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Knowledge and Skills of Senior Architectural Design Students in China: A Channel for Enhancing Future Career Readiness

Xiaofei Zhu[1,2,*], Layla P.Padolina[1]

[1] School of Education at the Philippine Women's University, Manila 0900, Philippines
[2] Henan University of Urban Construction, Pingdingshan 467036, China
[*]Corresponding Author Email: 2022t0076@pwu.edu.ph

ABSTRACT

This chapter presents the findings of the study regarding the assessments of senior architectural design students' knowledge and skills from the perspectives of both the students and employers. The aim is to provide a comprehensive overview of the respondents' evaluations in various domains critical to architectural education and practice. This paper adopts descriptive quantitative with qualitative data to study the knowledge and skills of architectural design students from different perspectives of architectural design students and design firms (employers) to address deficiencies in key areas of architectural education and practice. In terms of knowledge level evaluation, architectural design students and architectural design companies (employers) evaluate key areas such as design skills, technical knowledge, theoretical understanding, sustainable development awareness and communication skills, and their degree is at a medium level (I). In terms of skill level assessment, architectural design students and architectural design companies (employers) evaluated specific abilities in design skills and creativity, technical ability, project management, sustainable design, and communication and presentation skills, and their levels were at the proficient level (P). evaluate the knowledge and skills level of Chinese architectural design students and develop a corresponding professional improvement plan.

KEYWORDS

Architectural Design; Knowledge; Skills; Training Program.

1. INTRODUCTION

Architectural design is a highly practical and technical major. The professional course system mainly focuses on creating architectural works that meet human needs and combine technology and art through comprehensive consideration of the function, form, material, structure and surrounding environment of the building."Knowledge + skill level" mainly refers to the cultivation of students' engineering awareness, engineering quality, construction drawing ability, professional coordination, project management and technological innovation capabilities.

At present, China's architectural education is still weak in the cultivation of practical ability and pays insufficient attention to the cultivation of engineering technical quality and ability. There is a lack of initiative to transform advanced and applicable educational and teaching concepts into talent training practice exploration. For the architectural design major, the key to university education is to cultivate future leading talents for the society. The teaching concepts and methods that only use knowledge as a carrier are obviously difficult to meet the society's demand for talents. Therefore, the demand for talent training transformation is more urgent.

2. PROBLEMS IN TEACHING

There are two core courses for students majoring in architecture: architectural design and architectural technology. The architectural design course focuses on cultivating students' design thinking, innovation and practical ability, while the architectural construction course focuses more on knowledge of the structure, materials, construction and other aspects of the building.

In actual teaching and student learning, these two types of courses are often independent of each other, each doing its own thing, and lack effective connection. Since architectural technology courses are more difficult to learn, students often pay attention to the study of architectural design courses and ignore the study of architectural technology. This results in students being unable to fully consider the rationality of the structure and the feasibility of construction during the design process and being out of touch with the real practice of the architectural design industry.

This study focuses on the thinking mode of architectural education and the architectural teaching design curriculum system against the background of the social needs of architects' professionalization. Through the discussion of design learning behaviors and learning methods, the foothold and practical significance in the process of cultivating the professionalization of architects are evaluated. Finally, we find an entry point for innovation in the thinking mode and teaching mode of architectural education.

3. RESEARCH DESIGN

3.1. Research Ideas

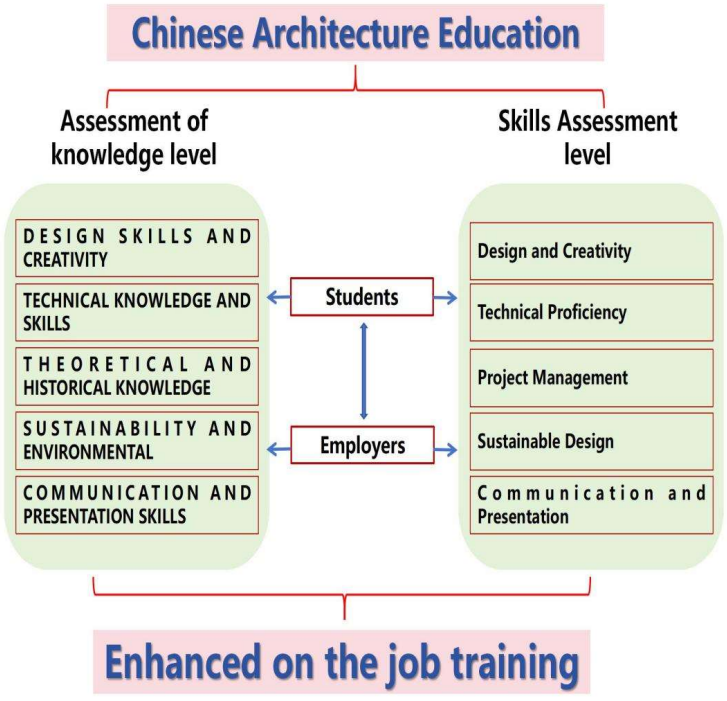

Figure 1. Conceptual Framework of the study

This conceptual framework diagram clearly describes the main content and direction of this study. By exploring students' basic profile, architectural design, creativity, technical knowledge, historical knowledge, sustainable design, communication, presentation skills, and other aspects, and evaluating professional development training programs, it aims to gain a comprehensive understanding of the field and provide valuable insights and guidance for its practice and development.

3.2. Research Design

This paper adopts descriptive quantitative with qualitative data to study the knowledge and skills of architectural design students from different perspectives of architectural design students and design firms (employers) to address deficiencies in key areas of architectural education and practice.

3.3. Respondents of the Study

The respondents of this study are 752 students from three universities, A, B, and C , and 60 managers, designers, and human resources managers from 10 design companies. The researcher selected the target population using cluster sampling and invited them to participate in the questionnaire designed by the researchers. 3-4 students were selected from each university, and a total of 10 students were selected for interviews. One employee was selected from each design company, and a total of 10 employees were selected for interviews.

3.4. Instrument/s

This study used a researcher-made questionnaire as the main tool to collect quantitative data. The questionnaire covers various aspects such as architectural design knowledge and skills to assess the respondents' perceptions and experiences.

The quantitative items used a four-point Likert scale to assess the levels of design skills and creativity, technical knowledge and skills, theoretical and historical knowledge, sustainability and environmental, communication and presentation skills.

3.5. Treatment of Data

After completing the data collection through the questionnaire, a series of statistical techniques and methods were used to examine and answer the specific research questions. T-test in statistics was used in the data analysis process.

The internal consistency of the item set was assessed using Cronbach's alpha reliability coefficient. The values obtained were interpreted in the following manner:

The mean and standard deviation were calculated to determine the respondents’ evaluation and impact on the professional knowledge and skills of architectural design in Chinese universities.

The t-test is a statistical method used to compare whether the difference between two sample means is significant. It can determine whether there is a statistically significant difference between two sets of data and help researchers to judge the reliability and credibility of the experimental results.

4. THE ASSESSMENT OF THE RESPONDENTS ON THE LEVEL OF KNOWLEDGE OF THE SENIOR ARCHITECTURAL DESIGN STUDENTS.

4.1. Design Skills and Creativity

Table 1 presents the assessment of both students and employers on the level of knowledge of senior architectural design students in China, focusing on design skills and creativity. The overall mean score for students is 2.85 with a standard deviation of 0.668, indicating an Intermediate (I) level of knowledge, while employers rate the students higher with an overall mean of 3.50 and a standard deviation of 0.518, which is verbally interpreted as Advanced (A). This discrepancy highlights that while students view themselves as having intermediate competence in design skills, employers perceive them to have more advanced capabilities in this area.

Architecture and fine arts are both visual arts, and both are about the art of modeling. Basic art courses are an important way for learners to improve their aesthetic expression, which has become a consensus in architectural design education. Basic art courses are not only a basic means to improve the modeling ability of architectural design professionals, but also an important way to cultivate artistic aesthetic qualities.

Table 1. Assessment of the Respondents on the Level of Knowledge of the Senior Architectural Design Students in terms of Design Skills and Creativity

INDICATORS	STUDENTS			EMPLOYERS		
	MEAN	STD. DEV.	V.I.	MEAN	STD. DEV.	V.I.
I have a foundation in painting and artistic representation.	**2.80**	**0.813**	**I**	**3.42**	**0.619**	**I**
I have knowledge of architectural drafting and can read and design drawings correctly	**2.96**	**0.778**	**I**	**3.58**	**0.671**	**A**
I have mastered the operation of design tools and software (such as Adobe Photoshop, Sketch, AutoCAD	**2.87**	**0.787**	**I**	**3.50**	**0.676**	**A**
I can accurately and reasonably lay out the floor plans of buildings.	**2.85**	**0.764**	**I**	**3.50**	**0.651**	**A**
I have innovative design skills and can use creative design solutions to address design challenges.	**2.81**	**0.777**	**I**	**3.50**	**0.676**	**A**
I can effectively integrate aesthetic considerations into my design projects.	**2.85**	**0.780**	**I**	**3.48**	**0.651**	**I**
OVERALL	**2.85**	**0.668**	**I**	**3.50**	**0.518**	**A**

LEGEND: A – Advanced (3.50- 4.00); I – Intermediate (2.50-3.49); Ba – Basic (1.50-2.49); Be – Beginner (1.00 – 1.49)(Table 1 to Table 5 are the same and will not be repeated).

4.2. Technical Knowledge and Skills

Table 2. Assessment of the Respondents on the Level of Knowledge of the Senior Architectural Design Students in terms of Technical Knowledge and Skills

INDICATORS	STUDENTS			EMPLOYERS		
	MEAN	STD. DEV.	V.I.	MEAN	STD. DEV.	V.I.
I have a solid understanding of construction methods and materials.	**2.79**	**0.792**	**I**	**3.35**	**0.799**	**I**
I can accurately produce construction documents and technical drawings.	**2.78**	**0.792**	**I**	**3.35**	**0.755**	**I**
I am knowledgeable about building codes and regulations.	**2.86**	**0.765**	**I**	**3.47**	**0.700**	**I**
I can effectively apply structural principles in my design projects.	**2.80**	**0.789**	**I**	**3.23**	**0.698**	**I**
I demonstrate proficiency in using architectural software for technical modeling and analysis.	**2.83**	**0.788**	**I**	**3.32**	**0.676**	**I**
I have a strong grasp of building systems (e.g., HVAC, electrical, plumbing) and their integration into design.	**2.74**	**0.817**	**I**	**3.17**	**0.785**	**I**
OVERALL	**2.80**	**0.699**	**I**	**3.31**	**0.627**	**I**

Table 2 presents the assessment of the respondents on the level of knowledge of senior architectural design students in China, specifically in terms of technical knowledge and skills. The overall mean score for the students' technical knowledge is 2.80, with a standard deviation of 0.699, which falls within the "Intermediate" range (2.50-3.49). This suggests that students are perceived to have an intermediate level of knowledge and skills in technical aspects related to architecture.

For employers, the overall mean is 3.31, with a standard deviation of 0.627, which also falls within the "Intermediate" range but is significantly higher than the student assessments. This indicates that employers perceive senior students to be more proficient in technical knowledge and skills compared to the students' own assessments. Among employers, the highest mean is 3.47 for "I am knowledgeable about building codes and regulations" with a standard deviation of 0.700, verbally interpreted as "Intermediate." This aligns with the students' perceptions and highlights the importance of regulatory knowledge in the professional field.

All these indicate the necessity and importance of architectural technology in architectural design education. In recent years, the impact of technological progress on architectural design has become increasingly significant. The evaluation data of students and employers on "technical knowledge and skill levels" also show that there are certain gaps in architectural technology education in the teaching of architectural design majors, which needs to be further strengthened.

4.3. Theoretical and Historical Knowledge

Table 3. Assessment of the Respondents on the Level of Knowledge of the Senior Architectural Design Students in terms of Theoretical and Historical Knowledge

INDICATORS	STUDENTS			EMPLOYERS		
	MEAN	STD. DEV.	V.I.	MEAN	STD. DEV.	V.I.
I have a thorough understanding of architectural theories and principles.	**2.82**	**0.777**	**I**	**3.38**	**0.666**	**I**
I can critically analyze and apply historical architectural styles in my designs.	**2.85**	**0.780**	**I**	**3.23**	**0.745**	**I**
I am familiar with the works and contributions of major architects throughout history.	**2.82**	**0.799**	**I**	**3.35**	**0.659**	**I**
I can articulate the theoretical underpinnings of my design decisions.	**2.86**	**0.766**	**I**	**3.38**	**0.715**	**I**
I demonstrate knowledge of architectural movements and their impacts on contemporary practice.	**2.84**	**0.763**	**I**	**3.30**	**0.671**	**I**
I can connect theoretical knowledge with practical design applications.	**2.86**	**0.770**	**I**	**3.45**	**0.649**	**I**
OVERALL	**2.84**	**0.693**	**I**	**3.35**	**0.605**	**I**

Table 3 presents the assessment of respondents on the level of knowledge of senior architectural design students in China, specifically in terms of theoretical and historical knowledge. The overall mean score for students is 2.84, with a standard deviation of 0.693, which falls within the "Intermediate" range (2.50-3.49). This suggests that students have an adequate, though not advanced, understanding of architectural theories, principles, and history.

For employers, the overall mean is higher at 3.35, with a standard deviation of 0.605, also falling within the "Intermediate" range but significantly closer to the "Advanced" category. This suggests that employers generally perceive the students' theoretical and historical knowledge more favorably than the students themselves.

Therefore, architectural designers need to find a balance between market demand and design innovation to create architectural works that can both meet market demand and have unique charm. In the questionnaire survey data, the questionnaire analysis of both students and employers also fully reflects the important position of historical and cultural knowledge in architectural design.

4.4. Sustainability and Environmental Awareness

Table 4. Assessment of the Respondents on the Level of Knowledge of the Senior Architectural Design students in terms of Sustainability and Environmental Awareness

INDICATORS	STUDENTS			EMPLOYERS		
	MEAN	STD. DEV.	V.I.	MEAN	STD. DEV.	V.I.
I understand the principles of sustainable design	**2.89**	**0.752**	**I**	**3.47**	**0.650**	**I**
I can effectively incorporate green building practices into my design projects	**2.91**	**0.771**	**I**	**3.35**	**0.685**	**I**
I demonstrate awareness of environmental impact and resource efficiency in my designs.	**2.91**	**0.748**	**I**	**3.38**	**0.715**	**I**
I can design buildings that promote energy efficiency and reduce carbon footprint.	**2.88**	**0.770**	**I**	**3.38**	**0.691**	**I**
I show a commitment to addressing environmental challenges through innovative design solutions.	**2.90**	**0.768**	**I**	**3.35**	**0.732**	**I**
I am knowledgeable about sustainable materials and technologies.	**2.88**	**0.799**	**I**	**3.43**	**0.647**	**I**
OVERALL	**2.89**	**0.687**	**I**	**3.39**	**0.608**	**I**

Table 4 presents the assessment of respondents on the level of knowledge of senior architectural design students in terms of sustainability and environmental awareness. For students, the overall mean is 2.89 with a standard deviation of 0.687, placing their knowledge at the "Intermediate" level (2.50-3.49). This suggests that students possess a moderate understanding of sustainable design principles, but there is room for further growth and deeper integration of environmental awareness in their work.

For employers, the overall mean is notably higher at 3.39 with a standard deviation of 0.608, still falling within the "Intermediate" range but closer to the "Advanced" category. This reflects a more positive view from employers regarding the students' knowledge of sustainability and environmental awareness.

Overall, both students and employers rate the students' knowledge of sustainability and environmental awareness as "Intermediate," but employers generally offer a more favorable assessment, especially regarding students' understanding of sustainable design principles. This may indicate that while students have foundational knowledge, employers expect them to further refine their skills in applying sustainable practices.

4.5. Communication and Presentation Skills

Table 5 presents the assessment of respondents on the level of knowledge of senior architectural design students in terms of communication and presentation skills. The overall mean score for students is 2.93, with a standard deviation of 0.665, indicating that their communication and presentation skills are at an "Intermediate" level (2.50-3.49). This suggests that students possess a moderate capability in conveying their design ideas, although there is potential for further improvement in these essential skills.

For employers, the overall mean is notably higher at 3.53, with a standard deviation of 0.518, indicating that employers view the students' communication and presentation skills as "Advanced." This assessment reflects a strong confidence in the students' abilities to articulate their design ideas and effectively engage with various audiences.

Overall, the data indicates that while students are assessed as having an intermediate level of communication and presentation skills, employers rate these skills significantly higher, suggesting that students are well-prepared in this area for professional practice, particularly in producing organized portfolios and delivering effective presentations.

Table 5. Assessment of the Respondents on the Level of Knowledge of the Senior Architectural Design Students in terms of Communication and Presentation Skills

INDICATORS	STUDENTS			EMPLOYERS		
	MEAN	STD. DEV.	V.I.	MEAN	STD. DEV.	V.I.
I can clearly and effectively present my design ideas to various audiences.	**2.94**	**0.745**	**I**	**3.53**	**0.596**	**A**
I am proficient in using visual aids (e.g., models, renderings) to enhance my presentations.	**2.87**	**0.799**	**I**	**3.52**	**0.596**	**A**
I can produce well-organized and coherent design portfolios.	**3.02**	**0.739**	**I**	**3.60**	**0.643**	**A**
I demonstrate strong verbal communication skills during design critiques and reviews	**2.90**	**0.759**	**I**	**3.53**	**0.566**	**A**
I am capable of writing clear and concise project descriptions and reports.	**2.89**	**0.764**	**I**	**3.53**	**0.676**	**A**
I can engage in constructive feedback and discussions about my design work.	**2.93**	**0.736**	**I**	**3.47**	**0.596**	**I**
OVERALL	**2.93**	**0.665**	**I**	**3.53**	**0.518**	**A**

LEGEND: A – Advanced (3.50- 4.00); I – Intermediate (2.50-3.49); Ba – Basic (1.50-2.49); Be – Beginner (1.00 – 1.49).

5. ASSESSMENT OF THE RESPONDENTS ON THE SKILLS OF THE SENIOR ARCHITECTURAL DESIGN STUDENTS

5.1. Design Skills and Creativity

Table 6 presents the assessment of the respondents regarding the skills of senior architectural design students in terms of design skills and creativity. The overall mean score for students is 2.86, with a standard deviation of 0.681, indicating that they are perceived as "Proficient" (2.50-3.49) in their design skills and creativity. This suggests that students have a commendable level of skill, though there is still room for improvement in specific areas.

For employers, the overall mean score is significantly higher at 3.46, with a standard deviation of 0.585, placing their assessment within the "Proficient" range as well. This suggests that employers perceive the students as having a solid skill set in design and creativity.

Overall, Table 7 highlights the strengths of senior architectural design students in design skills and creativity, with both students and employers recognizing a proficient level of capability. However, there are specific areas where further development may be beneficial, particularly in design thinking and generating ideas under time constraints.

Table 6. Assessment of the Respondents on the Skills of the Senior Architectural Design Students in terms of Design Skills and Creativity

INDICATORS	STUDENTS			EMPLOYERS		
	MEAN	STD. DEV.	V.I.	MEAN	STD. DEV.	V.I.
I can develop innovative design concepts that meet client needs and project requirements.	**2.84**	**0.760**	**P**	**3.45**	**0.649**	**P**
I can integrate creative ideas into practical and functional architectural solutions.	**2.91**	**0.745**	**P**	**3.43**	**0.698**	**P**
I am skilled at using design thinking to solve complex design challenges.	**2.80**	**0.799**	**P**	**3.45**	**0.675**	**P**
I can effectively balance aesthetic appeal with functional requirements in my designs.	**2.88**	**0.770**	**P**	**3.53**	**0.596**	**A**
I am proficient in using various design software to create detailed and accurate designs.	**2.86**	**0.767**	**P**	**3.50**	**0.676**	**A**
I can generate original and imaginative design ideas under time constraints	**2.86**	**0.770**	**P**	**3.37**	**0.712**	**P**
OVERALL	**2.86**	**0.681**	**P**	**3.46**	**0.585**	**P**

LEGEND: A – Advanced (3.50- 4.00); P – Proficient (2.50-3.49); B – Basic (1.50-2.49); N – Novice (1.00 – 1.49)(Table 6 to Table 10 are the same and will not be repeated).

5.2. Technical Proficiency

Table 7. Assessment of the Respondents on the Skills of the Senior Architectural Design Students in terms of Technical Proficiency

INDICATORS	STUDENTS			EMPLOYERS		
	MEAN	STD. DEV.	V.I.	MEAN	STD. DEV.	V.I.
I can create detailed construction drawings and specifications that are clear and precise.	**2.86**	**0.742**	**P**	**3.38**	**0.761**	**P**
I am skilled in applying building codes and regulations to ensure compliance in my designs.	**2.85**	**0.781**	**P**	**3.43**	**0.698**	**P**
I can use technical analysis software to evaluate structural integrity and building performance	**2.83**	**0.791**	**P**	**3.42**	**0.696**	**P**
I am proficient in the use of BIM (Building Information Modeling) tools.	**2.83**	**0.812**	**P**	**3.17**	**0.905**	**P**
I can troubleshoot and solve technical issues that arise during the design process.	**2.86**	**0.774**	**P**	**3.43**	**0.673**	**P**
I can effectively coordinate with engineers and other specialists to integrate technical systems into my designs.	**2.84**	**0.792**	**P**	**3.45**	**0.622**	**P**
OVERALL	**2.85**	**0.687**	**P**	**3.38**	**0.615**	**P**

Table 7 presents the assessment of the respondents on the skills of senior architectural design students in terms of technical proficiency. The overall mean score for students is 2.85, with a standard deviation of 0.687, indicating that they are perceived as "Proficient" (2.50-3.49) in their technical skills. This suggests that while students have a commendable level of technical proficiency, there is still potential for further development in certain areas.

For employers, the overall mean score is 3.38, with a standard deviation of 0.615, also placing their assessment within the "Proficient" range. This indicates that employers perceive the students as having a solid technical skill set necessary for architectural design.

Overall, Table 8 highlights that senior architectural design students possess a proficient level of technical skills, as recognized by both students and employers. However, there are specific areas, particularly regarding the use of technical analysis software and BIM, where further training and experience could enhance their proficiency even more.

5.3. Project Management

Table 8. Assessment of the Respondents on the Skills of the Senior Architectural Design Students in terms of Project management

INDICATORS	STUDENTS			EMPLOYERS		
	MEAN	STD. DEV.	V.I.	MEAN	STD. DEV.	V.I.
I can develop and manage project timelines to ensure timely completion of design phases.	**2.87**	**0.773**	**P**	**3.57**	**0.593**	**A**
I am skilled in resource allocation and can effectively manage project budgets.	**2.87**	**0.765**	**P**	**3.35**	**0.777**	**P**
I can lead a design team and coordinate tasks to achieve project goals.	**2.87**	**0.770**	**P**	**3.45**	**0.594**	**P**
I am proficient in client communication and can manage client expectations throughout the project.	**2.86**	**0.768**	**P**	**3.42**	**0.671**	**P**
I can conduct risk assessments and develop mitigation strategies for potential project issues.	**2.85**	**0.784**	**P**	**3.40**	**0.718**	**P**
I am capable of managing multiple projects simultaneously without compromising on quality.	**2.79**	**0.817**	**P**	**3.30**	**0.743**	**P**
OVERALL	**2.85**	**0.685**	**P**	**3.41**	**0.583**	**P**

Table 8 presents the assessment of the respondents on the skills of senior architectural design students in terms of project management. The overall mean score for students is 2.85, with a standard deviation of 0.685, indicating that students are perceived as "Proficient" (2.50-3.49) in their project management skills. This suggests that while students possess a commendable level of proficiency in managing design projects, there remains room for enhancement in certain areas.

For employers, the overall mean score is 3.41, with a standard deviation of 0.583, which places their assessment within the "Proficient" range as well. This suggests that employers view the students as having solid project management skills that are valuable in a professional context.

Overall, Table 11 illustrates that senior architectural design students are viewed as proficient in project management skills by both students and employers. However, there are specific areas, particularly in managing multiple projects, where additional training and practical experience could further enhance their competencies.The "architect responsibility system" also prompts architects to gradually become potential managers of engineering projects, shifting to full-process services and professionalism, and returning to the origin of their profession.

5.4. Sustainable Design

Table 9 presents the assessment of the respondents on the skills of senior architectural design students in terms of sustainable design. The overall mean score for students is 2.85, with a standard deviation of 0.694, indicating that students are perceived as "Proficient" (2.50-3.49) in their sustainable design skills. This suggests that while students possess a commendable level of proficiency in applying sustainable design principles, there is still room for improvement in specific areas.

For employers, the overall mean score is 3.30, with a standard deviation of 0.688, which also places their assessment within the "Proficient" range. This indicates that employers view the students as having solid skills in sustainable design, which are increasingly valuable in the architectural profession.

Overall, Table 10 illustrates that senior architectural design students are viewed as proficient in sustainable design skills by both students and employers. However, there are specific areas, particularly in knowledge of green certification systems, where further training and practical experience could significantly enhance their competencies.

Table 9. Assessment of the Respondents on the Skills of the Senior Architectural Design Students in terms of Sustainable Design

INDICATORS	STUDENTS			EMPLOYERS		
	MEAN	STD. DEV.	V.I.	MEAN	STD. DEV.	V.I.
I can apply principles of sustainable design to create environmentally responsible buildings.	**2.86**	**0.763**	**P**	**3.37**	**0.688**	**P**
I am skilled in using energy modeling tools to assess and improve building performance.	**2.85**	**0.777**	**P**	**3.32**	**0.770**	**P**
I can select and specify sustainable materials and technologies for my projects.	**2.86**	**0.755**	**P**	**3.32**	**0.770**	**P**
I can design buildings that minimize energy consumption and reduce carbon emissions.	**2.85**	**0.789**	**P**	**3.27**	**0.778**	**P**
I am knowledgeable about green certification systems (e.g., LEED, BREEAM) and can work towards achieving certification.	**2.79**	**0.825**	**P**	**3.18**	**0.792**	**P**
I can incorporate strategies for water conservation and waste reduction into my designs.	**2.89**	**0.780**	**P**	**3.37**	**0.688**	**P**
OVERALL	**2.85**	**0.694**	**P**	**3.30**	**0.688**	**P**

5.5. Communication and Presentation Skills

Table 10. Assessment of the Respondents on the Skills of the Senior Architectural Design Students in terms of Communication and Presentation Skills

INDICATORS	STUDENTS			EMPLOYERS		
	MEAN	STD. DEV.	V.I.	MEAN	STD. DEV.	V.I.
I can effectively communicate my design ideas through compelling presentations.	**2.87**	**0.765**	**P**	**3.42**	**0.696**	**P**
I am skilled in creating visual materials (e.g., renderings, models) that enhance my presentations.	**2.86**	**0.782**	**P**	**3.45**	**0.675**	**P**
I can produce clear and detailed design documents that communicate project intent.	**2.88**	**0.767**	**P**	**3.60**	**0.527**	**A**
I am proficient in public speaking and can confidently present my designs to an audience.	**2.85**	**0.793**	**P**	**3.47**	**0.650**	**P**
I can engage in effective written communication, producing reports and proposals that are well-organized and persuasive	**2.85**	**0.775**	**P**	**3.45**	**0.675**	**P**
I am capable of actively listening and responding to feedback during design reviews and client meetings.	**2.91**	**0.762**	**P**	**3.57**	**0.593**	**A**
OVERALL	**2.87**	**0.689**	**P**	**3.49**	**0.563**	**P**

Table 10 presents the assessment of the respondents on the skills of senior architectural design students in terms of communication and presentation skills. The overall mean score for students is 2.87, with a standard deviation of 0.689, indicating that students are perceived as "Proficient" (2.50-3.49) in their communication and presentation skills. This suggests that the respondents believe the students possess a commendable level of skill in effectively conveying their design ideas.

For employers, the overall mean score is 3.49, with a standard deviation of 0.563, indicating that employers perceive students to be within the "Proficient" range. This suggests that employers recognize a strong capability in students to communicate effectively, which is crucial in the architectural field.

Overall, Table 10 indicates that senior architectural design students are viewed as proficient in their communication and presentation skills by both students and employers. However, the feedback also highlights specific areas, such as public speaking and written communication, where additional development could enhance their overall effectiveness in professional settings.

6. PROPOSED ON-THE-JOB TRAINING PROGRAM FOR STUDENTS

The goal of this on-the-job training program is first to improve the architectural technology practice of architectural design students, especially the integration of architectural equipment, building structure and other related knowledge with architectural design. Secondly, it is to improve the sustainable architectural design and environmental awareness of architectural design students, including the improvement of green building design, energy-saving calculation and other capabilities.

Target Beneficiaries: Senior Students Majoring In Architectural Design, Junior Practitioners In Society.

Table 11. Proposed On-The-Job Training Program For Students

Key Result Areas (KRAs)	Specific Objectives	Activities/ Strategies	Target Schedule	Materials/ Resources Needed	Budget(RMB)	Expected Outputs/Success Indicators
Design Skills and Creativity	● Apply advanced design principles to create innovative architectural solutions for urban landscapes ● Demonstrate appreciation for sustainable design by incorporating eco-friendly materials and methods in their projects ● Create detailed 3D architectural models	● Conduct a workshop where students will analyze and critique existing urban structures using balance, proportion and scale principles ● Organize a student competition where they must present their 3D models to a panel of judges focusing on accuracy, creativity and feasibility. ● Visit to a LEED-certified or environmentally friendly building where students can observe and	Once per semester, starting from the second semester of the 2024-2025 academic year	● Students ● Teachers ● Design companies	● Seminar: 2,000 ● Competition: 3,000 ● Visit and discussion: 5,000 Total 10,000 RMB	● Submit a written critique of 500 words or more to evaluate urban architectural designs using advanced principles of balance, proportion and scale. ● Incorporate at least 2 eco-friendly features in their own design projects ● Submit a redesigned urban park incorporating balance, scale and proportion to be assessed with a rubric.

Key Result Areas (KRAs)	Specific Objectives	Activities/ Strategies	Target Schedule	Materials/ Resources Needed	Budget(RMB)	Expected Outputs/Success Indicators
		discuss sustainability features.				
Technical Knowledge and Skills	Gain knowledge on emerging technologies in architecture (VR, AR, etc)	● Conduct lecture on software and hardware operation, VR scene production, and comprehensive ability improvement. ● Practical operation is mainly based on student practice, mainly including simulation drills, practical drills, and work production.	16 classes per semester, starting from the second semester of the 2024-2025 school year	● Teachers ● Design companies ● Various drawing and simulation analysis software related to architectural design (such as CAD, BIM, Mars, etc.)	500 per class Total 8,000 RMB	● Use emerging architectural technologies to quickly realize and realistically restore design works and design ideas in virtual digital space. ● Synthesize and systematically accumulate and inherit virtual reality works to form high-value virtual reality digital teaching content and advantageous teaching experimental environment.
	Simulate and calculate building structural components	● Conduct lectures by famous professors, mainly in the form of face-to-face classroom lectures, and architectural design practice	2 times per semester, starting from the second semester of the 2024-2025 academic year	Well-known professors and experts	3,000 per lecture Total 6,000 RMB	● Understand the performance and stress characteristics of various building structure types and components. ● Be able to use simulation analysis software to perform stress simulation calculations.
Sustainability and Environmental Awareness	Evaluate at least 5 sustainable building practices and their impact on environmental conservation Design an architectural project that incorporates at least 3 sustainable design principles Participate in 2 sustainability workshops and complete a reflective journal entry	● Organize a series of guest lectures featuring sustainability experts in architecture and environmental science ● Conduct a group project where students collaborate to research and create a presentation on the benefits of specific sustainable materials and technologies ● Facilitate field trips to sustainable buildings or eco-friendly projects in the local area.	Lectures: 4 sessions per semester, starting from the second semester of the 2024-2025 academic year	● Well-known professors and experts ● Students ● Tutors	3,000 per lecture Total 12,000 RMB	● Research paper achieving at least an 80% on the grading rubric ● Present their sustainable design projects with at least 85% of their peer ratings. ● Reflection on the field trip.

7. CONCLUSION

In summary, the knowledge level of students and the skills they possess are evaluated from the perspectives of architectural design students and architectural design companies (employers).

The times are constantly changing, and the improvement of the knowledge and skills of students majoring in architectural design is also lasting and has no upper limit. Based on the findings and conclusions of this study, the improvement plan gives priority to the lowest sub-items in each dimension. During the implementation of the plan, the lowest sub-items should be given priority, and other related items should be supplemented to jointly promote the training plan, thereby driving the improvement of other items and optimizing the level of architectural design knowledge and skills. In addition, for the knowledge and skills training plan or project of students majoring in architectural design, the discipline continuity and depth of the training plan can be further improved.

In addition, colleges and universities should also strengthen the communication between students majoring in architectural design and architectural design companies, especially in terms of design practice, so that schools can better understand the level of knowledge and ability that architectural design students need to have, so as to better formulate training plans.

Future researchers can still expand this study and look at other factors that can affect the skills of the architectural skills of students aside from those stated in this study.

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