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Phenomenon-based learning with peer assessment learning model for Chinese college students in entrepreneurship education: A needs assessment study

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Abstract: Entrepreneurship education is central in higher education, yet many programs remain teacher-centered. To develop a more learner-centered approach, this study surveyed 364 students in Taiyuan, China, on learning needs, including phenomenon-based learning, peer assessment, entrepreneurial skills, and critical thinking, using the Priority Needs Index (PNI). Students strongly preferred experiential, real-world challenges (PNI=9.05) and expressed interest in AI-supported project learning (PNI=8.35). They also reported high needs for peer feedback for improvement (PNI=10.6) and for strengthening opportunity analysis, persuasive communication, teamwork, and critical evaluation of information (PNI=9.30). Based on these findings, the study proposed an eight-step Phenomenon-Based Learning with Peer Assessment model (PhBLPA). A focus group of five experts affirmed that its iterative cycles of feedback, revision, presentation, and reflection mirror entrepreneurial practice and can enhance students' entrepreneurial skills and critical thinking, with generative AI as a supportive tool when used transparently and critically. This model offers a practical framework for renewing entrepreneurship pedagogy in Chinese higher education.

Keywords: *College students, Entrepreneurship education, Need assessment, Peer assessment, Phenomenon, Based learning.*

1. Introduction

Entrepreneurship education has emerged as a pivotal component of higher education worldwide, aimed at cultivating students' entrepreneurial skills and critical thinking to identify and seize commercial opportunities in a dynamic economy and job market. However, the current entrepreneurship courses in China have not always been accompanied by equally substantive innovation in pedagogy; many programs still rely on teacher-centered learning, which risks treating entrepreneurship as a predominantly cognitive domain rather than a situated, experiential process [1]. Phenomenon-based learning with peer assessment (PhBLPA) has been proposed as one promising response to this challenge. On one hand, Phenomenon-Based Learning (PhBL) encourages students to start with complex, real-world issues and explore them from various disciplinary and stakeholder viewpoints to provide possible commercial solutions and solve real-world problems, thereby helping students develop their entrepreneurship skills [2]. On the other hand, in the process of peer assessment (PA), students can take on roles as potential customers, investors, and team members to evaluate each other's business work with clear criteria and learned entrepreneurship knowledge. This process can enhance their understanding of entrepreneurship and foster critical thinking through the exchange of constructive feedback [3].

However, an appropriate and effective learning model must tailor itself to the students' needs. Needs assessment in educational contexts is critical to identify the specific learning gaps and requirements of students [4]. Thereby, the researcher of this study conducted a Chinese college student

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needs assessment to ensure that the proposed PhBLPA learning method aligns with student needs, to make the proposed learning method more culturally appropriate, acceptable to students, and sustainable in everyday instructional practice in entrepreneurship education.

2. Research Objectives

1. To identify the Chinese college students' needs in entrepreneurship education.
2. To propose a Phenomenon-based Peer Assessment learning model tailored to Chinese college students' needs in entrepreneurship education.

3. Literature Review

3.1. Students' Needs

Need assessment provides an important initial step for developing approaches to learning. This process examines the difference between current abilities and desired outcomes. The assessment allows the design of methods that relate to particular contexts and show relevance for learners. The approach provides a basis using data rather than assumptions regarding what individuals in the study require [4]. In settings for higher learning, approaches that focus on learners indicate that methods should relate to prior understanding, reasons for learning, and preferences that individuals show. This relationship supports engagement, the ability to direct learning, and the development of deeper understanding [5]. The process involves gathering data that examines difficulties individuals perceive, interests they report, and abilities that require development. Data collection of this type allows outcomes, methods, and assessments to relate to each other in consistent forms. Perdanasari, et al. [6] indicated that providing treatment on the basis of careful analysis of needs shows a greater likelihood of improving performance, increasing satisfaction, and supporting the transfer of what individuals learn. This occurs as methods address actual issues and particular limitations that contexts present. For approaches that differ from common practice, including peer assessment, phenomenon-based learning, or methods using technology, the assessment process reveals whether individuals show readiness for greater independence, working with others, and addressing complex material. The process also reveals what forms of support, response mechanisms, and assessment practices that learners require.

3.2. Entrepreneurship Skills

Building skills for starting and managing ventures in college students has become a main focus of programs that provide this form of training, and this focus appears because developing these skills rather than providing general information shows stronger relationships to the likelihood that individuals start ventures, find work, and produce new approaches [7]. Recent work in this area describes the skills that support starting ventures as a set of different but related abilities. These abilities include finding opportunities in markets, developing new ideas, addressing problems that appear in ventures, managing risks that ventures face, continuing work when difficulties occur, building networks with other individuals, and obtaining resources that ventures require. The skills are important for individuals who start new ventures. These skills also appear important for individuals working within organizations who develop new approaches in these contexts [8]. In work settings that show high rates of change and conditions that are difficult to predict, skills function as the main abilities that support finding work. They allow individuals who complete college programs to respond to new conditions, develop new approaches, and provide value in different organizations and sectors [9]. The skills also support broader objectives that extend beyond individual outcomes. They provide a basis for ventures that respond to opportunities and show potential for substantial development. They contribute to networks that support new approaches in particular regions. They prepare students to address problems related to society and the environment by developing ventures that focus on social objectives and produce particular forms of impact.

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3.3. Critical Thinking

Critical thinking is increasingly regarded as the core learning achievement of entrepreneurship education because it is the basis of students' opportunity assessment, evidence-based decision-making, and responsible entrepreneurial practice in uncertain and complex environments. Rather than simply viewing entrepreneurship as creativity generation or business plan writing, contemporary research emphasizes that students must have the ability to question assumptions, analyze market and stakeholder information, assess risks and feasibility, and weigh ethical and social impacts, and these processes are fundamentally supported by critical thinking [10]. Research shows that entrepreneurship education can actively promote the development of students' high-level cognitive skills, such as analysis, evaluation, and synthesis, especially when the curriculum employs experiential, problem-based, and inquiry-driven teaching methods, which require students to diagnose real-world problems, critique business models, and reflect on their own reasoning [11]. In addition, critical thinking is closely related to entrepreneurial judgment and opportunity evaluation: the study found that entrepreneurs who systematically doubt cognitive biases and use analytical methods to evaluate opportunities tend to achieve better entrepreneurial results while avoiding overconfidence and commitment escalation [12]. In the discourse of higher education policy and employability, critical thinking is also regarded as a "cross-domain ability," which can support individual adaptability and lifelong learning, crucial for graduates seeking development in the volatile labor market and rapidly changing entrepreneurial ecosystems.

3.4. Phenomenon-based Learning

China's entrepreneurship education must adapt to the rapidly evolving economic environment and turn to the student-centered active learning mode. "Phenomenon-based learning," which focuses on real-world challenges rather than isolated disciplines, is increasingly regarded as an effective strategy. This method enables students to deeply participate in complex and real business phenomena and directly connect theoretical concepts with practical situations [2]. Research shows that when students collaborate to complete problem-solving tasks around real entrepreneurial phenomena, they can not only acquire technical knowledge but also develop flexible thinking and resource integration skills, which are key qualities to deal with China's dynamic economic environment [13]. By shifting from mechanical memory to a context-rich and experiential learning framework, the phenomenon-based learning model encourages students to identify opportunities, assess risks, and make informed decisions, thus directly promoting the development of entrepreneurial skills.

3.5. Peer Assessment

Integrating peer assessment activities into phenomenon-based learning can further strengthen critical thinking in entrepreneurship education. The research indicates that when students evaluate each other's work on real business projects, they are prompted to analyze different perspectives, provide reasons for their judgments, and continuously refine their entrepreneurial ideas [14]. This peer interaction promotes deeper learning and stimulates the reflection and evaluation processes that are crucial to entrepreneurship. Additionally, peer review can help reproduce the characteristics of collaboration and feedback typical of real business environments, thereby preparing students for future teamwork and leadership roles [15]. The research demonstrates that combining phenomenon-based learning with structured peer review not only aligns with Chinese students' expectations for "highly relevant and practical" education but also enhances students' entrepreneurial abilities and critical thinking skills in a rapidly changing economic environment.

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3.6. Proposed Phenomenon-Based Learning with Peer Assessment Learning Model

The researcher proposed an eight-step phenomenon-based learning model for entrepreneurship education in higher education, which is well grounded in contemporary pedagogical and entrepreneurship education. Beginning with the identification of a real-world phenomenon and the setting of learning goals (Step 1) aligns with calls for authentic, context-rich, and opportunity-oriented learning experiences that mirror the uncertainty and complexity of entrepreneurial practice. Anchoring learning in real phenomena, such as regional innovation challenges, social problems, or emerging market trends, supports opportunity recognition and entrepreneurial mindset development by situating theory within lived contexts [2]. Designing the learning process and assessment criteria (Step 2) reflects constructive alignment principles, ensuring that intended entrepreneurial competences (e.g., opportunity recognition, creativity, resilience) are coherently connected to learning activities and assessment tasks [14]. Introducing students to the overall process and explicitly training them in peer assessment (Step 3) is supported by research emphasizing the need to scaffold students' feedback literacy and evaluative judgment if they are to function as active co-assessors and co-creators of value in entrepreneurial learning environments. Guiding phenomenon exploration and inquiry (Step 4) operationalizes experiential and inquiry-based entrepreneurship pedagogy, in which students engage in problem framing, customer discovery, experimentation, and iterative sensemaking, thereby developing entrepreneurial self-efficacy and opportunity evaluation skills.

Peer assessment and the provision and reception of feedback (Step 5) are consistent with research showing that dialogic, peer-based feedback deepens learning, develops critical judgment, and supports the social construction of entrepreneurial knowledge and identity [16]. Revising and refining work in response to feedback (Step 6) mirrors the iterative, effectual logic of entrepreneurship characterized by experimentation, pivoting, and continuous improvement, and corresponds to findings that action-based, iterative learning designs enhance entrepreneurial competencies more effectively than lecture-based approaches. The final presentation and consolidation stage (Step 7) resonates with social constructivist perspectives and the entrepreneurial education literature that positions pitching, storytelling, and public articulation of value propositions as powerful mechanisms for synthesizing learning and developing communication, persuasion, and networking skills [13]. Finally, structured reflection and evaluation of the process (Step 8) draw on extensive evidence that critical reflection on action, failure, and uncertainty is fundamental to entrepreneurial learning and the development of adaptive expertise, resilience, and lifelong learning capabilities. Collectively, these steps form a research-informed, cyclical model that integrates phenomenon-based inquiry, aligned assessment, peer feedback, iteration, and reflective practice to foster deep, transferable entrepreneurial competences in higher education.

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Figure 1.
8 steps of PhBLPA.

3.8. AI Generative Technologies

Integrating generative AI technology into entrepreneurship education has brought significant innovation in both teaching content and learning processes. Such technologies enable students to generate business plans, simulate the market environment, produce roadshows, or critically analyze business ideas with the help of artificial intelligence, thereby cultivating entrepreneurial ability far beyond what static textbooks can provide [17]. Importantly, these tools support adaptive learning: students can learn at their own pace, receive instant feedback, and continuously iterate on their achievements, which is particularly critical for skill development and the cultivation of a growth mindset. Generative AI is highly compatible with phenomenon-based learning. Phenomenon-based learning emphasizes that students should face real, complex, and interdisciplinary situations, often reflecting typical entrepreneurial phenomena such as uncertainty, market changes, and social issues. Generative AI can instantly generate personalized cases, adjust business problems according to the latest market dynamics, and provide multiple perspectives for analyzing entrepreneurial phenomena [18]. Students can use artificial intelligence to brainstorm, predict results, or simulate business strategies based on current data and trends, thereby improving the realism and relevance of the learning situation. Additionally, AI tools can generate peer feedback, support online collaboration, and assist in repeatedly polishing projects, which aligns closely with the characteristics of peer-centered and reflection-centered, phenomenon-based learning. By enabling teaching activities to respond swiftly to the rapidly changing entrepreneurial environment and providing strong support for students' exploration, critical reflection, and creativity, generative AI not only adapts to but also significantly enhances the effectiveness of phenomenon-based learning in entrepreneurship education.

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4. Research Method

4.1. Research Method for Research Objective 1

The population of this study consisted of 6,482 college students enrolled in Entrepreneurship courses across 8 financial and economic higher education institutions in Shanxi Province, Taiyuan City, China, in 2025. According to Krejcie and Morgan [19] the researcher needed to select a sample size of 364 to represent the population. The researcher employed a cluster sampling method to select 4 institutions from the 8 higher education institutions in Taiyuan, then randomly selected 91 students from each of these institutions, resulting in a total sample size of 364 for this survey. Most respondents were male (56.3%), aged between 20-22 years (45.9%), and enrolled at universities (58.0%). The demographic table 1 below provides a comprehensive overview of the sample's representation in terms of gender, age, and institution type.

Table 1.
Demographic Information.

Demographic factors	Items	Frequency	Percent (%)
Gender	Male	205	56.3%
	Female	159	44.7%
Age	Below 18	10	2.7%
	18-20	132	36.3%
	20-22	167	45.9%
	Above 22	55	15.1%
University type	college type	153	42.0%
	University type	211	58.0%
Total		364	100%

Five-point Likert scale [Strongly disagree (1) to Strongly agree (5)] has been used to develop a student need assessment questionnaire for this survey. This questionnaire covers four aspects: phenomenon-based learning (PhBL), peer assessment (PA), entrepreneurship skills (ES), and critical thinking (CT). Each aspect contains 5 items, totaling 25 items. An Item of Convergence (IOC) test was conducted by five experts to evaluate the content validity of the designed questionnaire. The IOC values of 20 items ranged from 0.8 to 1.0, greater than 0.5, indicating that the designed items are qualified for data collection. Furthermore, the reliability of the test was analyzed using Cronbach's alpha. The results showed that PhBL (0.85), PA (0.88), ES (0.84), and CT (0.83) all exceeded 0.7, indicating that the questionnaire is reliable in terms of internal consistency.

The researcher used the Priority Needs Index (PNI) to analyze need assessment in this study. The formula for PNI was: PNI = (I - D) * I, where D represents the Degree of Success, which was the mean score of the observed items collected from the respondents in this study. "I" represents Importance, which was the desirable status for the observed items; in this study, "I" was set to 5, the maximum score on the five-point Likert scale [20]. Subsequently, the researcher ranked the observed items to provide clear insights into student needs in the entrepreneurship education course, helping to adopt those prioritized student needs into the development of a new learning model.

4.2. Research Method for Research Objective 2

The researcher conducted a focus group to discuss the proposed PhBLPA as illustrated in the literature review in this study, with five experts selected by purposive sampling. The inclusion criteria were: 1) having five years of teaching experience in entrepreneurship education; 2) having teaching experience in peer assessment; 3) having teaching experience in phenomenon-based learning; 4) having experience in applying AI tools in the teaching process. These five experts participated in the evaluation of the PhBLPA model. An interview form with three guiding questions was designed to facilitate the focus group discussion. The IOC test was used to assess the content validity of the interview form. The results showed three IOC values of 0.8, 1.0, and 1.0, all exceeding 0.5, indicating that the content

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validity of the developed interview form was adequate for guiding the focus group. Additionally, the data were analyzed using content analysis.

5. Results

5.1. Result For Research Objective 1

Table 2 summarizes the results of students' needs assessment for the implementation of phenomenon-based learning (PhBL) in entrepreneurship courses by using the "major needs index" (PNI). Among the statements, students' demand for "learning through real-world problems" is the highest (PNI=9.05), followed by "focusing on the practical problems faced by new ventures" (PNI=8.95) and "solving open and complex challenges" (PNI=8.65). The application of generative AI tools to entrepreneurial project learning is also considered to be very important, but the demand is slightly low (PNI=8.35); the PNI of "connecting classroom theory with observable social phenomena" is the lowest (7.35), but it still shows a considerable demand. Overall, the average PNI is 8.47. The results show that students have a strong preference for learning methods that are more experiential, practical, and integrated with technology in entrepreneurship education.

Table 2.
Student Needs towards Phenomenon-Based Learning.

Aspects	Items/ To what extent you agree with the following statements in your entrepreneurship courses	I	D	PNI	Rank
Phenomenon-Based Learning (PhBL)	Learning by exploring real-world problems in entrepreneurship courses.	5	3.19	9.05	1
	Solving open-ended, complex challenges helps me learn more effectively in entrepreneurship courses.	5	3.27	8.65	3
	Connecting classroom theory to actual, observable events or phenomena of society in entrepreneurship courses.	5	3.53	7.35	5
	The entrepreneurship courses focused on practical issues faced by new businesses.	5	3.21	8.95	2
	Working on entrepreneurship projects with AI generative tools for assistance.	5	3.33	8.35	4
Overall		5	3.31	8.47	

Table 3 presents the results of the needs assessment regarding peer assessment in entrepreneurship courses, utilizing the "main needs index" (PNI) for analysis. The findings indicate that students' needs for "peer review for improvement" are the highest (PNI=10.6), suggesting that students place particular importance on receiving critical feedback that can enhance their entrepreneurial development. Activities involving peer evaluation to help students identify their strengths and weaknesses ranked second (PNI=9.45), followed by the need for "getting peer feedback" (PNI=9.30). The demand for "providing sincere and constructive feedback to peers" (PNI=8.90) and "encouraging more students to participate in the classroom through peer evaluation" (PNI=8.35) is slightly lower but remains significant. Overall, the average PNI of peer evaluation is 9.35, emphasizing that students consider peer evaluation an important but varied aspect of their entrepreneurial learning process, with the quality and practicality of feedback being particularly critical.

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Table 3.
Student Needs towards Peer Assessment.

Aspects	Items/ To what extent you agree with the following statements in the entrepreneurship courses	I	D	PNI	Rank
Peer Assessment	Receiving feedback from my classmates on my entrepreneurship project.	5	3.14	9.30	3
	Providing honest and constructive feedback for my peers' entrepreneurship projects helps me reflect on the knowledge I learned in class.	5	3.22	8.90	4
	Peer assessment activities help me see my strengths and weaknesses more clearly.	5	3.11	9.45	2
	Receiving critiques from my peers provides me with helpful perspectives for improvement.	5	2.87	10.6	1
	Encouraging everyone to participate more actively through peer assessment activities in class.	5	3.33	8.35	5
Overall		5	3.13	9.35	

Table 4 summarizes the students' needs related to entrepreneurial skills in the course and uses the "main demand index" (PNI) for analysis. The results show that students have the highest demand for "learning how to identify and analyze problems that can be transformed into business opportunities" (PNI=8.20), followed by "learning how to show their ideas persuasively" (PNI=8.45) and "learning how to collaborate with others to achieve entrepreneurial goals" (PNI=7.85). The demand for "understanding the basic process of entrepreneurship or project startup" (PNI=7.70) and "developing solutions that can create value" (PNI=7.40) is also significant, but the order is slightly lower. Overall, the average PNI of the demand for entrepreneurial skills is 7.90, indicating that students strongly hope that entrepreneurship education will focus more on cultivating practical skills, especially analytical thinking, communication skills, and teamwork, to better identify opportunities and achieve success in the entrepreneurial context.

Table 4.
Student Needs towards Entrepreneurship Skills.

Aspects	Items/ To what extent you agree with the following statements in the entrepreneurship courses	I	D	PNI	Rank
Entrepreneurship skills	Learning how to identify and analyze problems that could turn into business opportunities in entrepreneurship courses.	5	3.36	8.20	1
	Learning how to develop solutions that could create value in an entrepreneurial setting.	5	3.52	7.40	5
	Learning how to present my ideas to others in a persuasive manner.	5	3.31	8.45	2
	Learning how to understand the basic process of starting a business or launching an entrepreneurial project.	5	3.46	7.7	4
	Learning how to work collaboratively with others to pursue entrepreneurial goals.	5	3.43	7.85	3
Overall		5	3.42	7.90	

Table 5 presents the results of the needs assessment regarding students' critical thinking abilities in entrepreneurship courses, analyzed through the "main needs index" (PNI). The findings indicate that the highest demand is for "improving the ability to evaluate the reliability of information when solving business problems" (PNI=9.30), followed by "being able to discuss and defend business ideas when their views are questioned" (PNI=8.60), and "questioning existing assumptions and considering different views when thinking about problems" (PNI=8.35). The need for using logic and evidence to support personal views (PNI=7.80) and enhancing ideas through reflective feedback (PNI=7.55) are also significant, though their rankings are comparatively lower. Overall, the average PNI of critical thinking-related needs is 8.05, emphasizing that students particularly aim to strengthen their skills in

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assessing information reliability and defending opinions. These skills are fundamental for developing effective critical thinking in entrepreneurial contexts.

Table 5.
Student Needs towards Critical Thinking.

Aspects	Items/ To what extent you agree with the following statements in the entrepreneurship courses	I	D	PNI	Rank
Critical thinking	Enhancing the ability to question assumptions and consider alternative viewpoints before making decisions in entrepreneurship projects	5	3.33	8.35	3
	Enhancing the ability to evaluate the reliability of information when solving problems in a business environment	5	3.41	9.3	1
	Enhancing the ability to discuss and defend my business ideas when challenged by others.	5	3.28	8.6	2
	Enhancing the ability to use logic and evidence to support opinions and conclusions.	5	3.44	7.8	4
	Enhancing the ability to reflect on feedback and make changes to improve my ideas or solutions.	5	3.49	7.55	5
Overall		5	3.39	8.05	

5.2. Result for Research Objective 2

Question 1: Can phenomenon-based learning be integrated with peer assessment in entrepreneurship education?

The experts viewed the combination of phenomenon-based learning and peer assessment at the core of the PhBLPA model as both valuable and mutually reinforcing. They stressed that the process must start with selecting concrete, real-world issues (Step 1: Identifying the phenomenon and setting goals) and establishing transparent assessment criteria (Step 2: Designing the learning process and assessment criteria), as these early decisions strongly shape student engagement. As one expert remarked, the way teachers support topic selection and rubric design "directly impacts the quality of peer assessments." When students move on to collaborative inquiry and problem solving (Step 3: Introducing students to process and training in peer assessment), followed by structured peer review (Steps 4–5: Guiding phenomenon exploration and inquiry; conducting peer assessment by providing and receiving feedback), the panel observed that peer assessment helps learners "see problems from different angles and compare their ideas with those of classmates." The subsequent revision phase (Step 6: Revising and refining work) encourages students to take feedback seriously and improve their work accordingly. This cycle concludes with presentations and reflective tasks (Steps 7 and 8: Final presentation and consolidation; reflection and evaluation of the process), which were seen as supporting both communication skills and deeper understanding. The use of structured, anonymous peer feedback was also highlighted as a way to nurture "empathy and communication" among students, mirroring the interpersonal demands of real entrepreneurial practice.

Question 2: How effective is the PhBLPA model for teaching entrepreneurship courses in enhancing students' entrepreneurial skills and critical thinking?

When evaluating how the PhBLPA model improves entrepreneurial skills and critical thinking, experts agreed that the gradual and process-oriented design of the model truly reflects entrepreneurial practice. A reviewer pointed out that this model reflects the real entrepreneurial process - from conceiving ideas, adjusting after criticism, and then presenting to stakeholders. Links such as collaborative presentation (step 7) and repeated reflective writing (step 8) were praised for effectively integrating metacognitive ability and teamwork into the curriculum. Experts stressed that each iteration - covering group cooperation, peer evaluation, revision, improvement, and reflection - will prompt students to constantly re-examine their assumptions, weigh new evidence, and make adjustments, which is the core feature of critical thinking and entrepreneurial thinking. The final written reflection step is particularly valued. An expert pointed out that written reflection requires

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students not only to explain what they have done but also to clarify why they have made some choices, how feedback has changed their ideas, and what skills they have acquired.

Question 3: Will the use of an AI generative tool in the PhBLPA model enhance its effectiveness in teaching?

As for the use of AI generative tools in the PhBLPA model, experts pointed out that these tools have a scaffolding effect at all stages, from brainstorming in step 1 to the synthesis of peer feedback in steps 5 and 6. An expert pointed out that AI tools can enable more students to obtain high-quality feedback and resources, especially those who may have difficulties in research or communication, emphasizing the role of AI in improving the accessibility and effectiveness of the model. However, the review team also repeatedly reminded that students should not rely too much on AI and advocated that students should record how they use AI at all stages to maintain the authenticity of creativity and the depth of critical participation. Another expert stressed that AI should be a collaborative partner in thinking, not a substitute for rational thinking or original tools, highlighting the importance of maintaining the integrity of the learning process in each step of the model.

In summary, the PhBLPA model has been praised for building a powerful ecosystem and effectively promoting the development of students' entrepreneurial thinking and critical thinking, from problem identification, rating scale development, collaborative inquiry, guided and anonymous peer evaluation, revision, to reflection. Expert comments pointed out that, under the premise of the combination of clear guidance and reflective practice (especially around the use of AI), the model can provide students interested in entrepreneurship with comprehensive and close-to-real-world study and practice preparation.

6. Discussion

The current study explored Chinese college students' needs and preferences regarding Phenomenon-Based Learning (PhBL) and peer assessment practices in entrepreneurship education, developed and piloted the PhBLPA model, and incorporated expert feedback on the integration of phenomenon-based learning, peer assessment, and AI generative tools. The findings significantly align with and extend existing research on student-centered, experiential approaches to entrepreneurship education.

First, the high Primary Needs Index (PNI) scores for learning through real-world phenomena, practical problem-solving, and open-ended challenges reflect an increasing shift in entrepreneurship education literature towards experiential, authentic learning [21]. Students in this research expressed a strong desire for hands-on learning anchored in current and observable business challenges. The prioritization of real-world problem engagement in student needs corresponds with works emphasizing the effectiveness of phenomenon-based and problem-based learning for entrepreneurial development [22]. The relatively high, though slightly lower, value placed on integrating AI generative tools into entrepreneurship projects is consistent with scholarship highlighting technology's emerging role in shaping entrepreneurship pedagogy and enhancing student agency [23].

Peer assessment, according to this research finding, is not only desired by students but is also seen as essential for improvement, insight, and engagement, a pattern well documented in the literature. The highest PNI was for receiving critiques from peers, supporting Ng's [24] assertion that peer feedback can drive metacognitive growth and entrepreneurial self-efficacy. The experts' emphasis on scaffolding, especially via guided and anonymous feedback, mirrors calls in research for structured peer assessment processes to optimize learning gains and minimize bias. This study's result, that students value both giving and receiving feedback, aligns with Xu, et al. [16] synthesis showing reciprocal benefits in peer review for critical thinking skills.

Relatedly, the need to integrate practical entrepreneurial skills such as opportunity recognition, persuasion, and teamwork resonates with the core frameworks in entrepreneurship education theory. The preference for skill-oriented learning supports arguments that entrepreneurial competencies are best cultivated through iterative, collaborative, and reflective tasks [9]. The PhBLPA model, by emphasizing revision, reflection, and presentation, is consistent with process-oriented models

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recommended by Olutuase, et al. [7] and experiential learning principles described by Motta and Galina [25].

Notably, the study points to a heightened demand for critical thinking, especially evaluation of information reliability and defending ideas, which echoes recommendations for embedding critical inquiry in entrepreneurship curricula [10]. The positive reception of the PhBLPA's mechanisms for fostering reflection and dialogue echoes prior evidence that critical thinking and reflective practice are intertwined in effective entrepreneurship education [2].

Expert feedback in this study underscores the interplay between phenomenon-based learning and peer assessment, affirming earlier findings that collaborative, real-world projects enable richer, more authentic assessment and self-improvement [26]. The explicit alignment of the PhBLPA's structure with entrepreneurial practice, ideation, group inquiry, iterative feedback, and public reflection offers robust support for its pedagogical authenticity [14]. Furthermore, expert caution regarding the use of AI generative tools reflects broader debate in recent literature: while AI-enhanced feedback and scaffolding can foster inclusion and efficiency [18], concerns about over-reliance and diminished creativity are well-founded.

In sum, this research not only corroborates established knowledge, such as the value of experiential, collaborative, and reflective approaches, but also responds to contemporary shifts in entrepreneurship education, namely the integration of digital tools like AI and structured peer assessment regimes. By responding directly to identified student needs and integrating expert insights, the PhBLPA model addresses key gaps cited in the literature and offers a potentially scalable approach for enhancing both entrepreneurial capability and critical thinking among Chinese college students.

7. Implications and Suggestions

Traditional entrepreneurship teaching is often difficult to fully help students deal with the complex and changeable entrepreneurial environment in the real world. This study provides strong evidence for Chinese universities to adopt a more active and student-centered entrepreneurship education model. The PhBLPA model has been positively evaluated by students and experts, which shows that the teaching reform based on experiential, collaborative, and integrated technical support is not only feasible but also has obvious value and attraction. The study suggests that teachers in the field of entrepreneurship education should adopt the PhBLPA learning model in teaching practice. In addition, the results of the student needs assessment highlight the urgent need for students to cultivate entrepreneurial skills and critical thinking in entrepreneurship courses. Therefore, it is suggested that teachers of entrepreneurship courses pay more attention to the cultivation of these abilities in teaching, so as to better respond to the needs of students and ensure that students have the ability to achieve career success in the changing economic environment and labor market.

8. Conclusion

This study emphasizes the obvious mismatch between the traditional teacher-centered entrepreneurship education in Chinese higher education and students' more experiential, phenomenon-based teaching methods. The needs assessment results show that students have a particularly strong demand for the following aspects: participating in the exploration of real-world problems, understanding the practical challenges faced by start-ups, completing open and complex tasks, and obtaining AI support in project learning. Students also expressed a high demand for structured peer evaluation, activities to promote self-awareness of strengths and weaknesses, and the ability to systematically cultivate opportunity analysis, persuasive communication, team cooperation, and critical evaluation of information. In response, this research proposed an eight-step "phenomenon-based peer evaluation learning model" (PhBLPA) that combines real situations (phenomena), iterative cycles of feedback and revision, and reflective practice. The expert review verified the consistency between the model and real entrepreneurial practice and affirmed its potential in promoting students' entrepreneurial

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skills and critical thinking. Therefore, the model provides a coherent and suitable framework for the reconstruction of entrepreneurship courses, especially in the context of higher education in China.

9. Limitations and Future Study

This study is subject to several limitations. First, the sample is only from students in the same city (Taiyuan, China), which to some extent limits the universality of the needs identified in this study and the promotion of the PhBLPA model to other regions, different types of colleges and universities, or different cultural situations. Second, the conclusion of this study is mainly based on self-reported questionnaire data and expert focus group discussions. The model has not been implemented in actual courses, nor has evidence directly related to the learning effect been collected. Therefore, the practical impact of the PhBLPA model on students' entrepreneurial skills and critical thinking needs to be verified in practice. Future research should pilot and conduct long-term tracking of the model in different universities and regions, using mixed research methods to investigate changes in students' abilities and behaviors over time. Additionally, it should further explore how to design AI-supported learning activities and peer evaluation mechanisms to enhance the effect of entrepreneurial learning while maintaining academic integrity and independent critical judgment.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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References

[1] J. Lyu, D. M. Shepherd, and K. Lee, "Teaching entrepreneurship in China: Culture matters," *International Journal of Entrepreneurial Behavior & Research*, vol. 27, no. 5, pp. 1285-1310, 2021. https://doi.org/10.1108/IJEBR-09-2020-0653

[2] P. G. Yanti, Suswandari, I. H. Amzat, I. Baadillah, Y. Masrokhah, and R. A. Karnawati, "Phenomenon-based learning method to enhance students' skills in entrepreneurship course," in *AIP Conference Proceedings (Vol. 3148, No. 1, p. 040048). AIP Publishing LLC*, 2024.

[3] G. Pisoni, L. Gaio, and A. Rossi, "Investigating soft skills development through peer reviews assessments in an entrepreneurship course," in *2019 IEEE International Symposium on Multimedia (ISM) (pp. 291-2915). IEEE*, 2019: IEEE, 2019.

[4] A. Priambodo, A. Hariyanto, V. C. Dinata, K. O. Ristianto, and B. B. Prakoso, "Learning need assessment: Formulating blended-learning as academic services for student-athletes," in *International Conference on Research and Academic Community Services (ICRACOS 2019) (pp. 217-220). Atlantis Press*, 2020.

[5] J. Hauer and T. Quill, "Educational needs assessment, development of learning objectives, and choosing a teaching approach," *Journal of Palliative Medicine*, vol. 14, no. 4, pp. 503-508, 2011. https://doi.org/10.1089/jpm.2010.0232

[6] A. Perdanasari, Sudiyanto, and K. B. Sangka, "Development needs analysis of teaching materials for improving critical thinking skills students in Century 21," *Journal of Physics: Conference Series*, vol. 1808, no. 1, p. Article 012035, 2021. https://doi.org/10.1088/1742-6596/1808/1/012035

[7] S. O. Olutuase, P. Brijlal, and B. Yan, "Model for stimulating entrepreneurial skills through entrepreneurship education in an African context," *Journal of Small Business & Entrepreneurship*, vol. 35, no. 2, pp. 263-283, 2023. https://doi.org/10.1080/08276331.2020.1786645

[8] J. Jardim, A. Bártolo, and A. Pinho, "Towards a global entrepreneurial culture: A systematic review of the effectiveness of entrepreneurship education programs," *Education Sciences*, vol. 11, no. 8, p. 398, 2021. https://doi.org/10.3390/educsci11080398

[9] I. M. Steira, K. Wigger, and E. Rasmussen, "Variety of entrepreneurial skills measured in the entrepreneurship education literature," *Education+ Training*, vol. 66, no. 7, pp. 755-776, 2024. https://doi.org/10.1108/ET-09-2023-0374

[10] P. A. Igwe, U. C. Okolie, and C. V. Nwokoro, "Towards a responsible entrepreneurship education and the future of the workforce," *The International Journal of Management Education*, vol. 19, no. 1, p. 100300, 2021. https://doi.org/10.1016/j.ijme.2019.05.001

[11] R. Bell and H. Bell, "Entrepreneurship education in the era of generative artificial intelligence," *Entrepreneurship Education*, vol. 6, pp. 229-244, 2023. https://doi.org/10.1007/s41959-023-00099-x

[12] C. Wang, P. Zheng, F. Zhang, Y. Qian, Y. Zhang, and Y. Zou, "Exploring quality evaluation of innovation and entrepreneurship education in higher institutions using deep learning approach and fuzzy fault tree analysis," *Frontiers in Psychology*, vol. 12, p. 767310, 2022. https://doi.org/10.3389/fpsyg.2021.767310

[13] A. L. Rodrigues, "Entrepreneurship education pedagogical approaches in higher education," *Education Sciences*, vol. 13, no. 9, p. 940, 2023. https://doi.org/10.3390/educsci13090940

[14] S. Trongtorsak, K. Saraubon, and P. Nilsook, "Collaborative experiential learning process for enhancing digital entrepreneurship," *Higher Education Studies*, vol. 11, no. 1, pp. 137-147, 2021. https://doi.org/10.5539/hes.v11n1p137

[15] D. Bolzani and E. Luppi, "Assessing entrepreneurial competences: Insights from a business model challenge," *Education+ Training*, vol. 63, no. 2, pp. 214-238, 2021. https://doi.org/10.1108/ET-04-2020-0072

[16] S. Xu, Z. Xu, F. Li, and A. Sukumar, "Redefining peer learning: Role of student entrepreneurs in teaching entrepreneurship in the UK higher education context," *Industry and Higher Education*, vol. 35, no. 4, pp. 306-311, 2021. https://doi.org/10.1177/09504222211012634

[17] M. Borge, B. Smith, and T. Aldemir, "Using generative ai as a simulation to support higher-order thinking," *International Journal of Computer-Supported Collaborative Learning*, vol. 19, pp. 479-532, 2024. https://doi.org/10.1007/s11412-024-09437-0

[18] D. E. Salinas-Navarro, E. Vilalta-Perdomo, R. Michel-Villarreal, and L. Montesinos, "Using generative artificial intelligence tools to explain and enhance experiential learning for authentic assessment," *Education Sciences*, vol. 14, no. 1, p. 83, 2024. https://doi.org/10.3390/educsci14010083

[19] R. V. Krejcie and D. W. Morgan, "Determining sample size for research activities," *Educational and Psychological Measurement*, vol. 30, no. 3, pp. 607-610, 1970. https://doi.org/10.1177/001316447003000308

[20] S. Wongwanich, S. Sakolrak, and C. Piromsombat, "Needs for Thai teachers to become a reflective teacher: Mixed methods needs assessment research," *Procedia-Social and Behavioral Sciences*, vol. 116, pp. 1645-1650, 2014. https://doi.org/10.1016/j.sbspro.2014.01.450

[21] X. Weng, T. K. Chiu, and C. C. Tsang, "Promoting student creativity and entrepreneurship through real-world problem-based maker education," *Thinking Skills and Creativity*, vol. 45, p. 101046, 2022. https://doi.org/10.1016/j.tsc.2022.101046

[22] Y. Baggen, T. Lans, and J. Gulikers, "Making entrepreneurship education available to all: Design principles for educational programs stimulating an entrepreneurial mindset," *Entrepreneurship Education and Pedagogy*, vol. 5, no. 3, pp. 347-374, 2022. https://doi.org/10.1177/2515127420988517

[23] H. Tran and P. J. Murphy, "Generative artificial intelligence and entrepreneurial performance," *Journal of Small Business and Enterprise Development*, vol. 30, no. 5, pp. 853-856, 2023. https://doi.org/10.1108/JSBED-09-2023-508

[24] N. M. Ngoc and N. H. Tien, "Formative assessment in business and entrepreneurship education in Poland," *Journal of Southwest Jiaotong University*, vol. 56, no. 1, pp. 176–187, 2021.

[25] V. F. Motta and S. V. R. Galina, "Experiential learning in entrepreneurship education: A systematic literature review," *Teaching and Teacher Education*, vol. 121, p. 103919, 2023. https://doi.org/10.1016/j.tate.2022.103919

[26] R. Habash, "Phenomenon-based learning for age 5.0 mindsets: Industry, society, and education," in *2022 IEEE Global Engineering Education Conference (EDUCON) (pp. 1910-1915). IEEE*, 2022.