# INNOVATIVE INSTRUCTIONAL MANAGEMENT APPROACHES IN DESIGN EDUCATION IN CHINA

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### ARTICLE HISTORY

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### **ABSTRACT**

The objectives of this research were: 1) to study innovative instructional management approaches in design education in Beijing University, China, and 2) to evaluate innovative instructional management approaches in design education in Beijing University, China. This research was quantitative method research. The sample consisted of 297 students in Beijing University. The instrument used in the study was a 5 rating scale questionnaire. Statistics used for data analysis were percentage, frequency, mean, and standard deviation. The results found that: 1) innovative instructional management approaches in art and design education in Beijing university, China as a whole was at much level. When considering each aspect from the highest to the lowest following, praising its teaching methodologies, curriculum adaptations, and pedagogical strategies, increasing networking opportunities, and the lowest level was promoting critical thinking, and 2) Results of the appropriateness assessment and possibility of innovative instructional management approaches in design education in Beijing university, China found that appropriate and feasible were at a high level.

Keywords: Innovative Instructional, Management Approaches, Art and Design Education

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## INTRODUCTION

The research study focused on innovative instructional management strategies in art and design education at Beijing University, particularly in vocational colleges. Let's delve deeper into the key elements:

Context and Importance: The subject matter pertains to the dynamic realm of art and design education, which plays a vital role in molding modern societies, particularly within the creative sectors. In professional training, vocational institutions, such as Beijing University, play a crucial role by equipping ambitious individuals with the essential skills required for their chosen careers. The significance of modifying instructional methodologies is underscored due to the ever-changing nature of the creative industry.

Educational Landscape Changes: Art and design education experiences perpetual transformations, which are shaped by emerging trends and escalating expectations within the creative sector. The demand for creative teaching methods stems from these transformations, guaranteeing that students are adequately equipped for the ever-changing professional environment. The dynamic field of art and design education requires a continuous demand for inventive methods in instructional management, particularly at vocational colleges. Art and design have a major role in defining the socio-economic and cultural surroundings of contemporary countries, particularly within the creative sectors. Vocational institutions play a crucial role in equipping prospective art and design professionals with the necessary skills and knowledge to thrive in their careers. Beijing University is committed to providing comprehensive and fulfilling education to first-year students who are seeking a degree in art design.

The field of art and design education is constantly changing, with new trends and increasing demands in the creative business substantially affecting how we teach and structure our curriculum (Evetts, 2017; Kimbell, 2011). Therefore, vocational institutions such as Beijing University require assistance in modifying their instructional management strategies to adequately equip students for the requirements of the professional realm (Miettinen, 2013). To ensure the success of first-year students majoring in art design at applied undergraduate universities, it is crucial to address the need for innovative and relevant teaching methodologies, curricular adaptations, and pedagogical strategies. This will improve labor education in the new era (Roth & Gennari, 2016).

The research is essential in elucidating the inventive instructional management strategies utilized in art and design courses at Beijing University. This study aims to provide crucial insights into art and design education at vocational schools by analyzing the present practices and their influence on the educational experience of new students in art design majors (Freedman & Stuhr, 2018). The results of this study can provide valuable insights for the creation of improved teaching methods, educational programs, and instructional approaches that address the dynamic demands of the creative sector and its aspiring practitioners (Klebsiella & Kornetsky, 2018).

The primary objective of this research is to facilitate a more extensive discussion on the contribution of vocational colleges in equipping prospective professionals with the necessary skills for the challenges of the creative sector (Roth & Gennari, 2016). This study aims to uncover the determinants of success for art and design majors. Doing so can provide valuable insights for establishing policies and practices that foster the growth of competent and versatile graduates. Ultimately, this will have an advantageous effect on the creative industry and society entirety (Rittel & Webber, 2013).

## **Research Question**

What are the perceived benefits and challenges of implementing innovative instructional management approaches in design education for freshmen art design majors at Beijing University?

## LITERATURE REVIEWS

In recent years, Art and Design Education encompasses the teaching and learning processes of developing students' creative, technical, and critical thinking abilities in various art and design disciplines (Eisner, 2002; Efland, 2002; Kimbell, 2011). Art and design education aim to cultivate visual literacy, problem-solving skills, cultural awareness, and aesthetic appreciation, preparing students for careers in the creative industry (Freedman & Stuhr, 2018; Roth & Gennari, 2016). The curriculum in art and design education often includes foundational and specialized courses, such as drawing, painting, graphic design, illustration, photography, and multimedia (Dannels & Martin, 2017; Oliver, 2012). A range of pedagogical approaches, such as studio-based learning, collaborative projects, and critique sessions, are employed to create an engaging and experiential learning environment that fosters the development of artistic skills and conceptual understanding (Schön, 1987; Klebesadel & Kornetsky, 2018). Several theories and frameworks have been proposed to guide art and design education, such as the Discipline-Based Art Education (DBAE) model, which emphasizes the integration of art production, art history, aesthetics, and art criticism into a comprehensive educational approach (Dobbs, 1998). The Discipline-Based Art Education (DBAE) model (see Figure 2-2) is a comprehensive approach to art education that aims to provide students with a well-rounded understanding of the various aspects of art by integrating four key disciplines: art production, art history, aesthetics, and art criticism (Dobbs, 1998; Greer, 1984). This model was developed in the 1980s in response to concerns about the narrow focus of traditional art education, which primarily emphasized developing artistic skills and techniques (Greer, 1984; Eisner & Day, 2004).

The Visual Culture Art Education (VCAE) framework is an approach to art education that critically examines visual culture and its impact on society (Duncum, 2002; Freedman, 2003). It broadens the scope of traditional art education by incorporating diverse visual media, such as advertising, popular culture, digital media, and everyday visual experiences, in addition to traditional fine arts (Tavin, 2003). The VCAE framework aims to develop students' visual literacy, critical thinking skills, and cultural awareness, enabling them to better understand and navigate the complex visual world they live in (Freedman, 2003; Duncum, 2009)

Recent developments in art and design education have highlighted the importance of integrating digital technology, interdisciplinary collaboration, and real-world problem-solving into the curriculum to better prepare students for the evolving demands of the creative industry (Evetts, 2017; Kimbell, 2011; Mason, 2013). Additionally, the role of innovative instructional management approaches in enhancing student engagement, motivation, and learning outcomes has gained increased attention (Freedman & Stuhr, 2018; Dannels & Martin, 2017).

Acuff, J. B. and Hirak, R. G. (2019) conducted a study titled "The radical possibilities of online art education: Exploring the new frontier of art and Technology," published in Art Education. This study aimed to investigate the potential of online art education in fostering innovative instructional management approaches for art and design students. The authors emphasized the need for art educators to adapt to the ever-changing technological and creative industry landscape. The study highlighted several digital tools and platforms that can enhance the learning experience of art and design students in an online environment. These tools can facilitate collaborative learning, project-based learning, and the development of digital literacy skills, which are critical for success in the creative industry. Collaborative learning is essential to online art education, as it allows students to engage with peers, share ideas, provide feedback, and work together on creative projects. Online platforms and digital tools, such as Google Docs, Trello, and Slack, can support collaborative learning by enabling real-time student communication and collaboration. Project-based learning is another instructional management approach discussed in the study. It involves students working on real-world, complex projects that integrate multiple subjects and skills. Online platforms, such as Padlet

and Basecamp, can facilitate project-based learning by providing a digital space for students to plan, organize, and showcase their work. The development of digital literacy skills is also emphasized in the study, as these skills are essential for navigating the digital landscape of art and design. The authors argue that online art education can help students develop digital literacy skills by exposing them to various digital tools, platforms, and resources, such as Adobe Creative Cloud, YouTube tutorials, and online museums and galleries.

The study concludes that online art education offers radical possibilities for rethinking and transforming art and design education. By embracing digital tools and platforms, art educators can provide innovative instructional management approaches that better prepare students for the demands of the creative industry and the evolving expectations associated with art and design education. Freedman, K. and Heijnen, E. (2013) conducted a study titled "Challenges of Teaching and Learning in a global age: Curriculum Adaptations at the secondary level in Art and Design," published in the International Journal of Art & Design Education. This study aimed to examine how secondary-level art and design educators adapt their curricula and teaching approaches to address the challenges of globalization and the rapidly changing creative industry. The study involved qualitative research methods, including interviews with art and design educators, observations of classroom practices, and analyses of curricular materials from various secondary-level institutions. The authors aimed to identify the key challenges art and design educators face in a global age and explore the strategies they use to adapt their curricula and teaching approaches accordingly. The study's findings revealed several challenges, including the need to develop students' intercultural competence, integrate technology into teaching and learning, foster innovation, and address students' diverse needs and interests in a global context. In response to these challenges, the authors identified several curriculum adaptations and instructional strategies employed by art and design educators at the secondary level: Technology Integration: The study highlighted the need for art and design educators to integrate technology into their teaching and learning practices to prepare students for the demands of the digital age. This can be done using digital tools and resources, such as digital cameras, graphic design software, and online galleries, to facilitate creative expression, communication, and collaboration. Fostering Innovation: Art and design educators were found to promote innovation by encouraging students to experiment with new materials, techniques, and ideas, as well as to engage in critical thinking and problem-solving. This can involve providing opportunities for students to work on open-ended projects, participate in design challenges, and collaborate with peers on creative tasks. Addressing Diverse Needs and Interests: The study also emphasized the importance of providing differentiated instruction and support to meet students' diverse needs and interests globally. This can involve offering a variety of learning experiences, resources, and assessment strategies that cater to students' strengths, preferences, and cultural backgrounds. In conclusion, Freedman and Heijnen's study sheds light on the challenges faced by art and design educators in a global age and the curriculum adaptations and instructional strategies they use to address them. The findings of this study can inform the development of innovative instructional management approaches in art and design education at the secondary level, enabling educators to better prepare their students for the demands of the creative industry and the evolving expectations associated with art and design education in a global context.

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Intercultural Competence: Educators emphasized the importance of promoting cultural understanding and empathy among students by incorporating diverse cultural perspectives, artifacts, and practices into their curricula. This can be achieved by studying global art movements, and historical and contemporary artists from various cultural backgrounds and exploring different artistic techniques and styles.

Technology Integration: The study highlighted the need for art and design educators to integrate technology into their teaching and learning practices to prepare students for the demands of the digital age. This can be done using digital tools and resources, such as digital cameras, graphic design software, and online galleries, to facilitate creative expression, communication, and collaboration.

Fostering Innovation: Art and design educators were found to promote innovation by encouraging students to experiment with new materials, techniques, and ideas, as well as to engage in critical thinking and problem-solving. This can involve providing opportunities for students to work on open-ended projects, participate in design challenges, and collaborate with peers on creative tasks.

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### RESEARCH METHODOLOGY

**Population and Sample**: The population consisted of 1,151 of mobile communication majoring students in Chongqing College during the epidemic. The samples were 297 students as determined by Krejcie and Morgan's formular. With a reliability level of 95% and an error margin below 5%.

**Research instrument**: Data Collection Tools for Quantitative Research: The researcher used a rating scale of 5: Most Agree, Agree, moderate, Disagree, and Very Disagree; they developed an improvement from the research questionnaire Likert scale (Likert, 1932).

**Data analysis**: The statistics used in this research are this time. Frequency distribution, percentage value, Average, Standard Deviation (S.D) and Multiple Regression Analysis

**Data analysis method**: The data obtained from the questionnaire were analyzed by using a ready-made computer program divided into four parts as follows: Part 1 data on respondents'

status using frequency distributions and percentages. Part 2 The investigation of Innovative Instructional Management Approaches in Art and Design Education vocational and technical college freshmen majoring in Beijing Jingbei, China. In 5 areas using mean and standard deviation (S.D.) criterion. Mean interpretation is classified by item and combined.

### RESEARCH RESULTS

**Table 1** Frequency of Respondents

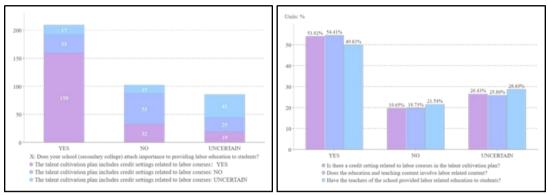
	Sample Size	Percentage Value
Gender		
Male	172	45.62%
Female	205	54.38%
Total	377	100.00%
Grade		
First grade	84	22.28%
Second grade	76	20.16%
Third grade	121	32.10%
Fourth grade	96	25.46%
Total	377	100.00%
Age		
Under 18 years old	42	11.14%
18-19 years old	143	37.93%
20-22 years old	124	32.89%
22 years old above	68	18.04%
Total	377	100.00%
Family location category		
Urban	199	52.79%
Rural	178	47.21%
Total	377	100.00%

Table 1 A total of 389 questionnaires were distributed in this survey, with 378 questionnaires collected and 377 valid questionnaires. The effective rate of the questionnaire was 96.92%. After data processing, representative and authentic research content has been obtained, and a certain understanding of the basic information and labor education status of students in Pass College of Chongqing Technology and Business University has been gained. Objectively reflecting the students' labor views and current status of labor education in Pass College of Chongqing Technology and Business University, as well as their opinions on carrying out labor education in Pass College of Chongqing Technology and Business University, provides basic data for the research on innovative paths to strengthen labor education in applied undergraduate universities in the new era.

### **Regarding University**

When asked about the labor related activities or competitions in the campus cultural activities of your school for college students, various schools have various labor related activities and competitions. The results show that "club volunteer activities" and "basketball games, sports games and other sports events" account for the highest proportion, while group meetings and activity events with labor as the theme only account for 37.43%. From this, it can be seen that some universities adhere to enriching students' extracurricular life with campus cultural activities, but there are few labor related activities and competitions that focus on improving the overall quality of college students.

Cross analysis of the survey results of "Does your school (secondary college) attach importance to labor education for students?" and "Is there a credit setting related to labor courses in the talent cultivation plan?" The researcher can see that the frequency of choosing labor education in the school is 209 people, and the frequency of choosing labor course related credit setting in the talent cultivation plan is 192, The above two options are both 'yes', with a total of 159 students, accounting for 42.29% of the total. Some schools have a sense of strengthening labor education for college students.



**Figure 1** Cross analysis of data on whether universities attach importance to labor education and whether they set up labor course credits (Left Image)

**Figure 2** Cross analysis of data on labor course credit setting, labor related education and teaching content, and labor education provided by teachers or homeroom teachers to students in universities (Right Image)

The research results indicate that 53.92% of college students reported that the school has already offered labor courses in the talent cultivation plan and set corresponding course credits. More than half of the college students were unsure whether to offer courses or directly replied that the school did not offer labor related courses in the talent cultivation plan. Correspondingly, when asked about "whether labor related content is involved in education and teaching content" and "whether teachers or homeroom teachers have provided labor related education to students", about 50% of college students choose "yes" and "no" or "uncertain" for the phenomenon of "yes", "no" or "uncertain".

### **Regarding the Family Aspect**

When asked about "parents' attitudes towards labor" and "parents' attitudes towards labor outcomes", over 96% of parents have a positive attitude towards labor, respect labor and the working people, and participate in creative labor to be self-sufficient. Cherishing the fruits of labor is an important manifestation of respecting labor and the working people. Nearly 90% of parents understand how to cherish the fruits of labor. More than 80% of parents often educate their children to love labor and have a positive attitude towards their children's participation in labor.

**Table 2** Data analysis of parents' attitudes towards labor, labor outcomes, and their attitudes towards their children's participation in labor

	FRQ.	%
Parents' Attitudes toward the Fruits of Labor (multiple choices)		
Be extravagant and wasteful	10	2.65%
Cherish your important achievements, and do not cherish unimportant	25	6.63%
achievements		
Cherish the fruits of labor (eat the food, etc.)	165	43.77%
Not only cherish oneself, but also advocate for those around us to cherish	171	45.36%
No clear attitude	6	1.59%
Parents' attitude towards children's participation in the Labour Force		
(multiple choices)		
Always educate me to love labor	312	82.76%
Learning is more important, labor is optional	27	7.16%
No clear attitude	38	10.08%

Research data shows that in their view, labor practice and scientific and cultural knowledge are equally important for the growth and success of college students. Encouraging college students to complete basic education while participating in labor indicates that most parents recognize the importance of labor and have the awareness of allowing their children to continuously improve their comprehensive quality through labor practice on the basis of completing self-service.

# **Regarding College Students**

The main ways for college students to understand the "labor spirit" are through social practice and online new media platforms, which are different from mandatory learning platforms such as "campus classrooms" and "lecture activities". At the same time, students from Pass College of Chongqing Technology and Business University have learned and mastered the "labor spirit" through platforms such as "online new media" and "traditional media such as newspapers and radio", demonstrating that applied undergraduate college students represented by Pass College of Chongqing Technology and Business University can actively absorb and master labor knowledge through various channels, and have an urgent expectation of self-improvement.

**Table 3** The main ways for college students to understand the content of labor education and the main ways to cultivate "labor spirit"

	FRQ.	<b>%</b>
Main ways to understand the content of labor education (multiple		_
choices)		
Campus Classroom	201	53.36%
Network new media	244	64.71%
Traditional media such as newspapers and radio	198	52.50%
Social practice activities	247	65.57%
Promotion and explanation from friends and family	132	35.14%
Lecture activities	101	26.79%
Others	37	9.86%
Main ways to cultivate "labor spirit" (multiple choices)		_
Theoretical learning	111	29.36%
Campus cultural activities	132	35.14%
On campus practical activities	173	45.86%
Social practice activities	200	52.93%
Others	23	6.21%

Correspondingly, the question "What are the main ways you cultivate the 'spirit of labor'?" shows that nearly 50% of college students cultivate their own 'spirit of labor' through practical activities, and 'practical activities', especially' social practical activities', have become the main way for college students to understand and learn about the spirit of labor, Furthermore, it reflects that application-oriented undergraduate college students, represented by Pass College of Chongqing Technology and Business University, tend to enhance themselves in practice, test and master truth through subjective and active labor practice. At the same time, it indirectly reflects that campus theoretical courses and cultural activities cannot meet the needs of college students for labor practice.

### **DISCUSSION & CONCLUSION**

This study discovered that the way teaching is done, changes made to the curriculum, and teaching tactics had a substantial and beneficial effect on the influence of innovative instructional approaches on student learning experience and professional preparedness in design education. The researcher would like to provide the following findings, which align with previous research emphasizing the significance of creative teaching methods and curriculum design in enhancing student learning outcomes.

To assess the instructional management strategies employed in art and design courses at Beijing University and determine their efficacy in equipping first-year art design students for the creative industry.

The objective is to analyze the advantages and difficulties related to novel instructional management methods in art and design education at vocational colleges, with a specific focus on the experiences of first-year art design students at Beijing University.

This study aims to offer suggestions for creating and applying creative teaching methods, adjusting curricula, and employing pedagogical techniques to improve the learning process of first-year art design students at vocational colleges. The recommendations will be based on the findings from a case study conducted at Beijing University.

The study also found that changing the curriculum significantly impacts how students learn and how well-prepared they are for their jobs. This is consistent with previous studies highlighting the importance of interdisciplinary learning and adaptable curriculum designs in promoting creativity and innovation in art and design (Stevenson et al., 2019; Zimmerman, 2010).

The study revealed a somewhat significant disparity in the influence of Innovative Instructional Management Approaches in Design Education between Male and Female cohorts, suggesting that gender may play a role in how these aspects affect students. This discovery corroborates prior research on the significance of considering gender disparities when developing and executing instructional strategies to establish fair and impartial learning opportunities for all students (Hill et al., 2010; Kuh et al., 2008).

To summarize, the results of this study emphasize the significance of utilizing creative teaching methods in Design Education, which should consider teaching techniques, curriculum adjustments, and pedagogical tactics. The research highlights the need for educators to consider gender disparities while creating and executing instructional methods to guarantee inclusive and fair learning experiences. The present study enhances the previous research by elucidating the precise aspects that impact student learning experiences and professional readiness in Art and Design Education.

This study discovered that the way teaching is conducted, adjustments made to the curriculum, and tactics used in teaching had a substantial and beneficial effect on the impact of innovative instructional approaches on students' learning experience and their preparedness for their professional careers in design education. 1) To assess the existing instructional management strategies employed in art and design courses at Beijing University and their efficacy in

equipping first-year art design majors for the creative industry. 2) The objective is to examine the advantages and difficulties of creative instructional management methods in art and design education inside vocational institutions. The study will specifically concentrate on the experiences of first-year art design students at Beijing University. 3) The objective is to offer suggestions for creating and applying creative teaching methods, curriculum adjustments, and pedagogical approaches to improve the learning process for first-year art design students at vocational colleges. This will be done by utilizing the research findings from Beijing University as a case study. The study also found that changing the curriculum significantly impacts students' learning experience and readiness for their future vocation. This is consistent with previous studies highlighting the importance of interdisciplinary learning and adaptable curriculum designs in promoting creativity and innovation within art and design (Stevenson et al., 2019; Zimmerman, 2010). The study revealed a small but statistically significant disparity in the influence of Innovative Instructional Management Approaches in Design Education between male and female cohorts, suggesting that gender may play a role in how these aspects affect students. This discovery reinforces prior research on the significance of considering gender disparities when developing and executing instructional methods to establish fair learning opportunities for all students (Hill et al., 2010; Kuh et al., 2008). To summarize, the results of this study emphasize the significance of using creative teaching methods in Design Education. This includes considering different teaching techniques, adjusting the curriculum, and implementing effective pedagogical tactics. The research highlights the need for educators to consider gender disparities when creating and executing instructional methods to guarantee all students have fair and inclusive learning opportunities. The present study enhances the previous research by elucidating the precise aspects that impact student learning experiences and professional readiness in Art and Design Education.

### REFERENCES

Cheng Xianying. (2011). A Historical Review of the "Seventeen Years of Labor Education in New China". Xiangtan: Xiangtan University.

Feng Jianxiong. (2008). Labor Education: Let Them Work. *The Road to Success*, (13), 17-18. Ficht. (2003). *A speech on the German nation*. In Liang Zhixue, Shen Zhen, and Li Li (Translated). Shenyang: Liaoning Education Press.

Gladler. (2007). *Learning and Teaching-Theory to Practice*. Fifth Edition. Beijing: China Light Industry Press.

Huang Ji. (2004). Understanding and Suggestions on Labor Education. *Journal of Jiangsu Institute of Education (Social Science Edition)*, (9).

Huang Ji. (2004). Understanding and Suggestions on Labor Education. *Journal of Jiangsu University of Education (Social Science Edition)*, 20(5), 17-22.

Robert Slevin. (2004). *Educational psychology (Theory and Practice 7th Edition)*. Beijing: People's Posts and Telecommunications Press.

Rousseau. (2003). Emil. In Li Pingru. (Translated). Shanghai: Commercial Press.

Wen Xinhua. (2020). Build a Responsibility Chain and Work Together to Implement Labor Education. *China Higher Education*, (08), 1.

Yang Xianjiang. (1962). New Education Outline. Beijing: People's Education Press.

**Data Availability Statement:** The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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