

A Study on the Influence of Art Majors' Innovative Ability on Academic Achievement at Shandong Vocational and Technical University of Engineering, China

Man Li ^{1*} and Shujing Wu ²

¹ Master of Educational Administration, Stamford International University, Thailand

² Lecturer, Stamford International University, Thailand

* Corresponding author:

Abstract: This study aimed to investigate the current situation of innovative ability and academic achievement among art majors at Shandong Vocational and Technical University of Engineering, and to examine the influence of innovative ability on academic achievement. Through a questionnaire survey, 270 art majors were quantitatively studied. The results showed that the overall mean of innovative ability was 4.09 (SD = 0.80), and the overall mean of academic achievement was 3.54 (SD = 0.75), both at relatively high levels. No significant gender differences were found in innovative ability or academic achievement; significant differences were found among different grade levels, between award-winning and non-award-winning students, and between class leaders and non-leaders ($p < 0.05$). Linear regression analysis indicated that innovative ability had a significant positive impact on academic achievement ($\beta = 0.748$, $t = 18.51$, $p < 0.001$), explaining 56.0% of the total variance in academic achievement. Multiple regression analysis showed that innovative consciousness was the strongest predictor of academic achievement ($\beta = 0.218$, $p < 0.01$). Based on the findings, specific suggestions were proposed, including strengthening innovative consciousness cultivation, expanding the coverage of awards, and establishing innovation support mechanisms for senior students.

Keywords: Art Majors, Innovative Ability, Academic Achievement, Demographic Backgrounds, Regression Analysis.

1. Introduction

Innovative ability was an important driving force for enhancing a country's scientific and technological strength and competitiveness. Xi (2021) pointed out that it was necessary to "better combine developing science and technology as the primary productive force, cultivating talent as the primary resource, and enhancing innovation as the primary driving force," and that higher education institutions should cultivate high-quality talents with innovative thinking, innovative ability, and innovative spirit. Many countries and regions internationally attached great importance to the innovativeness of arts education. Through measures such as reforming education systems, optimizing curriculum design, and updating teaching methods, they cultivated arts students equipped with innovative spirit and innovative

ability. Innovative ability referred to a kind of power through which a person could transform or create new things from existing old things through thinking (Dutta, 2020). However, not everyone possessed the same degree of innovative ability.

In the 21st century, the competition for knowledge and talent in China became increasingly fierce. The innovative consciousness and innovative ability of Chinese university students held great significance for improving the level of talent cultivation and enhancing comprehensive national strength. Cheng et al. (2022) pointed out that setting goals, providing role model and emotional motivation, and accumulating successful experiences helped directly or indirectly improve students' unclear learning objectives and insufficient academic achievement. Ren & Fu (2017) proposed that

innovative ability had a positive impact on academic achievement. With the increasing demand for artistic innovation, workplace competition in the art design industry became increasingly fierce, and students' academic achievement became an important standard for measuring their future career prospects (Zhong, 2022).

Currently, there are notable gaps in the literature concerning the relationship between innovation capability and academic performance among art majors in higher vocational colleges. First, existing studies have predominantly focused on science, engineering, or business students at four-year undergraduate institutions, leaving empirical research on art majors in higher vocational settings extremely limited. Second, prior research has failed to systematically examine differences in innovation capability across various demographic and background variables, such as award attainment and student leadership roles. Third, the differential predictive effects of various dimensions of innovation capability on academic performance remain unclear. This study aims to bridge these gaps through an empirical investigation.

Based on the research objectives and literature review, the following hypotheses were proposed:

H1: There are significant differences in innovative ability among art majors with different demographic backgrounds.

H2: There are significant differences in academic achievement among art majors with different demographic backgrounds.

H3: There is a significant positive correlation between innovative ability and academic achievement.

H4: Innovative ability has a significant positive predictive effect on academic achievement.

Conceptual Framework

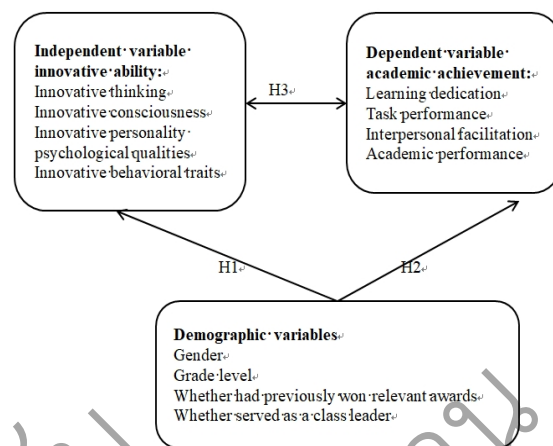


Figure1.1 Research Conceptual Framework

Research Objectives

- 1) To determine the current status of innovative ability among art majors
- 2) To determine the current status of academic achievement among art majors
- 3) To compare differences in innovative ability across demographic backgrounds
- 4) To compare differences in academic achievement across demographic backgrounds
- 5) To analyze the impact of innovative ability on academic achievement

Literature Review

Innovative Ability

The United States was the earliest country to research and practice innovation and entrepreneurship education. Contemporary scholars believe that innovation and entrepreneurship education aims to search for the laws of innovation and entrepreneurship and cultivate talents with innovative spirit (Timmons, 2023). Chinese scholars' generalizations of the connotation of university students' innovative ability roughly fall into two categories: some believe it is a potential for development (Chen, 2010), while others view it as a quality and ability (Chu, 2016). Qu (2011) revised a survey questionnaire suitable for students' innovative ability, dividing it into four dimensions: innovative thinking, innovative consciousness, innovative personality psychological qualities, and innovative behavioral traits.

	Overall	4.09	0.80	High
	Innovative Ability			
Academic Achievement	Learning Dedication	3.56	0.65	High
	Task Performance	3.45	0.60	Medium
	Interpersonal Facilitation	3.58	0.68	High
	Academic Performance	3.59	0.57	High
	Overall Academic Achievement	3.54	0.75	High

Difference Analysis

1) Gender: All p-values for innovative ability and academic achievement were > 0.05 , indicating no significant differences.

2) Grade Level: Significant differences were found in all dimensions ($p < 0.05$). Post-hoc (LSD) tests showed that first-year students scored significantly higher than second-year and third-year students.

3) Award-winning Status: Award-winning students scored significantly higher than non-award-winning students in all dimensions ($p < 0.05$).

4) Class Leader Status: Class leaders scored significantly higher than non-leaders in all dimensions ($p < 0.05$).

Correlation Analysis

Innovative ability and academic achievement were significantly positively correlated ($r = 0.748$, $p < 0.01$).

Regression Analysis

Linear Regression: Innovative ability had a significant positive impact on academic achievement ($\beta = 0.748$, $t = 18.51$, $p < 0.001$), with $R^2 = 0.560$, adjusted $R^2 = 0.558$, and $F = 340.8$ ($p < 0.001$).

Regression Analysis

Linear Regression: Innovative ability had a significant positive impact on academic achievement ($\beta = 0.748$, $t = 18.51$, $p < 0.001$), with $R^2 = 0.560$, adjusted $R^2 = 0.558$, and $F = 340.8$ ($p < 0.001$).

Table. 2: Multiple Regression (four dimensions predicting overall academic achievement):

Independent Variable	β	t	p
Innovative Thinking	Male	148	54.8
	Female	122	45.2
Innovative Consciousness	First-year	75	27.8
	Second-year	96	35.6
	Third-year	99	36.7
Innovative Personality	Yes	62	23.0
	No	208	77.0
Qualities			
Innovative Behavioral Traits	Yes	61	22.6
	No	20	77.4
		9	

Model $R^2 = 0.578$, adjusted $R^2 = 0.572$, $F = 91.23$ ($p < 0.001$). Innovative consciousness had the strongest predictive effect.

4. Discussion

This study found that first-year students scored significantly higher than second-year and third-year students in both innovative ability and academic achievement. This finding is consistent with Sun and Sheng (2020). An in-depth analysis of the reasons:

First, first-year students are full of curiosity and enthusiasm for new knowledge and new environments. This "novelty effect" may stimulate their innovative motivation and learning engagement. Second, as grade level increases, students face greater academic pressure and employment pressure, which may lead to a decline in innovative motivation. Third, in the three-year higher vocational system, third-year students often face multiple tasks such as internships and job hunting, leaving less time for innovation. Fourth, there may be an "innovation burnout" phenomenon, where long-term academic pressure gradually diminishes students' enthusiasm for innovation.

This study found that innovative

- motivation on technical learning engagement of students specializing in technical courses in physical education colleges: The mediating role of self-efficacy. *Journal of Southwest Normal University (Natural Science Edition)*, 47(4), 96-106.
- Chu, H. (2016). The international perspective and Chinese stance of core competencies: The transformation of national quality improvement and educational goals in 21st century China. *Educational Research*, 37(11), 8-18.
- Guo, J., & Deng, F. (2020). The impact of higher education talent cultivation reform on university students' innovative ability. *Higher Education Research*, 37(7), 70-77.
- Huang, Z. (2004). *A study on the relationship among organizational innovation climate perception, personal innovative behavior, self-efficacy perception, and problem-solving styles* (Master's thesis). National Sun Yat-sen University.
- Jing, R. L. (2008). On college students' creative education and cultivation of innovative ability. *Journal of Changchun University*, 18(4), 10-18.
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607-610.
- Lan, S. (2012). The cultivation of students' innovative spirit and the development of innovative ability. *Youth of the Times: Education*, 15(3), 20-23.
- Li, X., & Wang, F. (2016). Academic achievement evaluation and the cultivation of university students' innovative and entrepreneurial ability. *Modern Education*, 4(3), 42-43.
- Li, Y., & Chen, D. (2023). A study on the influence of academic achievement on university students' innovative behavior. *Journal of Adult Education College of Hebei University*, 25(1), 121-128.
- Pike, G. R., Smart, J. C., & Ethington, C. A. (2012). The mediating effects of student engagement on the relationships between academic disciplines and learning outcomes: An extension of Holland's theory. *Research in Higher Education*, 53(5), 550-575.
- Qu, L. (2011). *Correlation analysis of prospective personality, time insight and innovation among university students* (Master's thesis). Shaanxi Normal University.
- Shandong Vocational and Technical University of Engineering. (2024). *University profile [University profile]*. Author.
- Sun, C., & Sheng, Y. (2020). Several issues and experiences in the cultivation of scientific research innovative ability of university students in medical undergraduate colleges: Taking the "University Student Innovation and Entrepreneurship Training Program" as an example. *Theoretical Research and Practice of Innovation and Entrepreneurship*, 3(24), 4.
- Timmons, J. A. (2023). *The entrepreneurial mind*. Brick House Publishing Company.
- Wang, H. (2004). On how to cultivate the innovative spirit of primary and secondary school students. *Psychological Science*, 27(2), 383-385.
- Wang, Y., Li, Y., & Huang, Y. (2011). A study on the relationship among university students' psychological capital, achievement goal orientation and academic achievement. *Higher Education Exploration*, 19(6), 80-83.
- Wei, T. (2010). Some thoughts on the cultivation of university students' innovative ability. *China Forestry Education*, 5(1), 48-51.
- Wu, S. (2013). *A study on the relationship among university students' learning engagement, academic self-efficacy and academic achievement* (Master's thesis). Central China Normal University.
- Xi, J. (2021). Striving to become the world's main scientific center and innovation highland. *Contemporary Party Members*, 5(7), 3-6.
- Yang, J. (2009). Focusing on comprehensive development to cultivate innovative and applied undergraduate talents in economics and management. *Theory and*

Practice of Contemporary Education,
1(1), 3.

Yang, Y., Dai, L., & Zhang, Q. (2022). A study on the collaborative cultivation of craftsmanship spirit and innovative and entrepreneurial ability of higher vocational students. *Journal of Heilongjiang Vocational Institute of Ecological Engineering*, 35(3), 93-96.

Zhong, Y. (2022). Exploration of school-enterprise cooperation in art majors of higher vocational colleges under the background of "Double High Plan." *Journal of Hubei Open Vocational College*, 35(18), 48-50.

Authors' Biography:

Man Li, The researcher currently studies in EMA Program, Graduate School,

Stamford International University. Her main research interests include educational leadership, school management, and educational administration. During her studies, she focuses on educational management, international comparative education, and curriculum and teaching management. She actively participates in academic exchanges and practical activities, aiming to explore innovative approaches to educational management by integrating an international perspective with local educational practices.