

Probing the Link Between Critical Thinking Ability and Academic Achievement of Chinese Art Design Students

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Abstract: This study explores the relationship between critical thinking ability and academic performance of art and design students in Chinese universities. The researchers surveyed 500 art and design students from 10 universities in nine cities in China. The research results show that students' critical thinking ability in art and design is at the average level, and students' academic achievement assessment in art and design is also at the average level, and critical thinking ability has a significant impact on the academic performance of art and design students.

Keywords: Critical Thinking Ability; Academic Achievement; Academic Performance in Art Design.

1. Introduction

UNESCO has proposed that critical thinking and creativity are the main themes of education in the 21st century, and the cultivation of critical thinking is an "indispensable link" in the future development of education, rather than a "free option". As the change of literacy-oriented curriculum and learning in the 21st century begins to become the new symbol of educational change worldwide, the cultivation of critical thinking is an indispensable part of the construction of the core literacy framework in almost all countries and international organizations. The EU's Key Competencies for Lifelong Learning report (2018) updates the eight key competencies as: literacy; multilingualism; science, technology, engineering and mathematics; Numeracy; Personal, social and learned Learning; citizenship; entrepreneurship; cultural awareness and expression. China Education Innovation Research Institute of Beijing Normal University (2018) held a press conference to release the Research Report on 21st Century Core Literacy 5C Model (Chinese Version) for the first time. The core literacy 5C model for the 21st century is proposed, which includes Culture Competency, Critical Thinking, Creativity, Communication, and Collaboration. In 2019, China stressed in the "Implementation Opinions of the Ministry of Education on the Construction of First-class Undergraduate Courses" that the core task of building dual-first-class disciplines is to solve the problem of innovation and critical thinking training. This indicates that critical thinking is widely regarded as a necessary high-level thinking for higher education learners.

In the introduction to the Third Volume of the Reform of Universities (2020), it is said that the value of education is not only reflected in students' knowledge mastery, but also reflected in students' thinking development, the core of which is the education of critical thinking and creative thinking. In the first "Yangtze River Delta" Design Education Forum, Xi Tao (2020), a professor at the School of Media and Communication of Shanghai Jiao Tong University, believes that our thinking on design education should gradually shift from the traditional perspective of cultivating students' skills to cultivating students' ability to think creatively, raise and

solve problems. Qu Zhenyuan (2020), former president of the Chinese Association of Higher Education, said that the cultivation of innovative design talents must have a flexible head and emancipate the mind, "that is to say, the mind is very active, constantly have new ideas, new consciousness, and can have new works, in this regard, we also need to cultivate students' critical and innovative thinking." This study contributes to the assessment of critical thinking ability of art and design students, and helps to understand the relationship between critical thinking ability and students' academic performance, and helps students identify their shortcomings in critical thinking. At the same time, it can help educational institutions, teachers and researchers intuitively understand the current level of critical thinking ability of art and design students, and carry out professional training or projects in the field of critical thinking ability cultivation for art and design education.

2. Statement of the Problem

This study aimed to probe the link between critical thinking ability and academic achievement of Chinese Art Design students. In particular, it seeks answers to the following: What is the assessment of the respondents on their critical thinking ability? How do the respondents assess their academic achievement in Art Design? Is there a significant relationship between the respondents' assessment of their critical thinking ability and their academic achievement in Art Design?

3. Methodology

The respondents of this study were 500 art and design students from 10 universities in Guangdong Province. The researchers selected the target population from 10 universities by cluster sampling method, and then randomly selected some small groups in the major of art design and invited them to participate in the questionnaire designed by the researchers.

The study was quantitative and used a descriptive correlation design. To answer the research questions, the researchers used a self-made questionnaire. The researchers adopted questionnaire survey as the data collection method. The questionnaire is divided into three parts. The first part of

the questionnaire is the profile of the respondents, including grade, age and gender information. The second part focuses on the respondents' assessment of their critical thinking skills applied in art design. The third part is the respondents' evaluation of their academic performance in art design. Respondents were asked to select the appropriate option based on their situation. The second part includes five sub-parts: (1) problem identification and definition, (2) analysis and interpretation, (3) synthesis and integration, and (4) decision making and reason, (5) reflection and self-assessment. These five sub-parts correspond to the five components of critical thinking ability respectively to determine the level of critical thinking ability of art and design students. The third part includes (1) creative process, (2) problem solving ability, (3) creativity and innovation, (4) research and development, (5) collaboration and communication, which correspond to the assessment of academic performance in art design.

4. Analysis

Table 1. The Respondents' Assessment of Their Critical Thinking Ability as Applied to Art Design

Indicator	Mean	S.D.	V.I.
1.1 Problem Identification and Definition	2.75	.779	VG
1.2 Analysis and Interpretation	2.74	.756	VG
1.3 Synthesis and Integration	2.71	.742	VG
1.4 Decision-Making and Justification	2.70	.751	VG
1.5 Reflection and Self-Assessment	2.52	.762	VG
Overall	2.68	.710	VG

Legend: 3.25 – 4.00 Excellent (E), 2.50 – 3.24 Very Good (VG), 1.75 – 2.49 Good (G), 1.00 – 1.74 Fair (F)

After the completion of data collection through the survey questionnaires, a range of statistical techniques and methods were employed to examine and answer the specific research inquiries. SPSS version 26 was used in the process of data analysis. The quantitative items utilized a four-point Likert rating scale ranging from 4 – Excellent, 3 – Very Good, 2 – Good, 1 – Fair to assess the respondent critical thinking ability and academic achievement of Chinese art design students. The mean and standard deviation were computed to determine the respondents' assessment their critical thinking ability and academic achievement of Chinese art design students. The Pearson Product Moment of Correlation or Pearson's r was utilized to test the significant relationship between the respondents' assessment of their critical thinking ability and their academic achievement in art design. The correlation coefficient with the equivalent interpretations were as follows: 0.00 - 0.19 Very Weak Correlation, 0.20 - 0.39 Weak Correlation, 0.40 - 0.59 Moderate Correlation, 0.60 - 0.79 Strong Correlation, 0.80 – 1.00 Very Strong Correlation.

Table 1 shows the summary of the respondents' assessment of their critical thinking ability as applied to art design. The student respondents rated their critical thinking ability as very good, with an overall mean of 2.68 and a standard deviation of .710. 2.68. Among the different parameters of critical

thinking ability, the highest were problem identification and definition ($M = 2.75$, $SD = .779$), followed by analysis and interpretation ($M = 2.74$, $SD = .756$), synthesis and integration ($M = 2.71$, $SD = .742$), decision-making and justification ($M = 2.70$, $SD = .751$), and reflection and self-assessment ($M = 2.52$, $SD = .762$).

Respondents overall felt that their critical thinking skills were applied relatively well in art design, but did not yet reach the highest rating. The score is somewhere between medium and good, with a bias toward the good side. A standard deviation of 0.710 means that respondents' ratings are relatively concentrated without much dispersion. In other words, most respondents scored close to the 2.68 average, with only a few deviating far from it. Although the average score did not reach the highest level, respondents generally rated their critical thinking skills as "very good," perhaps because they did use some critical thinking in their art design or because they were confident in their abilities.

Table 2. The Respondents' Assessment of Their Academic Achievement Design in Art

Indicator	Mean	S.D.	V.I.
2.1 Creative Process	2.73	.763	VG
2.2 Problem-Solving Abilities	2.73	.765	VG
2.3 Creativity and Innovation	2.63	.757	VG
2.4 Research and Development	2.70	.759	VG
2.5 Collaboration and Communication	2.54	.766	VG
Overall	2.67	.716	VG

Legend: 3.25 – 4.00 Excellent (E), 2.50 – 3.24 Very Good (VG), 1.75 – 2.49 Good (G), 1.00 – 1.74 Fair (F)

Table 2 reveals the summary of the respondents' assessment of their academic achievement in art design. The student respondents rated their academic achievement in this area as very good, with an overall mean of 2.67 and a standard deviation of .716. Among the different areas of achieving art design, the highest were creative process ($M = 2.73$, $SD = .763$) and problem-solving abilities ($M = 2.73$, $SD = .765$), followed by research and development ($M = 2.70$, $SD = .759$), creativity and innovation ($M = 2.63$, $SD = .757$), and collaboration and communication ($M = 2.54$, $SD = .766$).

The data showed that respondents rated their academic performance in art and design as "very good", with an overall average score of 2.67 ($SD = 0.716$). Notably, the areas with the highest scores were creative process and problem solving, both with an average score of 2.73 ($SD = 0.763$ and 0.765 , respectively). This indicates that respondents are particularly confident in these aspects of art and design education.

Table 3 reveals the relationship between the respondents' assessment of their critical thinking ability and their academic achievement in art design.

The creative process is very strongly and significantly correlated with analysis and interpretation ($r = .852$, $p < 0.01$), decision-making and justification ($r = .848$, $p < 0.01$), and synthesis and integration ($r = .844$, $p < 0.01$). This means that the better the respondents perform in the creative process, the better their performance in critical thinking skills such as analysis and explanation, decision making and argument, synthesis and integration. Creative process is strongly and significantly correlated with problem identification and definition ($r = .794$, $p < 0.01$), and reflection and self-assessment ($r = .722$, $p < 0.01$). This indicates that the more invested the interviewee is in the creative process, they are also better at identifying and defining problems.

Table 3. Relationship Between the Respondents' Assessment of Their Critical Thinking Ability and Their Academic Achievement in Art Design

Academic Achievement in Art Design		Critical Thinking Ability				
		Problem Identification and Definition	Analysis and Interpretation	Synthesis and Integration	Decision-Making and Justification	Reflection and Self-Assessment
Creative Process	Pearson r Coefficient	.794 (Strong correlation)	.852 (Very strong correlation)	.844 (Very strong correlation)	.848 (Very strong correlation)	.722 (Strong correlation)
	Sig. p-value	.000 (Significant)	.000 (Significant)	.000 (Significant)	.000 (Significant)	.000 (Significant)
Problem-Solving Abilities	Pearson r Coefficient	.820 (Very strong correlation)	.871 (Very strong correlation)	.869 (Very strong correlation)	.855 (Very strong correlation)	.735 (Strong correlation)
	Sig. p-value	.000 (Significant)	.000 (Significant)	.000 (Significant)	.000 (Significant)	.000 (Significant)
Creativity and Innovation	Pearson r Coefficient	.779 (Strong correlation)	.829 (Very strong correlation)	.838 (Very strong correlation)	.815 (Very strong correlation)	.767 (Strong correlation)
	Sig. p-value	.000 (Significant)	.000 (Significant)	.000 (Significant)	.000 (Significant)	.000 (Significant)
Research and Development	Pearson r Coefficient	.794 (Strong correlation)	.852 (Very strong correlation)	.852 (Very strong correlation)	.846 (Very strong correlation)	.738 (Strong correlation)
	Sig. p-value	.000 (Significant)	.000 (Significant)	.000 (Significant)	.000 (Significant)	.000 (Significant)
Collaboration and Communication	Pearson r Coefficient	.673 (Strong correlation)	.721 (Strong correlation)	.742 (Strong correlation)	.766 (Strong correlation)	.742 (Strong correlation)
	Sig. p-value	.000 (Significant)	.000 (Significant)	.000 (Significant)	.000 (Significant)	.000 (Significant)

Problem-solving abilities were very strongly and significantly correlated with analysis and interpretation ($r = .871, p < 0.01$), synthesis and integration ($r = .869, p < 0.01$), decision-making and justification ($r = .855, p < 0.01$), and problem identification and definition ($r = .820, p < 0.01$). This expresses that the ability to solve problems is strongly and significantly correlated with analysis and interpretation/synthesis and integration, decision making and argument, problem identification and defining factors. This suggests that individuals with strong problem-solving skills are also proficient in analyzing and interpreting information, synthesizing and integrating data, making decisions and justifying them, and identifying and defining problems.

Problem-solving abilities is strongly and significantly correlated with reflection and self-assessment ($r = .735, p < 0.01$). This points out that problem solving ability is closely related to individual reflective ability and self-assessment ability.

Creativity and innovation were very strongly and significantly correlated with synthesis and integration ($r = .838, p < 0.01$), analysis and interpretation ($r = .829, p < 0.01$), and decision-making and justification ($r = .829, p < 0.01$). This implies that there is a strong and significant correlation between creativity and innovation ability and synthesis and integration ability, analysis and explanation ability, decision making and argumentation ability. Individuals with high levels of creativity and innovation are also generally good at integrating information, analyzing and interpreting it, and making decisions and arguments.

Synthesis and integration ability ($r = .838, p < 0.01$), which means that when individuals combine different information, ideas or elements into a whole, or integrate multiple

viewpoints to form new insights, their creativity and innovation ability are correspondingly higher. Analytical and interpretive skills ($r = .829, p < 0.01$), which indicates that individuals with excellent analytical and interpretive skills are able to understand problems, data, or situations more deeply and come up with innovative solutions or ideas.

Decision-making and reasoning ability ($r = .829, p < 0.01$), when individuals can make wise decisions based on analysis, and effectively provide reasonable basis for their own decisions, their creativity and innovation ability is particularly prominent.

Creativity and innovation were strongly and significantly correlated with problem identification and definition ($r = .779, p < 0.01$), and reflection and self-assessment ($r = .767, p < 0.01$). This may mean that creativity and innovation are strongly and significantly correlated with problem identification and definition, reflection and self-assessment. Problem identification and definition ($r = .779, p < 0.01$), the correlation coefficient between creativity and innovation and problem identification and definition was as high as 0.779, and the P-value was less than 0.01, indicating that the correlation was highly statistically significant.

Research and development were very strongly and significantly correlated with analysis and interpretation and synthesis and integration ($r = .852, p < 0.01$), and decision-making and justification ($r = .846, p < 0.01$). This means that Research and Development and "analysis and interpretation and synthesis and integration" The correlation coefficient was 0.852 for integration and 0.846 for decision-making and justification. Both of these correlations exceed 0.8, which is generally considered to be statistically strong. At the same time, a P-value of less than 0.01 indicates that the correlation

is statistically significant, meaning that the relationship is unlikely to be due to chance.

Research and development were strongly and significantly correlated with problem identification and definition ($r = .794$, $p < 0.01$), and reflection and self-assessment ($r = .738$, $p < 0.01$). This suggests that Research and development are strongly and significantly correlated with problem identification and definition, reflection and self-assessment.

Collaboration and communication were strongly and significantly correlated with decision-making and justification ($r = .766$, $p < 0.01$), synthesis and integration and reflection and self-assessment ($r = .742$, $p < 0.01$), analysis and interpretation ($r = .721$, $p < 0.01$), and problem identification and definition ($r = .673$, $p < 0.01$). This infers that collaboration and communication are strongly and significantly correlated with critical thinking skills in several ways.

5. Discuss

This study aims to explore the relationship between critical thinking and academic achievement of art and design students. The research results show that there is a significant positive correlation between critical thinking ability and academic performance, which is consistent with the study of Wang Runzi (2021), who found that the higher the critical thinking ability of students, the better their academic performance. In addition, Ugur Akpur's (2020) study further validates the strong link between critical, reflective, and creative thinking and shows that these variables can significantly predict academic achievement. Uzma Shahzadi and Itbar Khan (2020) similarly found a significant positive correlation between students' critical thinking skills and their academic performance. Therefore, it is of great significance to study the critical thinking ability of art and design students. Mariela Samaniego (2024) emphasizes that creative thinking is crucial in art and design education, especially in fostering innovation and problem solving. In addition, UNESCO (2024) states in its report that the application of AI in education should be strategic and aimed at promoting the development of social-emotional skills, metacognition, collaboration, problem solving and creativity. This view is echoed by the high evaluation of the creative process and problem-solving skills of the respondents in this study. At the same time, it also shows that cultivating the ability of cooperation is crucial to the all-round development of students. This study also confirms the core idea of this study, that critical thinking is closely linked to academic achievement in art and design, while highlighting the key role of creative thinking and collaboration in art education.

6. Conclusion and Recommendations

The research shows that there is a significant relationship between critical thinking and academic performance of Chinese art and design students, and critical thinking ability has a significant impact on the academic performance of art and design students. Students demonstrated an intermediate level of critical thinking skills, best in Problem Identification and Definition, Analysis and Interpretation, Synthesis and Integration, Although the level of Reflection and Self-Assessment is slightly lower, the overall evaluation is very good. The analysis also found that students' academic achievement assessment in art and design was also at an average level, and respondents performed best in academic

assessment in Creative Process and Problem-Solving Abilities. Collaboration and Communication were slightly lower and overall rated very good. The findings also suggest that improving students' critical thinking skills not only improves their academic performance, but also promotes creativity. Future art education should focus more on cultivating students' innovative thinking, collaborative skills and critical thinking to adapt to the rapidly changing social needs and promote sustainable development in the field of art and design.

According to the research results, in order to further improve the critical thinking ability and academic performance of Chinese art and design students, it is suggested to strengthen the training of students in Reflection and Self-Assessment, and enhance their thinking depth through structured reflection tasks and case analysis. Optimize the instructional design of Collaboration and Communication, and exercise expression and collaboration skills through team projects and role playing; In future research, researchers can refer to the research methods in this paper, conduct research on other professional-related abilities, and conduct in-depth research on the implementation effect of specific professional development plans.

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