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RESEARCH ARTICLE

A Study on the Sustainable Career Development Competencies of University Students in Zhejiang Province, China

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ABSTRACT

This study, based on empirical analysis of 656 valid questionnaires, investigates the relationship between university students' awareness of sustainable development, aesthetic experience, and career competencies in Zhejiang Province. The findings indicate that awareness of sustainable development significantly impacts both career competencies and aesthetic experience, with aesthetic experience partially mediating the relationship. Additionally, gender and educational background show significant differences in students' awareness of sustainable development, aesthetic experience, and career competencies. The study suggests that enhancing students' awareness of sustainable development and aesthetic literacy improves career competencies and positively impacts social responsibility.

Keywords: University Students; Awareness of Sustainable Development; Sustainable Career Development Competencies; Aesthetic Experience

1. Introduction

As the importance of global sustainable development issues rises, sustainability is gradually integrated into various educational models. University students, as future builders of society and key human resources, are becoming the core force for social and environmental sustainability in the context of globalization, digitalization, and green transformation [18]. Their awareness of sustainable development, career development competencies, and aesthetic experiences are central to this transformation. Sustainable career development competencies encompass not only traditional employment skills but also proactive identification with and practice of environmental protection and social responsibility throughout their careers. This competency is crucial for both individual success and the long-term development and responsibility of society as a whole.

Research on sustainable development education for youth has increased, focusing on university students' awareness of environmental protection, social responsibility, and economic sustainability. Previous studies show that awareness of sustainable development significantly impacts students' career development, influencing both value formation and the cultivation of practical action abilities. However, the role of aesthetic experience in this process has not been fully explored. Aesthetic experience relates to artistic cultivation and cultural perception, and involves how sensory cognition influences rational judgment, thus

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affecting career choices, social responsibility attitudes, and innovation abilities [10]. Aesthetic experience may be the key bridge between sustainable development awareness and career competencies, though empirical research remains limited.

In China, particularly in Zhejiang Province, university students face challenges from employment competition, skill requirements, green transition, social responsibility, and public values. This requires higher education to help students balance sustainable cognition, career competencies, and aesthetic experience, in addition to academic education. The unique regional characteristics of Zhejiang provide a practical foundation for this research, making it both theoretically significant and practically relevant.

The study investigates university students in Zhejiang Province via a questionnaire survey, focusing on how gender and educational background affect students' sustainable development awareness, aesthetic experience, and career competencies. It examines the interactive relationships between these variables and aims to fill the gap in literature on the "aesthetic experience – career development" relationship. The findings provide a solid theoretical foundation for sustainable education and offer actionable recommendations for higher education practices, promoting a long-term development of students' career growth and social responsibility.

2. Literature review

2.1. Theoretical framework

This study adopts the Triple Bottom Line (TBL) theory proposed by Elkington in 1994 as the framework to explore university students' awareness of sustainable development and its impact on sustainable career development competencies. The TBL model emphasizes that economic, social, and environmental dimensions should be integrated into the evaluation system for organizational and societal development, moving beyond a model focused solely on economic benefits [8]. The economic dimension not only considers profitability but also involves resource allocation and long-term value creation. The social dimension includes responsibility awareness, educational equity, and social welfare enhancement. The environmental dimension focuses on ecological protection and resource conservation.

The core feature of TBL theory is its balanced approach, emphasizing the interaction between the three dimensions. Sustainable development is seen as not only a result of economic growth but also a product of the synergy between social responsibility and environmental protection. This theory offers a unique perspective for understanding the interaction between individual development and social responsibility in education [10].

In higher education, TBL theory provides theoretical support for students' awareness of sustainable development and career planning. As students understand the importance of economic benefits, they also become aware of the value of social responsibility and environmental protection in their careers. A career thus becomes a practice of realizing public value and environmental stewardship, demonstrating a stronger sense of responsibility and sustainability in career decision-making.

In summary, the TBL theory is a crucial tool for understanding sustainable development in education. It explains how students can balance economic benefits, social responsibility, and environmental protection in their careers while offering a flexible framework for educational practice. The theory's versatility makes it a key support for exploring sustainable career development and social responsibility cultivation in university students.

2.2. Awareness of Sustainable Development

Awareness of sustainable development refers to an individual's understanding of the core concepts, goals, and pathways to achieving sustainability, particularly the interconnections of the three key dimensions: ecology, society, and economy [11]. For university students, this awareness influences how they understand the relationship between environmental protection, social responsibility, and economic benefits, and shapes their actions and career choices. Research has shown that university students' awareness of sustainable development can enhance their career competencies, leading them to emphasize social responsibility and environmental protection in their career planning [22]. This study focuses on university students' understanding of sustainable development concepts and explores how it influences their career goal-setting and self-awareness development.

2.3. Aesthetic Experience

Aesthetic experience is the comprehensive experience of beauty that an individual undergoes during perception, understanding, and emotional response, and is often regarded as an important bridge between emotion and cognition [29]. From the perspective of environmental aesthetics, aesthetic experience not only arises from sensory stimuli but also closely relates to an individual's value recognition and the meaning construction of their environment [22]. By fostering emotional identification and value formation, aesthetic experience can profoundly influence university students' awareness of sustainable development and career choices. This study argues that, through perceiving and identifying the beauty of the environment, students gradually become more concerned about ecological and social issues, thus subtly enhancing their career development competencies. With the intervention of aesthetic education, students can not only cultivate aesthetic literacy in their daily lives but also more consciously integrate sustainable development goals into their career planning.

2.4. Sustainable Career Development Competencies

Sustainable career development competencies refer to an individual's comprehensive ability to balance career and life demands, plan future goals, and deepen self-awareness in the dynamic social, economic, and environmental context, thus achieving career stability and personal growth. This competency emphasizes not only flexibility in adapting to the uncertainties of the social and professional environment but also includes career planning skills and commitment to social responsibility and environmental protection. In this study, sustainable career development competencies are regarded as one of the core concepts. These competencies not only affect students' employability but also reflect their recognition of social responsibility and the realization of long-term career goals [1]. Through analyzing university students' sustainable career development competencies, we further explore how innovative practices in the educational system can improve students' career adaptability, creativity, and sustainability awareness.

2.5. Hypotheses

Existing studies show that different background variables significantly impact university students' awareness of sustainable development, career competencies, and aesthetic experience. In terms of sustainable development awareness, gender and education level are two key factors. Kassinis et al [16] found that women were more involved in environmental behaviors (e.g., using energy-saving light bulbs), indicating that gender plays a role in sustainability-related actions. Education level also shapes sustainable development awareness, with Wang et al [20] noting that individuals with higher educational attainment show more enthusiasm in both cognitive and behavioral aspects, while those with lower levels tend to lack participation. Ren et al and Zhou et al further emphasized that education affects individuals' ability to translate awareness

into long-term green practices. Higher-educated groups excel in interdisciplinary integration and problem-solving.

In sustainable career development competencies, gender and education level also show significant differences. Research shows that women often have clearer career planning but are constrained by gender stereotypes, particularly in STEM fields (Deng) [26] . Women also tend to seek flexible work models and excel in communication and interpersonal coordination. Regarding education level, Yuan et al stated that higher education enhances career maturity and competitiveness, and curricula emphasizing sustainable development strengthen students' responsibility and adaptability. This highlights education's role in sustainable career development.

Lastly, the impact of gender and education background on aesthetic experience has been widely studied. Pietras and Czernecka found that women exhibit greater sensitivity and participation in art appreciation, while those with art education backgrounds perform better in understanding diverse art styles. Miller and Hübner [19] emphasized that social conditions and education have a greater influence on women's aesthetic experiences, while men's responses are more driven by personal interests. Education background influences aesthetic experience, as studies by Hamada and Gong show that systematic art education and higher education levels improve emotional responses and aesthetic judgment in art. Gao noted that education not only shapes aesthetic preferences but also determines whether individuals can elevate aesthetic cognition to higher levels of value recognition. Based on these findings, this study proposes the following hypothesis:

- **H1**: There are significant differences in university students' awareness of sustainable development based on different background variables (gender, education level) in Zhejiang Province, China.
  H1a: There are significant differences in sustainable development awareness between male and female university students in Zhejiang Province, China.
  H1b: There are significant differences in sustainable development awareness between university students with different education levels in Zhejiang Province, China.
  H2: There are significant differences in university students' sustainable career development competencies based on different background variables (gender, education level) in Zhejiang Province, China.
  H2a: There are significant differences in sustainable career development competencies between male and female university students in Zhejiang Province, China.
  H2b: There are significant differences in sustainable career development competencies between university students with different education levels in Zhejiang Province, China.
  H3: There are significant differences in university students' aesthetic experience based on different background variables (gender, education level) in Zhejiang Province, China.
  H3a: There are significant differences in aesthetic experience between male and female university students in Zhejiang Province, China.
  H3b: There are significant differences in aesthetic experience between university students with different education levels in Zhejiang Province, China.

Existing research indicates a close relationship between awareness of sustainable development, sustainable career development competencies, and aesthetic experience. In terms of the relationship between awareness and career competencies, Kovalenko and Shvorob noted that high awareness promotes career development and resilience. Mas-Tur et al emphasized the correlation between cognitive ability to identify sustainable opportunities and entrepreneurial skills, aiding decision-making in uncertain environments. Ishaq et al and Carpenter and Wilson found that awareness influences continuous learning and career planning,

enhancing problem-solving abilities through innovative higher education training. Other studies Rahmaningtyas et al.[24] [30] also confirm that awareness of responsibility and the environment can drive action, promoting coordinated career and social value development. Thus, awareness is a core driver in enhancing career competencies.

Secondly, regarding the relationship between awareness and aesthetic experience, Fleurbaey et al [9] suggested that moral awareness generates creative aesthetic experiences in economic and social values. Yin et al [35] and Su and Swanson [28] found that higher awareness levels lead to more positive aesthetic perceptions in environmental and organizational contexts. Studies by Sixiao Chen and Hui [25] show that environmental awareness enhances emotional resonance and shapes aesthetic preferences. Clearly, awareness is a key driver of aesthetic experience.

Thirdly, concerning the relationship between aesthetic experience and career competencies, Wei and Xie [33] noted that ecological aesthetic experiences enhance responsibility and career adaptability. Daugelaite et al [6] and Kitriniaris pointed out that aesthetic experience facilitates skill accumulation and stimulates interest in environmental careers. Research in the social and economic fields [15] [34] also shows that aesthetic experience strengthens social responsibility and creativity, thus promoting career development.

Lastly, some studies found that aesthetic experience mediates the relationship between awareness and career competencies. Wang and Yu [32] and Strappini et al [27] indicated that awareness is transformed into career adaptability through aesthetic experience. Delacroix [7] and Zou [40] found that awareness of responsibility enhances career and social goal alignment through aesthetic experience, while Jiang and Zhang [14] emphasized that economic awareness improves career decision-making strategies through aesthetic experience.

In summary, awareness of sustainable development not only directly promotes career competencies and aesthetic experience but also indirectly enhances career development through aesthetic experience. Based on this, the study proposes the following hypothesis:

- **H4**: The awareness of sustainable development among university students in Zhejiang Province, China, has a significant positive impact on sustainable career development competencies.
- **H5**: The awareness of sustainable development among university students in Zhejiang Province, China, has a significant positive impact on aesthetic experience.
- **H6**: The aesthetic experience of university students in Zhejiang Province, China, has a significant positive impact on sustainable career development competencies.
- **H7**: The aesthetic experience of university students in Zhejiang Province, China, mediates the relationship between awareness of sustainable development and sustainable career development competencies.

3. Methodology

3.1. Participants

The sample for this study was drawn from university students in Zhejiang Province, China. A total of 656 valid responses were collected from the formal survey. The demographic information of the respondents collected in the questionnaire includes gender and educational background, as shown in Table 1. In terms of gender, there were 321 male participants (48.9%) and 335 female participants (51.1%), indicating a relatively balanced distribution. Regarding educational background, there were 418 undergraduate students (63.7%), 126 graduate students (19.2%), and 112 college students (17.1%), reflecting a multi-level

distribution of educational backgrounds. The sample is representative and well-structured, providing a reliable data foundation for subsequent empirical analysis, as shown in Table 1.

Table 1. Demographic Information of Sample

Background Variable	Category	Number	Percentage (%)
Gender	Male	321	48.9
	Female	335	51.1
Educational Background	College	112	17.1
	Undergraduate	418	63.7
	Graduate	126	19.2

3.2. Measurements

This study employed a questionnaire survey method to collect data. The research instruments included three scales: awareness of sustainable development, sustainable career development competencies, and aesthetic experience. To ensure the scientific validity and applicability of the measurement tools, the study selected well-established scales from existing literature and made necessary local adaptations based on the research context. The sources, composition, and reliability and validity indicators of the relevant scales will be explained in detail in the following sections.

3.2.1. Awareness of sustainable development scale

The Awareness of Sustainable Development Scale consists of 30 items covering three dimensions: environmental ethics, social community, and eco-friendly economy. Examples of items include, "I believe protecting the natural environment is everyone's responsibility" and "Social responsibility and environmental impact should be considered in career planning." All items were rated on a Likert 7-point scale (1 = strongly disagree, 7 = strongly agree). The results of the formal questionnaire analysis showed that the correlations between individual items and the total score exceeded .300, and the C.R. values were significant, with no items excluded for failing to meet the standard.

Reliability tests indicated that the Cronbach's Alpha coefficients for the three dimensions—environmental ethics, social community, and eco-friendly economy—were .947, .937, and .913, respectively, with the overall scale reliability being .961. This suggests that the scale has excellent internal consistency and measurement stability, effectively reflecting university students' true levels of awareness of sustainable development.

Confirmatory factor analysis (CFA) showed that the standardized factor loadings ranged from .624 to .883, all significant ($p < .001$), indicating good explanatory power for the latent constructs. The composite reliability (CR) values for the dimensions were .947, .937, and .913, with the overall scale CR being .961, all significantly above the .600 standard. The average variance extracted (AVE) for each dimension was .643, .601, and .583, with the overall scale AVE being .669, exceeding the .500 threshold, indicating good convergent validity.

In terms of model fit, the χ^2/df value was 3.842, GFI = .954, AGFI = .928, SRMR = .039, RMSEA = .067, NFI = .948, RFI = .930, CFI = .963, IFI = .964, PNFI = .672, PGFI = .598, and CN = 311. All indices met the evaluation standards ($\chi^2/df < 5$, GFI/AGFI/CFI/IFI > .900, RMSEA/SRMR < .080, PNFI/PGFI > .500, CN > 200), indicating good overall model fit. In conclusion, the Awareness of

Sustainable Development Scale performed well in terms of structural and convergent validity, validating its reliability as a core variable in subsequent path models.

3.2.2. Sustainable career development competency scale

The Sustainable Career Development Competency Scale consists of 25 items, covering three dimensions: career and life management, future career and life planning, and identity awareness. Examples include, "I can manage my time effectively to balance study and life" and "I consider long-term goals and social responsibility in career planning." All items were rated on a Likert 7-point scale (1 = strongly disagree, 7 = strongly agree). The formal questionnaire analysis showed that the correlations between individual items and the total score ranged from .671 to .886, all exceeding the .300 reference value. The C.R. values ranged from 3.242 to 10.089, all significant ($p < .01$), indicating significant differences between high and low score groups for all items, so all 25 items were retained.

Reliability analysis showed that the Cronbach's Alpha coefficients for the three dimensions—career and life management, future career and life planning, and identity awareness—were .926, .833, and .896, respectively, with the overall scale reliability being .963, indicating good internal consistency.

Confirmatory factor analysis (CFA) showed that the standardized factor loadings ranged from .611 to .902, all significant ($p < .001$), indicating strong explanatory power for the latent constructs. The composite reliability (CR) values for the dimensions were .966 for career and life management, .850 for future career and life planning, and .887 for identity awareness, with the overall scale CR being .942, all above the .800 standard. The average variance extracted (AVE) for each dimension was .673, .544, and .566, and the overall scale AVE was .651, all exceeding .500, showing good convergent validity.

In terms of model fit, the χ^2/df value was 3.415, GFI = .946, AGFI = .921, SRMR = .044, RMSEA = .061, NFI = .938, RFI = .919, CFI = .956, IFI = .957, PNFI = .683, PGFI = .601, and CN = 336. All indices met the evaluation standards ($\chi^2/df < 5$, GFI/AGFI/CFI/IFI > .900, RMSEA/SRMR < .080, PNFI/PGFI > .500, CN > 200), indicating stable structural and convergent validity. The scale is a reliable tool for measuring university students' sustainable career development competencies.

3.2.3. Aesthetic experience scale

The Aesthetic Experience Scale consists of 21 items, covering four dimensions: pleasure in beauty, aesthetic cognition, understanding of beauty, and holistic experience. Examples include, "I feel pleasure when appreciating the beauty of nature or art" and "I gain a deeper understanding through aesthetic experiences." All items were rated on a Likert 7-point scale (1 = strongly disagree, 7 = strongly agree). The formal questionnaire analysis showed that the correlations between individual items and the total score ranged from .671 to .886, all exceeding the .300 reference value. The C.R. values ranged from 3.574 to 10.241, all greater than 3 and significant ($p < .001$), indicating significant differences between high and low score groups. As a result, all 21 items were retained.

Reliability tests showed the Cronbach's Alpha coefficients for the four dimensions—pleasure in beauty, aesthetic cognition, understanding of beauty, and holistic experience—were .923, .904, .907, and .901, respectively, with an overall reliability of .976, indicating good internal consistency.

Confirmatory factor analysis (CFA) showed that the standardized factor loadings ranged from .642 to .886, all significant ($p < .001$), indicating strong explanatory power for the latent constructs. The composite reliability (CR) values for the dimensions were .906 for pleasure in beauty, .907 for aesthetic cognition, .904 for understanding of beauty, and .882 for holistic experience, with the overall scale CR

being .946, all above the .600 standard. The average variance extracted (AVE) for each dimension ranged from .603 to .660, with the overall scale AVE being .656, exceeding .500, showing good convergent validity.

In terms of model fit, the χ^2/df value was 3.622, GFI = .951, AGFI = .925, SRMR = .041, RMSEA = .065, NFI = .944, RFI = .923, CFI = .960, IFI = .961, PNFI = .677, PGFI = .589, and CN = 327. All indices met the statistical standards (χ^2/df < 5, GFI/AGFI/CFI/IFI > .900, RMSEA/SRMR < .080, PNFI/PGFI > .500, CN > 200), indicating that the Aesthetic Experience Scale demonstrated good structural and convergent validity and can effectively measure university students' psychological and emotional responses in aesthetic experiences.

4. Results

4.1. Descriptive statistics

Descriptive statistics showed that Zhejiang university students demonstrated relatively high awareness of sustainable development (M = 4.359, SD = 0.873), balanced across environmental, social, and economic dimensions, but only moderate levels of aesthetic experience (M = 3.297, SD = 0.961) and sustainable career development competencies (M = 3.092, SD = 0.719). While awareness was consistent across subdimensions, aesthetic experience showed greater individual variation, and career competencies clustered around the midpoint, indicating room for growth in planning, identity development, and self-management. Overall, the findings suggest that educational efforts should shift toward strengthening students' aesthetic literacy and career-related competencies.

4.2. Analysis of gender differences

Independent samples t-tests revealed significant gender differences across all three variables. Male students scored higher than females in awareness of sustainable development (M = 4.607 vs. 4.122; t = 7.402, p < .001) and sustainable career development competencies (M = 3.291 vs. 2.901; t = 7.224, p < .001). In contrast, females outperformed males in aesthetic experience (M = 3.396 vs. 3.201; t = 2.613, p = .009). These results support H1a, H2a, and H3a, indicating that gender has a multidimensional influence on students' sustainability awareness, aesthetic engagement, and career readiness (see Table 2).

Table 2. Gender Differences in Each Dimension

Variable	Male (n = 265) *M (SD)*	Female (n = 391) *M (SD)*	t	p	Difference Comparison
Awareness of Sustainable Development	4.607 (0.783)	4.122 (0.890)	7.402	.000	Male > Female
Aesthetic Experience	3.396 (0.976)	3.201 (0.938)	2.613	.009	Female > Male
Sustainable Career Development Competencies	3.291 (0.705)	2.901(0.679)	7.224	.000	Male > Female

4.3. Analysis of differences in education background

To examine the impact of educational background, participants were grouped into college, undergraduate, and graduate categories. A one-way ANOVA, validated with Levene's test and Brown–Forsythe analysis, revealed significant differences in awareness of sustainable development (F = 10.107, p < .001), aesthetic experience (F = 5.321, p < .01), and sustainable career development competencies (F = 59.560, p < .001). Graduate students consistently scored highest: awareness of sustainable development (M = 4.661, SD = 0.906) compared with undergraduates (M = 4.307, SD = 0.856) and college students (M = 4.213, SD = 0.828); aesthetic experience (M = 3.546, SD = 0.995) compared with undergraduates (M = 3.243, SD = 0.942) and college students (M = 3.219, SD = 0.957); and sustainable career development competencies (M

= 3.579, SD = 0.663) compared with undergraduates (M = 3.063, SD = 0.661) and college students (M = 2.649, SD = 0.663). Overall, graduate students performed significantly better across all three dimensions, with the largest gap observed in sustainable career development competencies. These findings confirm that educational background is a key factor influencing students' awareness, aesthetic experience, and career competencies, thereby supporting H1b, H2b, and H3b (see Table 3).

Table 3. Analysis of Differences in t Educational Backgrounds

Variable	Educational Background	M	SD	*F*	Post-hoc Comparisons
Awareness of Sustainable Development	College	4.213	.828	4.312***	3 > 1, 3 > 2
	Undergraduate	4.307	.856		
	Graduate	4.661	.906		
Aesthetic Experience	College	3.219	.957	2.163**	3 > 1, 3 > 2
	Undergraduate	3.243	.942		
	Graduate	3.546	.995		
Sustainable Career Development Competencies	College	2.649	.663	6.107***	3 > 1, 3 > 2
	Undergraduate	3.063	.661		
	Graduate	3.579	.663		

***Note 1**: **p < .010*
***Note 2**: Educational categories: 1 = College; 2 = Undergraduate; 3 = Graduate*

4.4. Regression analysis

Multiple regression analyses revealed that awareness of sustainable development significantly predicted sustainable career development competencies (β = 0.416, p < .001, R^2 = 42.8%), while gender showed a negative effect (β = -0.150, p < .001), supporting H4. Awareness of sustainable development also positively predicted aesthetic experience (β = 0.443, p < .001, R^2 = 25.4%), validating H5. When aesthetic experience was included as a predictor, it significantly enhanced sustainable career development competencies (β = 0.401, p < .001, R^2 = 43.1%), with gender remaining significant (β = -0.224, p < .001), supporting H6. Bootstrap analysis confirmed the mediating role of aesthetic experience (indirect effect = 0.121, 95% CI = [.088, .157]), which accounted for 27% of the total effect, thereby supporting H7. Additionally, the regression analysis results for sustainable development awareness on sustainable career development competencies, aesthetic experience, and the mediating effects can be seen in Table 4, Table 5, Table 6, and Table 7.

Table 4. Regression Analysis of the Effect of Awareness of Sustainable Development on Sustainable Career Development Competencies

Variable	Dependent Variable: Sustainable Career Development Competencies	B	SE	β	VIF
Control Variables	-	-	-	-	
Female	-0.215	0.044	-0.150***	1.090	
Undergraduate	0.405	0.058	0.271***	1.733	
Graduate	0.777	0.072	0.426***	1.768	

Variable	Dependent Variable: Sustainable Career Development Competencies	B	SE	β	VIF
Independent Variable	-	-	-	-	
Awareness of Sustainable Development	0.342	0.027	0.416***	1.204	
R^2	0.429	-	-	-	
Adj. R^2	0.424	-	-	-	
F	97.497***	-	-	-	

Table 4. (*Continued*)

Note 1: ****p < .001; Gender is coded with males as the reference group, and educational background is coded with associate degree holders as the reference group.*

Table 5. Regression Analysis of the Effect of Awareness of Sustainable Development on Aesthetic Experience

Variable	Dependent Variable: Aesthetic Experience	B	SE	β	VIF
Control Variables	-	-	-	-	
Female	0.045	0.068	0.024	1.090	
Undergraduate	0.002	0.089	0.001	1.733	
Graduate	0.119	0.110	0.049	1.768	
Independent Variable	-	-	-	-	
Awareness of Sustainable Development	0.486	0.041	0.442***	1.207	
R^2	0.254	-	-	-	
Adj. R^2	0.249	-	-	-	
F	44.364***	-	-	-	

*Note 1: ***p < .001; Gender is coded with males as the reference group, and educational background is coded with associate degree holders as the reference group.*

Table 6. Regression Analysis of the Effect of Sustainable Career Development Competencies on Aesthetic Experience

Variable	Dependent Variable: Sustainable Career Development Competencies	B	SE	β	VIF
Control Variables	-	-	-	-	
Female Gender	-0.322	0.043	-0.224***	1.011	
Undergraduate	0.433	0.058	0.290***	1.726	
Graduate	0.830	0.071	0.455***	1.739	
Independent Variable	-	-	-	-	
Aesthetic Experience	0.300	0.023	0.401***	1.100	
R^2	0.431	-	-	-	
Adj. R^2	0.427	-	-	-	
F	98.533***	-	-	-	

Note: ****p < 0.001; Gender is coded with males as the reference group, and educational background is coded with associate degree holders as the reference group.*

Table 7. Bootstrap Analysis Results for Mediating Effect (5,000 Resamples)

Path	Estimate	SE	95% LLCI	95% ULCI
Direct Effect	0.239	0.028	0.184	0.294
Mediating Effect	0.103	0.016	0.073	0.136
Total Effect	0.342	0.027	0.290	0.395

Note: *This table presents the Bootstrap analysis results for the mediating effect of sustainable career development competencies. LLCI refers to the lower limit of the confidence interval, and ULCI refers to the upper limit of the confidence interval. ***p < .001.*

5. Discussion

This study aimed to explore the impact of university students' awareness of sustainable development on their career development competencies in Zhejiang Province, and examine the mediating role of aesthetic experience. Statistical analysis of 656 valid responses revealed significant differences in awareness, aesthetic experience, and career competencies based on gender and educational background. Awareness of sustainable development had a significant positive effect on both aesthetic experience and career competencies, with aesthetic experience playing a partial mediating role.

First, this study found significant gender differences in students' awareness of sustainable development, aesthetic experience, and career competencies, consistent with prior research. Male students scored higher in awareness and career competencies, while females excelled in aesthetic experience [3].This may relate to gender socialization: men focus more on rational planning and career goals, while women are more sensitive to emotional experiences, often achieving resonance through aesthetic activities [38]. This suggests that future education programs should address gender differences in students' learning styles and design personalized educational approaches [16].

Second, graduate students scored higher than undergraduates and college students in all three dimensions, with the greatest difference in career competencies. This aligns with research on the relationship between educational background and career literacy [37]. Graduate education involves more systematic training and academic exchanges, enabling students to form higher levels of awareness and competency in sustainable development concepts, career planning, and value judgments [20]. This indicates that higher education is crucial for promoting the construction of values and enhancing career competencies.

Third, regression analysis showed that awareness of sustainable development positively affects career competencies. This aligns with international research emphasizing the "cognition-competency" relationship [20]. Students who understand the value of sustainable development are more likely to be prepared and stable in career management, goal setting, and identity recognition, suggesting that sustainable development education should focus on both environmental awareness and overall student development. Strengthening sustainability awareness can enhance students' competitiveness and adaptability in the workplace.

Fourth, the study also showed that awareness of sustainable development positively predicts aesthetic experience, aligning with theories of aesthetic education [19]. Students with a strong awareness of sustainability seek aesthetic experiences in nature, art, and social practice, gaining a sense of value and happiness [10]. Aesthetic experience not only provides emotional pleasure but also helps internalize values and construct meaning, further translating sustainability concepts into actions. This suggests that integrating sustainable education with aesthetic education strengthens students' value identification and promotes holistic development [13].

Fifth, aesthetic experience significantly impacts career competencies, indicating its value in students' career development. This supports previous studies on "aesthetic education promoting individual

development" [36]. Students with a higher level of aesthetic experience are more active in goal-setting, time management, and identity recognition, as they reflect on themselves through art, enhancing creativity and collaboration [30]. This suggests that universities should emphasize aesthetic education in their curricula, positioning it as a key pathway to enhancing career competencies and social responsibility.

Finally, the mediating effect analysis revealed that aesthetic experience partially mediates the relationship between awareness of sustainable development and career competencies [29]. Awareness of sustainable development directly enhances students' career competencies and indirectly facilitates development by strengthening aesthetic experience, with the indirect effect accounting for 27% of the total effect. This aligns emphasizing the role of aesthetic experience in students' development. This result highlights the importance of interdisciplinary education, particularly in integrating sustainable development education with aesthetic education, to support the comprehensive development of university students [39].

6. Conclusion

This study examines the interplay between sustainable development awareness, aesthetic experience, and career competencies among university students in Zhejiang Province. It finds that gender and educational background significantly impact these competencies, with graduate students scoring higher in all areas [16]. Male students excel in career development, while females excel in aesthetic experience. The study suggests that universities should design personalized support pathways, particularly for female students, to enhance career development [26]. It also emphasizes the integration of sustainable and aesthetic education to foster holistic growth and career preparedness [12].

7. Limitations and recommendations

This research examines university students in Zhejiang Province, aiming to explore the relationships between their awareness of sustainable development, aesthetic experience, and career competencies. Although the large sample size and diverse backgrounds enhance the representativeness of the study, its regional focus limits the ability to generalize the findings [5]. Additionally, relying primarily on a questionnaire survey restricts the depth of understanding, as it lacks qualitative insights [26]. Future studies should broaden the sample to include students from various regions and cultures, incorporating mixed methods to investigate additional factors like family background and educational policies for a more comprehensive analysis [24].

Conflict of interest

The authors declare no conflict of interest

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