qualifications are important to interpret building codes and zoning ordinances?						X			
19. What are your experiences with onsite observation by architects?						X			
20. How could the process for communication and coordination between architects and civil/geotechnical consultants and landscape architects be improved?		X							

CONTINUED

	CLIENTS OF ARCHITECTS	CIVIL, GEOTECHNICAL, AND LANDSCAPE ARCHITECTS	STRUCTURAL, MECHANICAL, ELECTRICAL ENGINEERS	INTERIOR DESIGNERS AND SPECIALTY CONSULTANTS	GENERAL CONTRACTORS CONSTRUCTION MANAGERS	SENIOR BUILDING OFFICIALS	CADD DELIVERY GROUPS AND MATERIAL/PRODUCT MANUFACTURERS	LIABILITY CARRIERS, LENDING INSTITUTIONS AND ATTORNEYS	FUTURISTS AND VISIONARIES
21. How could the process for communication and coordination between architects and interior designers and specialty consultants be improved?				X					
22. How could the process for communication and coordination between architects and engineers be improved?			X						
23. What problems have you encountered as a result of your work with architects?		X	X	X		X	X		
24. What services do you currently engage other professionals to provide that you previously engaged architects to provide?	X								
25. What recurring issues have you observed in your interactions with architects?	X				X			X	
26. How have recent economic challenges affected the services provided by architects?	X		X						X
27. How have recent economic challenges affected the relationship between architects and interior designers and specialty consultants?				X					
28. How has the role of the architect changed in the use of building information modeling (BIM) systems?		X	X	X	X	X	X		X
29. How will the architect's role in the construction delivery process change in the next 10 years?					X	X	X	X	X
30. How has the role of the architect changed in sustainable design?		X	X	X		X	X	X	X
31. What is your role in ensuring that licensed architects and engineers provide construction documents?						X			
32. How have advances in computer technology affected architectural services?	X		X						X
33. How do you believe architecture education programs will need to change to adapt to the future trends in the industry?							X		X
34. How do you believe architecture internship programs will need to change to adapt to the future trends in the industry?									X
35. How do you believe continuing education programs will need to change to adapt to the future trends in the industry?							X		X
36. How do you believe architecture examinations will need to change to adapt to future trends in the industry?									X
37. In what ways do you see technological changes impacting the profession of architecture in the next 10 years?							X		X

CONTINUED

	CLIENTS OF ARCHITECTS	CIVIL, GEOTECHNICAL, AND LANDSCAPE ARCHITECTS	STRUCTURAL, MECHANICAL, ELECTRICAL ENGINEERS	INTERIOR DESIGNERS AND SPECIALTY CONSULTANTS	GENERAL CONTRACTORS CONSTRUCTION MANAGERS	SENIOR BUILDING OFFICIALS	CADD DELIVERY GROUPS AND MATERIAL/PRODUCT MANUFACTURERS	LIABILITY CARRIERS, LENDING INSTITUTIONS AND ATTORNEYS	FUTURISTS AND VISIONARIES
38. How have advances in computer technology affect the relationship between architects and CADD technology delivery groups and material/product manufacturers?							X		
39. How have advances in computer technology affected the relationship between architects and general contractors/ construction managers?					X				
40. What additional services would you like architects to provide?	X				X				
41. What do you see as future trends in design, construction and delivery of architectural services?	X	X	X	X	X	X	X	X	X
42. What additional knowledge and/or skills do you believe architects will need in the future?	X							X	
43. What additional knowledge and/or skills do you believe architects will need in the near future?							X		
44. How will architectural firms need to change and adapt in the coming 10 years?									X
45. How will the role of the architect change in the coming 10 years?	X				X			X	
46. How do you select architects? Qualifications, fees and/or location?			X						
TOTAL	**15**	**9**	**14**	**11**	**12**	**15**	**15**	**12**	**15**

APPENDIX B: **GLOSSARY**

ACSA

The Association of Collegiate Schools of Architecture is a nonprofit, membership association comprised of over 250 member schools for all accredited programs in the United States and government-sanctioned schools in Canada. The ACSA provides a forum for leading edge ideas and issues that affect the architectural profession.

AIA

The American Institute of Architects is a leading professional membership association for licensed architects, emerging professionals, and allied partners. The AIA maintains a number of programs, initiatives, and resources, including continuing education experiences and standard contract documents.

AIAS

The American Institute of Architect Students is an independent, nonprofit student-run organization whose mission is to promote excellence in architectural education, training and practice, and advance the art and science of architecture.

BIM

Building Information Modeling, or BIM, is a process that entails generation and management of digital representations of the physical and functional characteristics of a building or facility. BIM provides a database resource and virtual three-dimensional (3-D) model for making decisions about a building throughout its life cycle. Information can be tracked for the cost management, construction management, project management, and facility operation purposes.

BRANCHING

The term branching, or conditional skip logic, refers to dynamic system logic in online survey software that permits the respondent to be directed to a question based on his/her responses to a previous question. In this survey, respondents were asked, "to what extent is the task covered in architecture education?" If they answered "*yes*", they were asked, "to what extent do students perform the task by completion of their architecture program?" If they answered "*no*", they were asked, "why is the task not covered in your architecture program?"

COMPETENCY

The term competency refers to the set of behaviors identified in the practice analysis through interviews and focus groups of subject-matter experts. See practice analysis.

CONTENT VALIDITY

The term content validity refers to the extent to which a measure represents what it is intended to measure. In order to produce valid survey content or test questions, psychometricians will collaborate with persons in the profession who understand the nuances and technical aspects of the subject matter. Here, the practice analysis was based on a content validation approach whereby persons with technical subject-matter knowledge were consulted in the design and implementation of the survey instrument.

CORRELATION

A series of statistical measures that describes the relationship, positive or negative, between two variables on a continuum. For example, if there is a strong positive correlation between years of experience and number of hours worked per week (0.80), one could conclude that people who have many years of experience tend to work more hours per week. If the correlation were negative, one could conclude that people with many years of experience tend to work fewer hours per week.

CRITERION

This term refers to a standard on which a judgment or decision is based. For example, the numeric of a mean importance rating for a knowledge/skill statement must equal or exceed 1.5 to be included in the content outline.

CROSSWALK

A crosswalk analysis involves mapping elements of one source with another source according to standards, semantic equivalents, or conceptual equivalents. Typically, the concepts and attributes in one source are compared side by side with similar concepts and attributes of another source to identify similarities and differences across time periods. Here, a crosswalk analysis was conducted to compare tasks and knowledge/skills from the 2007 and the 2012 practice analyses to identify similarities and differences between them.

DEFENSIBILITY

A research study, particularly a practice analysis, can be considered legally defensible if the methodology for the study abided by specific standards, procedures, and guidelines. Here, the practice analysis relied on a content validation approach cited in the Standards for Educational and Psychological Testing whereby the survey content was developed in collaboration with many subject-matter experts and validated by responses of thousands of subject-matter experts. Generally speaking, if the methodology was performed correctly, the study can withstand legal scrutiny.

DESCRIPTIVE STATISTICS

Statistics that summarize the main features of a dataset in order to understand its properties. Descriptive statistics can be summarized in tables or graphical displays such as graphs and charts). Examples of descriptive statistics include overall sample size (N), percent/proportion of subjects for different variables, measures of central tendency (mean, median, mode), and measures of spread (range, quartiles, variance, standard deviation).

DISTRIBUTION

In statistics, a distribution can represent discrete categories of variables or continuous variables, e.g., frequency of use. For example, a histogram might illustrate how many respondents answered "*yes*" and "*no*" to the question ("Is this concept important?") vs. how many respondents answered yearly, quarterly, monthly, weekly, daily to a question ("how frequently have you performed this task?").

EBD

Evidence-based design is a process that emphasizes the importance of using data to make decisions about the design process. Typically, existing research literature is reviewed to identify significant findings and recommendations; data is gathered from multiple sources, e.g., site visits, surveys and subject-matter experts, predicting outcomes of design decisions, and tracking positive outcomes for design implementation. For example, the design of healthcare facilities may be based on data from environmental psychologists, clinicians, administration, and evidence-based tools and methods.

FFE

This term refers to movable furniture, fixtures, and equipment that have no permanent connection to a building structure.

FOCUS GROUP

A qualitative technique that uses a representative group of subject-matter experts to provide information and/or critically evaluate the merits of a work product. In the present study, face-to-face and webinar focus groups were used to ensure that the content of the practice analysis surveys (e.g., task and knowledge/skill statements) were comprehensive and related to the current practice of architecture. The focus groups also elicited information regarding recent developments in the profession and future trends.

FREQUENCY DISTRIBUTION

This term refers to an arrangement of values taken from a sample. For example, the number of cases could be arranged along a continuum according to a rating scale, e.g., 1-of never, 2-rarely, 3-sometimes, 4-often, and 5-constantly. So the distribution might show there were 20 respondents with a rating of 1, 40 respondents with a rating of 2, and so on.

FREQUENCY RATING

Frequency ratings on survey instruments typically assign numeric ratings to scale points along a continuum. For example, the scale points could be: 1-of little or minor importance, 2-somewhat important, 3-important, 4-very important, and 5-critically important.

HSW

This term refers to health, safety, and welfare guidelines. Examples of health guidelines include those for accessibility, energy efficiency, mechanical, plumbing, and electrical systems. Examples of safety guidelines include codes, regulations, provision of fire-rated egress enclosures, and correct rise-to-run proportions for stairs. Examples of welfare include adaptive reuse, environmental issues, and building design and materials.

IBC

This term refers to International Building Codes, which are model building codes developed by the International Code Council.

IMPORTANCE RATING

Importance ratings on survey instruments typically assign numeric ratings to scale points along a continuum. Here, the following scale points could be: 0-of little or no importance, 1-somewhat important, 2-important, 3-very important, and 4-critically important.

INFERENTIAL STATISTICS

Statistics based on probability theory that allow the use of samples to make generalization, estimates, predictions of decisions about the populations from which they are drawn. For example, if there were 100 randomly selected cases, inferential statistics could be used to determine the probability that those cases would occur according to specific limits, e.g., 95 percent, 99 percent.

IPD

Integrated Project Delivery (IPD) refers to the process used in construction projects and is typically conceptualized in terms of eight main phases: conceptualization, criteria design, detailed design, implementation documents phase, agency review, buyout, construction, closeout, and facilities management. The IPD process involves contractual arrangements between the owner, contractor, and design professionals such as architects.

KNOWLEDGE

Job knowledge is a measurable, organized body of information related to specific aspects of a job. Examples of job knowledge include principles, protocols, procedures, systems, methods, procedures, techniques, standards, codes, and laws that apply to specific job tasks.

LEED

The Leadership in Energy and Environmental Design, or LEED, is a set of rating systems developed by the U. S. Green Building Council as a framework for identifying and implementing practical and measurable solutions for design, construction, operation, and sustainability of high-performance buildings, homes, and neighborhoods.

MAPPING (SEE CROSSWALK)

MATRIX SAMPLING

The term matrix sampling refers to specific procedures that are employed to improve the representativeness of survey results. So, instead of obtaining a random sample from a population of prospective respondents, a researcher may select a subset of cases from different strata, e.g., interns with two years of experience, or architects licensed in the past year who completed the IDP in the past two years. By using matrix sampling methods, the size of the samples will better represent the population at large.

MEAN

A type of descriptive statistic commonly known as the average. It is calculated by summing the values of a variable and dividing by the number of cases. For example, if the sum of ratings from 5 individuals is 20, then the mean is 20 divided by 5, or 4.

MEDIAN

A type of descriptive statistic commonly known as a midpoint of a dataset. After the data is rank ordered, the median is calculated by the formula (n +1)/2. For example, if there are 60 values, the midpoint of the dataset is (60 + 1) divided by 2, or 30.5.

N

N refers to the size of the sample, or number of cases in a sample. For example, if N = 171, there are 171 cases that were used in the calculation of statistics for that sample.

NAAB

The National Architectural Accrediting Board (NAAB) is the sole agency authorized to accredit U. S. professional degree programs in architecture. The curriculum of a NAAB-accredited program includes general studies, professional studies, and electives. The intent is to provide students with a range of skills that enables them to solve architectural design problems and understand the historical, socio-cultural, and environmental context of architecture.

NCARB

The National Council of Architectural Registration Boards' membership is comprised of the architectural registration boards of all 50 states, the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands. These boards formed NCARB in order to provide a common approach to protecting the public health, safety, and welfare. NCARB leads the regulation of the practice of architecture through the development and application of standards for licensure and credentialing of architects. These range from the Intern Development Program (IDP) and Architectural Registration Examination® (ARE®) to certification for the purposes of reciprocal licensing and record keeping.

PASC

The Practice Analysis Steering Committee (PASC) is a steering committee appointed by NCARB to carry out strategic planning and assist in the implementation of the practice analysis.

PATF

The Practice Analysis Task Force (PATF) is a task force appointed by NCARB to provide the majority of subject-matter expertise in survey task and knowledge/skill development for the practice analysis.

PRACTICE ANALYSIS

A practice analysis defines professional practice in terms of the actual tasks that practitioners must be able to perform safely and competently at the time of licensure or certification. The process is an essential step in validating test programs so that they comply with professional testing standards such as the Standards for Educational and Psychological Testing. The Standards are the universally recognized benchmark for design, construction, standard setting/cut score, test administration, score reporting, and test score for all examinations.

REVIT

A type of Building Information Modeling software that allows the user to draft 3-D and two-dimensional (2-D) elements. The 3-D elements are represented as physical building components such as doors and walls. The Revit environment allows the user to render realistic images of buildings and rooms.

ROUTING

The term routing refers to dynamic system logic in online survey software that permits respondents to complete a specific set of questions. Here, if a respondent was a licensed architect, he/she could be directed to ARE, IDP, EDU, or CE surveys.

SAMPLE PARAMETERS

(See discussion of stratified random sampling under "sampling plan")

SAMPLING PLAN

This term refers to the approach taken to ensure adequate representation from all of the populations of interest. If a researcher wanted to obtain survey responses, he/she could identify strata/parameters of interest (stratified random sampling), e.g., geographic region or years of experience, which he/she would target to obtain representative data from different populations, and select a percentage of names of prospective respondents that is equal to that population's occurrence in a large population. For example, a specific state represents 15 percent of the total population of licensed architects; the researcher would select 15 percent of the individuals from that state to solicit survey responses. A simpler, but less effective, procedure is random sampling. Random sampling assumes that all individuals in the population are equal, and a specific number of cases are selected from the pool of individuals without regard for any strata of interest.

SKILL

A job skill is a specific, observable, measurable competence required to perform one or more job tasks. Examples of job skills include skill in using software to produce 3-D models and skill in producing freehand sketches.

SME

Subject-matter experts are individuals who possess technical knowledge of their field. When tests are developed, the process is typically facilitated by persons knowledgeable in the design of tests (psychometricians), who work with SMEs who understand the technical content of the test questions.

STAKEHOLDERS

The term stakeholder refers to persons, groups, or organizations with an interest in a project. For example, the results of the practice analysis will affect stakeholders such as students, educators, and licensed architects.

STANDARDS FOR EDUCATIONAL AND PSYCHOLOGICAL TESTING ("STANDARDS")

The Standards for Educational and Psychological Testing were developed jointly by the American Educational Research Association, the American Psychological Association, and the National Council for Measurement in Education. The Standards are the universally recognized benchmark for design, construction, standard setting/cut score, test administration, score reporting, and test score for all examinations, including those related to education, personnel selection, licensure, and certification.

TASK

A job task is a stand-alone unit of work with a definite beginning and end, which results in a product or service. For example, a job task is "perform building code analysis."

TAXONOMY

The term taxonomy refers to the development of categories to classify objects, properties, or relationships. For example, Bloom and Depth of Knowledge taxonomies have identified different levels of cognitive processing such as recall, comprehension/understanding, application, analysis, and synthesis/evaluation.

TEST

The term test, or examination, can be used broadly and refer to any measurement procedure including surveys, tests, and structured interviews.

VALIDITY

The term validity refers to the degree to which evidence supports the interpretation of test score or proposed use of tests. If a test is valid and includes questions with technically correct subject-matter, one can make inferences about the test taker's scores.

VALIDITY EVIDENCE

There are three types of validity evidence from which conclusions may be drawn. In content validity, the issue is representativeness ("does the content to be measured represent the intended body of knowledge?"). In criterion related validity, one can infer from a test score how an examinee will perform on some external criterion ("how well does performance on a test predict future performance?"). In construct validity, one can classify individuals based on test scores according to a theoretical trait (how well do test scores assess a theoretical concept of interest?). For example, if a student scores well on a test, one could infer that students had verbal reasoning.

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