Integrating Environmental, Social and Governance (ESG) Principles in Architecture Education: A Reform Approach for Universities

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Abstract.
As the world faces increasing environmental challenges, it is becoming increasingly important for the construction industry (CI) to adopt sustainable principles. Environmental, Social and Governance (ESG) principles are a framework for measuring the sustainability and ethical impact of business practices. Integrating ESG principles into architecture education (AE) can help promote sustainable design practices and ensure that future architects are equipped with the knowledge and skills needed to address environmental challenges, but the current application of ESG principles in architecture education remains relatively limited. This study aims to address the existing research gaps by answering the following questions:

(1) What are the current methods for integrating ESG principles into AE?
(2) What are the most effective strategies for integrating ESG principles into AE?
(3) What are the potential barriers to integrating ESG principles into AE? How can these barriers be overcome?

The research methodology includes a comprehensive literature review, case studies, and a questionnaire survey. The survey was conducted with architectural faculty members (AFM), architectural students (AS), professionals in CI (PCI), and professional form other industries, to gather opinions on integration strategies. The study also summarizes the challenges that impede the widespread application of ESG principles in AE, such as teacher training, curriculum redesign, and access to resources and expertise, as well as strategies and recommendations for overcoming them, including teacher development programs, interdisciplinary and industry collaboration, addition of ESG-related courses, etc..

The study aims to provide effective strategies for integrating ESG principles into AE. The results will help architecture educators and institutions develop strategies that promote sustainable design practices and prepare future architects for environmental challenges.

Keywords: Environment, Society and Governance (ESG), architecture education, architects, sustainability

1. Introduction

In recent years, with the increasing concerns over issues such as climate change and corporate responsibility, the "Environmental, Social, and Governance" (ESG) framework has become a hot topic of interest for businesses and investors worldwide (Coleman et al., 2010; Blank et al., 2016). It emphasizes the consideration of environmental, social, and governance issues in the business operations of companies. Many industries have recognized the importance of ESG and have taken corresponding actions (Li et al., 2021).

Despite the success of ESG in other industries, its development in CI remains insufficient (Hadro et al., 2022). Construction projects typically involve substantial investments of funds, time, and resources, along with long supply chains, numerous stakeholders, and practitioners. It is a highly significant industry in terms of scope and scale (Pearce, 2003), and its productivity improvement is closely tied to national economic development (Fulford, 2019). However, CI is one of the major contributors to global resource consumption and carbon emissions, and its impact on the environment and society cannot be overlooked (Emmanuel, 2004). Furthermore, CI is prone to unethical behaviors such as bribery and corruption (Sohail & Cavill, 2008), which can have negative societal impacts, and result in significant consequences, such as building collapses (Zulu & Muleya, 2019). Additionally, CI often exhibits poor working conditions, such as excessive overtime and inadequate safety measures (Lu et al., 2015), leading to a higher incidence of occupational diseases (Brenner & Ahern, 2000). In the past, CI primarily focused on economic benefits and project completion time, with considerations for environmental and social impacts often being secondary. However, as attention to sustainable development and social responsibility continues to increase, CI is also realizing the importance of ESG in its development (Soares & Pereira, 2022).

Currently, in China, various relevant departments have begun taking measures to promote ESG principles in CI. In terms of standards and specifications, institutions, such as the People's Bank of China, have issued green finance standards that include green building construction, material production, and energy-efficient retrofitting of existing buildings. In terms of financing, progress has been made in the application of green financial instruments, such as green loans, green bonds, and green building performance insurance (Yan, 2021). The gradually improving green financial system has sent positive signals for green finance supporting green buildings. However, there is a severe shortage of talent with a combination of architecture and ESG expertise in the industry.

To address the shortcomings of CI in the realm of ESG, it is crucial to start incorporating ESG principles into AE, aiming for a fundamental solution. Nurturing architecture

professionals who are consciously aware of ESG principles is key to achieving sustainable development in the construction sector. However, the dissemination of ESG in AE in China is still relatively limited. While some universities offer courses on green building and energy efficiency, there is still a lack of ESG education in other aspects. In this paper, we will explore the definition of ESG and its key role and current application in CI and AE in Section 2. Section 3 will outline the methodology of this study. Section 4 will present the analysis of survey results on integrating ESG principles into AE. Section 5 will provide the conclusions and future research prospects. Through in-depth research and extensive discussion, we aim to provide valuable insights and recommendations for the ESG development in AE and CI, driving them towards a more sustainable and responsible direction.

2. Current Situation of Applying ESG to CI and AE

2.1 ESG Principles

ESG is an extension and enrichment of the concept of Socially Responsible Investment (SRI) and serve as important indicators for measuring the sustainable development of companies (Michelson et al., 2004; Nekhili et al., 2019). ESG encompasses the most crucial factors in assessing the sustainability and ethical impacts of corporations or business investments, including a wide range of elements such as climate change, energy, waste, gender inequality, product responsibility, corruption and bribery, social development, stakeholders, board responsibilities, management diversity, etc. (Cao & Xu, 2019). Investors are increasingly interested in companies that adhere to ESG principles because such companies are more sustainable and have greater access to long-term development resources (Renneboog et al., 2008; Lynch, 2018).

The “E(Environmental)” component, refers to a company's proactive actions in the environmental aspect, including compliance with existing policies and regulations and consideration of future impacts, which is of utmost importance in CI. UK has established *Promoting Net Zero Carbon and Sustainability in Construction* guidelines in 2022, which offer approaches to decarbonization for procurers of building and infrastructure projects (UK, 2022).

The “S(Social)” component emphasizes equal treatment of stakeholders and the preservation of the social ecosystem that supports a company's development, such as human rights, labor, and health. In CI, the “S” aspect focuses on the potential for projects to promote positive emotions among users.

The “G(Governance)” component encompasses the overall formation and effects of governance environment, structure, mechanisms, and behavior (Michaud & Magaram, 2006). It covers aspects such as the composition and structure of corporate boards, oversight of strategic sustainability and compliance, executive compensation, as well as issues related to bribery and corruption(Schwartz & Carroll, 2003).

2.2 Application of ESG in CI

CI encompasses a wide range of activities and is defined as the sector closely associated with real estate, building construction, and infrastructure development (Ofori, 1990). For CI, the ESG performance of corporate entities is a key concern for sustainable investment and reflects the overall non-financial creditworthiness of the companies. In practical terms, construction companies have various solutions addressing ESG issues. In terms of the environment, key issues involve setting carbon reduction targets, improving energy efficiency, utilizing renewable energy, establishing green supply chains, and promoting green building practices. Regarding the social aspect, the social benefits generated by construction companies affect nearly all stakeholders, including employees, customers, suppliers, communities, and governments. As for corporate governance, ESG standards are relevant to topics such as board composition, goal setting, development of business and management policies, and risk management.

Internationally, specific standards have been developed for CI. The Global Real Estate Sustainability Benchmark (GRESB) is dedicated to assessing the ESG performance of global real estate. GRESB provides a disclosure framework for ESG-related information in the real estate industry, serving as a reference for international asset management institutions and investors engaged in sustainable investment. As of 2022, more than 170 institutions and financial investors utilize GRESB data, managing assets worth over $51 trillion (Amy & Danielle, 2023).

Many design firms have also begun practicing ESG principles, such as Gensler (Anthony et al., 2023) and Jo Cowen Architects (Jo Cowen Architects, 2023), making positive contributions to shaping a sustainable, human-centric, and socially beneficial construction industry. Gensler is currently researching relevant design guidelines and strategies to develop ESG metrics and ratings specific to different building types. This includes aspects such as thermal performance of outdoor spaces, optimized utilization of public facilities, and use of low-carbon building materials (Stacey et al., 2023).

2.3 Current Status of Integrating ESG in AE

Currently, among the ESG principles, only the “E” has been widely applied in AE (Wright, 2003). For instance, many Chinese architectural schools offer courses on sustainable development, energy-efficient design, and low-carbon buildings. However, there is a significant gap between students' expectations regarding sustainable and ecological design and the knowledge they actually acquire during their university courses (Brzezicki & Jasiolek, 2021).

There is relatively limited research on the application of ESG in CI. Search on Google Scholar and Chinese Knowledge Network (CNKI), using “ESG and architecture/construction”

as keywords, revealed a small amount of research papers. Some studies demonstrate the benefits of applying ESG (Daszyńska et al., 2022), and suggest ESG elements that need to be considered in CI (Assef & Mangold, 2022). Some explore the importance of establishing ESG evaluation criteria in CI (Soares & Pereira, 2022). Others find out the relationship between the application of ESG and the performance of architectural firms (Siew et al., 2013). However, with “ESG and architecture education” as keywords, there were no relevant results.

3. Methods

This study initially conducted a review and analysis of relevant literature and practical cases regarding the application of ESG in CI and AE. This was done to understand the existing industry practices and educational approaches related to ESG. Subsequently, a survey was conducted titled "Survey on Integrating ESG Principles in Architecture Education." The survey consists of four sections: (1) Respondent demographics, including gender, age group, whether they are AS, AFM or PCI, and their field of expertise; (2) ESG knowledge and awareness: Focus on whether the respondents are familiar with ESG, the importance of integrating ESG into AE, and the specific aspects of AE where ESG could be applied; (3) Level of ESG integration: Aim to understand whether ESG has already been integrated into the curriculum of the respondents' architecture schools, the extent of integration, effective measures to promote ESG integration, and challenges faced in the process; (4) Evaluation of ESG education effectiveness: Aim to gather respondents' perspectives on the impact of ESG education on their career development and employment prospects, and assess their willingness to receive more training and resource support regarding ESG.

4. Results & Discussions

4.1 Profile of the Respondents

A total of 158 valid questionnaires were collected in this survey. The characteristics of the respondents are presented in Table 1.

Table 1. The characteristics of the respondents

Classification	Content	Frequency	Proportion
Gender	Male	69	43.67%
	Female	89	56.33%
Age	Under 18	1	0.63%
	18-24	47	29.75%
	25-34	89	56.33%
	35-44	16	10.13%
	45-54	3	1.9%
	55 and above	2	1.27%
Occupational situation	AS	44	27.85%
	AFM	29	18.35%
	PCI	35	22.15%

	Other industries	50	31.65%
Field of Study	Architecture	62	39.24%
	Urban Planning/Urban Design	40	25.32%
	Landscape/Scenic Architecture	25	15.82%
	Interior Design	13	8.23%
	Environmental Art	3	1.9%
	Others	15	9.49%

Among the respondents, the age group of 25-34 accounts for the largest proportion, reaching 56.33%, because they are at a crucial stage of their career development and therefore have more attention and demands for industry development. Out of the 158 participants, 108 are involved in the field of architecture, which accounts for nearly 70% of the respondents, indicating a higher interest and concern regarding the integration of ESG in AE.

4.2 Respondents' ESG Knowledge and Awareness

4.2.1 Awareness of ESG Principles

Among the 158 participants, 107 indicated that they have heard of or are familiar with ESG, which suggests that a majority of the sample population has some level of understanding of ESG. Respondents from the architecture field exhibited a higher level of awareness regarding ESG, with 75% of them having an idea of ESG, compared to 52% among respondents of other industries. Among them, AFM displayed the highest level of awareness, with nearly 90% understanding ESG principles.

In this survey, over two-thirds of the respondents (125) considered the integration of ESG into AE to be important, with 55 considering it to be very important. 28 respondents indicated it to be moderately important, suggesting that this group may require more information to understand the significance of ESG in AE. Overall, the majority of respondents recognize the importance of ESG, indicating a significant potential for the application and promotion of ESG in AE.

4.2.2 Potential Applications of ESG in AE

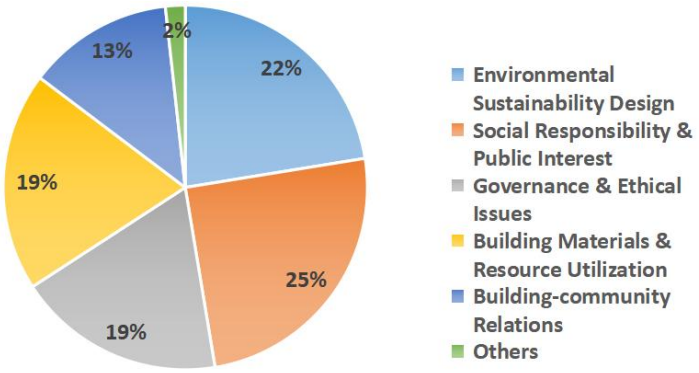

Fig 1. Potential Applications of ESG in AE

4.2.2.1 Social Responsibility & Public Interest

In terms of applying ESG to AE, social responsibility and public interest emerged as the most prominent focus, accounting for 24.94% (100 occurrences) of the total valid responses. It can encourage students to address social needs, consider human health and well-being, and provide corresponding solutions. Architects can contribute to society by designing and planning projects that have social significance, such as public spaces, community facilities, educational and healthcare facilities, to fulfill basic societal needs and improve people's quality of life. By creating healthy, safe, and comfortable built environments, such as providing good indoor air quality, natural lighting, and effective temperature control, living and working conditions can be enhanced, to promote citizens' health and well-being.

4.2.2.2 Environmental Sustainability Design

Environmental sustainability design is also deemed noteworthy, with 90 valid responses. ESG encourages architects to design energy-efficient buildings. In education, students can learn how to utilize advanced building technologies and design strategies, such as effective insulation and HVAC systems, to reduce energy consumption and carbon emissions. Additionally, students can learn how to design landscape and interior features with low water consumption, such as water-saving irrigation systems, to improve water resource efficiency. Furthermore, they can learn how to integrate buildings harmoniously with the natural environment, such as retaining existing vegetation and creating natural habitats, to preserve and enhance ecosystem functionality. ESG also encourages CI to conduct life cycle analysis (LCA) of building materials and projects, from which students can learn how to evaluate the environmental impacts, energy consumption, waste generation, and make informed material selections and design decisions based on these assessments.

4.2.2.3 Building Materials & Resource Utilization

Building materials and resource utilization are also important aspects in the application of ESG, with 78 occurrences. ESG encourages architects to choose environmentally friendly building materials, from which students can learn about green certification systems (e.g., LEED) and understand how to assess the environmental impacts of building materials, selecting those with low carbon emissions, renewable, recyclable, and non-toxic characteristics. ESG also emphasizes efficient resource utilization and waste reduction. Students can learn how to design and construct energy-efficient, water-saving buildings, and manage waste. Additionally, ESG encourages CI to seek sustainable supply chains, ensuring that the sourcing of building materials aligns with environmental and social responsibility standards. Students can learn how to select compliant suppliers and manufacturers to ensure the traceability and environmental friendliness of building materials.

4.2.2.4 Governance & Ethical Issues

Governance and ethical issues are also important aspects of applying ESG principles. ESG encourages architects to uphold high moral standards and professional ethics, which is useful

for cultivating students' ethical behavior in their professional practice. ESG also emphasizes the importance of good governance and transparency. Students can learn principles of project management and leadership in the architectural context, including standardized decision-making processes, compliance management, and financial transparency. Additionally, ESG highlights the significance of anti-corruption measures and compliance. Students can learn about principles and practices of compliance management, as well as establish compliance mechanisms and oversight measures to ensure that projects and actions align with legal, regulatory, and ethical requirements.

4.2.2.5 Building-community Relations

50 respondents chose *"Applying ESG to building-community relations", which* is of great importance as it can help students establish positive and lasting relationships within architectural projects. Students can learn the importance of cooperating and communicating with stakeholders such as representatives, residents, and community organizations, and better consider community interests in the design process. ESG also encourages CI to respect and safeguard the cultural distinctiveness and diversity of communities. Students can learn how to incorporate community culture and historical backgrounds into their projects, thereby preserving the cultural heritage. Moreover, students can learn how to design inclusive and diverse public spaces that foster communication, interaction, and inclusiveness among community members. Furthermore, ESG highlights the long-term maintenance of architectural projects and community involvement. Students can learn how to design sustainable operation and maintenance plans for architectural projects, gain insights into mechanisms and practices for community engagement.

4.3 The Current Situation of Applying ESG to AE

4.3.1 Level of Integration of ESG Principles

There is a certain divergence regarding the integration of ESG into AE. 76 participants indicated that ESG has been integrated into the curriculum of architectural schools, while 82 participants expressed the opposite opinion. Upon further examination of the responses from 108 participants in the architectural field, it can be observed that both AS and AFM exhibit a more optimistic attitude towards the integration of ESG. Among the 44 AS, 26 believed that their schools have integrated ESG. Among the 29 AFM, 22 held positive attitude. This suggests that AFM have started to pay attention to and introduce ESG principles in their teaching, while AS also recognize to some extent the level of integration within their schools' curriculum.

Compared to AS and AFM, PCI evaluated the integration of ESG more critically. Out of the 35 participants, only 14 believed that their university has integrated ESG principles, and only 9 of them indicated that the integration to be substantial. This may be due to the fact that PCI have been away from school education for a longer period, and ESG principles were not

integrated into AE when they were in school. Their dissatisfaction suggests that their ESG knowledge is not enough to meet the current industry development and work needs.

Overall, the majority of respondents expressed dissatisfaction with the level of integration of ESG in AE, and only 20 considered the integration to be very substantial, which indicates that there is still room for improvement in the integration of ESG in AE.

4.3.2 Challenges in Integration

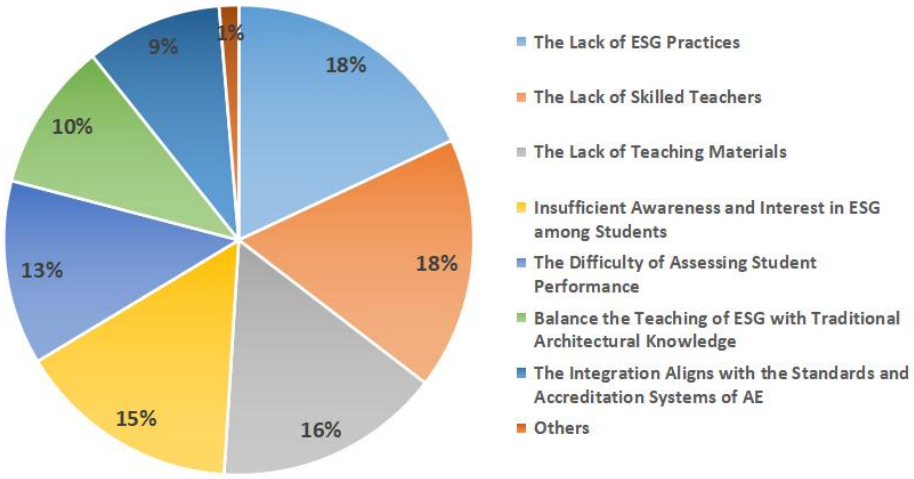

Fig 2. Challenges in Integration

4.3.2.1 The Lack of Opportunities and Resources for ESG Practices

The lack of opportunities and resources for ESG practices emerges as the greatest challenge, with 81 selections. The integration requires collaboration and support from industry, which involves partnering with architectural firms, institutions and professionals to provide practical opportunities. However, some schools may face challenges in collaborating with the industry, making it difficult to maintain close connections with the industry and keep up with the latest trends in practice. Additionally, time and resource constraints associated with architectural projects and the complexity make it challenging for students to engage in practical experiences. The integration also requires appropriate resource support, including technical facilities, laboratory equipment, etc., which is difficult for many schools may face limitations in terms of funding and facility resources, making it difficult to provide sufficient support for promoting practical education on ESG principles.

4.3.2.2 The Lack of Skilled Teachers and Teaching Materials

Insufficient understanding of ESG concepts and practices among teachers, as well as the lack of ESG-related teaching materials, are identified as significant challenges with 78 and 70 selections, respectively. ESG encompasses various principles related to environmental protection, social responsibility, and good governance, drawing upon knowledge and methodologies from disciplines such as environmental science, sociology, economics, law, and more. However, some AFM may have limited understandings. Integrating ESG into AE

also requires corresponding teaching materials, but there is a lack of certified ESG textbooks and cases, which affects teachers' instructional preparation and quality. The integration also faces the challenge of renewal and adaptability, due to technological advancements and evolving societal needs.

4.3.2.3 Insufficient Awareness and Interest in ESG among Students

Insufficient awareness and interest in ESG among students are also identified as an important challenge with 69 selections. Traditional AE often focuses more on technical and design aspects, and considering the relatively recent emergence of ESG, students may not have been adequately exposed to relevant content in their previous educational and life experiences, resulting in a limited understanding of ESG. In addition, students may face barriers in accessing authoritative and reliable sources of ESG-related information, because knowledge and practice in this field are fragmented and complex.

4.3.2.4 The Difficulty of Assessing Student Performance

The assessment of students' comprehension and application of ESG is a significant concern. Given that ESG is complicated, the evaluation process requires a multidimensional approach, which underscores the importance of developing robust assessment methodologies. Assessing students' understanding and application of ESG requires an examination of their performance in real-world projects. However, offering them ESG-related practical opportunities and conducting assessments can be quite challenging, due to issues such as project resource availability, time constraints, etc. Furthermore, striking a balance between subjectivity and objectivity is crucial. Subjective assessments can be conducted through student reflections, case analyses, group discussions, etc., but they may be prone to subjective evaluation criteria and biases. On the other hand, objective assessments can be conducted through exams, assignments, and project outcomes, but they may not fully reflect students' actual abilities and overall qualities. Additionally, since ESG may exhibit variations across different countries and regions, it is essential to develop and adopt assessment standards tailored to local contexts while continuously refining and updating them.

4.3.2.5 Balance the Teaching of ESG with Traditional Architectural Knowledge

Balancing the teaching of ESG principles with traditional architectural knowledge in education is a recognized challenge, with 46 selections highlighting its significance. Traditional architectural curricula typically prioritize architectural design, technology, and theory, while ESG encompasses broader considerations. Therefore, AFM must strike a balance by incorporating relevant ESG principles into AE. This may involve adjusting and reorganizing course content to ensure appropriate emphasis on ESG principles, and evolving teaching methods accordingly. Traditional AE often relies on lectures and demonstrations, emphasizing the transmission of theory and technical knowledge. However, teaching ESG principles requires a greater focus on student engagement, practical experience, and critical

thinking, so that incorporating inquiry-based learning, case studies, group discussions, and hands-on projects, can facilitate students' comprehension and application of ESG.

4.3.2.6 The Integration Aligns with the Standards and Accreditation Systems of AE

Ensuring the integration of ESG aligns with the standards and accreditation systems of AE is an important issue with 42 selections. Different countries and regions may have varying AE standards and accreditation systems, which often prioritize traditional architectural knowledge and skills, with relatively less emphasis on ESG. Therefore, integrating ESG into AE requires alignment and coordination with existing standards and accreditation systems to ensure overall quality and consistency of education. Furthermore, as ESG principles evolve, the standards and accreditation systems also need to be updated and improved accordingly, requiring close collaboration with relevant stakeholders, educational institutions, and professional associations. The integration of ESG is a global challenge that necessitates the establishment of platforms for international cooperation and knowledge exchange. By sharing best practices, experiences, and educational resources, a common understanding and collaboration can be fostered among different countries and regions, which contributes to enhancing the overall quality and standards of AE and strengthening the global promotion and implementation of ESG principles.

4.3.3 Methods of Integrating ESG into AE

4.3.3.1 Combine ESG Education with the Existing Curriculum

On how to better integrate ESG into AE, combing ESG education with the existing curriculum was selected the most frequently (93 times). The basic idea of this approach is to integrate the concept, knowledge and practical application of ESG into the existing architecture courses, so that students can understand and apply ESG principles while learning traditional architectural knowledge. First, it is necessary to carefully review the existing courses and determine which modules are suitable for integrating ESG. Then, institutions have to identify learning objectives and teaching methods, to ensure that students are able to understand the concepts, principles and practices of ESG and have appropriate application skills. A variety of teaching methods, such as case studies, group discussions, practical projects, site visits, etc., can be employed to promote student participation and interaction.

4.3.3.2 The Provision of ESG Training and Workshops

The provision of ESG training and workshops received a high number of selections, with 87 responses. Architectural institutions should design training programs that are tailored to the characteristics and needs of AE, ensuring that the training content is closely related to ESG issues in the field of architecture. The content may include concepts of ESG principles, background knowledge, best practice examples, relevant regulations and standards, etc. The training can take various forms, such as lectures, seminars, workshops, and case studies, to actively engage and involve participants. Relevant materials and resources, such as training handouts, reference books, online resources, etc., should be provided to participants to

facilitate their further learning and application of ESG after the training. Finally, regular evaluation of the training effectiveness and participant feedback should be conducted to understand their satisfaction with the training, and continuously improve the quality.

4.3.3.3 The Addition of ESG-related Courses

The addition of ESG-related courses was selected 70 times, which is different from the previous fusion courses, meaning that new courses are created. First, identify areas and topics related to ESG in order to design a curriculum accordingly, which can include sustainable design, green building, environmental assessment, building materials and resource management, etc. According to the characteristics and resources of the school, choose the appropriate ESG field for in-depth discussion. Then, institutions have to design the content and teaching activities of ESG-related courses according to the curriculum objectives and learning outcomes.

4.3.3.4 Collaboration with the Industry

Collaborating with the industry to introduce ESG practical experiences was selected 63 times. Architecture schools should establish collaborative relationships with relevant organizations, institutions, and practitioners in CI, which can help introduce ESG practical experiences and professional knowledge, providing students with real-life cases and industry insights. Industry experts and practitioners can be invited to participate in teaching, such as guest lecturers or mentors. They can share their ESG practical cases, introduce the latest sustainable development trends and standards. Besides, students may have the opportunities to participate in green building design and assessment projects, the formulation of sustainable development strategies, etc. Organizing site visits to real-world projects also enables them to learn about the industry's best practices in applying ESG principles.

4.4 Evaluation of ESG Education Effects

The impact of ESG education on the career development and employment prospects can be categorized into three types: positive, neutral, and negative. The results show that 37.97% of the respondents believe that ESG education has a positive impact. 43.04% consider the impact to be neutral, while 11.39% perceive it as negative. Among 108 architecture professionals, the proportion who expect a positive impact is slightly higher at 44.44%. Notably, the highest percentage of PCI (60%) expressed optimism about the positive impact, while only 50% of AS and a surprising 17.24% of AFM shared the same view. This suggests that PCI have more exposure to cutting-edge industry knowledge and a greater understanding of the significance of ESG, while educational institutions lag behind. Therefore, it is recommended that universities strengthen ESG education to enhance students' understanding and awareness of ESG-related knowledge, thereby improving their competitiveness in future career development.

Although only 60 respondents (37.97%) believe that integrating ESG into AE has a positive impact on their future prospects, a significant number of 135 respondents (85.44%) express their willingness to receive more training and resource support on ESG principles. This proportion rises to an impressive 90.74% among architecture professionals, which indicates that the majority of respondents have a positive attitude towards ESG education. Moreover, even among 50 non-architecture professionals, 37 expressed a desire for more ESG training, highlighting the influence and popularity of ESG education among diverse fields.

5. Conclusion

This study aimed to explore the methods and challenges of integrating ESG into AE. Through a literature review, case studies, and a survey, we conducted an in-depth analysis. According to the survey results, the majority of respondents, especially AS, believe that ESG education has a positive impact on their career development and employment prospects. This indicates their awareness of the importance of ESG in CI and their belief that possessing ESG knowledge and skills can enhance their competitiveness in the job market. However, there are also respondents who hold neutral or negative views, which may be due to a limited understanding of ESG concepts and practices or a lack of relevant training and resource support. Moreover, the results show that most respondents support the integration of ESG and AE, and they are willing to receive more training and resource support on ESG, which indicates a high demand and interest in ESG education.

However, the current level of integration between ESG and AE is relatively low. Several challenges need to be overcome, including a lack of opportunities and resources for ESG practices, a lack of skilled teachers and teaching materials, insufficient awareness and interest in ESG among students, assessment methods of student's performance, etc. To address these challenges, universities can strengthen teacher training, update and enrich course content, enhance students' ESG awareness and engagement, collaborate with the industry, and develop effective assessment methods.

In conclusion, integrating ESG into AE is a key strategy to promote sustainable design practices and cultivate future architects with ESG knowledge and skills. By employing various methods and strategies, we can advance this process and provide better career development and employment prospects for AS.

Despite the thorough exploration of integrating ESG into AE in this study, there are still some limitations which can be further developed. First, future research can expand the sample size to obtain a more comprehensive understanding. Second, it can employ a wider range of data collection methods to obtain more comprehensive and multi-faceted information. Additionally, this study primarily focused on the methods and effects of integrating ESG in AE, but a quantitative assessment of the actual impact and benefits of ESG on AS and CI

remains to be explored. Future research can evaluate the long-term impact and effects of ESG education by tracking students' career development and employment outcomes.

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