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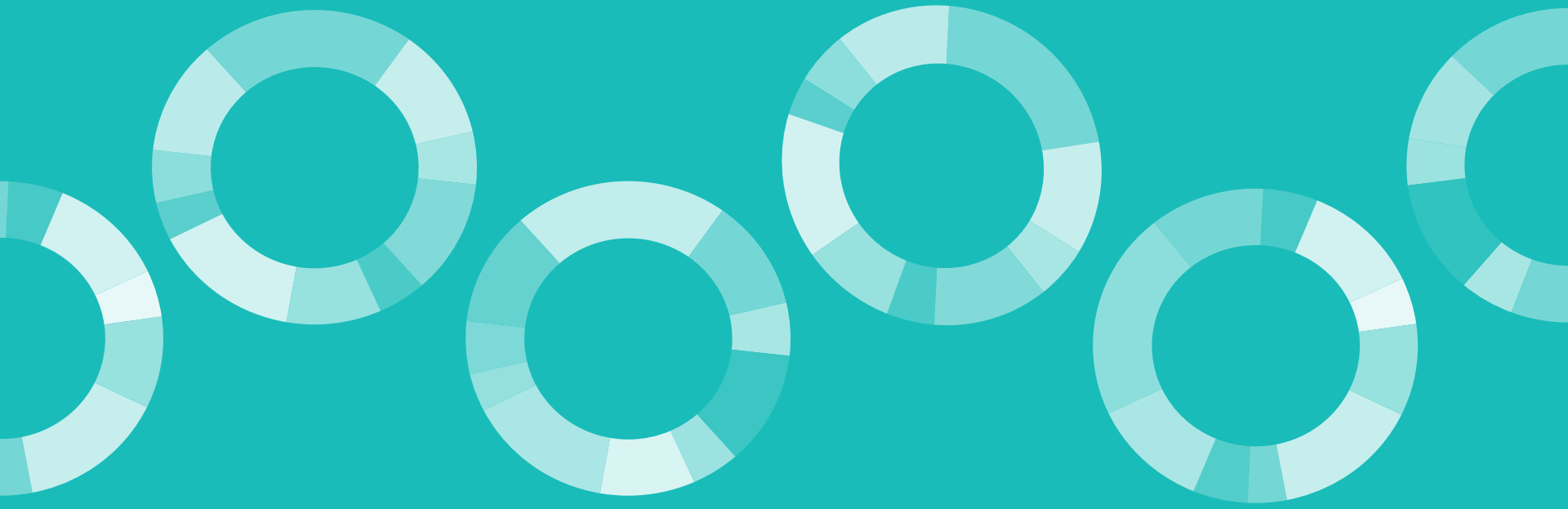

2012 NCARB Practice Analysis of Architecture: **EDUCATION REPORT**

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2012 NCARB Practice Analysis of Architecture: Education Report

By the National Council of Architectural Registration Boards

TABLE OF CONTENTS

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 2013 NAAB 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.

This *Education Report* is the first in a series of Practice Analysis-related reports that NCARB is publishing in 2013. The remaining reports will share data and findings for internship, examination, and continuing education. The complete *2012 NCARB Practice Analysis of Architecture*, which will include the full set of published reports, will be released in June 2013.

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

EXECUTIVE SUMMARY

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 the Architect Registration Examination®; 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.

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 more than 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

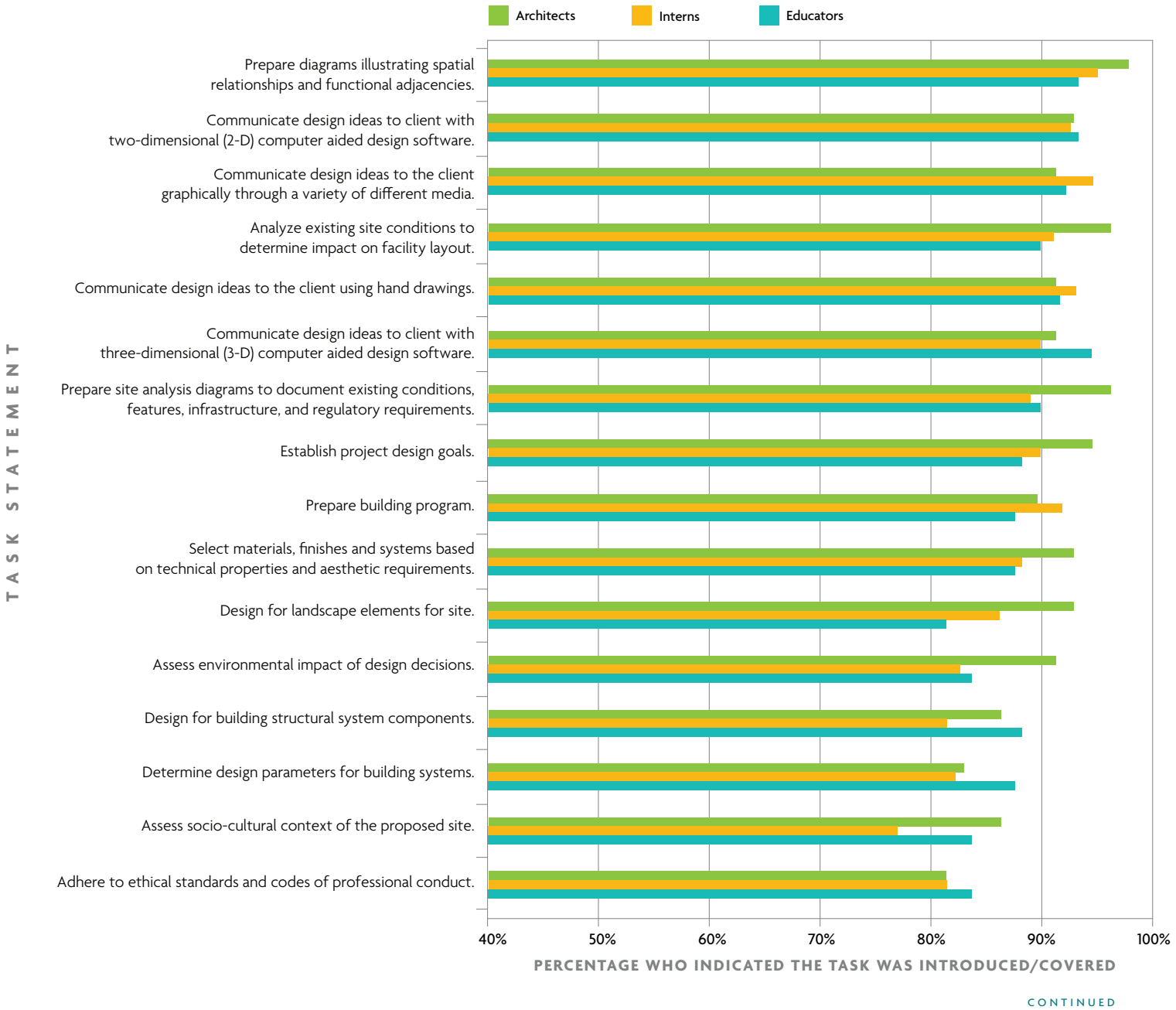
The latter half of this section presents eight key areas that have been identified as needing reinforcement and focus prior to completion of accredited education:

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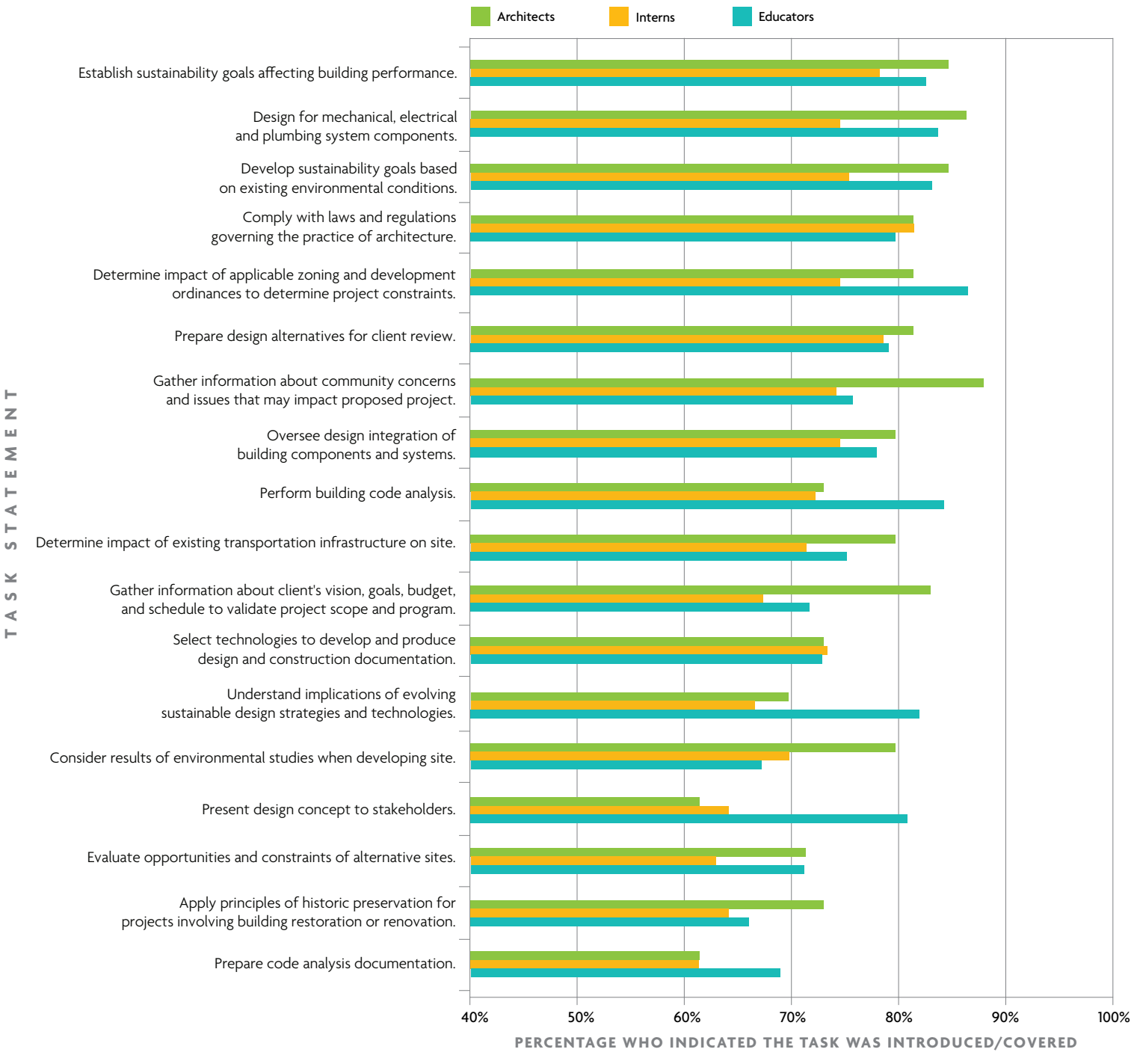
TASKS THAT 50 PERCENT OR MORE OF ARCHITECTS, INTERNS, AND EDUCATORS RATED AS "COVERED" OR "INTRODUCED" IN THE ACCREDITED PROGRAM (CONT.)



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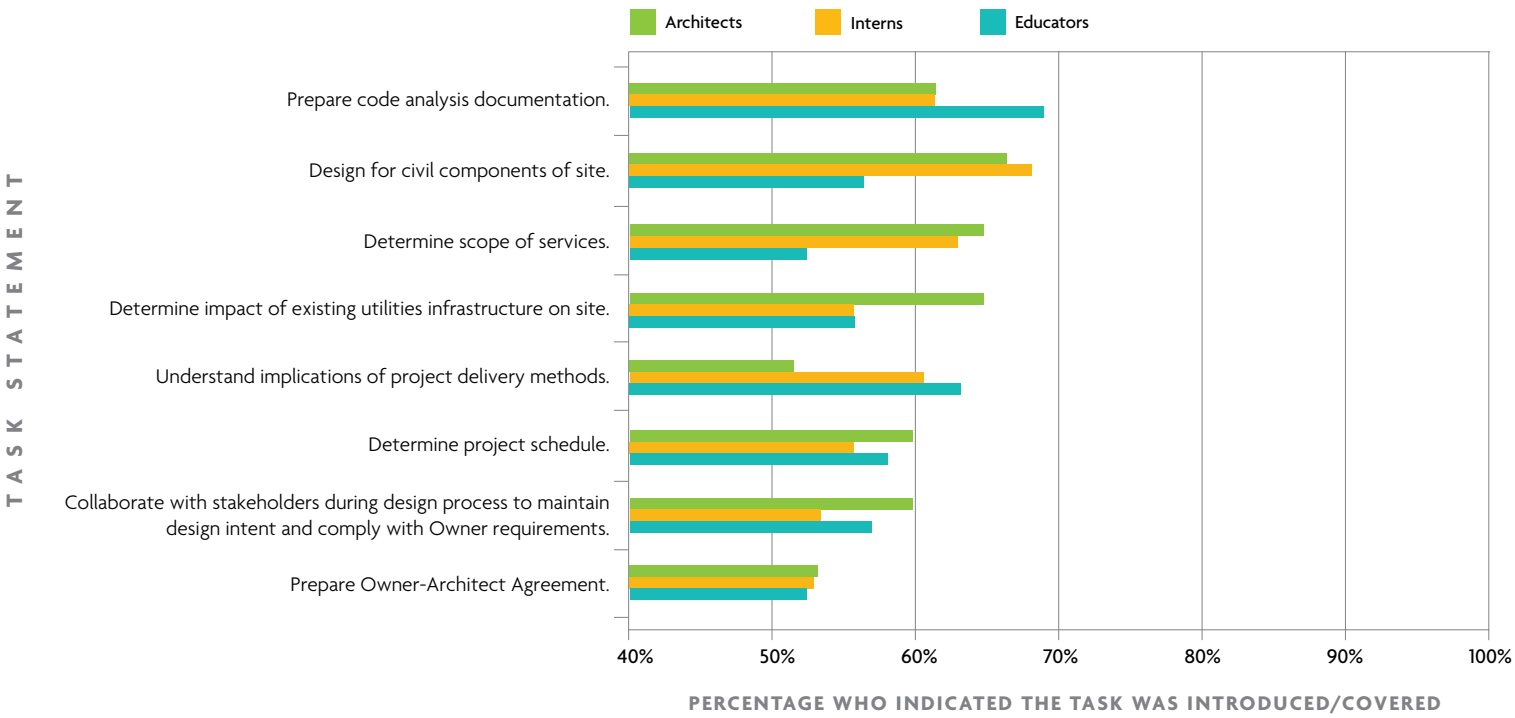


Nine of the 104 tasks included in the survey were identified by more than 50 percent of educators as "*not covered*" in their architecture program.

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.

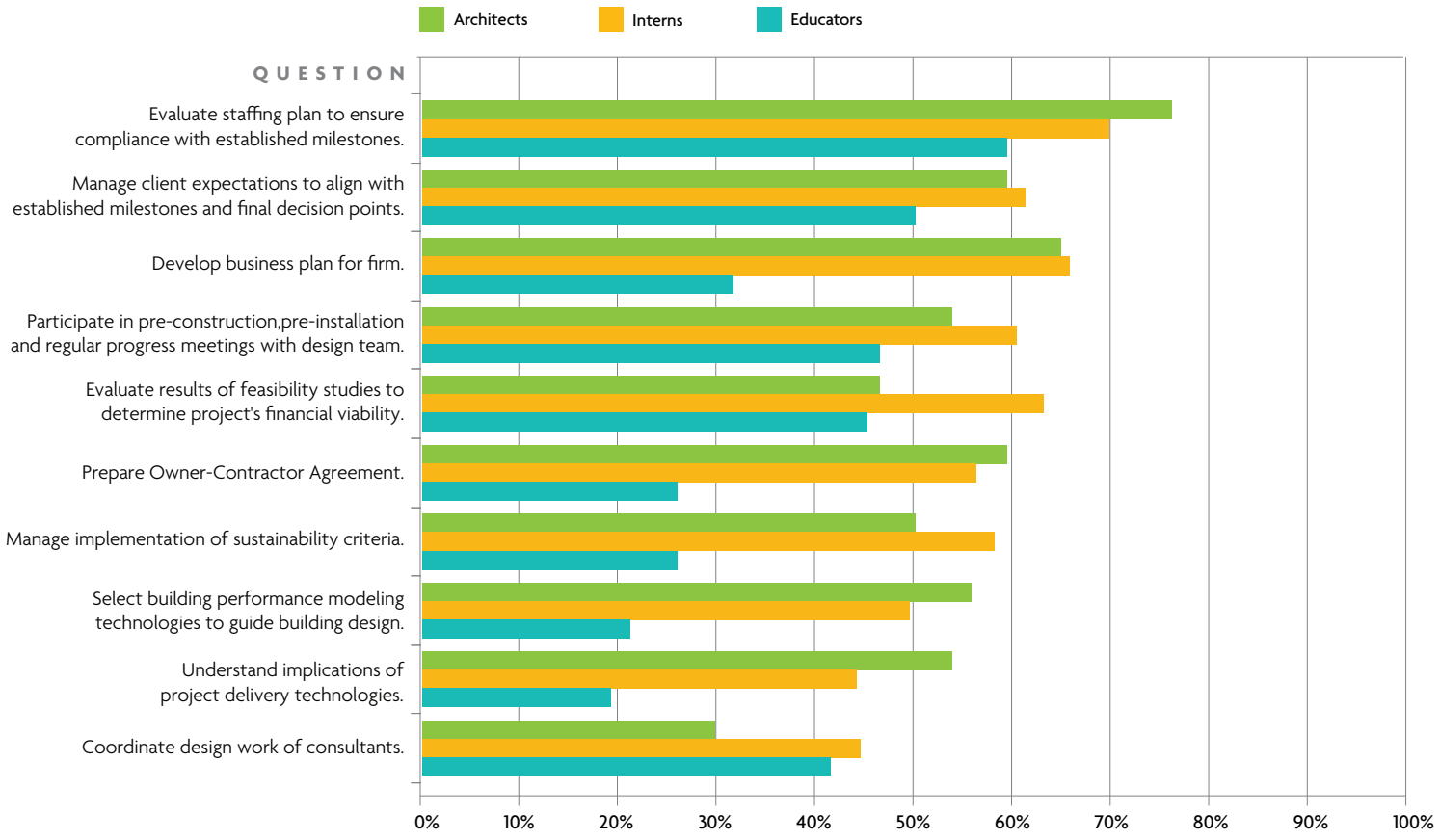
EDU TASK #	ADDITIONAL TASKS IDENTIFIED AS "NOT INTRODUCED" IN EDUCATION BY INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS, AND ARCHITECTS LICENSED IN THE PAST YEAR (LISTED FROM HIGHEST TO LOWEST)
86	Establish procedures for building commissioning.
91	Determine billing rates.
54	Determine specific 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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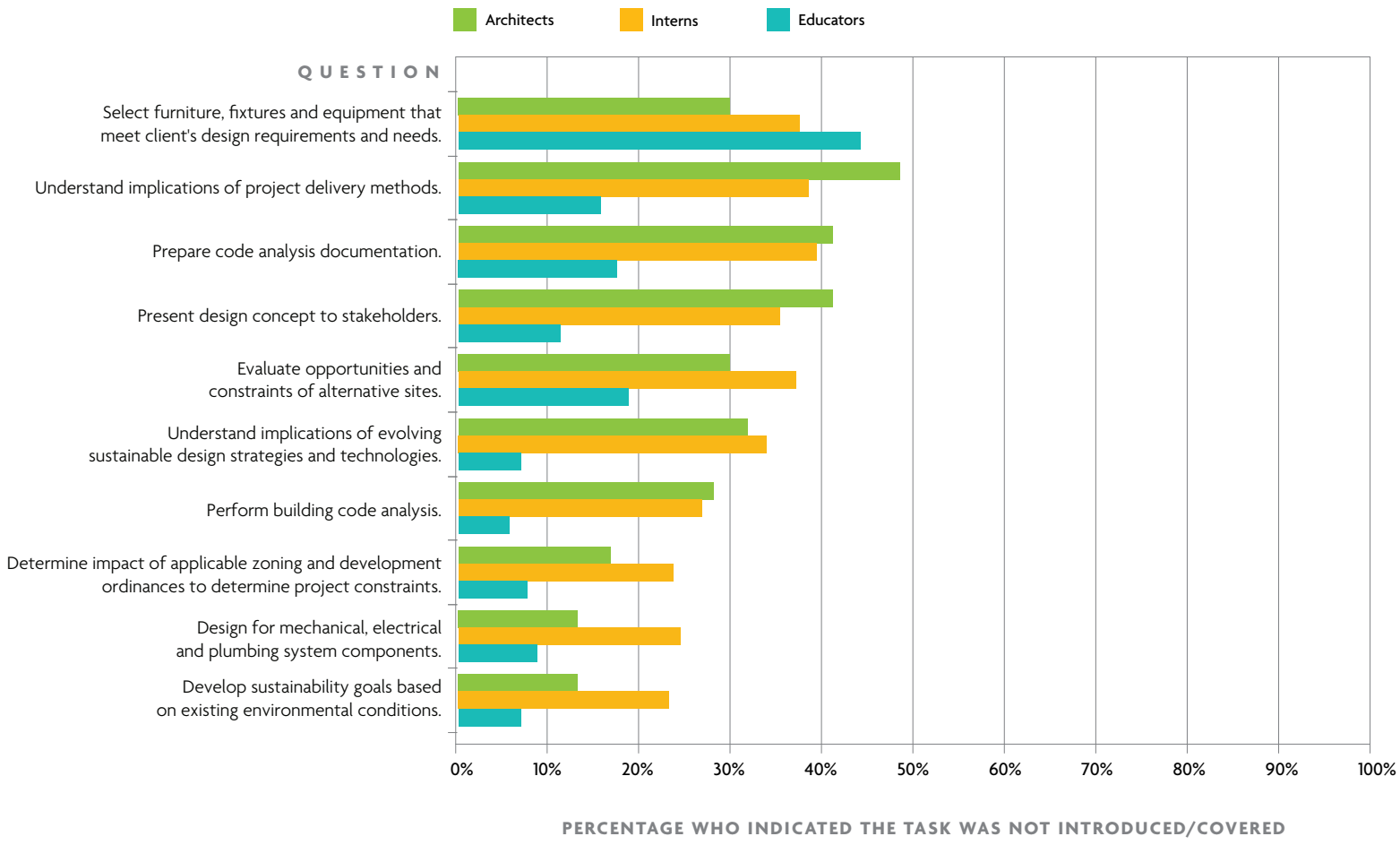
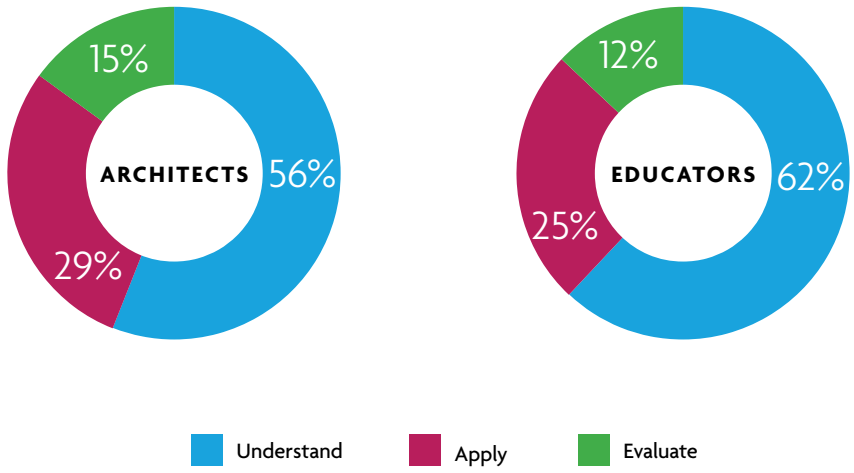
TASKS WITH SIGNIFICANT DISAGREEMENT ON WHETHER "INTRODUCED" OR "COVERED" IN THE ACCREDITED PROGRAM (CONT.)



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.

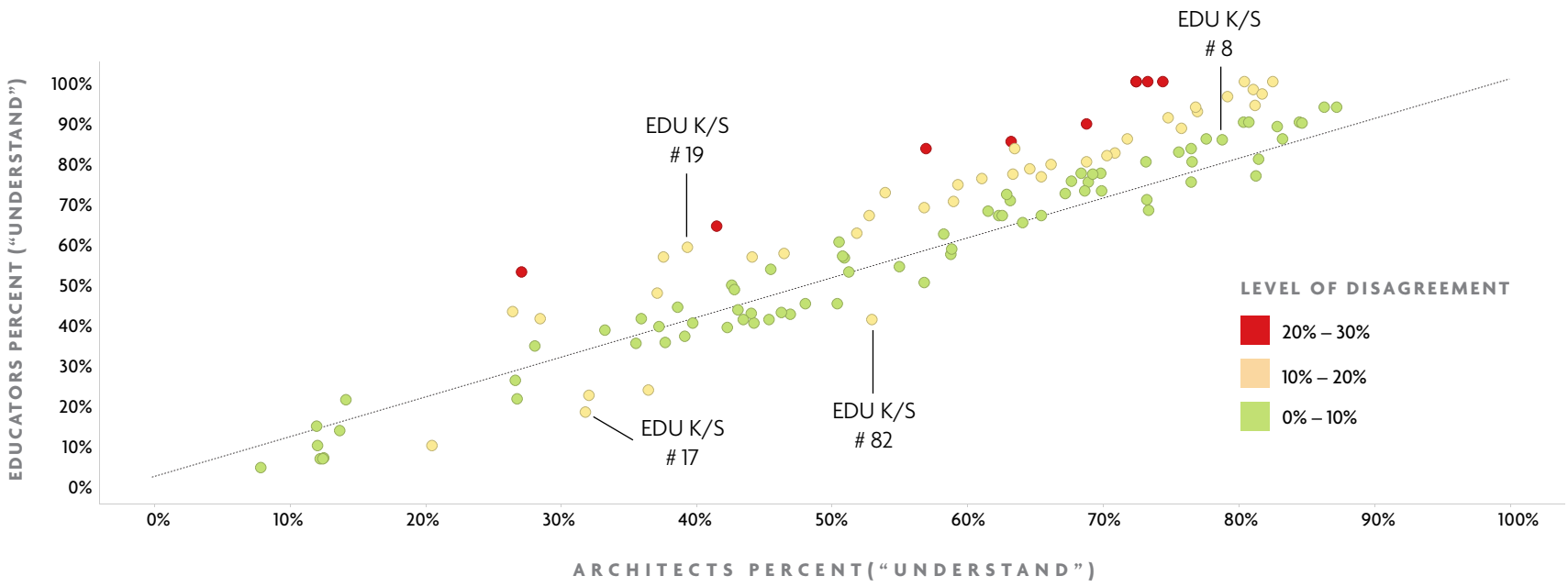
However, 31.8 percent of architects vs. 17.8 percent of educators rated EDU K/S #17 "*Knowledge of elements and processes for conducting a site analysis*," as a K/S that should be understood by completion of the degree. Similarly, for EDU K/S #82 "*Knowledge of sustainability strategies and/or rating 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.

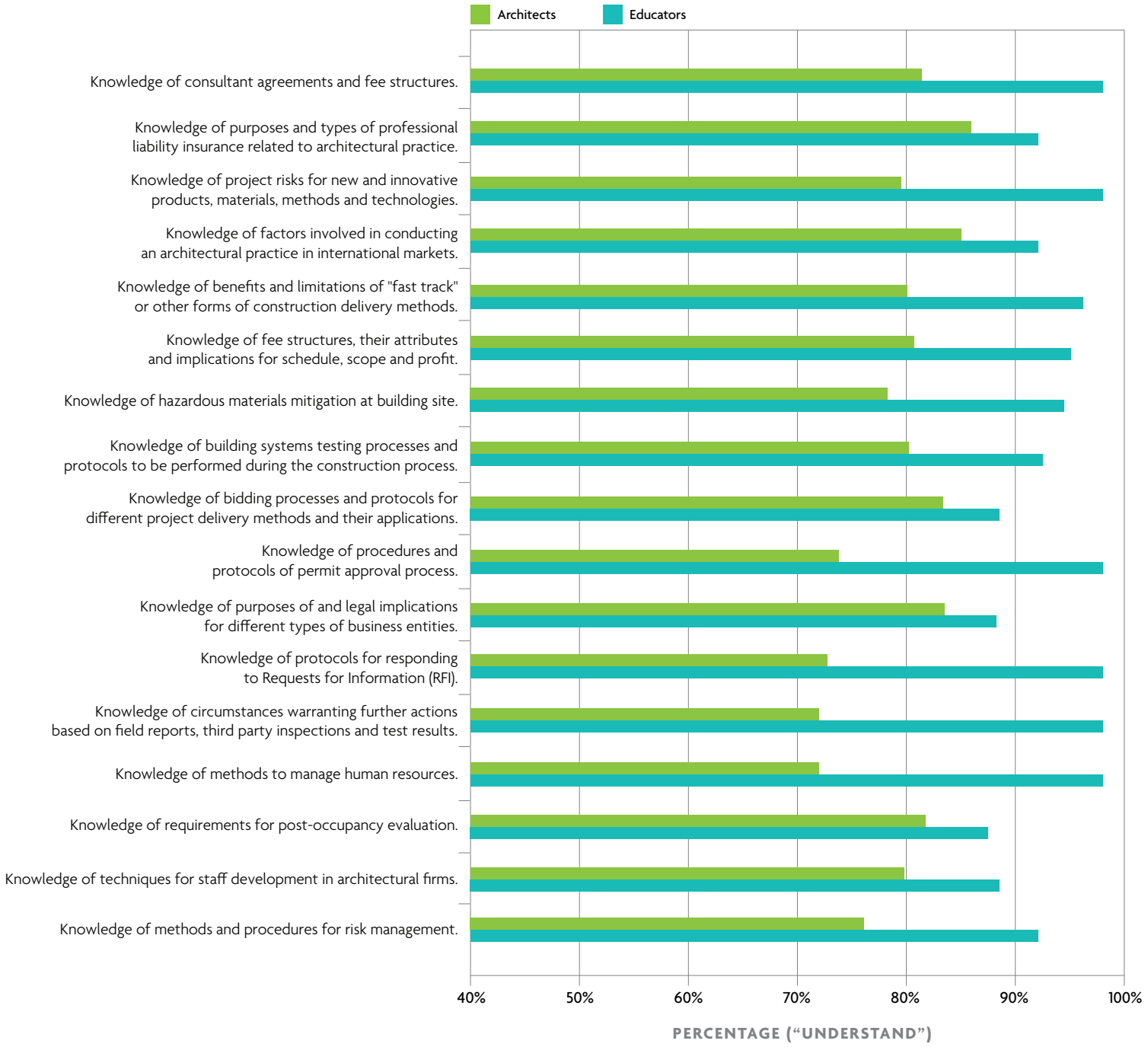
Each dot on the scatter plot represents a specific knowledge/skill (K/S), with position on the x-axis determined by the percentage of architect respondents who indicated that the K/S should be acquired to a particular level by completion of the program. The y-axis represents the response of educators 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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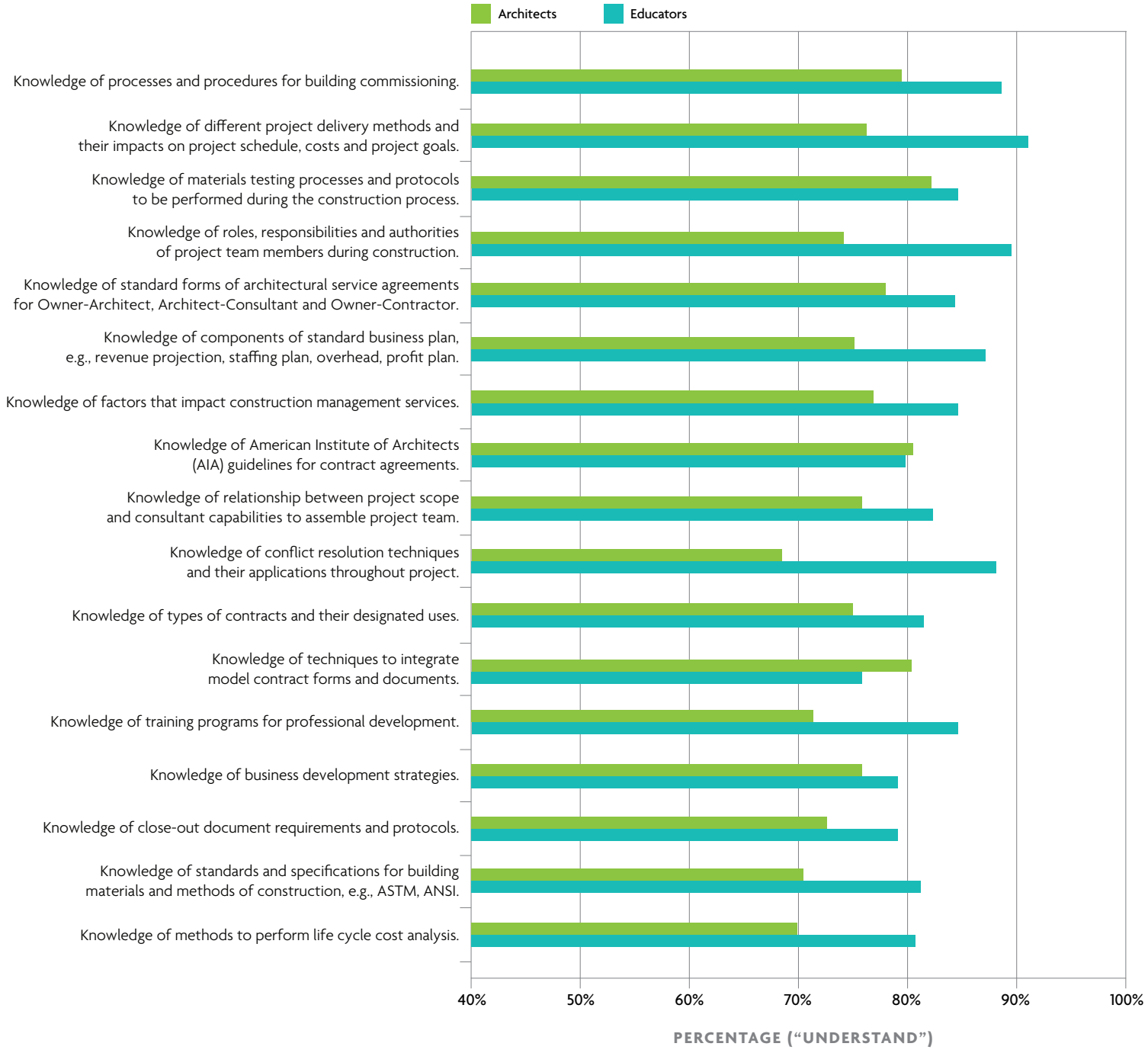
K/S THAT OVER 50 PERCENT OF ARCHITECTS AND EDUCATORS BELIEVE SHOULD BE ACQUIRED TO THE LEVEL OF "UNDERSTAND" BY COMPLETION OF ACCREDITED PROGRAM (CONT.)



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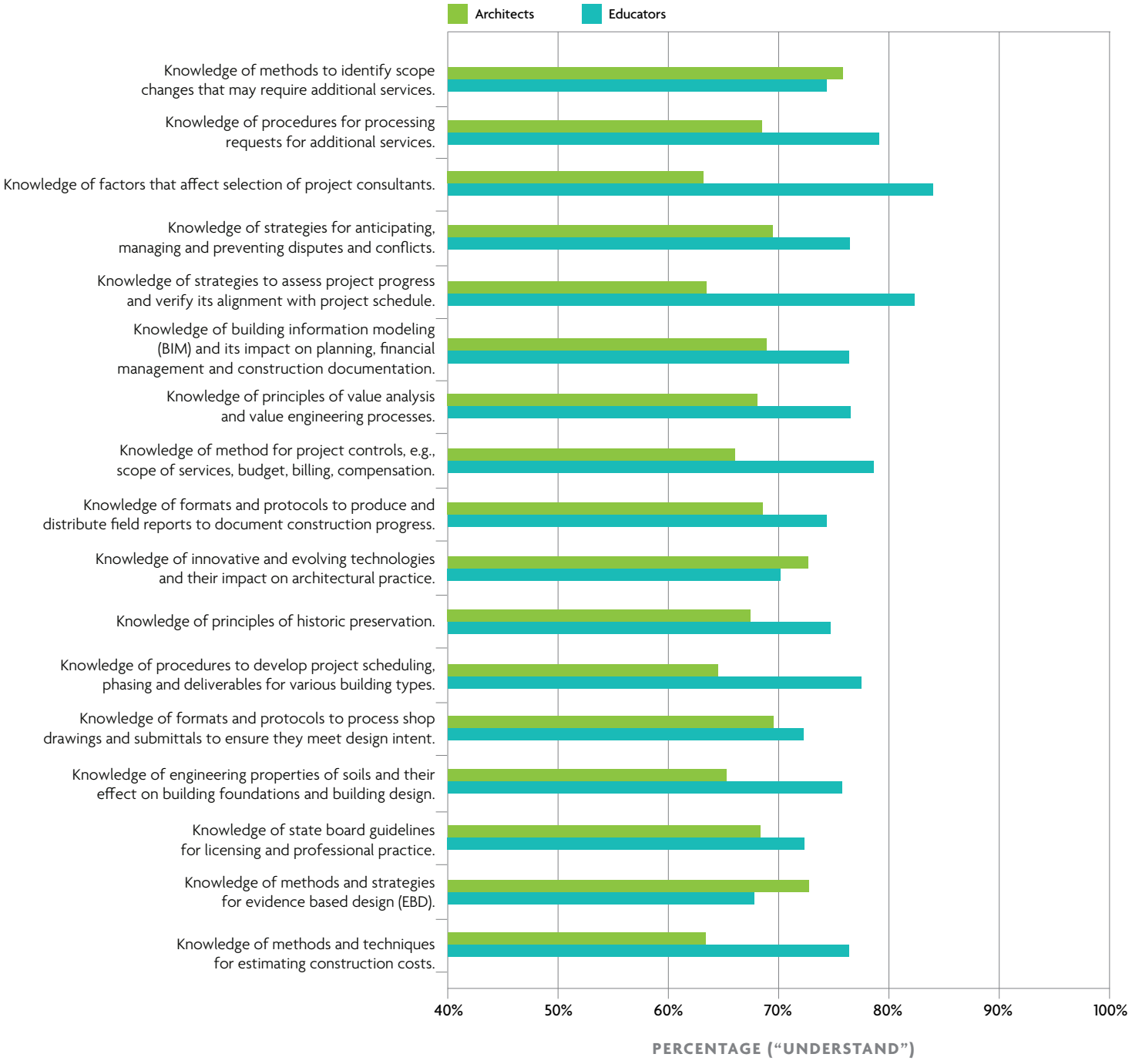
K/S THAT OVER 50 PERCENT OF ARCHITECTS AND EDUCATORS BELIEVE SHOULD BE ACQUIRED TO THE LEVEL OF "UNDERSTAND" BY COMPLETION OF ACCREDITED PROGRAM (CONT.)



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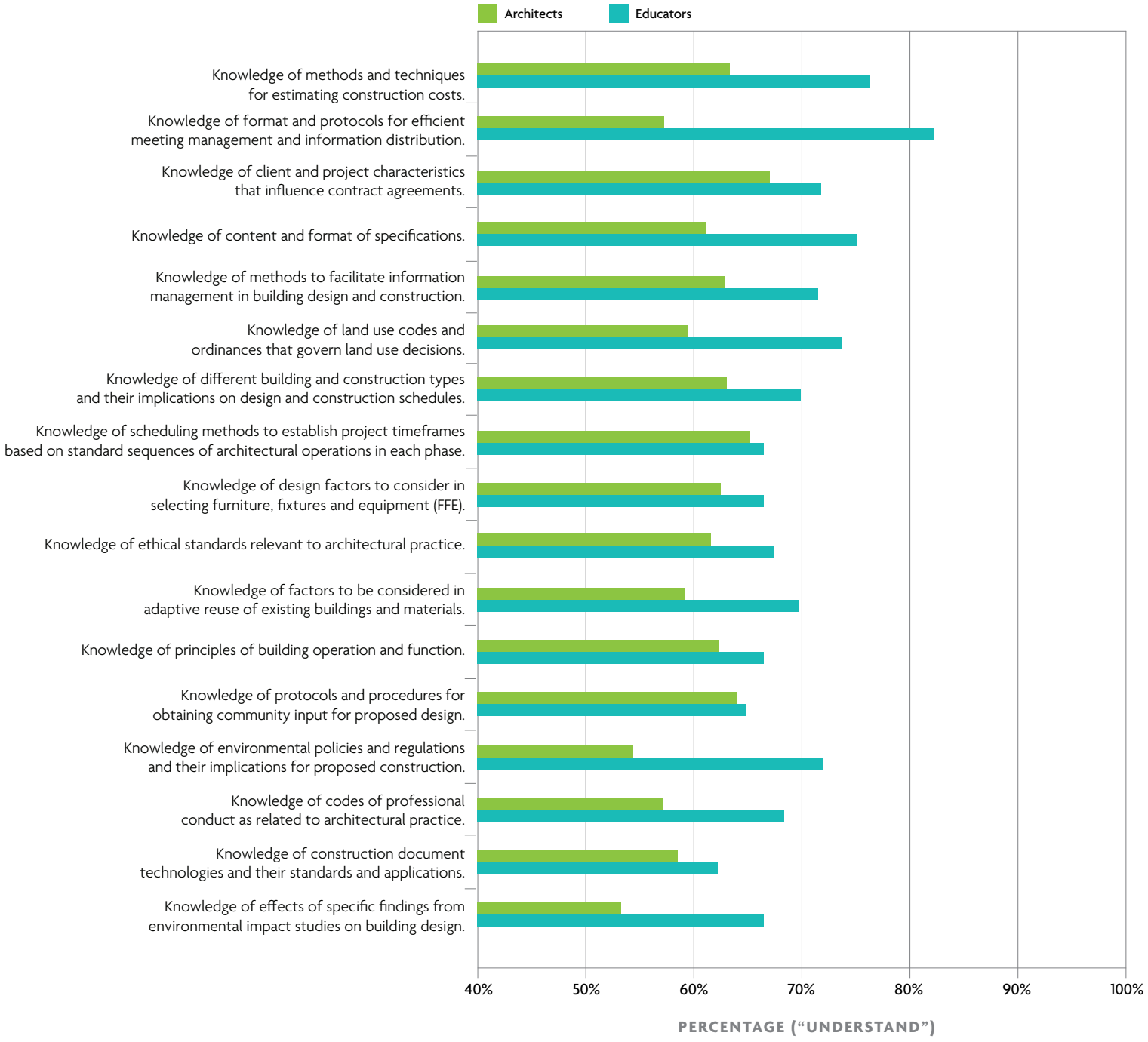
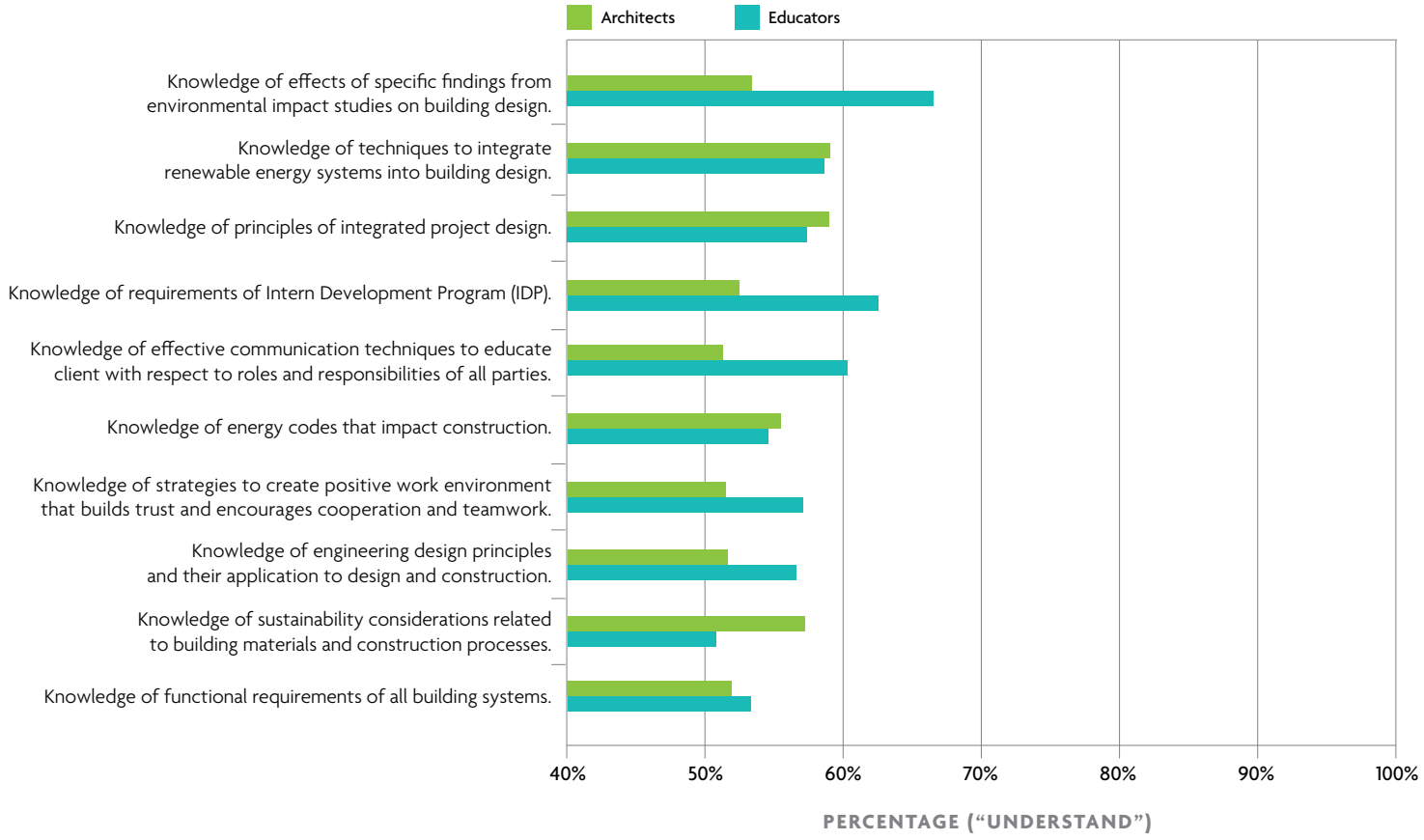
K/S THAT OVER 50 PERCENT OF ARCHITECTS AND EDUCATORS BELIEVE SHOULD BE ACQUIRED TO THE LEVEL OF "UNDERSTAND" BY COMPLETION OF ACCREDITED PROGRAM (CONT.)



CONTINUED

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.

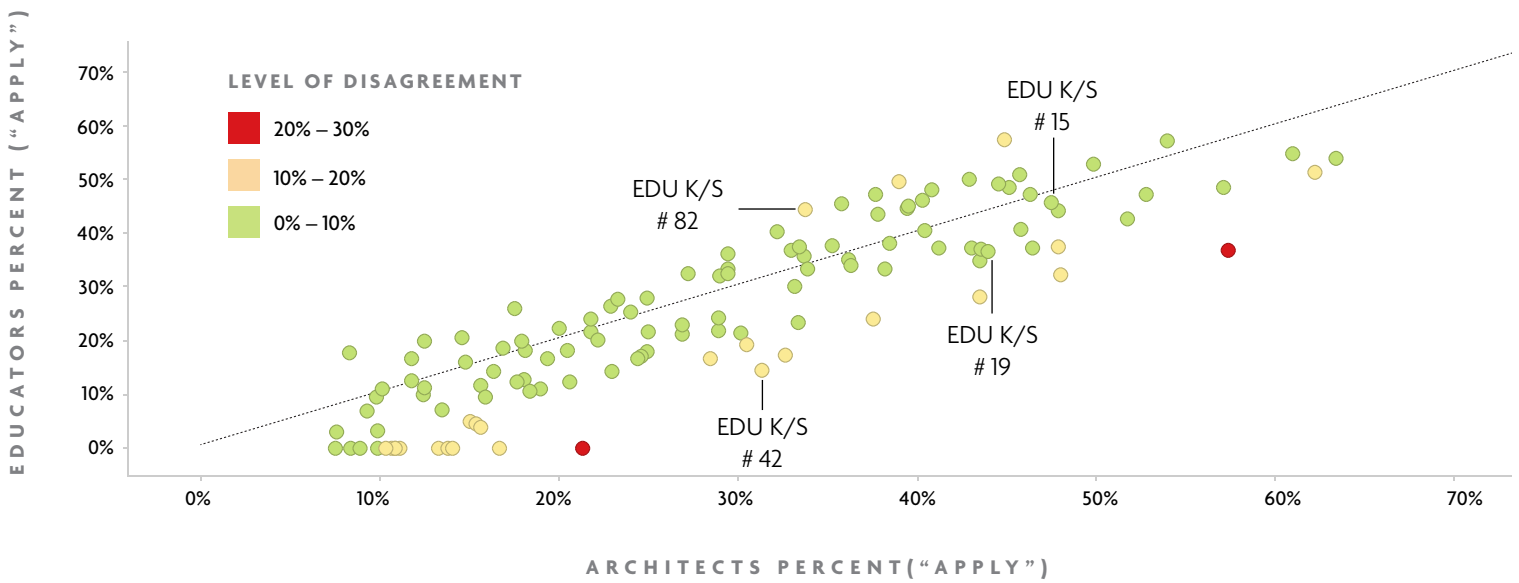
For EDU K/S #42 "*Knowledge of methods and techniques for estimating construction costs*," 31.3 percent of architects vs. 14.6 percent of educators indicated students should be able to "*apply*" the K/S by completion of the degree. Similarly, for EDU K/S #15 "*Skill in designing facility layout and site 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.

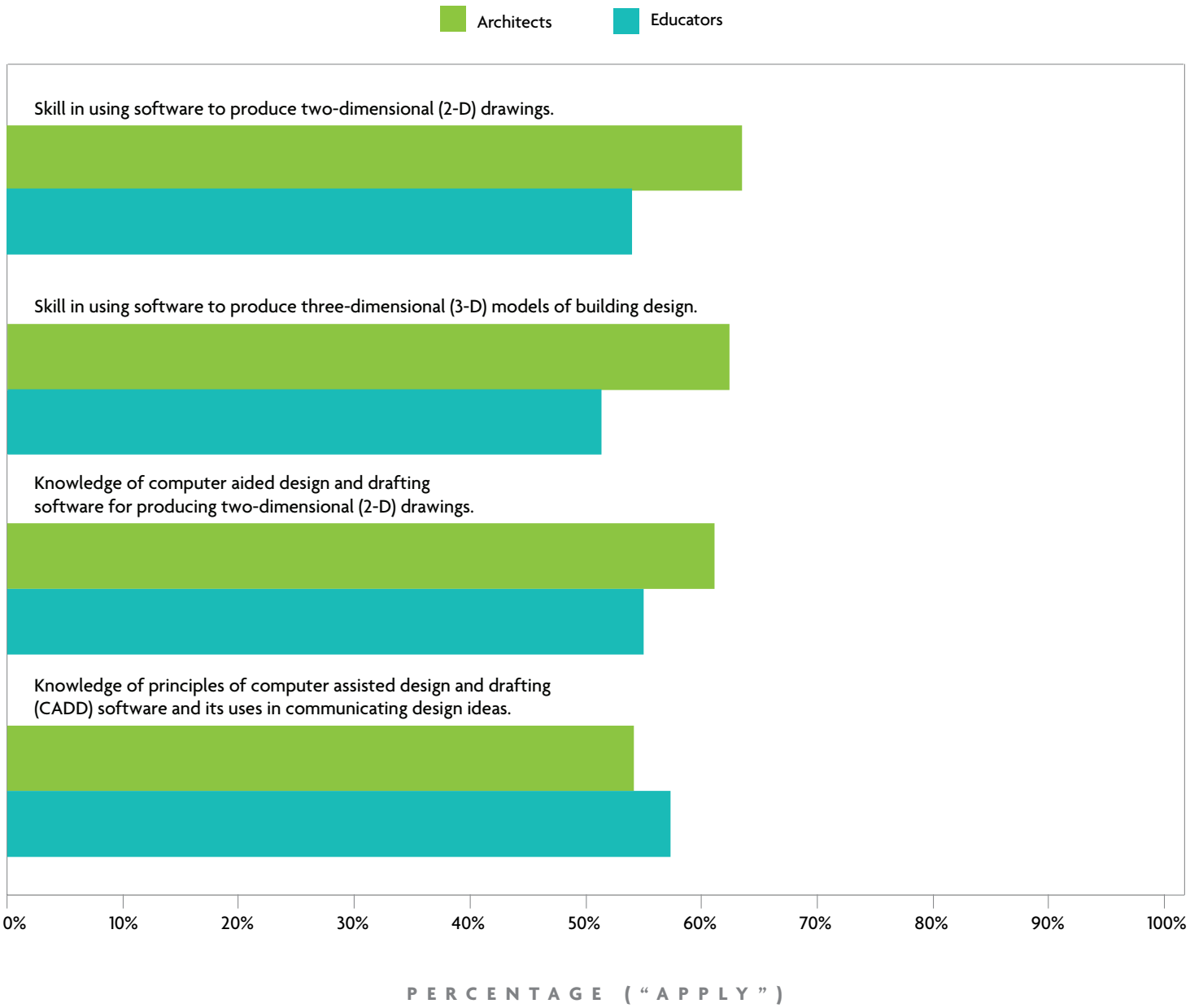
Each dot on the scatter plot represents a specific knowledge/skill (K/S), with position on the x-axis determined by the percentage of architect respondents who indicated that the K/S should be acquired to a particular level by completion of the program. The y-axis represents the response of educators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

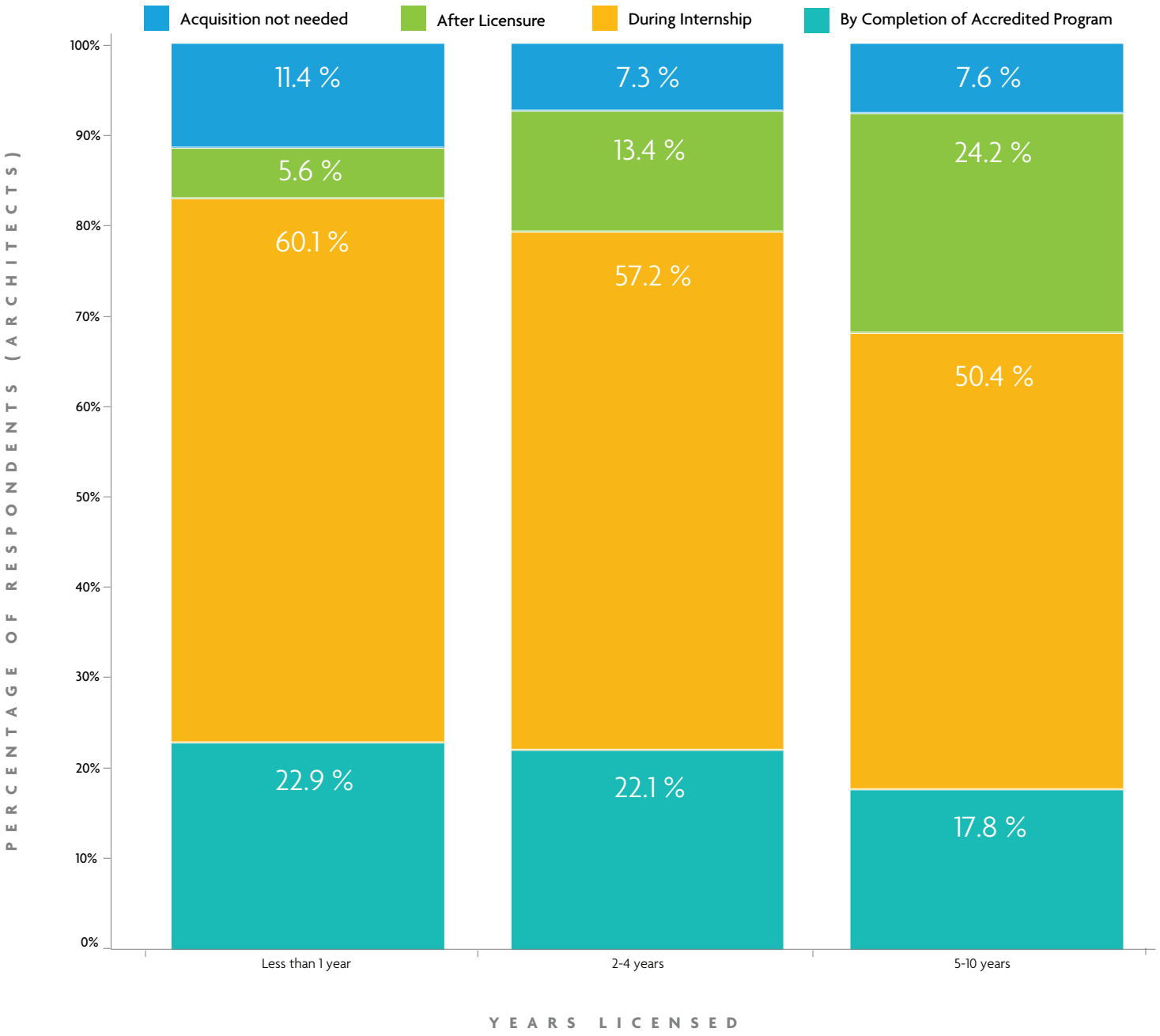
Fifteen K/S rated as important or greater were identified by more than 50 percent of all licensed architects as being acquired "*after licensure*." Ideally, all K/S rated important should be acquired prior to licensure. While this is rarely the case, the data does indicate a positive trend as recently 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		ALL LICENSED ARCHITECTS	
		ARCHITECTS LICENSED 10 YEARS OR LESS			
		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.

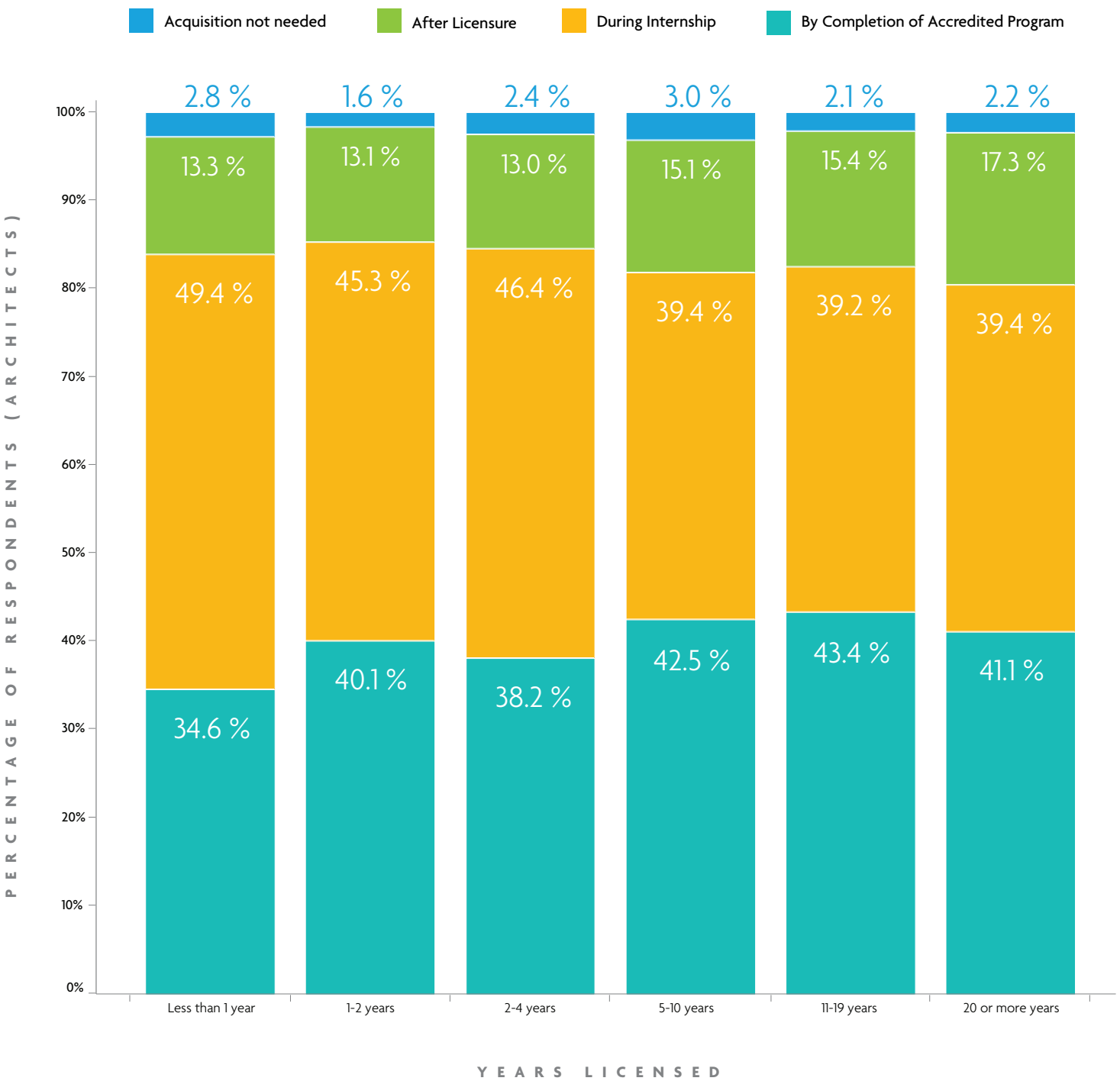
WHEN A K/S WAS FIRST ACQUIRED



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 earlier.

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

WHEN <u>SHOULD</u> A K/S FIRST BE ACQUIRED



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 / ARCHITECTS LICENSED IN THE PAST YEAR	EDUCATORS	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS / 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		EDUCATORS	ALL LICENSED ARCHITECTS
		ARCHITECTS LICENSED 10 YEARS OR LESS		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	EDUCATORS
		ARCHITECTS LICENSED 10 YEARS OR LESS	LICENSED ARCHITECTS
		FIRST ACQUIRED BY COMPLETION OF DEGREE	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	ALL LICENSED ARCHITECTS	
			ARCHITECTS LICENSED IN THE PAST YEAR		
		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 <u>should</u> first be acquired by completion of accredited education.

EDU K/S #	KNOWLEDGE OF	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS	EDUCATORS	ALL LICENSED ARCHITECTS	
		ARCHITECTS LICENSED 10 YEARS OR LESS	LICENSED ARCHITECTS		
		FIRST ACQUIRED DURING INTERNSHIP	<u>SHOULD</u> 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 should first be acquired prior to completion of education.

EDU K/S #	KNOWLEDGE OF	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS		EDUCATORS	
		ARCHITECTS LICENSED 10 YEARS OR LESS		LICENSED ARCHITECTS	
		ACQUIRED BY COMPLETION OF DEGREE	ACQUIRED DURING INTERNSHIP	SHOULD 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.

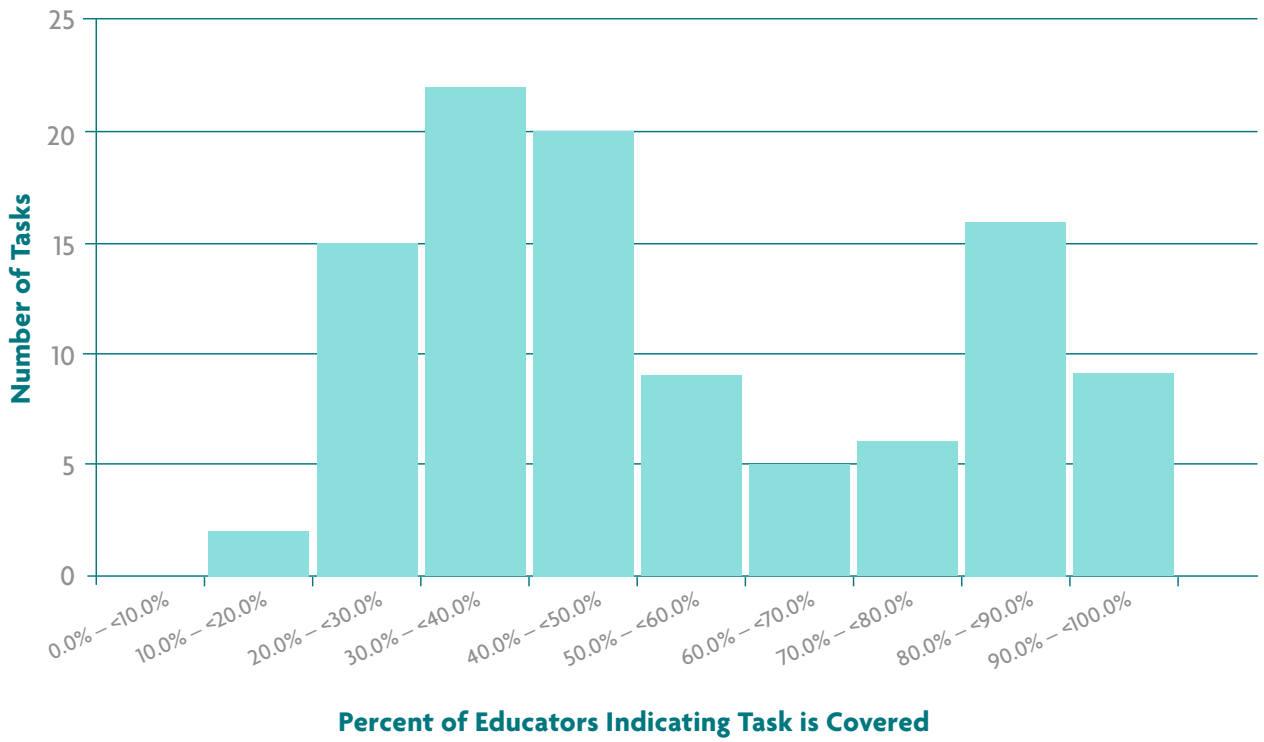
EDU K/S #	KNOWLEDGE OF	INTERNS WHO COMPLETED IDP WITHIN THE PAST 2 YEARS		EDUCATORS	
		ARCHITECTS LICENSED 10 YEARS OR LESS		LICENSED ARCHITECTS	
		ACQUIRED BY COMPLETION OF DEGREE	ACQUIRED DURING INTERNSHIP	SHOULD FIRST BE ACQUIRED BY COMPLETION OF DEGREE	SHOULD FIRST BE ACQUIRED DURING INTERNSHIP
34	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

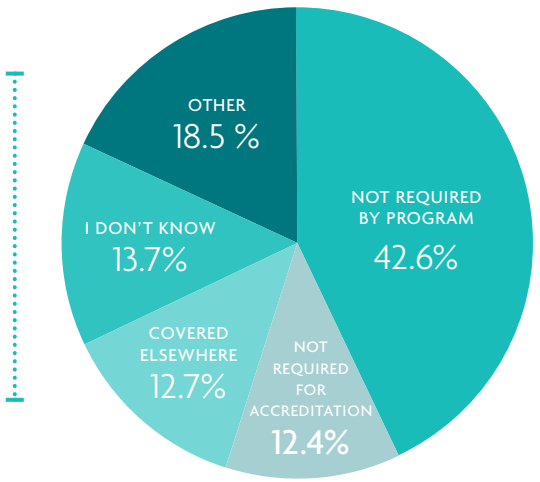
When educators rated a given task as being covered by their respective programs, they were asked a follow-up question regarding the extent to which students in their program perform the task. Data Table B3 lists the percent of educators who rated each task as *introduced but not performed, performed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

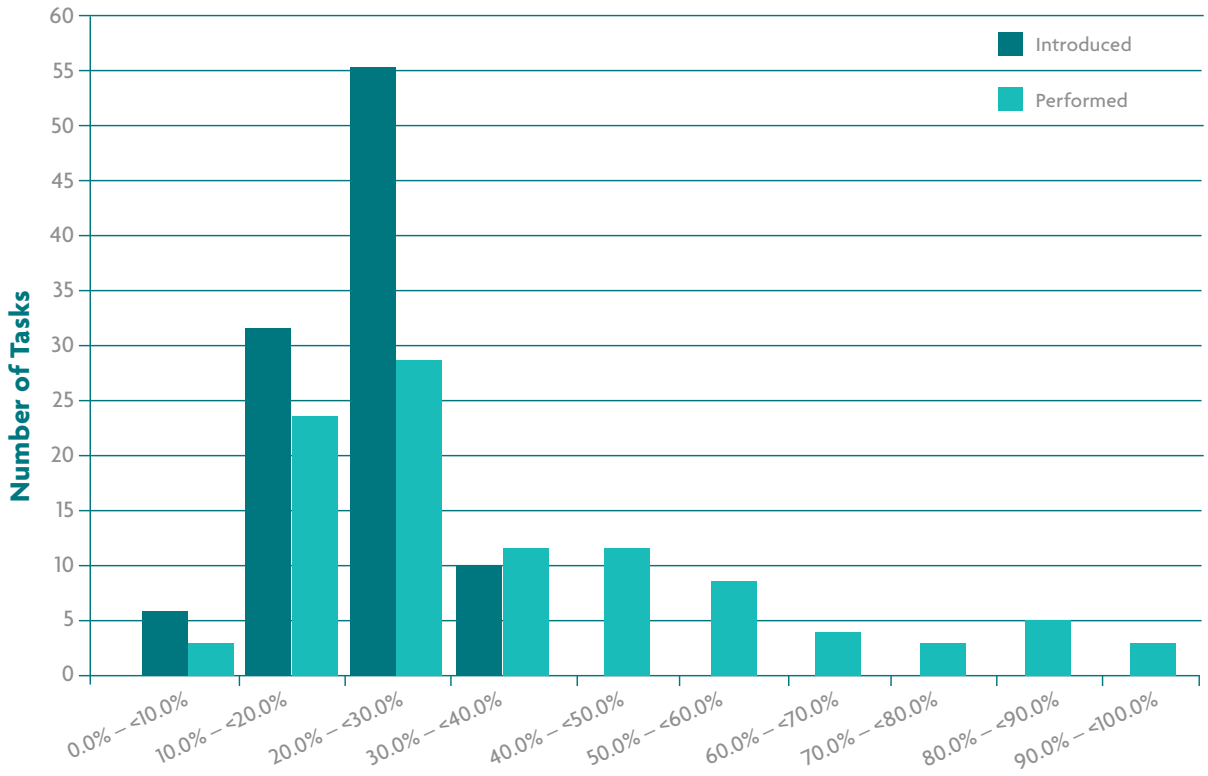
EXTENT OF TASK PERFORMANCE BY INTERNS AND RECENTLY LICENSED ARCHITECTS

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.



Percent of Recent Interns and Recently Licensed Architects Who Performed vs. Introduced 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

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

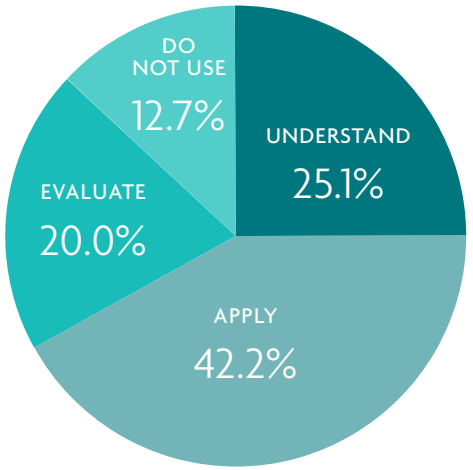
A total of 450 interns and architects responded to the EDU survey and indicated when they first acquired each listed knowledge/skill (K/S). The interns completed IDP in the past two years, but not the ARE; the architects were either: (a) licensed within the past year and completed IDP in the past two 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,* and *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.

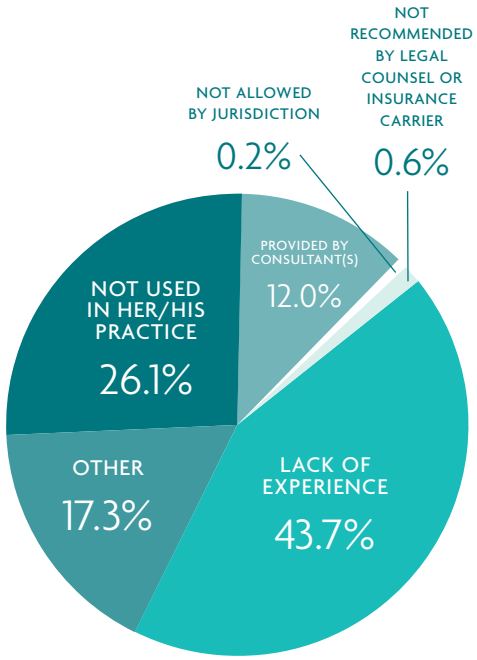


Mean percent of interns and architects rating each level at which they typically use knowledge/skills

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 did not 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.

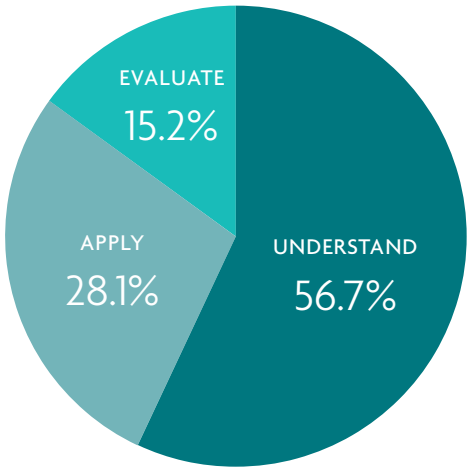
As such, 43 of 122 statements were rated by a majority of the educators and licensed architects as needing to be first acquired by the completion of a degree program. In comparison, 39 of the 122 K/S were rated by 50.0 percent or more of the respondents as needing to be first acquired during internship.

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, and many similarities in their responses emerged. The comments and suggestions specifically related to education are collectively presented in this section.

EDUCATION SURVEY RESPONDENTS

In general, education survey 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. Respondents also indicated the need for international language skills. The need for better interdisciplinary collaboration with clients and contractors was also voiced.

ALL SURVEY RESPONDENTS

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

With respect to the changing role of the architect, some respondents felt that architecture education should emphasize the practice of architecture—they indicated there is a need for well-rounded graduates who have a working knowledge of the basics rather than concentration on specialties such as LEED or green technology. An overwhelming majority felt that the educational curriculum should include more experience in the field and at the job site. Their reasoning is that by

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

having hands-on experience, graduates would be able to better visualize the design and construction process. Many respondents also 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. On a related note, other respondents suggested that architects should take a leadership role in order to oversee the design process, control the quality of designs, and make decisions regarding codes and standards. At the same time, some respondents mentioned that a collaborative approach should be taken in project work, particularly in early stages of development.

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

Adapting to Changing Demands

Respondents expressed a range of opinions regarding how the profession should adapt to changing demands of practice. An overwhelming majority of respondents felt that the educational curriculum should include more 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. Many respondents indicated that there should be greater emphasis on analytic thinking, materials and methods, specifications, contract documents, and communication skills in the architectural education curriculum.

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. Additionally, respondents believe students should develop good critical thinking and problem-solving skills rather than rely on technology alone.

Knowledge and/or Skills Needed Now and in the Future

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. Many respondents suggested that the education curriculum should place more emphasis on real world skills used in the field and less on studio and design. Some indicated a need for a uniform architecture curriculum that focuses on the knowledge and skills related to design fundamentals, constructability, sustainability, 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. Several responded that graduates need to develop good listening skills and acquire a good understanding of construction practices during their education.

Professional Practice, Accreditation, and Licensure

It was suggested by some that there should be a standardized, master's degree program curriculum that provides more specialized coursework and experiences, building upon the fundamentals learned in a bachelor's degree program. 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.

NCARB Opportunities

Many respondents suggested that the integration of education and internship should be further investigated. For example, teamwork, cooperative design, and project delivery experiences could be acquired during education and strengthened through internship. Exploring alternative educational routes such as those identified above was also suggested.

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.
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.

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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.

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

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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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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

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

CONTINUED

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

CONTINUED

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

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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

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.

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

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.

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

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.

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

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

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

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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.

K/S #	KNOWLEDGE/SKILL STATEMENT
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.

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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

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
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

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
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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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

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

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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
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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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.

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

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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

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

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

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

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

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

APPENDICES

APPENDIX A: **OVERALL 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

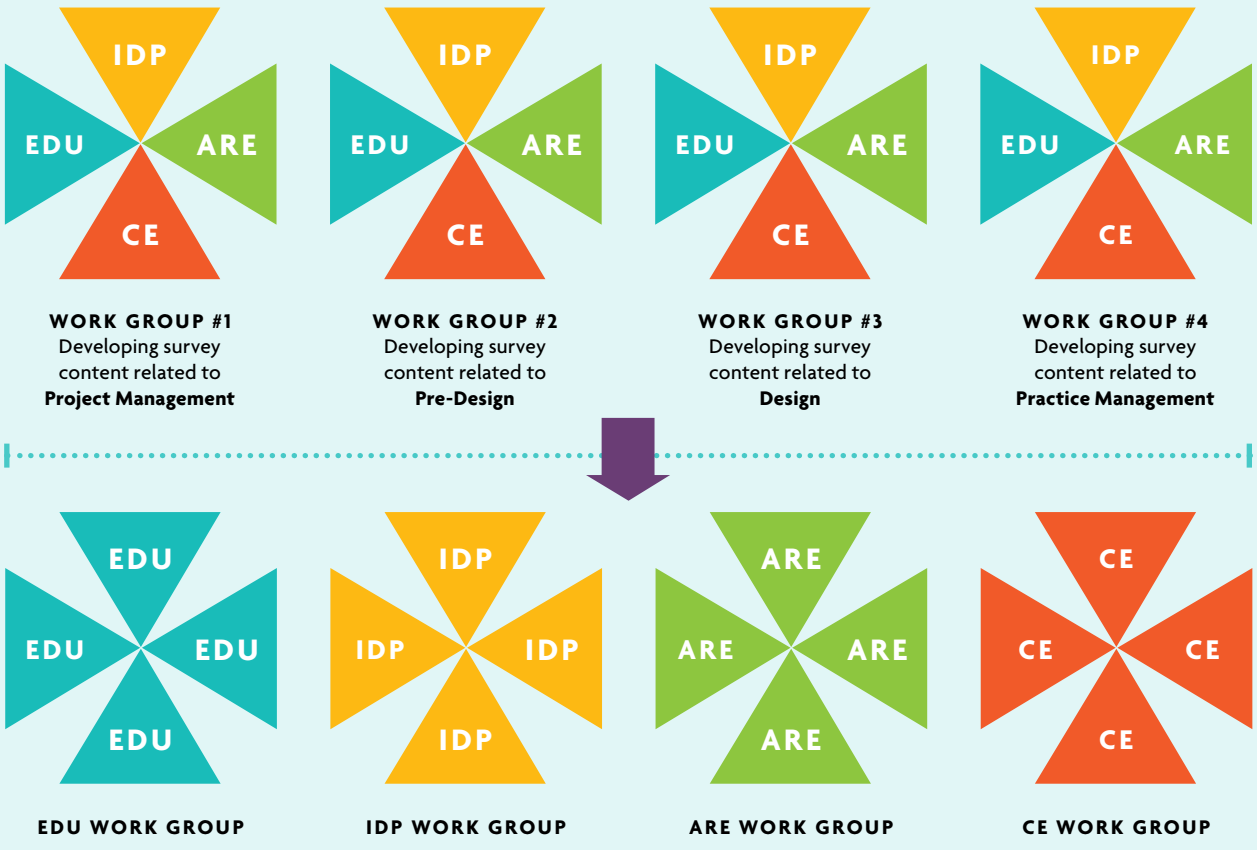
The 2012 Practice Analysis was designed under the guidance and review of the Practice Analysis Steering Committee (PASC), which served as the oversight body responsible for planning and implementing the new multi-disciplinary approach. The 11-member PASC included representatives from NCARB's Education Committee, Internship Committee, Examination Committee, Continuing Education Committee, Board of Directors, and staff. Additionally, for the first time, the PASC included leaders from the ACSA, AIA, AIAS, and the 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	123
Internship	**IDP**	Task	132
Examination	**ARE**	Task	108
		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 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 Practice Analysis 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 not 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.

APPENDIX B: **OVERALL 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 email 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%

APPENDIX C: **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: 1-of little or minor importance, 2-somewhat important, 3-important, 4-very important, and 5-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 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

A steering committee appointed by NCARB to carry out strategic planning and assist in the implementation of the practice analysis.

PATF

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.