

## Research Article

Lin Zeng, Yuan-Cheng Chang\*

# Construction of Entrepreneurship Coaching Index: Based on a Survey of Art Design Students in Higher Vocational Colleges in Guangdong, China

<https://doi.org/10.1515/edu-2024-0044>

received June 09, 2024; accepted September 25, 2024

**Abstract:** In China, higher education increasingly emphasizes innovation and entrepreneurship, recognizing its pivotal role in enhancing college students' entrepreneurial skills. While extensive research exists on entrepreneurship education for undergraduate students in Chinese universities and vocational colleges, there is a notable gap in studies specifically addressing entrepreneurship coaching for vocational art and design students. This investigation addresses this gap by examining the development of entrepreneurship coaching indicators for vocational art and design majors through a comprehensive literature review. By employing the fuzzy Delphi method, a questionnaire survey involving 12 experts was conducted to establish entrepreneurship coaching indicators for vocational art and design majors in Guangdong, China. The findings reveal a framework comprising entrepreneurship knowledge, practical skills, entrepreneurial dispositions, and intentions, organized into 4 dimensions, 15 principal indicators, and 46 sub-indicators.

**Keywords:** Chinese vocational education, art and design, entrepreneurship coaching, indicator construction

## 1 Motivation and Purpose of the Study

In recent years, entrepreneurship education has gained widespread recognition as a crucial means to foster entrepreneurial intentions and activities (Sitaridis & Kitsios, 2024; Thomas, 2023). Research on entrepreneurship education in Chinese universities has flourished (Li, Li, & Du, 2016; Liu, Walley, Pugh, & Adkins, 2020). A search on the China National Knowledge Infrastructure using the keyword “entrepreneurship education” from 2010 to 2023 yielded 59,116 articles, covering various topics such as university entrepreneurship, talent cultivation, entrepreneurship capabilities, entrepreneurial traits, entrepreneurship courses, entrepreneurial intentions, and practical entrepreneurship and teaching reforms. However, a majority of these studies are broad in scope, focusing on undergraduate and graduate students (Liu, 2018), with limited research specifically addressing entrepreneurship education and coaching for vocational art and design students (Zhu, He, & Li, 2021).

Moreover, vocational art and design students, with their distinctive characteristics, possess inherent advantages in innovative development and creative thinking within the current entrepreneurship education curriculum and professional teaching. Nonetheless, they may encounter challenges in comprehending and acquiring knowledge pertaining to team building and business operations (Liang et al., 2020). Kim, Kim, and Jeon (2018) argue that contemporary design practitioners must possess both business acumen and management skills. Concurrently, the rapid advancement of AI and digital intelligence technologies has led to substantial shifts in the industrial structure of the art and design field, resulting in significant changes to both the target audience and the final products (Hu, Hu, Lyu, & Chen, 2021). Investigating whether the existing entrepreneurship education curriculum aligns with the needs of these students is imperative (Gao, 2022). Thus, the primary objective of this study is to

\* **Corresponding author: Yuan-Cheng Chang**, College of China-ASEAN International, Dhurakij Pundit University, Bangkok, 10210, Thailand, e-mail: yuan-cheng.cha@dpu.ac.th

**Lin Zeng:** College of China-ASEAN International, Dhurakij Pundit University, Bangkok, 10210, Thailand; School of Art & Design, Guangdong Teachers College of Foreign Language and Arts, Guangzhou, 510640, China

delineate the framework of entrepreneurship coaching indicators for vocational art and design students in Guangdong, China, with the aim of offering enhanced guidance and support for their entrepreneurial pursuits.

Amidst the prevalent landscape of entrepreneurship education in China, where extensive research exists on entrepreneurship education for undergraduate and higher-level students, the focus predominantly revolves around comprehensive universities (Zhao & Sun, 2012). Vocational colleges often adopt or emulate models from undergraduate institutions, with limited attention paid to the unique qualities and characteristics of vocational college students (Zeng, Ye, Wang, Lee, & Yuan, 2023). Therefore, this study conducts a comprehensive analysis and synthesis of literature on entrepreneurship education, entrepreneurship coaching, and art and design entrepreneurship education both domestically and internationally. It aims to formulate initial indicators for entrepreneurship education coaching tailored to vocational art and design majors, which will be subjected to consultation with experts through the Delphi method. Following analysis using the fuzzy Delphi method, the study endeavours to validate and refine the framework of entrepreneurship education coaching indicators for vocational art and design majors (Vernon, 2009).

In conclusion, this study aims to investigate the primary indicators of entrepreneurship coaching for vocational art and design students in Guangdong, China, and to offer recommendations for enhancing entrepreneurship education in vocational art and design majors based on the developed indicators. This study provides actionable practical implications and rich theoretical implications for guiding art and design students in entrepreneurship.

Based on the relevant literature review and survey data, this study proposed the following main research questions: What are the suitable indicators for entrepreneurship guidance for art and design students in vocational colleges in Guangdong, China? How should these indicators be prioritized, and which ones are the most critical?

## 2 Literature Review

### 2.1 Entrepreneurial Coaching

According to Audet and Couteret (2012), coaching serves as a method for imparting knowledge and supporting young entrepreneurs who may be unfamiliar with the intricacies of their craft. They define entrepreneurial coaching (EC) as

personalized assistance provided to entrepreneurs in the developmental stages of their businesses or during the early phases of entrepreneurship or growth. The primary objective is to acquire or refine knowledge and skills, often encompassing various management-related areas, with the ultimate goal of fostering independence among beneficiaries within their respective fields or achieving a self-sustaining position. Audet and Couteret (2012) are among the pioneering scholars to introduce the concept of EC in the literature, although the term lacks unanimous scholarly acceptance (Kroeze, 2022). Mansoori, Karlsson, and Lundqvist (2019) similarly define EC as the support entrepreneurs receive in the initial stages of their entrepreneurial endeavours to aid in skill development.

Kotte, Diermann, Rosing, and Möller (2021) discovered that, despite the rising demand for coaching as a reflective and action-oriented learning approach in entrepreneurial education, empirical research remains in its exploratory phase. While there is growth in research on EC, existing studies tend to focus on specific aspects, resulting in isolation and a lack of integration. Currently, educational institutions play a crucial role in EC, empowering individuals undergoing coaching to contribute significantly to the development of human capital with entrepreneurial skills. This process has the potential to cultivate a generation of entrepreneurs capable of taking action towards sustainable development goals (Montes-Martínez & Ramírez-Montoya, 2020).

According to Kotte et al. (2021), EC is defined as a personalized, reflective, and results-oriented developmental intervention designed for entrepreneurs at various experience levels and stages of the entrepreneurial process. It entails collaboration between professional coaches, who may or may not have personal entrepreneurial experience, and entrepreneurs themselves. This coaching approach encompasses both embedded forms, such as within entrepreneurial projects or startup funding, and independent interventions, which include elements of expert consulting and process consulting. Furthermore, EC extends beyond individual entrepreneurs and their endeavours to encompass considerations at the enterprise level.

In summary, despite the increasing integration of coaching into entrepreneurial education as a reflective and action-oriented learning approach, empirical research is still in its nascent stages (Küttim, Kallaste, Venesaar, & Kiis, 2014). Although Audet and Couteret (2012) introduced the concept of EC over a decade ago, a widely accepted definition has yet to emerge. Kotte et al. (2021), utilizing qualitative content analysis, identified EC as distinct from traditional workplace training and startup consulting, yet bearing similarities to entrepreneurial guidance and

executive training. Unlike entrepreneurial guidance, EC entails the active involvement of businesses, such as alumni business support, alongside the impartation of entrepreneurial knowledge and practices, emphasizing reflection (Audet & Couteret, 2012).

Currently, research on EC is still in its infancy, with foreign scholars only beginning to investigate it since 2012, garnering increased attention in recent years (Kroeze, 2022). However, there is a dearth of literature on EC in China. Based on existing literature, most Chinese scholars conflate entrepreneurial education or entrepreneurial guidance with EC, presuming that entrepreneurial education is synonymous with EC. Notably, there is no official or academic definition of EC in China (Sun, 2020).

## 2.2 Architecture of Entrepreneurial Coaching Indicators for Vocational Arts and Design Students in Guangdong, China

Indicators are measurements, statistical analyses, and data used to comprehend, analyse, guide, and evaluate a specific observation. Johnstone (1981) defines indicators as statistical measures that reflect crucial aspects of interest to researchers while summarizing and analysing relevant concepts to achieve research objectives. Cuttance (1990) suggests that indicators aid in understanding and quantifying the quality or quantity of phenomena. The construction of indicators entails the optimization and combination of various metrics based on the analysis and quantification of past research literature and data, tailored to the evolving needs of research development.

During entrepreneurial guidance, entrepreneurs often express a strong desire for additional support, professional knowledge, and the sharing of experiential skills (Kotte et al., 2021). Empirical research conducted by Thom (2017) on entrepreneurship among art majors in the United Kingdom and the United States emphasized the importance of enhancing graduates' entrepreneurial skills, knowledge, and mindset to enhance their employment and entrepreneurial opportunities. Durão, Nogueira, Fernandes, and Neves (2023) similarly highlighted the significant contributions of experiential entrepreneurship education methods to the development of entrepreneurial and managerial skills within the cultural and creative industries. Moreover, Hausmann and Heinze's (2016) study indicated that terminology and comprehension of entrepreneurship education and guidance in the cultural and creative sectors are still in nascent stages. Finally, Van Horne, Dutot, Castellano,

Sosa, and Ahmad (2021) argued that fostering self-employment among graduates in the creative economy necessitates clear strategic planning and the integration of entrepreneurial concepts and thinking into existing curricula. Marras, Opizzi, and Loi (2024) showed that EC has multiple functions in entrepreneurship, which can be summarized in five different stages based on the stage of the entrepreneurial process in which it is applied, the context, the goals, and the outcomes.

In China, the majority of scholars concentrate on research pertaining to innovation and entrepreneurship education within art and design majors. This research encompasses various aspects such as entrepreneurship knowledge, entrepreneurial capabilities (Wang, 2018), entrepreneurial traits (Xu & Chen, 2017), entrepreneurship courses (Li, 2023), entrepreneurial intentions (Cai & Li, 2016), and entrepreneurship practices and teaching reforms (Wang, 2022).

Building upon previous research on entrepreneurial guidance and entrepreneurship education in art and design majors, this study adopts the entrepreneurial thinking and action model as its theoretical framework (Brush, 2021). Learning is defined as the acquisition of entrepreneurship-related knowledge, encompassing professional expertise, learning from innovation and entrepreneurship courses, and engagement in extracurricular practices. Therefore, "learning" is consolidated under the term "entrepreneurial knowledge" (Wong & Chan, 2022). Action predominantly involves entrepreneurial practice and experience, nurturing skills relevant to entrepreneurship such as team building and resource allocation, participation in mentorship programs with experienced alumni, engagement in entrepreneurship competitions, and practical experiences (Lose, 2021). Consequently, "action" is categorized as "entrepreneurial abilities (practical)." Creation primarily pertains to entrepreneurial support, platform communication, university-enterprise cooperation, and risk-taking endeavours. Thus, it is classified as "entrepreneurial traits." Reflection entails students critically evaluating the process of entrepreneurship education and guidance to assess its impact on their entrepreneurial intentions (Brush, 2021; Neck, Neck, & Murray, 2019; Wong & Chan, 2022). Therefore, "reflection" is encapsulated within the four dimensions of entrepreneurship guidance for art university students: "entrepreneurial knowledge," "entrepreneurial abilities (practical)," "entrepreneurial traits," and "entrepreneurial intentions."

In alignment with the prerequisites of indicator construction and the synthesis of pertinent literature on entrepreneurship education and art and design entrepreneurship education, this study, under the guidance of the entrepreneurial thinking and action theory, establishes the framework for entrepreneurial guidance indicators

tailored to art and design students in Guangdong, China (Brush, 2021; Kotte et al., 2021; Liang, Liang, & Ip, 2020; Liberona, Kumaresan, Valenzuela, Rojas, & Ferro, 2019; Neck et al., 2019; Pluzhnik, Ilnitskaya, & Lucci, 2018; Wong & Chan 2022; Ye, Chen, & Hao, 2023). The framework comprises 4 dimensions, 16 primary indicators, and 7 sub-indicators, as delineated in Table 1.

## 3 Research Methodology

### 3.1 Fuzzy Delphi Method

The fuzzy Delphi method, introduced by Murray, Pipino, and Van Gigch (1985), integrates Delphi methodology with fuzzy theory to address semantic ambiguity in human thinking during questionnaire responses. It represents an

advancement over the classical Delphi Method, incorporating fuzzy theory alongside traditional data analysis. Unlike the classical approach, which relies on probability theory to manage decision-making fuzziness, the fuzzy Delphi method incorporates fuzzy theory to accommodate human language preferences in the decision-making process (Saffie & Rasmani, 2016). Compared to the classical Delphi method, the fuzzy Delphi method offers several advantages: (1) reduction in the number of surveys required, (2) enhanced expression of expert opinions, (3) improved rationality of expert opinions through fuzzy theory integration, and (4) consideration of economic benefits in terms of practical costs (Tseng, Wu, Chiu, Lim, & Tan, 2019).

The application of the fuzzy Delphi method encompasses three primary steps: first, the establishment of a set of assessment factors influencing decision-making; second, the solicitation of opinions from experts or decision-making groups; and finally, the calculation of fuzzy Delphi method

**Table 1:** Preliminary construction of entrepreneurial guidance indicators for Chinese vocational art and design majors (conceptual)

Dimension	Main indicators	Indicator content
Entrepreneurial knowledge	Entrepreneurship courses	Number, types, and effectiveness of innovation and entrepreneurship courses, textbooks, and course management, especially those related to management, accounting, etc.
	Professional knowledge	Learning creative and design-related professional knowledge, especially the inheritance of Chinese arts and crafts knowledge
	Entrepreneurial lectures	General entrepreneurial lectures and practical sharing lectures, effectively enhancing students' entrepreneurial interest
	Design competitions	Types and social impact of professional design competitions, such as "Da Guang Competition" and art exhibitions
Entrepreneurial abilities (practical)	Competition activities	Various domestic and international entrepreneurship competitions and their influence, such as "China International Internet+" and "Challenge Cup"
	Practical platforms	Innovation and entrepreneurship labs, internship and training bases, incubators, etc.
	University-enterprise cooperation	Mechanism, modes, and effectiveness of university-enterprise cooperation
	Alumni enterprises	Alumni participation scope, degree of involvement, collaborative power, demonstration effect, etc.
Entrepreneurial traits	School support	Organizational structure and mode of innovation and entrepreneurship education at the school level
	Achievement motivation	Including entrepreneurship preparation, language expression, confidence, etc.
	Innovation awareness	Learning systematic design thinking and design methods, designing innovative capabilities
Entrepreneurial intentions	Entrepreneurial risk	Including project selection, partners, funding, etc.
	Family factors	Whether there are relatives involved in entrepreneurship, family support, and financial security, etc.
	Personal factors	Including entrepreneurial ideas, participation in entrepreneurial training, social practices, etc.
	Policy influence	Stability and effectiveness of policies issued by the government and school, related financial support, etc.
	Public services	Innovation and entrepreneurship infrastructure, intermediary service organizations such as makerspaces and incubators

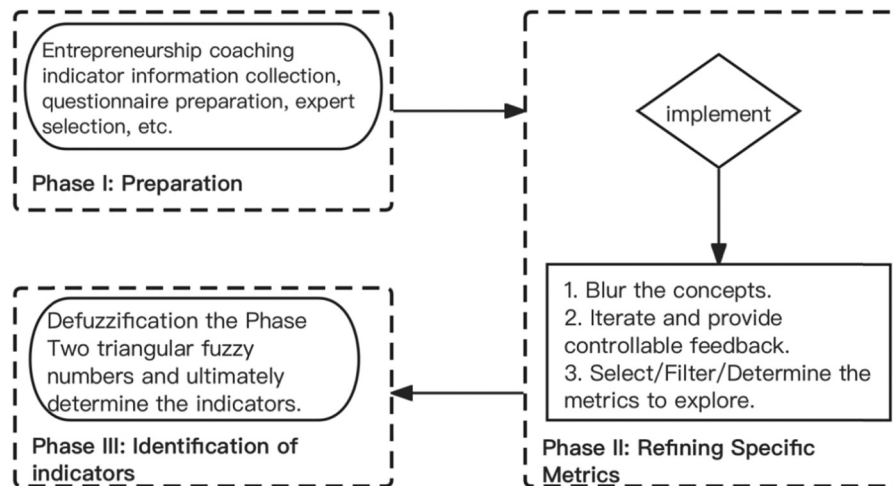


Figure 1: Research framework.

evaluation values. The research framework for the fuzzy Delphi method is depicted in Figure 1.

Utilizing expert responses, the triangular fuzzy numbers were calculated using methods such as the arithmetic mean and the centroid method for defuzzification. The specific data collection and calculation process is illustrated in Figure 2.

### 3.2 Research Participants

Guangdong Province is a leader in vocational education in China, with the scale of its higher vocational education ranking first in the country for many consecutive years. Students in design-related programs at vocational colleges demonstrate strong creative thinking abilities, which can be further enhanced through entrepreneurship courses and simulated entrepreneurial practices. These initiatives foster innovation and stimulate creative thinking, enabling students to better serve society (He, Lin, & Chen, 2020). Since most vocational colleges in Guangdong Province are concentrated in Guangzhou, it is meaningful to select art and design instructors from these institutions, along with representatives

from art and design enterprises in Guangzhou, as the subjects of this study. The goal is to develop entrepreneurial guidance indicators tailored to vocational art and design students in the Guangzhou region.

In the research process of the fuzzy Delphi method, opinions are solicited on an individual basis, with strict confidentiality maintained regarding the identities and backgrounds of the experts to minimize undue influences (Saffie & Rasmani, 2016). The recommended number of experts typically ranges from 10 to 12 individuals to mitigate various influencing factors (Okoli & Pawlowski, 2004). The expert panel for the fuzzy Delphi method in this study comprises 12 professional art and design educators from various higher vocational colleges and universities in the Guangzhou area. The selection criteria for these experts are as follows: possessing extensive knowledge in higher vocational art and design disciplines, having a solid understanding of entrepreneurship education, having experience guiding students in innovation and entrepreneurship competitions, and demonstrating a strong commitment and willingness to contribute to this study. All 12 experts have successfully guided students in various innovation and entrepreneurship competitions. The selection process is detailed in Table 2.

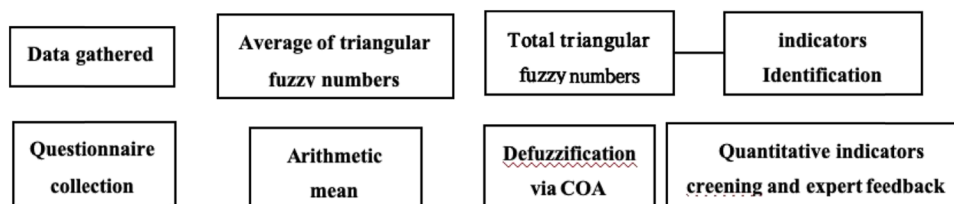


Figure 2: Fuzzy Delphi questionnaire data collection and calculation process.



**Table 2:** List of experts for the fuzzy Delphi method questionnaire (FD)

Number	Position/title	Major	Years of teaching	Innovation and entrepreneurship competition awards
FD01	Dean/Professor of Vocational College of Innovation and Entrepreneurship	Art design	33	National Second Prize
FD02	Evaluation Supervision Office Director/Professor	Product design	23	Provincial Second Prize
FD03	Dean/Professor of the School of Art and Design	Art design	34	Provincial First Prize
FD04	Professional leader/Associate Professor	Animation design	21	Provincial Second Prize
FD05	Professional leader/Professor	Art design	30	Provincial Third Prize
FD06	Director of Teaching and Research Office/Associate Professor	Product design	19	Provincial First Prize
FD07	Associate Professor	Art design	20	Provincial First Prize
FD08	Associate Professor	Advertising design	32	Provincial Second Prize
FD09	Associate Professor	Art design	17	Provincial Third Prize
FD10	Associate Professor	Environmental art design	24	Provincial Second Prize
FD11	Professor	Advertising design	27	Provincial Third Prize
FD12	Associate Professor	Jewellery design	28	Provincial First Prize

### 3.3 Research Tools

Following a thorough literature review and analysis, a fuzzy Delphi expert questionnaire was developed to compile entrepreneurial guidance indicators for Chinese higher vocational art and design programs. The questionnaire comprises 4 dimensions, 16 main indicators, and 44 sub-indicators pertinent to entrepreneurial guidance for Chinese higher vocational art and design students. Experts utilizing the fuzzy Delphi method assess the appropriateness of each item based on its perceived utility level. The questionnaire presents respondents with multiple response options for each question, including “very appropriate (0.9),” “appropriate (0.7),” “moderately appropriate (0.5),” “inappropriate (0.3),” and “very inappropriate (0.1),” as delineated in Table 3.

The questionnaire survey conducted using the fuzzy Delphi method in this study involved quantifying the appropriateness suggestions provided by experts and conducting a quantitative analysis. Following the analysis, indicators deemed inappropriate were removed, and open-ended opinions from experts were summarized and analysed. The content of indicators was subsequently modified, and partial adjustments were made to refine the framework of entrepreneurship coaching indicators.

### 3.4 Data Processing

The fuzzy Delphi method questionnaire for this study was distributed via email to 12 consulting experts in December 2023. By March 2024, all 12 questionnaires had been successfully collected. The completed questionnaires were then reviewed for completeness, individually coded, and subsequently subjected to quantitative analysis, along with the summarization of specific written feedback.

In the questionnaire survey conducted using the fuzzy Delphi method in this study, changes in the fuzzy values of each indicator were determined by consulting experts who participated in the survey. The questionnaire provided options for each question, including “very appropriate,” “appropriate,” “moderately appropriate,” “inappropriate,” and “very inappropriate.” Consulting experts could also independently set reference values. Table 4 presents recommended reference values for appropriateness.

This study employed the arithmetic mean method to calculate triangular fuzzy numbers based on the responses of expert committee members. These fuzzy numbers were used to represent the applicability values of various dimensions, primary indicators, and secondary indicators. The dimensions, primary indicators, and secondary indicators

**Table 3:** Approval of dimensions for entrepreneurship guidance for Chinese vocational college students in art and design

Dimension	Applicability				
	Very suitable	Suitable	Moderately suitable	Not suitable	Not suitable at all
1. Entrepreneurial knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Entrepreneurial skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Entrepreneurial traits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Entrepreneurial willingness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Table 4:** Presents suggested appropriateness reference values for the fuzzy Delphi method

Applicability reference value	Appropriateness assessment				
	Very suitable	Suitable	Moderately suitable	Not suitable	Not suitable at all
Maximum possible value	0.9	0.7	0.5	0.3	0.1
Range value	0.8–1.0	0.6–0.8	0.4–0.6	0.2–0.4	0.0–0.2

Note: (1) The maximum possible value range must be between the interval values of each option. (2) The interval value range from “very unsuitable” to “very suitable” is from 0 to 1.

were then ranked according to the total fuzzy number value. In this study, the left boundary values appropriate to the triangular fuzzy values were determined, and the threshold value for the total triangular fuzzy number was set at 0.6 (Prabhu, Abdullah, Ahmed, Nambirajan, & Pandiyan, 2020). When the total triangular fuzzy number is  $\geq 0.6$ , it is considered affirmed by the majority of experts; otherwise, if the total triangular fuzzy number is less than 0.6, revision of the item is required.

The formula is as follows:

$$A_i = 1/n \times (A_{i1} + A_{i2} + A_{i3} + \dots + A_{in}).$$

Following data collection, the arithmetic mean method was employed to calculate the average of the triangular fuzzy numbers. Subsequently, the centre of area method was used for defuzzification to determine the total value of the triangular fuzzy numbers. The calculation process is illustrated in Figure 2.

## 4 Results and Discussion

### 4.1 Analysis of Fuzzy Delphi Method Results

In this study, expert opinions were gathered using the “Fuzzy Delphi method survey questionnaire for entrepreneurship coaching indicators for Chinese vocational art and design students.” The arithmetic mean method was utilized to compute triangular fuzzy numbers, representing appropriate

values for various dimensions, primary indicators, and secondary indicators. Common defuzzification methods include maximum membership, centroid, weighted average, and maximum mean methods (Chakraverty, Sahoo, & Mahato, 2019). In this study, the centroid method was employed for defuzzification. Explicit values were calculated for the average triangular fuzzy values of each dimension, primary indicator, and secondary indicator. A threshold value of 0.6 was established, and any total value below 0.6 led to the removal of that indicator. Upon reviewing the total triangular fuzzy values for each dimension, primary indicator, and secondary indicator, items with total values below 0.6, except for “1.2.3 The study of traditional Chinese crafts is also necessary” under the entrepreneurship knowledge dimension and “4.4.2 Innovative entrepreneurship intermediary service organizations” under the entrepreneurship intention dimension (with triangular fuzzy total values of 0.5462 and 0.5769, respectively) were deleted as necessary. All other items were retained. While most expert committee members affirmed the entrepreneurship coaching indicator structure in this study, some items received lower suitability scores, prompting suggestions for text modifications or adjustments to indicator positions. Overall, the suitability score for the entrepreneurship coaching indicator structure could be further enhanced, indicating a high level of consensus and opinions among expert committee members regarding the entrepreneurship coaching indicator structure in this study. The triangular fuzzy numbers and explicit values of various level indicators and their total values are specified in the Appendix.

A comprehensive and inductive analysis of additional opinions and suggestions from expert committee members, utilizing the fuzzy Delphi method, was conducted. This analysis focused on the applicability, wording, and arrangement of various dimensions, primary indicators, and secondary indicators within the entrepreneurship coaching indicator structure. Based on the open-ended opinions of experts, adjustments and modifications were implemented to the dimensions, primary indicators, and secondary indicators. In response to expert feedback and interpretation, modifications were made to the dimensions of primary indicators and secondary indicators. Following expert recommendations, it was suggested to replace the dimension of “entrepreneurial ability” with “entrepreneurial practice,” which was confirmed as more suitable after consulting the opinions of most expert committee members. Based on comprehensive expert opinions, adjustments were made to the content and position of primary indicators, including the merging of “1.4 Design competition” with “2.1 Various competitions” and the incorporation of “2.4 Alumni companies” into “2.3 School-enterprise cooperation.” Additionally, “4.5 Entrepreneurial mentors” was added as a primary indicator. Following expert committee recommendations, secondary indicators “1.2.3 The study of traditional Chinese crafts is also necessary” and “4.4.2 Innovative entrepreneurship intermediary service organizations” were removed. New secondary indicators, such as “2.2.3 Support from parallel or other levels of practical platforms” and “4.4.2 Entrepreneurial networks and social activities, intellectual property, and legal support,” were introduced. Furthermore, modifications were made to the language descriptions and positions of some secondary indicators.

Following the outcomes detailed earlier, the comprehensive entrepreneurship coaching indicator framework has been finalized, encompassing 4 dimensions, 15 primary indicators, and 46 secondary indicators. This structure was achieved through the incorporation of new elements, removals, and adjustments. For a thorough overview of the structure, please refer to Table 5.

## 4.2 Comprehensive Discussion

### 4.2.1 Dimensional Results Discussion

In the comprehensive discussion, attention is directed towards the dimensional outcomes. By employing the designated formula, explicit values are derived and subsequently arranged based on their magnitudes. The consensus among the expert committee members indicates a hierarchical preference for dimensions, with “entrepreneurial ability” and “entrepreneurial

knowledge” deemed paramount, followed by “entrepreneurial willingness” and “entrepreneurial traits.” This prioritization underscores the significance attributed to fostering entrepreneurial skills and knowledge among vocational art and design students, aligning with Liberona et al.’s (2019) assertion that a foundational understanding and proficiency in entrepreneurship are imperative for subsequent training and practical endeavours, ultimately influencing entrepreneurial success. Moreover, the committee acknowledges the pivotal role of students’ entrepreneurial willingness, consistent with findings by Do Nguyen and Nguyen (2023), which underscore the interplay between students’ entrepreneurial abilities and the cultivation of entrepreneurial intentions. Pratikto, Winarno, and Restuningdiah (2023) identified entrepreneurial competencies – such as business skills, management, interpersonal relationships, conceptual understanding, and attitude – as crucial factors for entrepreneurial success. Similarly, previous research has demonstrated that entrepreneurial knowledge significantly influences students’ intentions to pursue entrepreneurship (Liberona et al., 2019; Wu, Chang, & Chen, 2008). Building on the foundation of entrepreneurial knowledge, it is essential to emphasize the guidance of entrepreneurial traits, foster the cultivation of innovative thinking, and focus on risk management (Othman, Othman, & Juhdi, 2022) to enhance students’ confidence in achieving entrepreneurial success. Motta and Galina (2023) further argue that experiential learning, as an approach to entrepreneurship education, can positively impact the development of entrepreneurial intentions, skills, and capabilities.

### 4.2.2 Main Indicator Results Discussion

In the discussion of main indicators, the expert committee’s assessment of explicit values provides valuable insights into the prioritization of entrepreneurship guidance for vocational art and design students in Guangdong, China. The top-ranking indicators, deemed most suitable for the top 50%, include “competition activities,” “policy influence,” “school support,” “innovation awareness,” “professional knowledge,” “design competitions,” and “practice platforms.” Consequently, the committee recommends a strategic approach, wherein the educational institution initiates entrepreneurial guidance through activities fostering innovation awareness, professional knowledge acquisition, and participation in design competitions. This foundational preparation is complemented by institutional support and access to practical platforms, ensuring students’ effective engagement in entrepreneurship endeavours. Notably, the committee underscores the pivotal role of “policy influence” in facilitating student



**Table 5:** Revised Delphi questionnaire on fuzzy Guangdong vocational college art and design students' entrepreneurship coaching index framework in China

Dimensions	Primary indicators	Secondary indicators
1. Entrepreneurial Knowledge	1.1 Entrepreneurship Course	1.1.1 Establishment of Entrepreneurship Course System Including Finance and Management 1.1.2 Entrepreneurship courses are closely aligned with the times and have strong timeliness 1.1.3 Development of entrepreneurship teaching materials in conjunction with the development of the times and the practical needs of the school
	1.2 Professional Knowledge	1.2.1 Creative courses need to be offered starting from the freshman year 1.2.2 Proficiency and mastery in various design software and design-related knowledge are required
	1.3 Entrepreneurship Lecture	1.3.1 Entrepreneurial practice-sharing lectures can effectively enhance students' interest in entrepreneurship 1.3.2 Entrepreneurship general lectures (team building, financial management, etc.) are essential
2. Entrepreneurial Practice	2.1 Various Competitions	2.1.1 Competitions such as the "China International Internet +" and "Challenge Cup" innovation and entrepreneurship competitions can significantly enhance students' entrepreneurial abilities 2.1.2 Establish a list of competition activities and develop guidance, training, and reward mechanisms 2.1.3 Design-oriented competitions can significantly improve students' professional skills and enhance innovation capabilities 2.1.4 The "Da Guang Sai" competition can closely integrate students' professional knowledge with societal needs 2.1.5 Learning and drawing inspiration from other award-winning works is essential
		2.2.1 The school has a well-established on-campus practical system for entrepreneurship and industry 2.2.2 The school provides support for student teams entering the "entrepreneurship incubator" 2.2.3 Support for practice platforms at parallel levels or other levels within the school
		2.3.1 The school establishes a sound mechanism for school-enterprise cooperation 2.3.2 Enterprises are allowed to enter the school premises to provide practical knowledge in areas such as enterprise operations to students 2.3.3 Students have the opportunity to engage in in-depth learning and practical experiences within enterprises 2.3.4 Industry enterprises participate in the development of entrepreneurship education curriculum 2.3.5 Policies are in place within industry enterprises to encourage and support student entrepreneurship, including incentives and support measures 2.3.6 Organize entrepreneurship forums involving industry enterprises to demonstrate and lead in the field
		3.1.1 Established specialized institutions responsible for innovation and entrepreneurship work 3.1.2 High-level leadership attention, personally involved in the organization and structure of entrepreneurial education 3.1.3 Well-developed system for innovation and entrepreneurship education
		3.2.1 Strong self-confidence and a strong sense of achievement 3.2.2 Excellent organizational, coordination, and communication skills
	3.3 Innovation Awareness	3.3.1 Systematic Innovative Thinking in Professional Courses 3.3.2 Design Innovation Capability in Practical Teaching
3. Entrepreneurial Traits	3.4 Entrepreneurial Risks	3.4.1 Rationality of Project Selection 3.4.2 Complementarity of Partner Capabilities 3.4.3 Safety of Funding Sources and Utilization

*(Continued)*

Table 5: Continued

Dimensions	Primary indicators	Secondary indicators
4. Entrepreneurial Willingness	4.1 Family Factors	4.1.1 Family members or relatives managing businesses or currently involved in entrepreneurial activities
		4.1.2 Family economic conditions
		4.1.3 Level of family education awareness and support
	4.2 Personal Factors	4.2.1 Strong Entrepreneurial Ideas
		4.2.2 Actively Participating in Entrepreneurial Training and Development Beyond Entrepreneurship Courses
		4.2.3 Possessing Sound Knowledge of Innovation and Entrepreneurship
		4.2.4 Demonstrating Strong Verbal and Writing Skills
		4.2.5 Abundant Practical Experience in Social Activities, Entrepreneurial Simulations, and Other Practical Ventures
	4.3 Policy Impact	4.3.1 Local government and schools introduce policy documents to promote student entrepreneurship
		4.3.2 Local government provides tax incentives for college students' entrepreneurship and simplifies the company registration process
		4.3.3 Schools provide financial support for college students' entrepreneurship
	4.4 Public Services	4.4.1 Local governments and schools actively establish collaborative spaces, incubation centres, and entrepreneurial nurseries
		4.4.2 Entrepreneurial networks, social activities, intellectual property, and legal support, etc.
	4.5 Entrepreneurship Mentors	4.5.1 Formulating a comprehensive plan for the allocation of entrepreneurship mentors and defining their job responsibilities

entrepreneurship and promoting entrepreneurial success, echoing findings by Cascavilla, Hahn, and Minola (2022), Liberona et al. (2019), and Motta and Galina (2023), which highlight the significance of practical experience and entrepreneurial knowledge acquisition in fostering entrepreneurial aspirations among students.

The expert committee believes that the least suitable dimensions are, in order, “family factors,” “school-enterprise cooperation,” “alumni enterprises,” “entrepreneurship lectures,” and “achievement motivation.” These five main indicators are considered by the expert committee to be relatively less important than knowledge learning, skill improvement, policy influence, and school support. While “family factors” may have some impact on student entrepreneurship guidance, they are not the decisive factors for the success of entrepreneurship. As for “school-enterprise cooperation,” “alumni enterprises,” and “entrepreneurship lectures,” these are considered supplementary methods and means for enhancing students' entrepreneurial knowledge and abilities, complementing entrepreneurship education and guidance. “Achievement motivation” mainly includes whether students possess the basic qualities for entrepreneurship and a desire for success, which can be effectively trained and guided through entrepreneurship education.

#### 4.2.3 Secondary Indicator Results Discussion

In assessing the least suitable dimensions, the expert committee ranks “family factors,” “school-enterprise cooperation,” “alumni enterprises,” “entrepreneurship lectures,” and “achievement motivation” in descending order of importance. These dimensions are deemed relatively less critical compared to knowledge acquisition, skill enhancement, policy influence, and institutional support. While “family factors” may exert some influence on student entrepreneurship, they are not pivotal determinants of entrepreneurial success. “School-enterprise cooperation,” “alumni enterprises,” and “entrepreneurship lectures” are viewed as supplementary tools for enriching students' entrepreneurial knowledge and capabilities, complementing formal entrepreneurship education and guidance efforts. Similarly, “achievement motivation” primarily reflects students' inherent qualities and aspirations for success, which can be honed and nurtured through structured entrepreneurship education programs. This is consistent with the findings of Fang (2019) and Crawford (2023).

The expert committee ranks the following indicators as the least suitable, listed in a descending order: “innovation and entrepreneurship intermediary service organizations,” “learning traditional Chinese arts and crafts is also

necessary,” “writing entrepreneurship textbooks based on the school’s actual situation,” “family economic conditions,” “the ‘Da Guang Sai’ competition can closely integrate students’ professional knowledge with social needs,” “having strong language expression and writing abilities,” “rich practical experience in social practice, entrepreneurship simulation, and other practical experiences,” “familiarity with various design software and professional knowledge,” “design competitions significantly enhance students’ professional skills and entrepreneurial abilities,” “family members or friends operate businesses or are currently starting businesses,” and “family education awareness and support level.”

## 5 Conclusion and Suggestions

### 5.1 Research Conclusion

Vocational art and design students possess a unique advantage in innovation and creative thinking within the entrepreneurship education curriculum, yet they may face challenges in understanding team building and enterprise operations. This study initially constructed a framework for entrepreneurial guidance in Chinese vocational art and design programs, comprising 4 dimensions, 16 main indicators, and 44 sub-indicators. Through the fuzzy Delphi method, a final framework was derived, featuring four dimensions – entrepreneurial knowledge, entrepreneurial practice, entrepreneurial traits, and entrepreneurial intent – along with 15 main indicators and 46 sub-indicators. This comprehensive framework provides valuable guidance for enhancing entrepreneurship education tailored to the needs of vocational art and design students, addressing their unique challenges and fostering their entrepreneurial capabilities.

### 5.2 Research Suggestions

Cultivating entrepreneurial knowledge, skills, and a positive attitude among college students plays a crucial role in entrepreneurship education (Jiang & Ni, 2022; Pham, Nguyen, Tran, Mai, & Nguyen, 2023). Therefore, vocational art and design programs should integrate entrepreneurship education from the first year of university to enhance students’ entrepreneurial skills (Onjewu, Haddoud, & Nowiński, 2021). Schools should design entrepreneurship curriculum systems tailored to student needs, aiming to improve the entrepreneurial environment, strengthen students’

motivation and confidence, and foster sustainable development (Liu, Gorgievski, Qi, & Paas, 2022; Wang, Ye, Gao, Lee, & Zeng, 2024). Entrepreneurial courses should closely align with professional knowledge, leveraging the unique characteristics of the profession to instill innovation awareness and prioritize professional entrepreneurship as the primary avenue for art and design students’ entrepreneurial endeavours (Wong & Chan, 2022). Furthermore, entrepreneurial practice can be bolstered through case studies, training programs, simulated ventures, and networking with established entrepreneurs (Carpenter & Wilson, 2022; Yang, Zhang, & Lin, 2022). Schools should actively encourage student participation in competitions, technology entrepreneurship events, entrepreneurship lectures, and provide information about entrepreneurial enterprises to nurture students’ entrepreneurial spirit (Padilla-Angulo, 2019; Zeng et al., 2023).

Entrepreneurial guidance should prioritize strengthening school-enterprise cooperation, fostering mutual benefits through resource sharing and collaborative outcomes. Schools must establish effective mechanisms for such cooperation, facilitating student exposure to enterprise operations, business management, and content, thus catalysing their future entrepreneurial endeavours (Hasche & Linton, 2021; Pashaei, Hassani, Mohajeran, & Shahbazi, 2024). Moreover, collaborations between enterprises and schools can harness students’ creativity, bolstering outcome transformation and maintaining a professional creative edge to enhance market competitiveness (Wang, Mundorf, & Salzarulo-McGuigan, 2022). These partnerships can also serve enterprises by cultivating and retaining skilled professionals. Crucially, establishing a feedback mechanism for entrepreneurship between schools and enterprises is imperative (McKenzie, 2017).

#### 5.2.1 Limitations and Recommendations for Future Research

In this study, the importance analysis of the indicators was conducted solely using the fuzzy Delphi method, which may not fully capture the true weights of the indicators. Therefore, future research should more clearly articulate and delve deeper into this issue. Subsequent research could employ methods such as hierarchical analysis to further investigate the relationships between indicator weights and to determine which indicators are most critical and significant for higher vocational art and design students.

In future research, the influence of general education and professional education on entrepreneurship education can be enacted and further examined, and the research

object can be chosen from a wider area to observe the practicality of entrepreneurship education content.

**Funding information:** Authors state no funding involved.

**Author contributions:** All authors contributed equally to this research. All authors read and approved the final manuscript.

**Conflict of interest:** The authors state no conflict of interest.

**Data availability statement:** The data supporting this study's findings are available based on request.

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## Appendix

Triangular fuzzy numbers and explicit values for entrepreneurship guidance of vocational art and design students in Guangdong, China.

Dimensions	Primary indicators	Secondary indicators	Fuzzy tri- angle number	Definite value (cen- troid method)
1. Entrepreneurial Knowledge	1.1 Entrepreneurship Course	1.1.1 Establish an entrepreneurial curriculum system that includes finance and management	(0.93, 0.83, 0.73)	0.839
		1.1.2 Entrepreneurial courses keep pace with the times and have strong timeliness	(0.95, 0.85, 0.75)	0.854
		1.1.3 Develop entrepreneurial teaching materials in conjunction with the actual situation of the school	(0.80, 0.70, 0.60)	0.685
	1.2 Professional Knowledge	1.2.1 At the beginning of the first year, creative courses need to be offered	(0.92, 0.82, 0.72)	0.808
		1.2.2 Proficiency in various design software and specialized design knowledge is required	(0.88, 0.78, 0.68)	0.792
		1.2.3 It is also essential to study traditional Chinese arts and crafts	(0.68, 0.58, 0.48)	0.577*
	1.3 Entrepreneurship Lecture	1.3.1 Entrepreneurial practical sharing lectures can effectively enhance students' interest in entrepreneurship	(0.92, 0.82, 0.72)	0.823
		1.3.2 Entrepreneurship general lectures (team building, financial management, etc.) are essential	(0.93, 0.83, 0.73)	0.839
	1.4 Design Competition	1.4.1 Design competitions can significantly enhance students' professional skills and boost entrepreneurial abilities	(0.90, 0.80, 0.70)	0.792
		1.4.2 The "Big Broad Competition" can closely integrate students' professional knowledge with societal demands	(0.88, 0.78, 0.68)	0.762
2. Entrepreneurial ability	2.1 Competition Activities	2.1.1 Participation in innovation and entrepreneurship competitions such as "China International Internet+" and "Challenge Cup" can significantly enhance students' entrepreneurial capabilities	(0.97, 0.87, 0.77)	0.869
		2.1.2 Establish a list of competition events, along with guidance, training, and reward mechanisms	(0.95, 0.85, 0.75)	0.854
		2.1.3 It is essential to learn from and draw inspiration from other award-winning works	(0.93, 0.83, 0.73)	0.823
	2.2 Practical Platform	2.2.1 The school has established a comprehensive entrepreneurial industry on-campus practical system	(0.93, 0.83, 0.73)	0.839
		2.2.2 The school is required to provide support to student teams entering the "entrepreneurship incubator"	(0.95, 0.85, 0.75)	0.854

3. Entrepreneurial Traits	2.3 School-Enterprise Collaboration	2.3.1 Establishing a sound school-enterprise cooperation mechanism by the school	(0.98, 0.88, 0.78)	0.885
		2.3.2 Allowing enterprises to enter the school to provide students with knowledge transfer in areas such as practical business operations	(0.97, 0.87, 0.77)	0.869
		2.3.3 Enabling students to engage in in-depth learning and practical experience within enterprises	(0.92, 0.82, 0.72)	0.823
	2.4 Alumni Enterprises	2.4.1 Alumni enterprises participate in the development of entrepreneurship education curriculum	(0.92, 0.82, 0.72)	0.808
		2.4.2 Establish policies that encourage student entrepreneurship with support and rewards from alumni enterprises	(0.93, 0.83, 0.73)	0.839
		2.4.3 Organize alumni entrepreneurship forums to demonstrate and lead	(0.97, 0.87, 0.77)	0.869
	3.1 School Support	3.1.1 Establishment of specialized institutions responsible for innovation and entrepreneurship work	(0.97, 0.87, 0.77)	0.869
		3.1.2 Strong leadership emphasis, personally involved in the organization structure of entrepreneurial education	(0.97, 0.87, 0.77)	0.869
		3.1.3 A well-developed system for innovation and entrepreneurship education	(0.97, 0.87, 0.77)	0.869
	3.2 Achievement Motivation	3.2.1 Possesses good knowledge of innovation and entrepreneurship	(0.95, 0.85, 0.75)	0.854
		3.2.2 Demonstrates strong language expression and writing abilities	(0.87, 0.77, 0.67)	0.777
		3.2.3 Exhibits good learning capabilities and self-confidence	(0.93, 0.83, 0.73)	0.839
		3.2.4 Displays effective organizational and coordination skills	(0.93, 0.83, 0.73)	0.839
	3.3 Innovation Awareness	3.3.1 Systematic Innovative Thinking in Professional Courses	(0.95, 0.85, 0.75)	0.854
		3.3.2 Design Innovation Skills in Practical Teaching	(0.95, 0.85, 0.75)	0.854
	3.4 Entrepreneurial Risk	3.4.1 Rationality of Project Selection	(0.92, 0.82, 0.72)	0.823
		3.4.2 Complementarity of Partner Capabilities	(0.95, 0.85, 0.75)	0.839
		3.4.3 Security of Funding Sources and Utilization	(0.90, 0.80, 0.70)	0.808
4. Entrepreneurial Willingness	4.1 Family Factors	4.1.1 Family members or close relatives managing a business or currently in the process of starting one	(0.90, 0.80, 0.70)	0.792
		4.1.2 Family economic conditions	(0.83, 0.73, 0.63)	0.715
		4.1.3 Level of family education awareness and support	(0.90, 0.80, 0.70)	0.792
		4.2.1 Strong entrepreneurial ideas		0.885

4.2 Individual Factors		(0.98, 0.88, 0.78)	
	4.2.2 Actively participating in entrepreneurial training and coaching beyond formal entrepreneurial courses	(0.93, 0.83, 0.73)	0.823
	4.2.3 Rich experience in social practices, entrepreneurial simulations, and other practical activities	(0.88, 0.78, 0.68)	0.777
4.3 Policy Influences	4.3.1 Local governments and schools issue policy documents to promote student entrepreneurship	(0.93, 0.83, 0.73)	0.839
	4.3.2 Local governments provide tax incentives for college student entrepreneurship and streamline the company registration process	(0.98, 0.88, 0.78)	0.869
	4.3.3 Schools offer financial support for college student entrepreneurship	(0.98, 0.88, 0.78)	0.885
4.4 Public Services	4.4.1 Local governments and schools actively establish co-working spaces, incubation centres, and entrepreneurial nurseries	(0.95, 0.85, 0.75)	0.839
	4.4.2 Innovative entrepreneurship intermediary service organizations	(0.63, 0.53, 0.43)	0.546*

Note: \* indicates deleted indicators.