

The Influence of Soft and Hard Skills on Learning Motivation in Environmental Design Education: Evidence from Jiangxi, China

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Abstract

This study investigated the relationships between soft skills, hard skills, and learning motivation among environmental design students in Jiangxi, China, employing a quantitative correlational research design to examine how different skill domains influence motivational processes in this specialized educational context. Data were collected from 384 undergraduate environmental design students across three major institutions in Jiangxi Province using validated questionnaires measuring learning motivation (intrinsic motivation, goal orientation, self-directed learning, and interest/relevance), soft skills (communication skills, teamwork capabilities, adaptability dimensions, and cultural competence), and hard skills (technical design proficiency, software competency, engineering knowledge, and project management). The theoretical framework integrated Self-Determination Theory, Expectancy-Value Theory, Social Learning Theory, Goal Theory, Cognitive Load Theory, and Skill Acquisition Theory to explain skill-motivation relationships. Statistical analyses included descriptive statistics, correlation analysis, independent samples t-tests, ANOVA, and multiple regression analysis to test four hypotheses examining gender differences (H1), age variations (H2), soft skills influence (H3), and hard skills influence (H4) on learning motivation. Results revealed significant gender differences in learning motivation favoring male students ($t(382)=5.529$, $p<.001$), significant age-related increases in motivation ($F(4,379)=6.868$, $p<.001$), and strong positive influences of both soft skills ($R^2=.978$) and hard skills ($R^2=.582$) on learning motivation. The findings demonstrated that communication skills were the strongest predictors among soft skills, while technical design proficiency showed the strongest relationship among hard skills. These results provide empirical evidence for educational practitioners and policymakers to develop targeted interventions that enhance

both skill development and learning motivation in environmental design education, particularly in Chinese provincial educational contexts.

Keywords: Influence of Soft, Hard Skills, Learning Motivation Environmental Design Education

Introduction

The study of learning motivation has evolved significantly over the past century, transitioning from behaviorist perspectives focused on external reinforcement to more nuanced cognitive and sociocultural approaches. In the 1950s and 1960s, motivation was studied with the help of drive theory and operant conditioning that referred to incentives and sanctions as the major motivators (Lei et al., 2024). The change of focus in theories happened in the 1970 and 1980s when cognitive theories that explained internal processes of motivation emerged. According to Self-Determination Theory (SDT) developed by Edward Deci and Richard Ryan, there are three basic psychological needs that are crucial for intrinsic motivation namely: autonomy, competence and relatedness (Daniel et al., 2024). This theoretical framework has been particularly useful in providing an understanding of the dynamics of motivation in the learning context.

At the same time, Eccles and Wigfield presented Expectancy-Value Theory (EVT) that presupposes that motivation depends on the students' expectations regarding success and their attitudes towards the tasks (Eccles & Wigfield, 2024). These complementary theoretical perspectives have provided the scholars with the theoretical paradigms they have used in the investigation of the possible antecedent factors that may promote or inhibit students' engagement and persistence in learning domains. These have been accompanied over the years by the social cognitive theories that touch on self-efficacy, goal and attributional patterns in the development of motivational patterns (Abaszadeh et al., 2024). This has led to the development of a good theoretical framework that has enabled the enhancement of the examination of students' beliefs, values and context of motivation with regard to motivational profiles.

Motivation has been described as a complex concept in today's college context and is found to have a significant influence on students' behavior and their decisions (Mahmood et al., 2025). Intrinsic motivation is the motivation that is driven by the desire to learn and not for any other reason such as grades and other incentives and such students have been found to process information in a better way, come up with unique ideas, and understand concepts better than the extrinsically motivated students (Deng & Shi, 2024). In the case of environmental design students, motivation is vital in ensuring that the students' efforts are properly channeled to acquire the technical skills that are needed to solve complex problems while at the same time fostering creativity. Research has also focused on the role of perceived relevance and future use of the content of the course to the personal and career goals of the learners, whereby students who can relate to their course and see its relevance in their future engagements show higher levels of engagement (Bakar, 2025).

The COVID-19 pandemic introduced further changes to motivational processes in higher education with the evidence suggesting changes in motivational patterns due to the shift to online learning. Chiu (2022) identified that while the provision of psychological needs of autonomy, competence, and relatedness is important for students, it is even more so during remote learning situations and it becomes more difficult to address them. In design disciplines

that are particularly focused on studio-based learning and project-based work, it was challenging to keep the students motivated throughout this transition. This context has further underscored the need to identify the characteristics that support student motivation in such courses as environmental design where skills and creativity are developed through continued practice.

In Chinese educational context, motivational processes are found to have cultural, social and educational specificities that are unique to the Chinese culture. Chinese culture has been shaped by Confucianism and this culture has a strong belief in hard work and respect for elders (Meng et al., 2024). Such cultural roots are reflected in motivational orientations that are not typical of Western countries and are characterized by extrinsic motivations associated with family expectations, social status, and career opportunities (Zhang et al., 2025). This culture of collectivism fosters strong motivational forces of group and family pride and dignity that can either augment or supplant the individual intrinsic motivation that has been widely espoused in the western education literature.

However, the modern Chinese higher education system is going through a process of constant transformation, and the focus is shifting to such values as innovation, creativity, and competitiveness on the world stage (Zhang & Chang, 2022). This evolution has given rise to a motivational structure that is a mixture of the conventional values and the new age desires for self-actualization and individuality. According to Wong et al. (2020), Chinese students' motivational profiles change during their higher education journey, and extrinsic motivation linked to job opportunities becomes more intrinsically driven, including creativity and self-development. It is crucial to comprehend these specific motivational processes in order to design effective educational strategies in Chinese environmental design courses where students are expected to balance between traditional technical requirements and new emerging trends in sustainable design. The research objectives for this study are as follow:

RO1: To identify the status of learning motivation among environmental design students in Jiangxi, China.

RO2: To compare the status of learning motivation between male and female environmental design students in Jiangxi, China.

RO3: To investigate the learning motivation across different age groups of environmental design students in Jiangxi, China.

RO4: To analyse the relationship between soft skills and learning motivation among environmental design students in Jiangxi, China.

RO5: To analyse the relationship between hard skills and learning motivation among environmental design students in Jiangxi, China.

RO6: To propose strategies for enhancing learning motivation through skills development among environmental design students in Jiangxi, China.

Literature Review

Environmental design education in China has undergone dramatic transformation over the past century, evolving from traditional apprenticeship models through Western-influenced academic structures to contemporary approaches blending international principles with distinctive Chinese characteristics. An understanding of this historical background is crucial for analyzing the present state of educational practice and future trends in Chinese environmental design education.

The history of the formal design education in China can be traced back to the beginning of the twentieth century when the Chinese education system was reformed by introducing the western education system either through cultural exchange or through the Chinese scholars who studied in western countries (Tang, 2019). Prior to this period, Chinese architectural design in both buildings and gardens, as well as the planning of the environment, was passed down through the apprenticeship system and not through schools. As Wang (2020) pointed out, these traditional knowledge systems focused on the comprehensive application of aesthetic principles, philosophical concepts and construction practices that were unique to Chinese ways of engaging with the natural environment. Educational systems of formal design that were set up during the Republican period (1912-1949) were influenced by the Beaux-Arts systems of education from the west but hybridised to the extent that they created tension with the traditional Chinese theories and practices of design.

The establishment of People's Republic of China in 1949 marked the changes in the design education systems especially during the 1950s and 1960s when the educational systems were reformed under the Soviet influence (Li, 2020). During this period, environmental design was limited to architecture and urban planning disciplines with focus on technical competencies and rationalist solutions for large-scale projects. As stated by Zhang and Chang (2022), this period set up significant technical tenets in Chinese design education but at times paid inadequate regard to cultural background and creative freedom due to the emphasis on process frameworks. The Cultural Revolution that occurred in 1966-1976 also affected higher education and the design programs in particular as many institutions were shut down or significantly limited during this period.

However, the post-1978 reform and opening up period was the critical stage in Chinese design education's development, which was expanded rapidly, enhanced internationalization, and curriculum diversification. Wei (2019) indicates that this period marked the development of environmental design as a new field of study that is different from architectural education due to the recognition of the complexity of the field, which also includes interior design, landscape architecture, urban design and sustainable planning. The growth of design programs accelerated during the 1990s and the early years of the current millennium due to the development of the Chinese economy that led to the need for more designers in various fields. According to Xu and Li (2022), the number of institutions offering environmental design programs grew from 18 in 1990 to 168 in 2010, which means that there are more opportunities for students to get education in this field, but at the same time, there are questions to the quality of the education and the homogeneity of the programs during this period.

In the past few decades, global attention has been paid to quality, creativity, and sustainability of educational programs for environment design in China. The Chinese government has incorporated the concept of 'ecological civilization' as a principle for the development of the country; this has brought new curriculum focus on ecological concepts, green technologies, and regenerative design (Wang & Zhou, 2022). Yang et al. (2021) argued that the current and future environmental design education in China is shifting towards the enhancement of innovation competence, integration of various fields, and relevance to China's special urbanization issues. National policies such as the "Double First-Class" university development plan have further added more pressure on education reform and international

competitiveness in the leading design programs. These contemporary developments are consistent with the general trends of the educational transitions that adopted internationalization while integrating the Chinese characteristics suited for the unique environmental design requirements in the country.

Theoretical Framework

This study develops an integrated theoretical framework that synthesizes complementary theoretical perspectives addressing learning motivation and skill development within environmental design education. Instead of employing one theoretical perspective, this theoretical framework integrates Self-Determination Theory, Expectancy-Value Theory, Social Learning Theory, Goal Theory, Cognitive Load Theory, and Skill Acquisition Theory to provide a holistic view of the interconnections between the soft skills, hard skills, and learning motivation. This theoretical integration allows for a more nuanced approach to the complex processes studied and offers strong theoretical frameworks for the research framework and findings.

According to the current study, Self-Determination Theory (SDT) is one of the key theoretical frameworks that can help explain motivational processes. SDT's classification of motivations according to regulatory processes and focus on basic psychological needs offers a rich theoretical model for understanding the qualitative aspects of motivation beyond the mere quantity (Ryan et al., 2021). This theoretical perspective give a specific view of how motivation might be enhanced or undermined in educational contexts through the impact on autonomy, competence, and relatedness satisfaction. The internalization processes of the theory help explain how external regulations might be internalized over time by aligning with personal values through educational experiences that link technical knowledge with meaningful design values (Ryan & Deci, 2020). Moreover, the cross-cultural extension of SDT offers valuable information about how the motivational processes might look like in the Chinese educational context and at the same time, remain consistent with the basic tenets of the theory in terms of psychological need satisfaction.

Expectancy-Value Theory (EVT) is related to SDT in that EVT focuses on how students' beliefs about their abilities and the value they place on learning activities affect motivational processes and educational decisions. This theoretical perspective offers useful frameworks for understanding how perceptions of different skill domains could affect various motivational aspects by their effects on capability beliefs and subjective value (Eccles & Wigfield, 2020). EVT's more complex approach to defining subjective task value as consisting of attainment value, intrinsic value, utility value, and cost is especially helpful in providing a better understanding of how various environmental design activities might gain motivational significance for the students. The theory's focus on how socialization processes affect the formation of expectancy-value profiles offers further understanding of how cultural settings, schooling, and demographic characteristics may lead to different motivational patterns.

Soft skills development can be explained through the theoretical frameworks of Social Learning Theory, which includes observational learning, modeling, and social reinforcement. This perspective explains how interpersonal skills evolve through observation of the experts, storage of the observed patterns in the memory, enactment of the observed behaviors, and reinforcement of the adopted behaviors (Abdulrahman & Mahmood, 2023). The theory also

provides further understanding of how confidence in social capabilities affects students' decision to try to use the observed skills, to continue even when feeling clumsy, and to persevere when encountering failure (Abbas et al., 2022). These theoretical dimensions offer useful ways of considering how educational contexts impact on the development of soft skills through the models offered, the reinforcement patterns set up, and the practice afforded.

Goal Theory enhances the theoretical foundation by explaining how different goal orientations and structures of the environment affect motivation and skill development processes. The theory of mastery and performance goals where mastery goals are associated with goals to develop competence and performance goals are associated with goals to perform better than others offers valuable information on how goal framing affects learning approaches, persistence and emotions during skill acquisition (Swann et al., 2021). Moreover, the theory's focus on goal content, goal difficulty, and goal contents in the context of the environment provides useful insights on how educational contexts impact motivational and developmental processes by the messages they convey about learning goals and success.

Cognitive Load Theory and Skill Acquisition Theory are two theories that can be used to explain the hard skills development because of their focus on instructional design and developmental stages respectively. Cognitive Load Theory explains how working memory capacity affects learning and how the instruction can be used to reduce cognitive load during the learning of complex skills (Partarakis & Zabulis, 2023). Skill Acquisition Theory is a three-stage developmental model that can be used to explain how technical skills evolve from the cognitive, associative, to the autonomous stage (DeKeyser, 2020). These theoretical frameworks cumulatively contribute to the knowledge of how environmental design education could enhance the technical learning skills through the proper design and organization of learning environment that is in harmony with the cognitive structure and development stages.

This integrated theoretical framework offers significant benefits over single-theory paradigms because it is more suitable for addressing the multifaceted research questions. The two theoretical frameworks offer different views of the studied phenomena, and their combination offers a theoretical framework for studying the interconnections between soft skills, hard skills, and learning motivation in environmental design education. This integration makes it possible to examine the interplay of these factors while offering sound theoretical frameworks for the study design, the assessment of variables, and the interpretation of results.

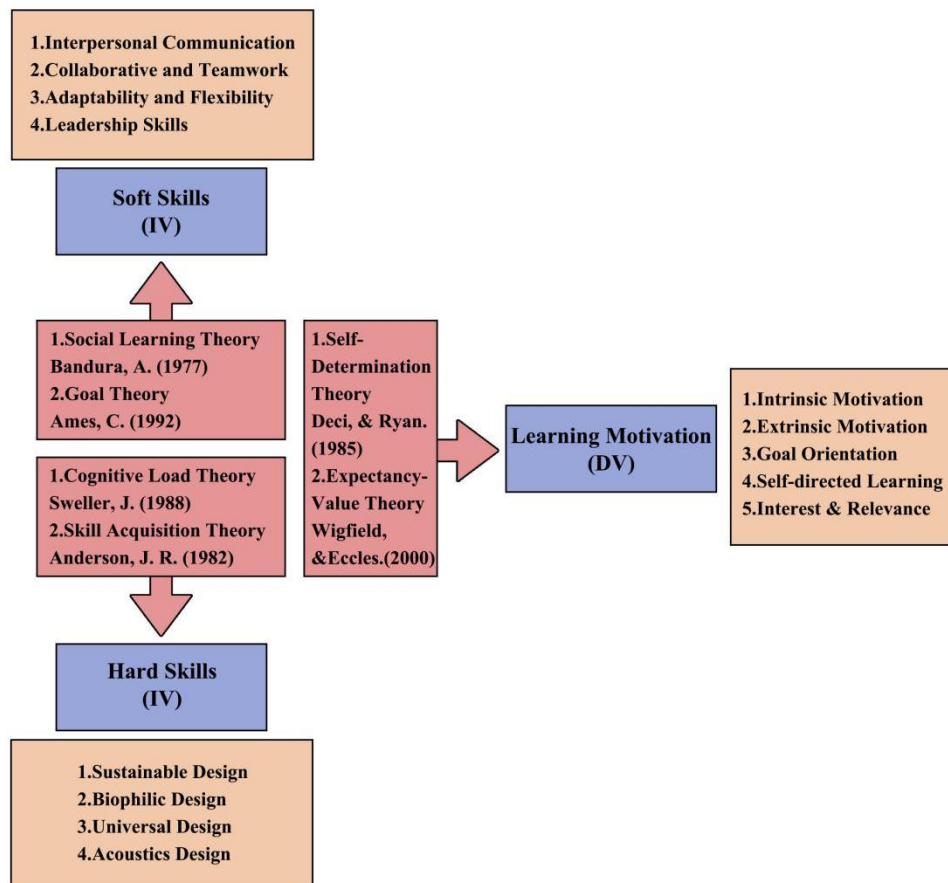


Figure 1 Theoretical Framework

Conceptual Framework

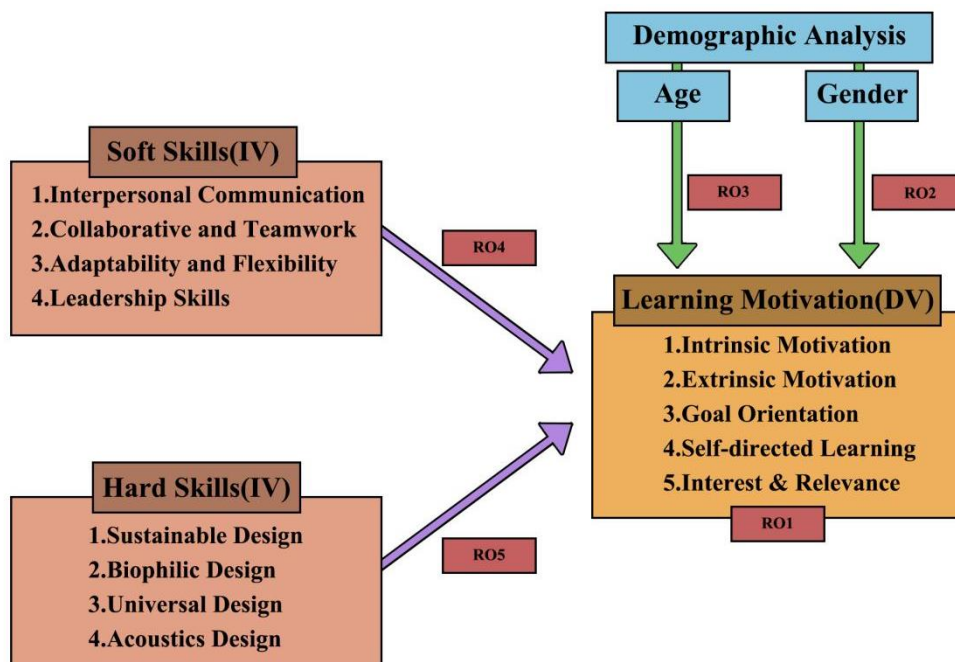


Figure 2 Conceptual Framework

Research Methodology

The study uses a quantitative research approach and cross-sectional survey design to establish the relationship between soft skills, hard skills, and learning motivation of the environmental design students in Jiangxi, China. The study included 384 participants and the researchers divided them by institution, academic year and field of environmental design. Collecting data from the whole population would take too much time, so using a sample seemed more practical, with a higher chance of finishing the data collection and working within the academic semester's time limits. The Krejcie and Morgan (1970) sample calculation rule is still used today in educational research. According to Krejcie and Morgan (1970), for a target population of 2,520 environmental design students, the sample size should be approximately 334, but this was increased to 384 to ensure adequate statistical power and account for potential non-response. The total sample for this study was 384 environmental design students.

The questionnaire selected for this study was not an original questionnaire but was based on the outstanding achievements of other researchers in partially relevant fields, which had already been confirmed to have good structural validity and internal consistency.

The study adopted the hypothesis testing approach where systematic procedures were used to test each of the research hypotheses with the help of the relevant statistical techniques. The null hypotheses with regard to gender and age differences in learning motivation was analyzed using t-test and ANOVA and the results compared to the set alpha level of 0.05.

Research Findings

Hypothesis	Statement	p-value	Decision
H01	There is a significant gender difference in learning motivation.	$p = 0.000$	Accepted
H02	There is a significant difference in learning motivation across age groups.	$p = 0.002$	Accepted
H03	Soft skills significantly influence learning motivation.	$p = 0.003$	Accepted
H04	Hard skills significantly influence learning motivation.	$p = 0.014$	Accepted

The results of the hypothesis testing reveal significant influences of gender, age, soft skills, and hard skills on learning motivation among environmental design students in Jiangxi, China. The first hypothesis (H01), which stated that there is a significant gender difference in learning motivation, was accepted based on the independent samples t-test ($p = 0.000$), indicating that male and female students differ meaningfully in their motivational levels. Similarly, the second hypothesis (H02) regarding significant differences across age groups was supported through one-way ANOVA results ($p = 0.002$), suggesting that learning motivation varies notably as students grow older. These findings underscore the importance of demographic factors in shaping motivational patterns and imply that educational strategies may need to be tailored according to age and gender to maintain or enhance student engagement.

The third and fourth hypotheses (H03 and H04) explored the influence of soft and hard skills on learning motivation using multiple regression analysis. Both hypotheses were accepted, with soft skills showing a statistically significant effect ($p = 0.003$) and hard skills also demonstrating a meaningful influence ($p = 0.014$). These results suggest that both

interpersonal competencies (such as communication and teamwork) and technical proficiencies (like design knowledge and sustainability practices) play vital roles in motivating students. The acceptance of all four hypotheses provides strong empirical evidence that motivation in environmental design education is multidimensional—shaped by personal attributes, educational background, and skill development. These insights offer valuable implications for curriculum design, advising educators to emphasize skill-building while recognizing the differing motivational needs of diverse student groups.

Discussion and Conclusion

The findings from the empirical study indicate five important points that help explain how skills and learning motivation are connected among students of environmental design in Jiangxi Province. Generally, participants showed a high level of learning motivation ($M = 4.01$), with intrinsic motivation ($M = 4.03$) and goal orientation ($M = 4.00$) being slightly higher than extrinsic motivation ($M = 3.98$). This pattern suggests that environmental design students are predominantly driven by internal interest and enjoyment rather than external rewards or performance comparisons. However, the consistently high scores across all motivational dimensions indicate that these students draw on multiple motivational sources in their educational engagement, combining internal drive with career aspirations and achievement goals.

Second, significant gender differences emerged across all motivational dimensions, with male students consistently demonstrating higher motivation than female counterparts. For intrinsic motivation, male students ($M = 4.22$, $SD = 0.746$) significantly outscored female students ($M = 3.78$, $SD = 0.804$), $t(382) = 5.529$, $p < .001$, with a moderate to large effect size ($d = 0.57$). Similar patterns appeared in extrinsic motivation and goal orientation dimensions. These findings contradict typical patterns observed in higher education, where female students often demonstrate higher academic motivation, suggesting unique gender dynamics within environmental design education in the Chinese context.

Third, a clear developmental pattern of increasing motivation with age was identified through ANOVA, with significant differences across age groups for all motivation dimensions ($F(4,379) = 6.868$, $p < .001$ for intrinsic motivation). Post-hoc analyses revealed that older students (22-23 years) reported significantly higher motivation than younger students (19-20 years), with a linear trend analysis confirming this progressive increase ($F(1,379) = 25.476$, $p < .001$). This developmental pattern persisted even when controlling for year of study, suggesting genuine maturational effects rather than simply academic progression.

Fourth, soft skills demonstrated exceptionally strong relationships with learning motivation ($R^2 = .978$, Adjusted $R^2 = .977$), with communication skills emerging as particularly powerful predictors. The regression analysis revealed complex patterns, with communication skills CS1 ($\beta = 1.111$, $p < .001$) and CS2 ($\beta = 1.008$, $p < .001$) showing strong positive influences, while some teamwork dimensions (TW2: $\beta = -0.386$, $p < .001$; TW3: $\beta = -0.704$, $p < .001$) demonstrated significant negative relationships. These mixed patterns suggest that different soft skill aspects may influence motivation in distinct and sometimes competing ways, challenging simplistic assumptions about uniformly positive relationships.

Fifth, hard skills showed substantial but more moderate relationships with motivation ($R^2 = .582$, Adjusted $R^2 = .573$) compared to soft skills. Technical design knowledge (TD1: $\beta = 0.236$, $p < .001$) and sustainable design principles (TD5: $\beta = 0.201$, $p < .001$) positively predicted motivation, while environmental assessment skills (TD4: $\beta = -0.173$, $p = .015$) showed a negative relationship. Importantly, moderation analyses revealed that these relationships varied significantly across demographic groups, with stronger positive associations for male students and those with prior design education, suggesting contextual influences on how technical skills relate to motivation.

Collectively, these findings reveal that the relationships between skills and motivation in environmental design education are more complex and nuanced than previously theorized, with significant implications for educational theory and practice. The interplay of gender, age, and educational background factors further underscores the importance of considering individual differences when designing educational approaches to enhance both skill development and motivation in this specialized educational context.

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