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Exploring the Entrepreneurship Education at Application-Oriented Universities in China: A Comprehensive Survey

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Abstract
Amidst growing entrepreneurship concerns globally, entrepreneurship education (EE) has become a critical component of higher education. This study evaluates the current state of EE at Application-Oriented Universities (AOUs) in Hebei Province, China, through a comprehensive questionnaire of 1747 students. The research aims to assess students' understanding of EE, evaluation of EE implementation, issues and challenges of EE implementation, and recommendations for EE improvement within the AOUs. The findings highlight a notable recognition of the importance of EE yet reveal significant shortcomings of EE implementation in student enthusiasm and institutional support, course content and teaching quality, practical guidance and incubation support, and external factors. The paper concludes with strategic recommendations to overcome these issues, advocating for refined educational policies, increased financial resources, and strengthened partnerships with the local business community to develop a more effective and sustainable EE framework.

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INTRODUCTION

The COVID-19 pandemic has exacerbated global unemployment, triggering a severe economic recession. In this challenging economic climate, entrepreneurship is viewed as a vital driver for economic recovery (Maritz et al., 2020). Research highlights the role of universities in fostering entrepreneurship through enhanced educational programs, with countries like China integrating EE into their systems (Del Vecchio et al., 2021;Huang et al., 2021). Chinese policies since 2010 have promoted innovation and EE to support economic and social development (Su, 2020). Despite these efforts, engagement with EE varies across institutions, particularly between research-based and application-oriented universities, indicating a need for tailored approaches (Wang et al., 2020). Various policies encourage graduates to pursue self-employment to address unemployment and support local economic growth.

EE in Chinese universities is largely a government-driven initiative aimed at fostering higher education development and boosting entrepreneurship among college students (Ren et al., 2023). Since 2015, prominent research-based universities in China have successfully integrated EE into their programs, supported by robust government backing until 2017. These universities developed their own models emphasising systematic courses and practical activities (Du & Wang, 2019). However, when AOUs began adopting these models, challenges emerged due to a lack of engagement from the entrepreneurial ecosystem, leading to issues in leadership, governance, staff, culture, and university-industry linkages, etc. (Hong & Yang, 2020).

Thus, it is very crucial for AOUs to learn their unique characteristics and issues of implementing EE in AOUs. The overall research objective of this study is to investigate the status quo (current scenario) of the

LITERATURE REVIEW

Entrepreneurship education aims to equip individuals with managerial and entrepreneurial skills to enhance entrepreneurial intentions (Sekhar et al., 2017). EE develops entrepreneurial thinking, attitudes, and willingness, enabling effective opportunity identification. Definitions and delivery modes vary globally: "entrepreneurship education" in Canada and the U.S., "enterprise education" in Europe, and "entrepreneurial education" in Britain (Bacigalupo et al., 2016; Stam & Spigel, 2016; Hytti & O'Gorman, 2004). EE differs from entrepreneurship training, which prepares individuals to start or operate enterprises. Recent studies suggest using lectures, seminars, industrial training, and simulations to systematically foster entrepreneurial awareness, knowledge, and skills (Yang & Li, 2020).

AOUs in China aim to cultivate talent to meet the needs of local economic and social development. These universities differ from research-oriented universities and vocational colleges by focusing on practical applications rather than research or vocational skills(Ruan et al., 2022). According to Bai Liang and Qin Wei, AOUs are oriented towards "training applied talents for production, management, construction, and service for regional social and economic development"(Bai & Qin, 2019).

This education involves a robust theoretical foundation combined with practical skills, innovation, and professional ethics (Boldureanu et al., 2020). Similarly, a well-structured EE curriculum also integrates theoretical and practical teaching to enhance students' innovation consciousness and practical abilities (Gao & Li, 2020; Sun et al., 2020). Thus, both of them have a lot in common, particularly in their aim to cultivate talent.

Besides, EE at AOUs in China differs significantly from that in research-oriented universities due to variations in talent training approaches, teacher qualifications, resources, and venture capital sources. AOUs, comprising nearly 30% of China's undergraduate institutions, focus on cultivating high-quality, application-oriented talents to meet local economic and social development needs (Bai & Qin, 2019). Effective EE in AOUs requires a diverse faculty with practical entrepreneurship experience to guide students(Ding & Xi, 2014; (Zhao, 2020). Meanwhile, the collaborative efforts from the government, industry, and educational institutions are crucial to creating a comprehensive support system for EE(Mei & Symaco, 2022).

In recent years, research on entrepreneurship education development strategies has primarily utilised qualitative methods. However, there has been a scarcity of quantitative research on the problems and challenges of entrepreneurship education in AOUs. This lack of data has resulted in many development strategies merely replicating the approaches used by research universities, leading to insufficient practical guidance for AOUs.

METHODOLOGY

Research design involves systematic data collection and analysis to meet specific objectives, beginning with clear research questions(Rahi, 2017; Saunders et al., 2019). It encompasses data collection, instrumentation, and analysis design (Creswell, 2009; Saunders et al., 2019). In statistics, a population includes all individuals or items meeting specific criteria, while a sample is a smaller, manageable group representing the population. This study focuses on 20 universities in Hebei Province transitioning to AOUs to support local economic development. Three public universities were selected for student surveys based on existing relationships and access to information. The survey targeted a population of 34,500 students, with a random sample to ensure unbiased representation. The criteria for selecting universities included location, participation in entrepreneurship competitions, and demonstrated entrepreneurial outcomes. Student respondents needed to understand Chinese and be second- or third-year undergraduates who had completed the EE course. Ethics approval and consent were obtained from the universities.

A well-designed survey instrument is essential for reliable data collection (Rahi, 2017). A published questionnaire from the *Blue Book on Innovation and Entrepreneurship Education Development in Chinese Universities* (2016) was selected and edited slightly to be the instrument. The questionnaire, adapted for relevance, uses 3 questions to get the nominal data and 15 choice questions (5 single-choice questions and 10 multiple-choice questions) across four dimensions: general understanding of EE, evaluation of EE implementation, challenges, and recommendations for improvement, as shown in Table 1. A pilot study at NCIAE revealed engagement issues, addressed by distributing the questionnaire class-by-class and offering WeChat lucky money as incentives. Conducted from May 12 to May 18, the survey targeted 90 classes across three universities, resulting in 1,747 student responses. The 300+ second completion time per response ensured meticulousness and content validity. The survey, costing 2,340 yuan, leveraged the researcher's network for distribution, enhancing engagement and data quality.

Table 1: Question Dimension Design for Students

No	Dimension	Questions
1	Understanding and Necessity of EE	1. Do you know about EE in the universities? 2. Do you think it is necessary for universities to carry out EE?
2	Evaluation on EE Implementation	3. What entrepreneurship courses do you think are helpful for innovation and entrepreneurship? 4. How much do you know about entrepreneurial communities or institutions in your school? 5. What service functions do you think business incubation bases or mass entrepreneurship spaces should provide? 6. Which of the following types of EE activity and services have you received in your university? 7. What do you think are the effective EE activities in your university? 8. If you start your own business, how do you finance it? 9. Do you think the entrepreneurship department of your university provides enough services for students?
3	Issues and Challenges of EE Implementation	10. What problems do you think exist in entrepreneurship education in your school? 11. Do you think your existing entrepreneurial knowledge and skills meet the requirements of entrepreneurship? 12. What do you think are the main obstacles that affect college students' entrepreneurship?
4	Recommendations for EE Improvement	13. What do you think college students need the most to start a business? 14. What do you think the government should do to help students from AOUs start their businesses? 15. What measures do you think your school should take to encourage college students to start their businesses?

In this study, significant emphasis was placed on descriptive statistics to shape the EE conditions, given their ability to provide a nuanced understanding of complex datasets. Multiple-choice questions formed the core component of the survey, making analysis techniques like response rate and popularity rate particularly relevant. Response rate measures the proportion of a specific option chosen relative to the total number of choices made, helping compare the size of each option selected. Popularity Rate, or case rate, indicates the proportion of respondents who chose a particular option, offering clear insights into their preferences. For example, if 60 out of 100 respondents choose Option A and each respondent selects 3 items, the response rate is 60/300 (20%), and the popularity rate is 60/100 (60%). These metrics are vital for interpreting survey data and are widely used in academic research. Through this analysis, the current state of EE implementation in AOUs can be effectively assessed.

ANALYSIS AND FINDINGS

To answer the research question “What is the current scenario of EE implementation in AOUs?” this section starts with the analysis of student respondents, who are the primary beneficiaries of EE implementation. By examining the

students' responses, the researcher aims to address the research question from 4 aspects. The quantitative data from students provide a comprehensive and holistic view of the current scenario of EE implementation in AOUs.

Understanding and Necessity of EE Implementation

To gain holistic insights into the implementation of EE in AOUs, the researcher explored students' knowledge and perception of its necessity. Despite the widespread initiative of "mass entrepreneurship and innovation" in China since 2015, data (Table 2) show that more than half of the student respondents possess only a somewhat clear understanding of entrepreneurship. A small proportion (6.93%) have a very clear understanding, while a significant segment (16.43%) admits to having no understanding of the concept at all. This suggests that although EE may be established in terms of presence and policy, there is considerable room for improvement in its clarity and effectiveness from the student perspective.

Table 2: Do You Know about Entrepreneurship in the Universities?

Categories	Frequency	Percentage
Very Clear	121	6.93%
Clear	408	23.35%
Somewhat Clear	922	52.78%
Not Clear at all	287	16.43%
Others	9	0.52%
Very Clear	121	6.93%

Despite these insights into understanding levels, there is an overwhelming consensus among students on the importance of EE. Almost all students believe that EE is crucial for them, affirming the necessity of its implementation within universities. The forthcoming Figure 1 is expected to visually convey students' attitudes toward the necessity of conducting EE in universities, showing a strong recognition of its value.

Given that an overwhelming majority of student respondents affirm the necessity of EE in AOUs, it prompts the problems of the practical impact of such implementation. The data analysis suggests that there is little variation in the evaluation of the roles served by EE implementation, pointing to a lack of distinct objectives for EE within these AOUs. This finding could imply that although the general concept of EE is valued, there may not be specific, clearly articulated goals driving its execution in these institutions.

Evaluation on EE Implementation in AOUs

The implementation of EE primarily involves entrepreneurship curricula and platforms. A key finding from a survey, detailed in Table 3, shows that among six different courses, entrepreneurship training courses are the most popular, with a popularity rate of 73.68%. In contrast, the 'Theoretical Foundation of Innovation and

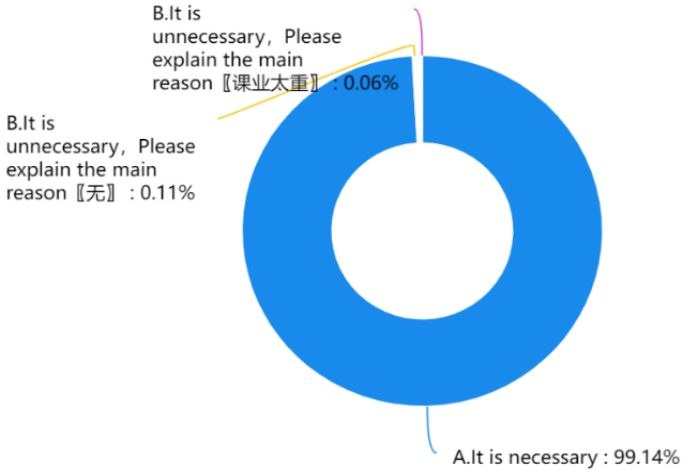

Figure 1: Necessity of Conducting EE

Entrepreneurship' course, mandatory for all students in Chinese HEIs and endorsed by the Ministry of Education, ranks only second.

This outcome suggests two major issues: Firstly, the mandated theoretical course does not significantly enhance students' practical entrepreneurial skills. Secondly, there is a clear preference among students for practical over theoretical learning in entrepreneurship.

Additionally, the survey data reveal a notable gap in the EE framework: the lack of integration between professional and entrepreneurship courses, as evidenced by the absence of any references to such integration among respondents. This indicates that few AOUs have effectively merged these course types.

Table 3: Which Entrepreneurship Courses are Helpful for Innovation and Entrepreneurship?

Details	**N**	**Rate（n=1747）**	
		Response	**Popularity**
Innovation and entrepreneurship training courses	1288	23.55%	73.68%
Theoretical Foundation of Innovation and Entrepreneurship	1244	22.75%	71.17%
Innovation and entrepreneurship quality training course	1164	21.28%	66.59%
Innovation and entrepreneurship practical operation skills training courses	1094	20.00%	62.59%
Innovative technology frontier knowledge courses	675	12.34%	38.62%
Others, please specify …….	4	0.07%	0.23%
Innovation and entrepreneurship training courses	1288	23.55%	73.68%

Students' perceptions of entrepreneurship platforms reveal a significant gap in their understanding of EE. These platforms, which form a core component of EE, are known variably as entrepreneurship centers, incubation bases, or mass makerspaces in different universities.

Data presented in Figure 2 indicates a concerning trend: over half of the students surveyed have a 'somewhat poor' understanding of these platforms. Furthermore, 6.98% of respondents are well-informed and actively engage in activities at their university's entrepreneurship centre. This finding suggests that these centres, integral to AOUs, are not effectively fulfilling their educational role. Key challenges identified include inadequate funding and staffing, as well as a failure to effectively cater to the needs of their audience. These shortcomings are detrimental to the cultivation of a robust entrepreneurial environment within the AOUs.

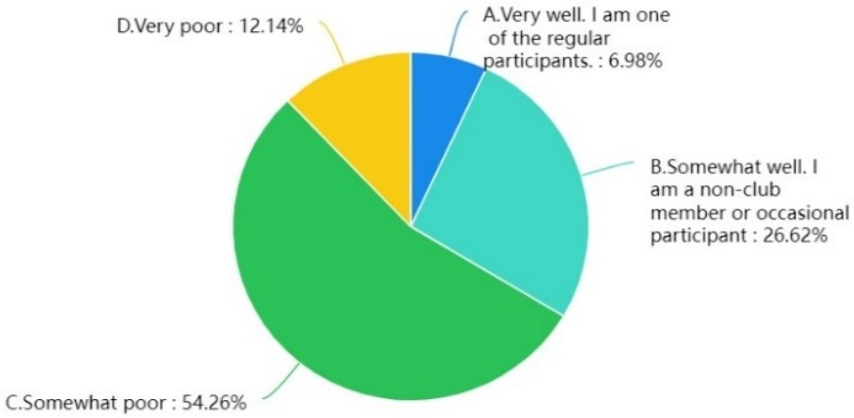

Figure 2: How much do you know about entrepreneurial communities in your school?

Students' understanding of the functions of entrepreneurship centers or incubation bases is limited, as revealed by a survey presented in Table 4. The survey identified five key functions students expect from these centers: (1) training and business registration services (69.39%), (2) office space (67.96%), (3) funding (67.33%), (4) resources like networking and production (66.36%), and (5) practical opportunities (65.39%). These results reflect a gap in students' comprehensive understanding of the entrepreneurship process and their desire for more support and guidance. Furthermore, the high priority given to funding, especially in AOUs, which ranks second (67.33%), underscores the economic challenges faced by students, many from economically disadvantaged backgrounds in Hebei Province. This highlights their reliance on institutional support for entrepreneurial activities, contrasting with preferences observed in more research-oriented universities.

Table 4: What service functions do you think entrepreneurship spaces should provide?

Details	N	Rate（n=1747）	
		Response	Popularity
Provide training, business registration and other services	1213	17.64%	69.39%
Provide office space	1188	17.27%	67.96%
Provide Funding	1177	17.12%	67.33%
Provide resources (network, production, design, etc.)	1160	16.87%	66.36%
Provide practical opportunities for college students	1143	16.62%	65.39%
Provide information	942	13.70%	53.89%
Others, please specify	54	0.79%	3.09%

The survey indicates similar popularity for various services, with training and registration most sought after, followed by office space and funding. These findings suggest AOUs' entrepreneurship centers focus more on

classroom teaching rather than practical entrepreneurship, failing to meet students' real-world needs. AOUs should reevaluate and improve their services to better support students' practical entrepreneurial skills.

The data in Table 5 reveals that the most popular entrepreneurship education (EE) services provided by universities are various innovation and entrepreneurship activities (lectures, salons, training classes, competitions, etc.) and optional or compulsory courses related to entrepreneurship, with popularity rates of 59.99% and 56.67%, respectively. Activities organised by entrepreneurship associations also have significant engagement, highlighting the importance of student-led initiatives. However, practical training activities, social entrepreneurship services,

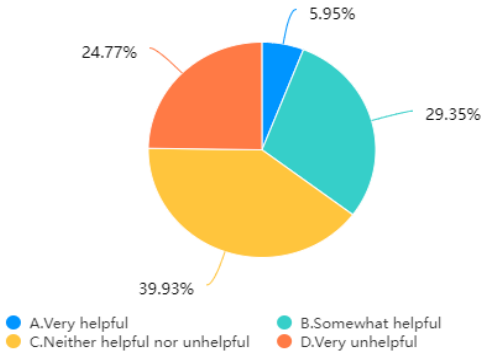

Figure 3: Do you think your existing entrepreneurial knowledge and skills meet the requirements of entrepreneurship

and technical assessment platforms are less popular, with lower response rates and popularity, suggesting potential areas for improvement in accessibility and awareness. Notably, a portion of students (12.36%) have not received any EE services, and 9.67% are not familiar with the available resources, indicating a need for better outreach and communication to ensure broader participation and benefit from these programs.

Table 5: The EE activities and services have you received in your university?

Details	N	Rate (n=1747	
		Response	Popularity
Various innovation and entrepreneurship activities held by colleges and universities	1048	22.91%	59.99%
Optional or compulsory courses related to innovation and entrepreneurship offered by colleges and universities	990	21.64%	56.67%
All kinds of innovation and entrepreneurship activities held by entrepreneurship associations in colleges and universities	859	18.78%	49.17%
Practical training activities at entrepreneurial practice bases of universities	533	11.65%	30.51%
Social entrepreneurship institutions provide entrepreneurship services for college students	421	9.20%	24.10%
The entrepreneurial skills assessment platform provides technical assessment services for college students	338	7.39%	19.35%
Has not received any entrepreneurship education or service in college	216	4.72%	12.36%
Not familiar with the above entrepreneurship education and services	169	3.69%	9.67%
Others, please specify	1	0.02%	0.06%

The data from Table 6 indicates students' preferences for effective methods of implementing EE in AOUs. According to the students, the most effective approaches include: 1) Inviting experts in the field to teach mandatory or elective entrepreneurship courses, with 63.22% considering it effective. 2) Organizing entrepreneurship competitions and simulation activities, regarded as effective by 62.07%. 3) Having entrepreneurs or business professionals provide regular lectures or training, which 57.09% found effective. 4) Implementing practical entrepreneurship training programs and guidance, with a 35.53% effectiveness rating.

These top four methods collectively received a 78.83% response rate regarding their effectiveness in conducting EE, demonstrating a strong desire among AOU students for more professionally-led instruction. This preference underscores the students' interest in acquiring practical entrepreneurial skills and experiences from experts rather than solely learning from theoretical and case-based material in textbooks. Encouraging college students to start their own businesses is a key aspect of entrepreneurship education in HEIs.

However, obtaining the necessary funding is a critical prerequisite for students embarking on such ventures. According to survey data presented in Table 7, the preferred sources for start-up funds among students are applying for capital from their university (62.45%) and from government programs (62.16%). This finding suggests that AOUs are expected to establish some support plans and financial aid for more entrepreneurship projects.

Table 6: What do you think are the effective EE activities in your university?

Details	N	Rate (n=1747	
		Response	Popularity
Invite experts in the field of entrepreneurship to teach compulsory courses or elective courses on entrepreneurship	1105	22.66%	63.22%
Hold entrepreneurship competitions and other entrepreneurship simulation activities	1085	22.25%	62.07%
Invite entrepreneurs or entrepreneurs to provide regular lectures or training	998	20.46%	57.09%
Carry out practical entrepreneurship training programs and other relevant practical entrepreneurship guidance	621	12.73%	35.53%
Carry out entrepreneurship training in industrial parks and enterprises such as university science parks and high-tech zone	429	8.80%	24.54%
Concentrated training such as entrepreneurship training camps and entrepreneurship elite class	312	6.40%	17.85%
Professional courses for entrepreneurship with enterprises	247	5.06%	14.13%
Purchasing entrepreneur-ship education courses from social entrepreneur-ship education institutions	77	1.58%	4.41%
For others, please specify	3	0.06%	0.17%

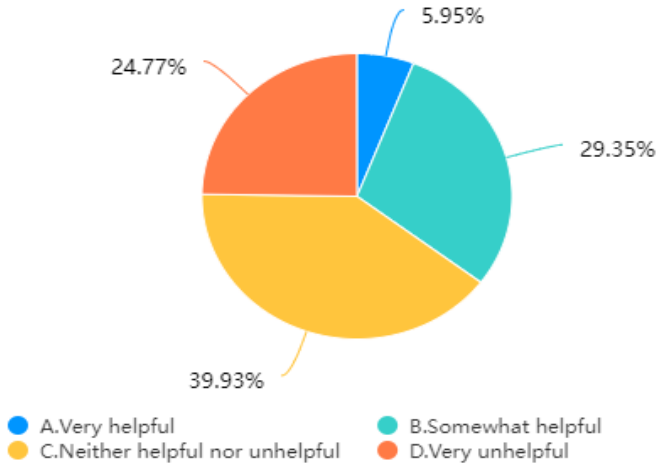

Figure 4: Do you think your existing entrepreneurial knowledge and skills meet the requirements of entrepreneurship?

A significant gap exists in the collaboration between banks and academic institutions. Only a minority of students (33.77%) consider bank loans a viable option, indicating a lack of favourable conditions for student entrepreneurs in the banking sector. Similarly, partnerships between colleges, enterprises, and investment institutions are rare, and as a result, only 28.85% of respondents see attracting investment from these entities as feasible for their entrepreneurial projects. Additionally, securing start-up funding from personal networks like family and friends is also uncommon, with only about one-third of respondents considering this option. This trend reflects the modest economic backgrounds of most students in AOUs.

Table 7: How do you finance your own business?

Details	N	Rate (n=1747	
		Response	Popularity
Apply to the school for start-up fund support	1091	25.27%	62.45%
Apply to the government for start-up funds	1086	25.16%	62.16%
Borrow money from the bank	590	13.67%	33.77%
Attract institutional investment	504	11.67%	28.85%
Family support	419	9.71%	23.98%
Personal savings	313	7.25%	17.92%
Borrow money from friends and family	157	3.64%	8.99%
The raise Crowdfunding	126	2.92%	7.21%
Others, please specify:	31	0.72%	1.77%

Issues and Challenges of EE Implementation

The essence of EE lies in developing the entrepreneurial knowledge and skills of college students. However, the current level of entrepreneurial knowledge and skills among students in AOUs appears to be insufficient for their entrepreneurial aspirations. This conclusion is supported by the survey results depicted in Figure 3.

A notable 24.77% of student respondents feel that their entrepreneurial knowledge and skills do not adequately meet their needs for entrepreneurship. Slightly more than one-third believe these skills and knowledge can basically meet their entrepreneurial needs. Conversely, only a small fraction, 5.95%, are confident that their knowledge and skills can meet their entrepreneurial needs very well. Interestingly, the largest segment of respondents, nearly 40%, could not or did not express an opinion on this matter. These findings indicate significant gaps in the cultivation of entrepreneurial knowledge and skills in AOUs. The high percentage of non-responsive participants also suggests a lack of awareness or engagement with entrepreneurship education among students. This situation highlights the need for a more robust and effective approach to EE in AOUs to better equip students for their entrepreneurial endeavours.

According to Table 8, from the students' perspective, several issues are hindering the effective implementation of EE in AOUs. These problems can be categorised into three main areas.

Table 8: What Problems do You Think Exist in EE in your school?

Details	N	Rate (n=1747	
		Response	Popularity
Students are not enthusiastic about entrepreneurship	1031	18.46%	59.02%
Lack of innovation and entrepreneurship teaching materials (too theoretical and lacks practical guidance)	706	12.63%	40.39%
Schools do not pay enough attention to and invest in EE	692	12.38%	39.59%
Innovation and entrepreneurship courses are lacking or unable to meet market demands,	623	11.15%	35.64%
Lack of professional service guidance for entrepreneurship	438	7.84%	25.06%
Lack of professional entrepreneurship teachers or teachers who teach entrepreneurship courses lack practical experience	434	7.77%	24.83%
The credit hours for EE courses are not counted	417	7.47%	23.87%
Insufficient or mere formality of entrepreneurial practice	375	6.71%	21.45%
Insufficient support for entrepreneurship incubation of student entrepreneurship projects	328	5.87%	18.76%
Oral teaching method is not suitable for entrepreneurship education (lack of inspirational teaching, discussion teaching, participatory teaching)	315	5.64%	18.02%
There are not enough startup mentors	220	3.94%	12.59%
Others, please specify:	7	0.13%	0.40%

Low Student Enthusiasm and Institutional Support

A significant percentage of students (59.02%) report low enthusiasm for entrepreneurship. Additionally, there is a perception that schools do not adequately focus on or invest in EE (39.59%). This indicates that the overall environment for EE in AOUs is currently unsatisfactory. Despite some level of entrepreneurial awareness among students, most AOUs have not yet established a conducive ecosystem for EE. This is

exacerbated by a lack of successful entrepreneurial cases and insufficient publicity, leaving students unsure about how to proceed with their entrepreneurial ventures.

Deficiencies in Course Content and Teaching Quality

There is a noted lack of suitable entrepreneurship teaching materials (40.39%), and the existing entrepreneurship courses often fail to meet student needs (35.64%). This dissatisfaction extends to the quality of teaching in these courses. Students feel that professional entrepreneurship teachers or instructors in entrepreneurship courses lack practical experience (24.83%), and their teaching methods are not well-suited to EE (18.02%). This suggests a disconnect between the course content and the practical demands of entrepreneurship.

Inadequate Practical Guidance

While the situation is slightly better than the teaching aspects, practical guidance in entrepreneurship is still lacking. Students point out a deficiency in professional entrepreneurship service guidance (25.06%) and observe that innovation and entrepreneurship practice activities are either insufficient or ineffective (21.45%). This highlights a need for more robust and practical engagement in entrepreneurial activities within the curriculum.

These findings illustrate that although AOUs have made efforts to implement EE, there are significant areas of improvement needed, particularly in enhancing student enthusiasm, improving course content and teaching quality, and providing more effective practical guidance to foster a healthy entrepreneurial environment.

In addition to the fundamental elements of EE, like teaching and practical application, students at AOUs face several challenges due to external factors, as outlined in Table 9.

Table 9: The Main Obstacles Affecting College Students' Entrepreneurship?

Details	N	Rate (n=1747	
		Response	Popularity
Lack of social connections	1070	20.42%	61.25%
Lack of start-up capital	1055	20.13%	60.39%
Lack of management experience	1043	19.90%	59.70%
Lack of entrepreneurial awareness	614	11.72%	35.15%
Lack of professional knowledge and technology	389	7.42%	22.27%
Lack of suitable start-up projects	309	5.90%	17.69%
Lack of risk tolerance	152	2.90%	8.70%
Starting a business conflict with studying	148	2.82%	8.47%
The market environment is not conducive to entrepreneurship	130	2.48%	7.44%
Lack of marketing channels	96	1.83%	5.50%
The policy environment is not conducive to entrepreneurship	87	1.66%	4.98%

It is difficult to form an entrepreneurial team	76	1.45%	4.35%
Family objection.	25	0.48%	1.43%
A suitable job is available	21	0.40%	1.20%
No obstacles	16	0.31%	0.92%
Others, please specify	10	0.19%	0.57%

Perceived Importance of Social Relations

A significant 61.25% of students surveyed believe that a lack of social connections impedes their entrepreneurial plans. This belief indicates that the external ecological environment and entrepreneurial management mechanisms at AOUs are not fully developed. Consequently, there's a prevalent misconception among students that entrepreneurship success is heavily reliant on social networks.

Start-up Funding Shortages

Mirroring earlier findings from Table 8, 60.39% of students cite a lack of start-up funds as a major barrier to launching their businesses. This reaffirms the financial difficulties faced by students in accessing the necessary capital for their entrepreneurial ventures.

Deficiency in Management Experience

The majority of students, 69.7%, identify a lack of management experience as another significant obstacle to their entrepreneurial efforts. This reflects a gap in the collaboration between AOUs and governmental or corporate entities for entrepreneurship education. Additionally, there are limited opportunities for students to engage in internships within enterprises and receive practical guidance from experienced business managers. These external factors contribute to the students' apprehensions and hesitancy in pursuing entrepreneurship.

Recommendations for EE Improvement

The primary aim of entrepreneurship education is to develop students' abilities in innovation and entrepreneurship, thereby addressing their entrepreneurial aspirations. It is crucial for students to understand what they most anticipate from college entrepreneurship programs. To gain insights into their specific needs, this survey introduces four key questions for AOU students. These questions are designed to probe their recommendation or actual requirements.

The objective of EE is to nurture the innovative and entrepreneurial spirit and abilities in students. In the context of AOUs, the primary needs for entrepreneurship focus on several key aspects as outlined in Figure 4. Firstly, a significant proportion of respondents (1/3) highlighted the need for well-cooperating entrepreneurial teams. This response suggests that the management of EE in AOUs may not be effectively meeting student needs, particularly in organizing and coordinating teams that align with the individual abilities and professional characteristics of innovative talents.

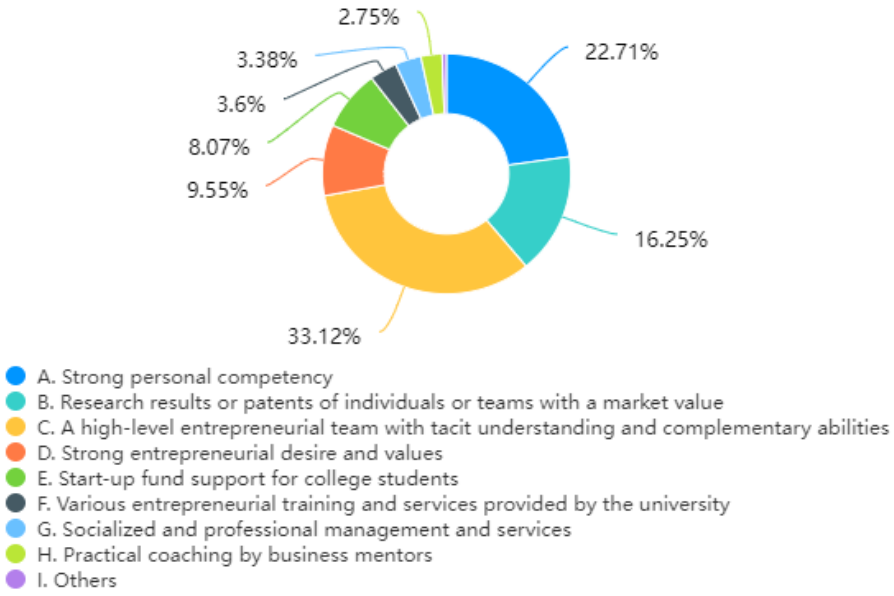

Figure 5: What do you think students need the most to start a business?

Secondly, individual entrepreneurial ability, chosen by 22.71% of respondents, reflects a gap in the AOUs' provision of adequate training in innovation and entrepreneurship. This indicates that students may not be acquiring the essential skills and qualities necessary for starting a business through their education.

Thirdly, 16.25% of students pointed to the importance of research achievements or patents with market value. This highlights a challenge for AOU students in entrepreneurship, as it impedes the healthy development of EE. A lack of projects with market value limits students' ability to attract investment, and the focus on application and practical skills in AOUs makes it difficult for students to develop high-tech products for entrepreneurship. This scenario underscores the limitations of innovation and entrepreneurship education in AOUs.

Moreover, researchers believe that application patents can become valuable market projects. The rarity of successful entrepreneurship based on practical projects can be attributed to three main factors. First, dual-professional teachers in AOUs may lack the capability to enhance students' research outcomes to meet market needs. Second, the entrepreneurial management departments in AOUs might not give sufficient attention to student research, lacking in market promotion and feasibility analysis. Third, the absence of deep collaboration between application-oriented colleges and enterprises results in entrepreneurial projects or products that do not align with the real needs of businesses, leading to a reluctance in enterprise investment in student entrepreneurial activities.

Figure 4 primarily illustrates the internal entrepreneurial needs of AOU students. Complementing this, Table 10 details the specific external entrepreneurial requirements these students have from the government. AOU students express a desire for governmental support in three main areas.

Firstly, a majority of students (67.03%) seek more relevant support policies. While numerous government policies currently support university student entrepreneurship, there is a perceived shortage of policies that fully

align with the unique aspects of talent cultivation in AOUs, or those that can be effectively applied within these institutions.

Secondly, financial support is a significant concern. Approximately 54.72% of respondents believe that the government should provide financial subsidies to assist students in starting their businesses. Additionally, 51.06% think the government should play a role in broadening financing channels for student entrepreneurs.

Thirdly, 48.71% of AOU students hope for more comprehensive government support throughout their entrepreneurial journey to foster a conducive entrepreneurial atmosphere. This includes the establishment of special entrepreneurship service institutions (desired by 25% of respondents) and the provision of expert guidance on entrepreneurship projects (20.95%) and technical support (59.30%) for college students engaged in entrepreneurial activities.

Table 10: what should the government do to help students from AOUs start their businesses?

Details	N	Rate (n=1747	
		Response	Popularity
Formulate relevant supporting policies	1171	18.35%	67.03%
Provide project or technical support	1036	16.23%	59.30%
Financial subsidies for entrepreneurs	956	14.98%	54.72%
Open up financing channels	892	13.98%	51.06%
Create a good entrepreneurial atmosphere	851	13.33%	48.71%
Set up specialised service agencies for entrepreneurship	437	6.85%	25.01%
Organise experts to give entrepreneurial guidance	366	5.73%	20.95%
Intellectual property protection	291	4.56%	16.66%
Establish a platform for the transformation of innovation achievements	268	4.20%	15.34%
Government project procurement	81	1.27%	4.64%
The government should not support them to start up a business blindly	18	0.28%	1.03%
Others, please specify:	15	0.24%	0.86%
Total	6382	100%	365.31%

Table 11 reflects the entrepreneurial demands of AOU students towards their university. According to the survey findings, the primary support students seek from the university is in the form of start-up funding. A significant 54.61% of respondents believe the university should provide financial support for student entrepreneurs. This expectation aligns with the desires expressed in Table 9, where students also indicated a need for financial support from the government.

Secondly, there is a notable dissatisfaction among AOU students with the current quality of entrepreneurship courses offered by the university. A majority of students (53.61%) express a desire for high-quality entrepreneurship courses that can enhance their entrepreneurial knowledge and improve their innovation and entrepreneurial abilities. Researchers suggest that improving the quality of entrepreneurship education is a crucial step towards addressing the challenges in AOUs.

Table 11: What measures should your school take to encourage students to start their businesses?

Details	N	Rate (n=1747	
		Response	Popularity
Provide supporting funds	954	20.60%	54.61%

Provide high-quality entrepreneurship courses	934	20.16%	53.46%
Provide high-quality entrepreneurship courses	934	20.16%	53.46%
Provide seminars for entrepreneurs	730	15.76%	41.79%
Provide start-up site support	531	11.46%	30.39%
Encourage the transformation of industry-university-research projects	366	7.90%	20.95%
Construction of pioneer park, incubation base, and other incubation projects	333	7.19%	19.06%
Host a variety of entrepreneurial activities such as a creative entrepreneurship competition	233	5.03%	13.34%
Popularise entrepreneurship policies, provide professional guidance or resource-matching services	202	4.36%	11.56%
Make entrepreneurship courses compulsory	144	3.11%	8.24%
Build online start-up communities and online platforms	98	2.12%	5.61%
Provide credit transfer policy for entrepreneurship practice and retain school status	89	1.92%	5.09%
Others, please specify：	18	0.39%	1.03%

Thirdly, the survey indicates a need for an overall enhancement of the entrepreneurial environment within the university. Specifically, 41.79% of respondents believe that the university should invite experienced entrepreneurs to deliver lectures, thereby creating a more vibrant entrepreneurial atmosphere. This can help in augmenting students' entrepreneurial awareness and experience. Additionally, there is a demand for more robust entrepreneurship practice platforms. 30.39% of students suggest the provision of more office spaces, while 20.95% recommend the implementation of policies to facilitate the transition of projects from academia to industry. Furthermore, 19.06% of the respondents propose the establishment of entrepreneurship parks and incubation bases to support the incubation of student projects.

Table 12: The issues and improvement suggestions for implementing EE in AOUs

Categories	Issues	Needs for Improvement
Entrepreneurial leadership and environment	- Low enthusiasm for entrepreneurship - Perception of inadequate focus and investment in EE - Inadequate entrepreneur-ship team management	- Increase institutional investment and focus on EE - Create a supportive environment for student entrepreneurs
Course Content & Teaching Quality	- Lack of suitable entrepreneurship teaching materials - Entrepreneurship courses not meeting market demands - Teachers lacking practical experience - Unsuitable teaching methods for EE	- Incorporate more practical and application-oriented teaching materials and methods - Align courses with market demands - Enhance teacher training to include practical entrepreneurial experience - Offer comprehensive technical and project support
Practical Guidance & Incubation Support	- Deficiency in professional entrepreneurship service guidance - Insufficient or ineffective entrepreneurship practice activities - Insufficient support for the incubation of student project - Unsuitable oral teaching method for EE - Lack of sufficient startup mentors	- Enhance practical training programs and ensure effective integration into the curriculum - Increase availability and quality of mentorship from experienced entrepreneurs and business professionals - Establish platforms for the transformation of innovation achievements
External Factors	- Lack of social connections - Insufficient startup funds - Lack of management experience - Lack of supportive policies tailored to the needs of AOUs - Insufficient financial support and limited financing channels	- Develop robust support systems to increase funding opportunities - Foster stronger connections between students and industry - Implement supportive policies tailored to the needs of AOUs - Provide financial subsidies and broaden financing channels for student entrepreneurs

From the data analysis provided, we can identify specific issues with EE in AOUs as compared to research-based universities in China. Despite shared shortcomings in areas such as curriculum content and faculty resources, there are very highlighted issues to be resolved, and improvement needs will soon be needed in terms of entrepreneurial leadership and environment, institutional support, and external support for students' entrepreneurship. These prominent issues and needs are detailed further in Table 12.

DISCUSSION AND RECOMMENDATION

In recent years, a comprehensive quantitative study on the EE in AOUs in Hebei Province has been conducted for the first time. Thus, this research provides an accurate and holistic depiction of the current state of EE, particularly highlighting the realistic challenges faced by students in AOUs. In addressing the above identified issues and challenges in the implementation of EE in AOUs in Hebei Province, it is essential to adopt multifaceted approaches to improve EE. Firstly, AOUs should set feasible entrepreneurship education goals that align with the characteristics of applied talent training and incorporate them into the school's strategic plan or vision and mission. From the top level of the institution, there should be an increased focus on entrepreneurship education and enhanced investment in it.

Secondly, it is crucial to enhance the EE curriculum for AOUs. The curriculum should integrate practical, real-world business challenges and case studies to bridge the gap between theoretical knowledge and market realities. Besides, the practical experience of entrepreneurial teachers and teaching methods are significant components of improving the EE curriculum. Without qualified teachers and an adapted curriculum, it is impossible to arouse student interest and better prepare them for entrepreneurial ventures.

Additionally, AOUs should endeavour to establish robust partnerships with local business communities, which can provide a supportive ecosystem for budding entrepreneurs. By fostering relationships with local businesses and startups, AOUs can offer students valuable mentorship opportunities and practical insights into the entrepreneurial landscape. This exposure is vital for instilling a realistic understanding of business dynamics and for nurturing networking skills that are essential for entrepreneurial success. Moreover, expanding access to entrepreneurship education in underserved areas through online platforms or traveling workshops can ensure equitable opportunities for all students.

Furthermore, the provision of increased funding and the creation of scholarship opportunities are critical in supporting students who are interested in entrepreneurship but may lack the financial resources to pursue their ambitions. The development or expansion of entrepreneurial incubators within educational institutions can also play a significant role. These incubators would provide not only the necessary resources but also the hands-on support needed to launch successful startups, such as management training or necessary social connections.

Finally, to ensure the effectiveness of these initiatives at AOUs, it is imperative to implement robust mechanisms for evaluating and gathering feedback on EE programs. Continuous improvement based on systematic feedback will enhance the quality and relevance of the education provided, thereby contributing to a more vibrant and inclusive entrepreneurial ecosystem at AOUs in China.

CONCLUSION

The investigation into the current scenario of EE at AOUs in Hebei Province underscores the critical need for improved educational strategies and resources. Despite increasing awareness of environmental issues, the study identifies substantial deficiencies in the existing EE infrastructure. To bridge these gaps, it is essential to implement targeted policy measures, enhance teacher training programs, and allocate sufficient funding to EE initiatives. Furthermore, fostering partnerships between schools, local governments, and environmental organisations can significantly enhance the effectiveness of EE programs. By addressing these recommendations, AOUs can develop a robust and impactful EE system, thereby contributing to the broader cultivation of applied talents with entrepreneurship knowledge and skills.

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