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Development of Entrepreneurship Opportunity Identification Course in Entrepreneurship Education Program for Engineering Students at Jiaxing University

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Abstract
The research objective was to explore the influence of the EOI course on the EOI ability of engineering students and, based on this, develop and validate the EOI course on the EOI ability of engineering students in Jiaxing University. Phase 1 used a post-test quasi-experimental group and control group design. The experimental group took compulsory and elective EEP courses, while the control group only took the compulsory EEP courses. The researcher administered a questionnaire to both groups on the effect of EEP on EOI. In Phase 2, a pretest-posttest quasi-experimental design was used to conduct the developed course intervention experiment with the experimental group. A pretest-posttest questionnaire and a structured interview survey on EOI abilities were administered. The research results showed that Phase 1 confirmed that EEP and EOI are positively correlated, but the current EEP is not significant in improving the EOI ability of engineering students. Phase 2 confirmed that the EOI training course developed with the combination of research results and theoretical basis could effectively improve the EOI ability of students. This research provides multiple avenues for future research, such as the survey methodology that could be used to develop the curriculum. It would be beneficial to conduct further empirical testing on how the developed curriculum influences students' EOI in more specific aspects for future research.

Keywords: Entrepreneurial Opportunity Identification, Entrepreneurship Education Program, Chinese Engineering Undergraduates.

Introduction

In the past few decades, entrepreneurship has become essential for economic and social development (Klofsten et al., 2019). Entrepreneurship is a planned and purposeful behavior that improves economic efficiency by creating new employment opportunities, fostering innovation, and promoting economic growth (Milana & Ashta, 2020). With China becoming one of the most entrepreneurial countries in the world (Shan et al., 2018), the requirements of enterprise employers for undergraduates have been upgraded from professional ability to necessary entrepreneurial knowledge and skills to cope with the rapidly changing and uncertain economic environment of the 21st century (Boyles, 2012). The European Commission has stated that there is a need to foster entrepreneurship and provide businesses with the skills to adapt to the new work environment (UE, 2010). Students need to develop their entrepreneurial skills, which can open up more possibilities for their social survival. EEP can stimulate entrepreneurship and is a crucial way to improve entrepreneurial attitudes, abilities, and intentions (Neck & Greene, 2011).

The reasons for the low entrepreneurial ability of Chinese engineering students (Cheng et al., 2018) are as follows. Firstly, EEP in China is immature. Although more than 90% of Chinese universities have entrepreneurship education programs (EEP), it is still in its infancy compared to the 80-year history of EEP in the United States, which is only 20 years old. Secondly, EEP is not sound, and its teaching objectives need to be clarified; it lacks faculty, has limited interdisciplinary coverage, and lacks theoretical and practical training in entrepreneurial skills. These lead to a lack of applied entrepreneurial knowledge and experience dealing with markets for engineering students with technical backgrounds. Engineering students need help to learn and utilize their entrepreneurial skills fully.

Engineering majors have technical thresholds and are qualified to carry out entrepreneurial and innovative activities in patented products, core technologies, and technical services. They have great entrepreneurial potential and markets. However, Chinese engineering education emphasizes technology and needs more comprehensive ability cultivation. The EEP needs to be fully integrated with

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professional guidance. Disciplines and professions have lost strong support from EEP. Low conditions for technological entrepreneurship education lead to a need for more awareness and practice of entrepreneurial opportunities in technological innovation among engineering students. Engineering students need the ability and conditions to find suitable entrepreneurial opportunities in their majors, and they consequently need more motivation and action to carry out entrepreneurial practice. EOI is crucial to EEP (Karimi et al., 2016), especially for engineering students with technical backgrounds, as it is the starting and critical point for improving a good combination of professional competencies and entrepreneurial activities.

Literature Review

The basic assumption of the EEP is that it enhances individual skills and creativity for successful entrepreneurship (Fayolle et al., 2013), helps students understand what entrepreneurship is, and teaches them how to apply theories and concepts in practice. Students are likelier to develop interest and confidence in entrepreneurship through planned education. There still needs to be more research in China; it is essential to study whether and how EEP can improve EOI ability.

This research aims to investigate whether the EEP of Chinese universities can improve the EOI of engineering students, determine the relationship between EEP and EOI, and develop an EOI course for engineering students. Figure 1 shows the conceptual framework. Although most Chinese universities have launched EEP courses, they are primarily offered in business, management, or entrepreneurship colleges, with few entrepreneurial practice courses (Yu, 2018). The EEP courses demonstrate simplification, fragmentation, and a lack of systematization. More importantly, only a few universities offer EEP courses and majors, which makes it difficult for students to integrate them into their professional studies effectively. There are gaps in the universities' understanding of EEP.

Entrepreneurial opportunity is a critical element of entrepreneurship (Milanesi, 2018). Previous studies have shown that EOI is crucial in determining whether undergraduate students can succeed in entrepreneurship (Kim et al., 2018). It is also the standard to test the quality of EEP for undergraduate students. EOI has antecedents, including developing personal, professional, and entrepreneurial knowledge. These will form a set of methods and technologies for each EOI. Individuals trained in specific entrepreneurial skills may have a higher EOI ability than those who have not studied (Laguna-Sánchez et al., 2020).

The context of EEP in China illustrates the apparent importance of EEP in developing the EOI ability of engineering students. EEP can increase social value creation through the EOI ability of undergraduate students (Kim et al., 2018). However, the empirical research on whether EEP improves the EOI ability is insufficient, and more research is needed to test it (Iwu et al., 2021).

The development of EEP should be based on the requirements of the national or even local economy as well as the current context. China's EEP still faces many issues and obstacles. Developing specific EEP courses in the "professional background" should be prioritized (Mei & Symaco, 2022). Therefore, it is necessary to develop a training course to improve the EOI abilities of undergraduate students (Ho & Man, 2022).

Another problem in China is that there needs to be more research on EOI for engineering students, especially regarding the impact of EEP (Mason et al., 2011). Most existing studies have focused on EEP engineering students, including research on the status of EEP, training modes, and the quality of student entrepreneurship. Regarding EOI, most research applies to undergraduate students regardless of their academic backgrounds, including the impact of entrepreneurial education on EOI, factors affecting EOI, and the impact of EOI on entrepreneurial intention. Worldwide, research in this field has been conducted in the same manner as in China. There are many studies on EEP for engineering students and EOI for undergraduate students, but few combined studies on EEP and EOI for engineering students. With the development of China's engineering economy, it is necessary to research how EEP can improve the EOI of engineering students (Turner & Gianiodis, 2018).

Based on the above description, the importance of EOI ability for Chinese engineering students is evident. This study aims to develop a training course to help engineering students improve their EOI ability. There are two phases in this research.

Phase 1 is a survey of the EEP status. To understand the problems that need to be discussed in the Chinese context, this part checks the EEP to find out whether engineering students who had studied the EEP courses (including EEP compulsory courses and elective courses) have EOI ability and determine the number of courses that can help improve the EOI ability by checking whether the more elective courses, the higher the EOI. Phase 2 is course development. Based on the research results of phase 1 and the corresponding theoretical support, it develops the EOI course for engineering students. Based on the above background, the importance of EEP and EOI is very significant. Phase 1 is to study the status of EEP courses on the EOI ability levels of engineering students. On this basis,

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Phase 2 is to develop an EOI course that can improve the EOI ability of engineering students.

The research objectives are:

1) To explore the influence of EEP courses on the EOI ability of engineering students in Jiaxing University.
2) To experiment with the EOI course on the EOI ability of engineering students in EEP at Jiaxing University.
3) 3)To validate the EOI course on the EOI ability of engineering students in EEP at Jiaxing University.

The research hypotheses are:

H1: The engineering students who had completed the EEP compulsory courses and those who had completed both EEP compulsory and elective courses have low EOI ability.

H2: The EOI course can effectively improve the EOI ability of engineering students.

The research questions are:

1) What factors of EEP courses significantly impact the EOI ability of engineering students??
2) Can the EOI course effectively improve the EOI ability of engineering students?

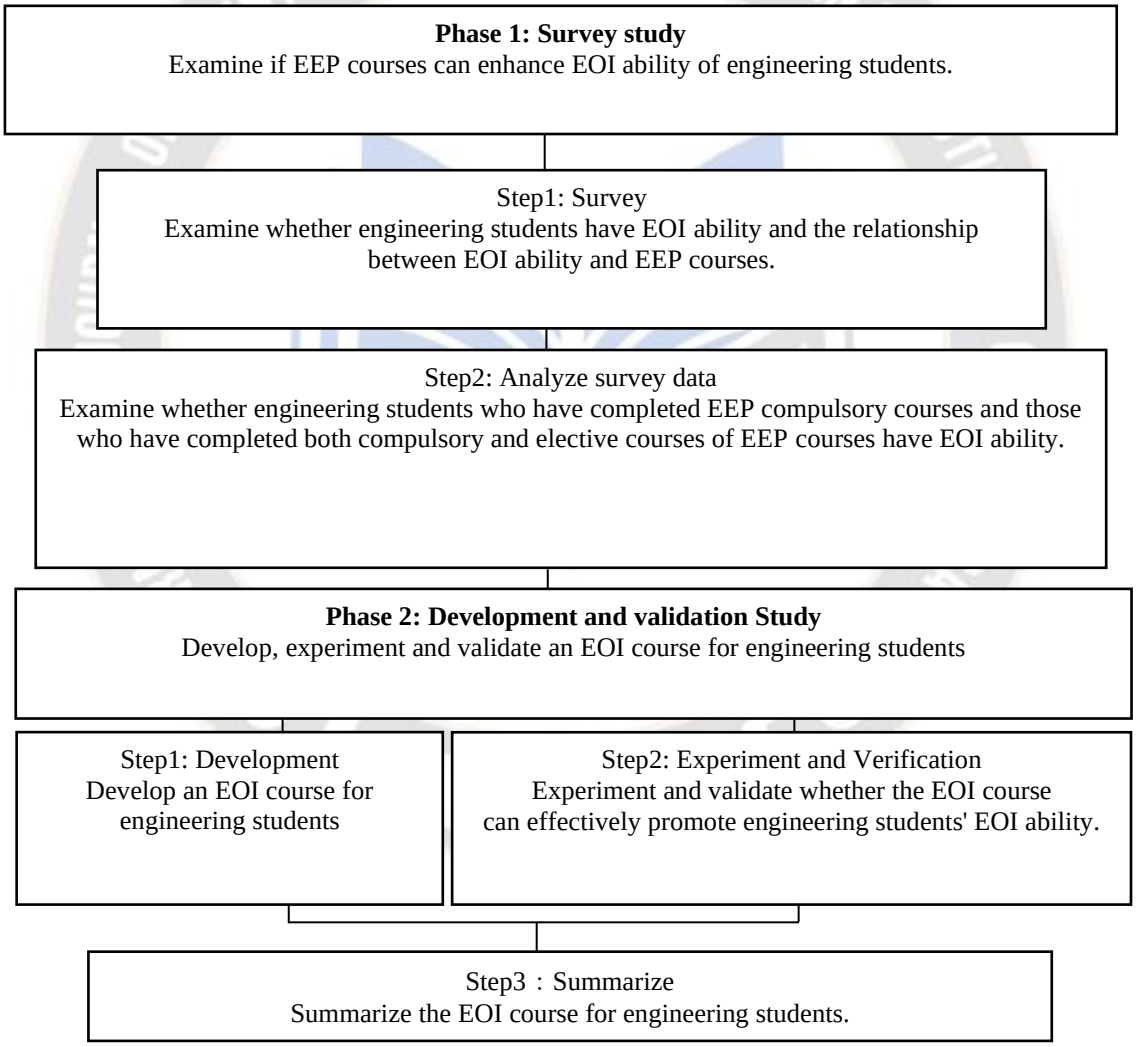

Figure 1. Conceptual Framework

Methodology

Population and Sample

The study focused on Chinese engineering undergraduate students at Jiaxing University, comprising a total population of 457 (Jiaxing University, 2022). From this population, a sample of 220 students responded to the questionnaire. Additionally, 26 participants who had completed the developed course were involved in the study's questionnaire and interview phases.

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Research Instrument

Research Instruments, including two questionnaires and one interview. Questionnaires are used to collect data from engineering students, and the interview is used to collect the learning outcomes of engineering students who have studied the EOI course.

Findings

Demographics

The researchers collected 220 questionnaire data to compare EOI abilities in the first stage and 26 survey questionnaire data of EOI before and after studying the EOI course in Phase 1 of the research.

All of the samples are undergraduate students, with 45% female and 55% male; 28.6% is engineering management, 28.64% is building environment and energy application engineering, 32.72% is architecture, and 60.45% is civil engineering; 39.55% are sophomores and 60.45% are juniors; 88.64% have no entrepreneurial experience, while 11.36% have entrepreneurial experience; 62.73% have studied elective and compulsory courses in entrepreneurship education, while 37.27% have only studied compulsory courses in entrepreneurship education.

Descriptive Data Analysis

In general, entrepreneurship education courses have a positive impact on the improvement of Chinese engineering students' EOI ability, and, based on social cognitive theory, combined with the analysis of Chinese engineering students' gender, majors, grades, whether they have entrepreneurial experience, and whether they have taken more entrepreneurship education courses (entrepreneurship education electives), it is concluded that entrepreneurship education courses have a positive impact on the improvement of students' EOI ability, but the overall EOI level is low.

Pearson Correlation

Based on these data, researchers calculated the correlation between EEP and EO using Pearson correlation. The Pearson correlation coefficients of the experiment and control groups are shown in Table 1 and Table 2.

Table 1. Pearson Correlation Matrix of EEP and EOI of the Experiment Group (N= 82)

Pearson Correlation Matrix

Variable	Exploit an opportunity	Perceive the unmet market demand	Predict the prospects of the industry	Identify the products and services	Spend more time and energy looking for	Make resource allocation decisions	Organize and motivate employees	Organize resources and coordinate various work
Start a business	0.686**	0.600**	0.657**	0.666**	0.565**	0.687**	0.626**	0.663**
Attitudes, values, and motivations of an entrepreneur	0.706**	0.705**	0.771**	0.771**	0.645**	0.739**	0.712**	0.792**
Management knowledge and skills	0.798**	0.651**	0.740**	0.717**	0.682**	0.781**	0.669**	0.819**
Create networks	0.745**	0.673**	0.687**	0.680**	0.695**	0.717**	0.675**	0.755**

* $p<0.05$ ** $p<0.01$

Table 2. Pearson Correlation Matrix of EEP and EOI of the Control Group (N= 138)

Pearson Correlation Matrix

Variable	Exploit an opportunity	Perceive the unmet market demand	Predict the prospects of the industry	Identify the products and services	Spend more time and energy looking for	Make resource allocation decisions	Organize and motivate employees	Organize resources and coordinate various work
Start a business	0.532**	0.491**	0.418**	0.482**	0.393**	0.370**	0.360**	0.285**

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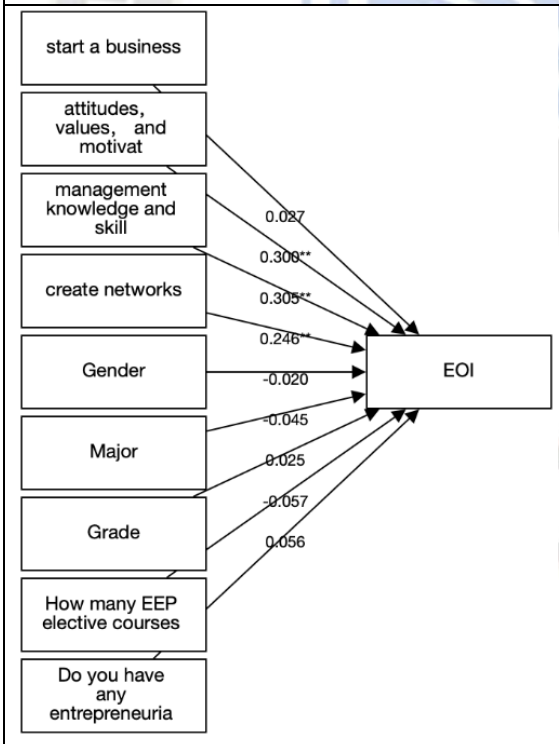
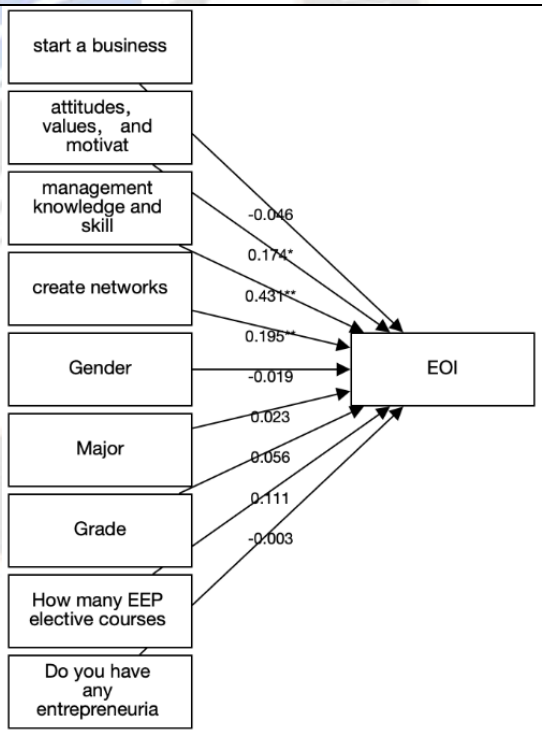
Variable	Exploit an opportunity	Perceive the unmet market demand	Predict the prospects of the industry	Identify the products and services	Spend more time and energy looking for	Make resource allocation decisions	Organize and motivate employees	Organize resources and coordinate various work
Attitudes, values, and motivations of an entrepreneur	0.640**	0.544**	0.605**	0.580**	0.569**	0.493**	0.524**	0.516**
Management knowledge and skills	0.713**	0.653**	0.656**	0.739**	0.646**	0.599**	0.648**	0.608**
Create networks	0.619**	0.617**	0.577**	0.626**	0.482**	0.545**	0.604**	0.580**

* $p<0.05$ ** $p<0.01$

Therefore, 'create networks' is the factor that has the greatest impact on EOI among the four factors of EEP. In addition, according to the results of one-way ANOVA, there is a significant positive correlation between EEP and EOI.

Table 3. Regression coefficient value (EOI Sub Items)

Regression coefficient value(Total)	
Experiment Group	Control Group
	
1. attitudes, values, and motivations of an entrepreneur 2. management knowledge and skills 3. create network	1. attitudes, values, and motivations of an entrepreneur 2. management knowledge and skills 3. create network

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Regarding the effect of EEP on EOI, four factors of the dependent variable EEP were considered, including "start a business," "attitudes, values, and motivations of an entrepreneur," "management knowledge and skills," and "create networks," all of which have the potential to have a significant impact on the eight factors of the EOI. As shown in Table 4, the experiment group had higher mean values for all EEPs and higher mean values for the 7 EOI factors than the control group. As shown in Tables 5 and 6, the same three factors of EEP had a significant and positive effect on the EOI of the experiment group and control group, with "create networks" having the largest positive effect and "start a business with no significant effect.

Table 3 shows that after studying more EEP courses, 'create networks' had the greatest positive impact on ‘explore an opportunity '. At the same time, 'management knowledge and skills' had the greatest positive impact on 'exploring an opportunity.' However, compared to the study of EEP compulsory courses, after receiving more courses, the improvement of this project was 0.082, which is relatively small. However, the 'attributes, values, and motivations of an entrepreneur' have decreased from having a positive impact to not having an impact.

From the results of the regression analysis, it is evident that there may be an influence of other variables on the relationship between EEP and EOI, and to obtain a picture of the influence of each independent variable on the dependent variable, the control factors measured in the study (gender, major, grade, how many EEP elective courses did you study, do you have any entrepreneurial experience) were introduced into the regression model to explain the results of the effect of each variable on the dependent variable, controlling for the effect of the other variables (Mueller, 2011). Table 3 shows the multiple regression relationship between the experimental and control groups, from which it can be seen that none of the five control factors were statistically significant, and the inclusion of these control variables did not have an explanatory significance on the model.

Table 4. Comparison of mean values between EEP and EOI

Variables	Items	Experiment Group		Control Group		Mean1-Mean2	SD1-SD2
		Mean	Std. deviation	Mean	Std. deviation		
EEP	start a business	3.34	1.08	3.08	0.81	+0.26	+0.27
	attitudes, values, and motivations of an entrepreneur	3.65	0.95	3.43	0.89	+0.22	+0.06
	management knowledge and skills	3.70	0.93	3.44	0.85	+0.26	+0.08
	create networks	3.65	0.88	3.38	0.95	+0.27	+0.07
	Total	3.59	0.96	3.33	0.88	+0.25	+0.08
EOI	exploit an opportunity	3.70	0.93	3.42	0.89	+0.28	+0.04
	perceive the unmet market demand	3.54	0.97	3.37	0.93	+0.17	+0.04
	predict the prospects of the industry	3.41	0.98	3.28	0.95	+0.13	+0.03
	identify the products and services	3.52	0.93	3.33	0.89	+0.19	+0.04
	spend more time and energy looking for	3.63	0.94	3.46	0.94	+0.17	+0.00
	make resource allocation decisions	3.60	0.89	3.42	0.92	+0.18	-0.03
	organize and motivate employees	3.52	0.92	3.47	0.86	+0.05	+0.06
	organize resources and coordinate various work	3.62	0.86	3.48	0.83	+0.14	+0.03
	Total	3.57	0.93	3.40	0.90	+0.16	+0.03

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Table 5. Regression coefficient value (Total)

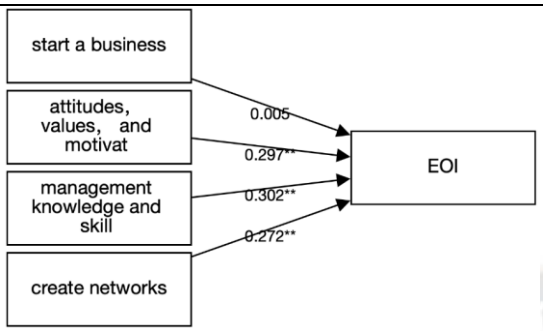
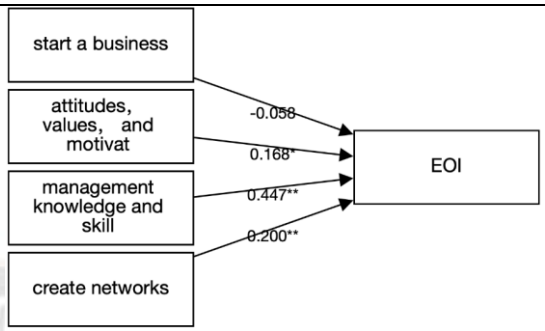
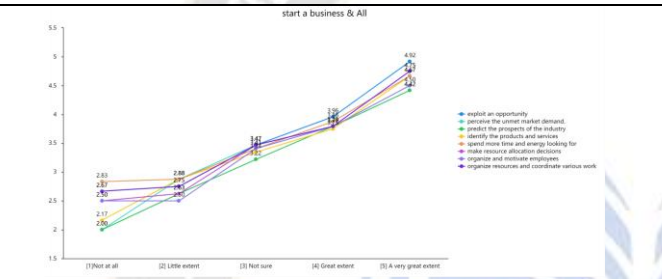
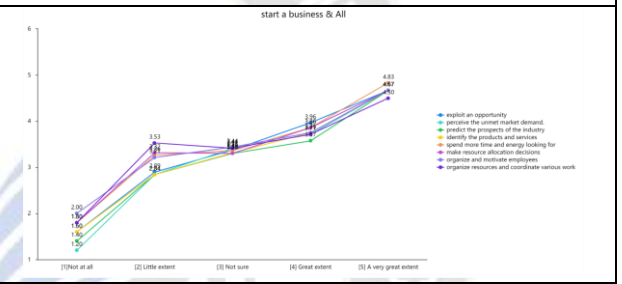
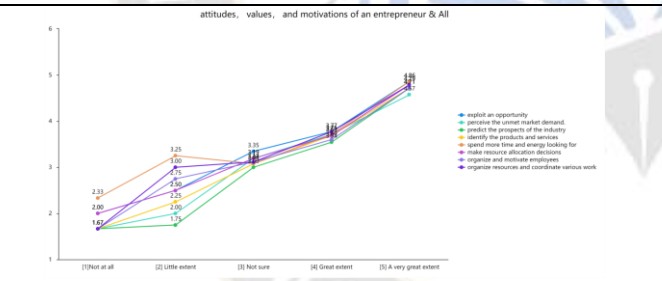
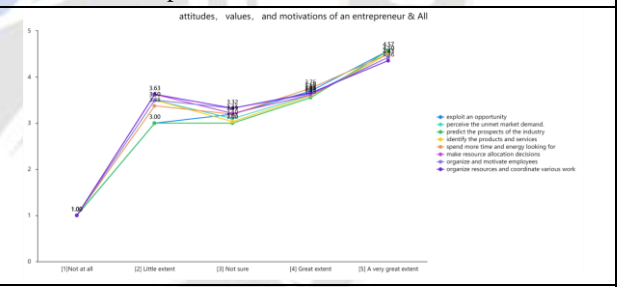
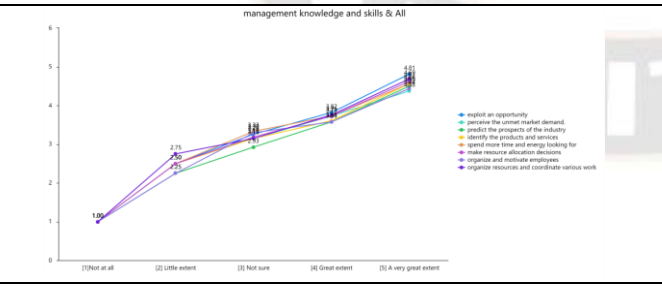
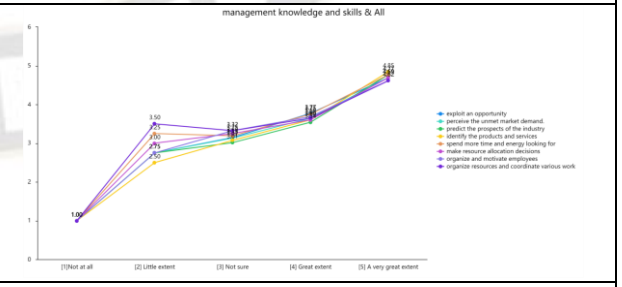
Regression coefficient value(Total)	
Experiment Group	Control Group
	

Table 6. Variance plot

Experiment Group	**Control Group**
Start a business	
	
Attitudes, values, and motivations of an entrepreneur	
	
Management knowledge and skills	
	
Create networks	

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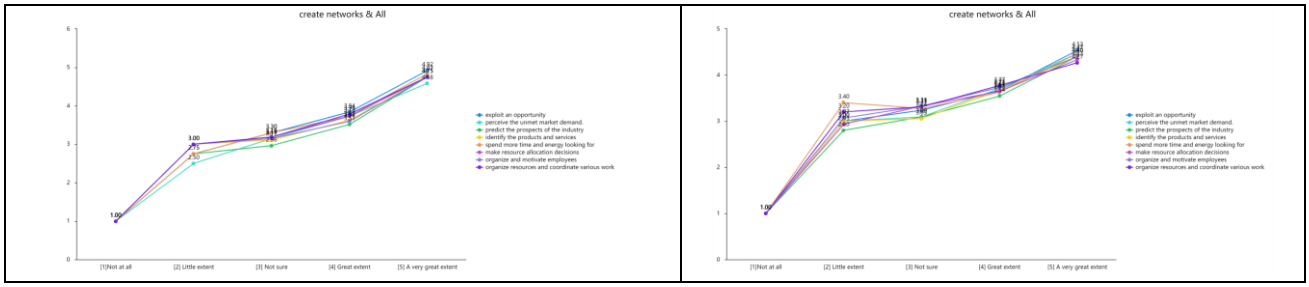

In general, according to the statistical results of this study, EEP in Chinese universities is somewhat successful. It has a role in improving students' EOI ability. Still, the overall EOI level is low, so there is a need to develop a course on "Entrepreneurial Opportunity Identification for Engineering Students" for engineering students to enhance their special abilities.

In the second part of the study, data were collected using a questionnaire on students' needs to take the course. The same sample as in the first part of the experiment was used, with a sample size of 220, including 138 engineering students who had taken the mandatory EEP course (Control Group) and 82 engineering students who had taken the mandatory and optional EEP course (Experiment Group) and the two groups were compared and analyzed. In general, the data collected shows that the students are motivated by the course to be developed and have high expectations that the feedback from the students can be adequately designed into the course content. The second part of the experiment was supported by literature and evaluation to develop and validate the effectiveness of the EOI course. Twenty-six people were recruited to participate in the teaching experiment of the course, and the group was pre-tested and post-tested using a questionnaire. The mean values of the pre-test and post-test data were compared and analyzed, and 26 people were interviewed about the learning outcomes.

Table 7. Comparison of mean values between pre-test and post test

Variables	Items	Pre-test		Post-test		Mean2-Mean1
		Mean1	Std. deviation	Mean2	Std. deviation	
EOI	exploit an opportunity	3.630	1.006	4.111	0.751	+0.481
	perceive the unmet market demand	3.741	0.859	4.074	0.781	+0.333
	predict the prospects of the industry	3.667	0.920	4.074	0.829	+0.407
	identify the products and services	3.704	0.823	4.074	0.781	+0.370
	spend more time and energy looking for	3.741	0.813	4.111	0.751	+0.370
	make resource allocation decisions	3.630	0.792	4.111	0.698	+0.481
	organize and motivate employees	3.667	0.961	4.037	0.706	+0.370
	organize resources and coordinate various work	3.815	0.681	4.111	0.698	+0.296

After comparing and analyzing the data in Table 7, it was found that the mean EOI of the post-test was greater than the mean EOI of the pre-test, and the overall score of EOI increased from 3 points to over 4 points. This means that understanding one's own EOI ability has increased from uncertainty to "certainty," which is a qualitative improvement in evaluating one's own EOI ability. This verifies the effectiveness of this course in improving EOI ability, and hypothesis 2 holds.

Discussion

This research extensively studies the literature on entrepreneurship education and entrepreneurial opportunity identification based on social cognitive theory. It analyzes some of the issues of entrepreneurship education in China. In the world, few studies have specifically examined the impact of EEP courses on the EOI ability of engineering students. Specifically, no studies have compared the EOI abilities of students who have received different levels of EEP courses. Few studies have determined the relationship between EEP courses and students' EOI abilities, and little is known about the critical factors that influence students' EOI abilities. This study examines the impact of EEP on engineering students' EOI at Jiaxing University and, based on this, develops an EOI course for engineering students that can effectively improve EOI ability. This study addresses the following questions: Does EEP enhance the EOI ability of Chinese engineering students? What factors of EEP

significantly impact the EOI ability of engineering students? Can the EOI course effectively improve the EOI ability of engineering students?

Responses to the First Research Question

The first research question of this study is, "What factors of EEP courses significantly impact the EOI ability of engineering students?" This research confirms the positive impact of entrepreneurship education on entrepreneurial opportunity identification in China. A post-test of engineering students who had taken different levels of EEP courses showed that the mean value of EOI increased and that EEP and EOI were positively correlated. The findings are consistent with previous studies on the impact of EEP on EOI (Cohen & Aviram, 2021; Gedeon, 2017; Goje, 2017). However, this contrasts with previous research on whether EEP effectively improves EOI capabilities. For example, Karimi et al. (2016) found no effect of supporting EEP on entrepreneurial opportunity identification. The results of the present study show a more significant difference in findings, in addition to the difference with Karimi et al. (2016) study. Liu et al. (2021) showed that entrepreneurship education courses positively moderated the relationship between entrepreneurial self-efficacy and opportunity recognition but did not provide a clear conclusion as to whether it significantly enhanced EOI ability. In this study, we found that the EOI ability of students who participated in the compulsory and elective EEP courses (experiment group) tended to increase compared with the control group, which confirmed that participation in EEP had a positive effect on Chinese engineering students, and also verified that the existing EEP improved students' EOI ability, but only from "disagreed little extent "This confirms the positive effect of participating in EEP on Chinese engineering students.

There may be various reasons why this study differs from previous studies. Most previous studies were descriptive, paralleling entrepreneurial opportunity identification with other factors and on different student samples. Most of the studies conducted in China focused on general education in entrepreneurship education, and most of these samples were from management disciplines or business fields. However, this study expands the depth and area of research from general entrepreneurship education research to entrepreneurship education integrated with disciplinary majors and from business primary research to engineering significant research. Expanding these areas led to more detail in the independent variables in the study. It increased the specificity of the dependent variables, providing a more detailed explanation for identifying entrepreneurial opportunities. As a result, the results of this study indicate a higher EOI ability in the experiment group than the control group, reflecting that conclusions drawn may be significantly different when the variables are more precise. This study broadened the source of the sample by using a more diverse two-stage experiment for the study and a sample of students from engineering disciplines, particularly those with degrees in construction engineering. Incorporating students' majors into the study context allows for more targeted enhancement of EOI ability for specific populations by capturing their significant preferences. After taking EEP courses at various levels, students' EOI ability improved somewhat, but the improvement was not significant. Therefore, there is a need to develop a course that can effectively enhance EOI ability and provide continuing education to students to enhance EOI ability effectively.

From the results of the study, the most critical point that emerges from this study is that the enhancement of engineering students' EOI capabilities in the Chinese context depends on students' learning in the areas of "network creation," "attributes, values, and motivations of an entrepreneur," and "management knowledge and skills." EEP is the acquisition of "network creation," "attributes, values, and motivations of an entrepreneur," and "management knowledge and skills." Therefore, in developing EOI abilities, students must focus on learning and acquiring the three factors because they are relatively practical and effective in improving their EOI abilities. They have a relatively valuable and influential role in improving students' EOI abilities. In the entrepreneurship education process, teachers should encourage students to engage in entrepreneurial activities by developing their interpersonal networks, Entrepreneurial spirit, and management skills.

Few previous entrepreneurship education studies have pointed to this point because there still needs to be more in-depth segmented research on the impact of EEP courses on EOI ability—however, the results of the study contrast with the views of some previous studies conducted in China. Most previous studies have emphasized students' entrepreneurial intentions, motivation, and self-efficacy rather than entrepreneurial opportunity identification in this context (Abdullahi et al., 2021). In addition, the results of this study are inconsistent with previous studies on the impact of gender on EOI ability, where the analysis of demographic data of engineering students yielded no significant effect of gender on the improvement of EOI ability, and the findings of Gupta et al., (2019), which reproduce the role played by the gender gap in entrepreneurial outcomes. However, the effect of gender in this study is minimal, which may be since, in the study of the effect of gender on EOI, most of the samples in the study were from society or companies, not college students. The gender differentiation in the personality traits of college

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students is not apparent. At the same time, the social division of labor has different needs for physical and gender strengths of different genders, so the "occupational gender " differentiation is evident. Few types of research have been conducted on the influence of disciplinary specialties on EOI ability (Rahim et al., 2021).

Moreover, the results of this study show that disciplinary specialties have some potential impact due to the different entrepreneurial characteristics of the specialties that determine the ease of professional innovation and entrepreneurship. Therefore, it is necessary to guide students in entrepreneurship by teaching professional courses when planning to start a business. At a broader level, this study provides empirical evidence for professional ability education in EEP by revealing the factors that influence students' EOI ability in EEP courses.

Responses to the Second Research Question

The second research question of this study is, "Can EOI courses effectively improve the EOI ability of engineering students?" This study confirms the positive correlation by testing the effect of EEP on EOI and reveals the main factors that influence students' EOI. The researcher identifies the factors that influence students' identification of entrepreneurial opportunities and, based on this, develops an EOI course for engineering students. The ADDIE model and BLOOM theory were used to guide the course development in the study, and the effectiveness of the course was verified through quantitative data obtained from the pre-test and post-test of the experiment group and qualitative data obtained from the interview. The students' EOI was significantly higher after participating in the developmental program, and there was a qualitative improvement from "uncertainty" to "certainty" about their abilities, which indicates that the EOI course developed in this study positively impacted EOI abilities and that the course developed specifically to improve EOI abilities had a higher pedagogical impact. Entrepreneurship education is a fundamental way to gain knowledge about identifying entrepreneurial opportunities, and students are advised to delve into the various abilities required in the entrepreneurial process. One possible reason for improving student EOI may be related to the variety of skills and teamwork practices students may gain in the EEP. The Chinese EEP emphasizes hands-on skills training and allows students to design business plans and analyze successful entrepreneurial cases. Students can look to them as successful role models for mentoring. Another reason may be that students' enthusiasm for learning may increase as they realize that a new discipline can open up new possibilities for their employment. However, the first experiment of this research experiment showed that Chinese engineering students had relatively low EOI ability scores. Of course, the low scores do not mean that the EEP is ineffective, which may be related to the curriculum design of the EEP. Most Chinese EEP courses are still in the general education curriculum and are taught uniformly (Cai & Hwang, 2021). In this pedagogical context, integrating engineering and technology into entrepreneurship education and maximizing the combination of professional characteristics and entrepreneurship training may be challenging, which also has some positive effects on students.

The results of this study are about education in the early stages of entrepreneurship. The ultimate learning value of students' participation in entrepreneurship courses may be reflected in either direct entrepreneurship or post-graduation employment. Prior literature has experimental evidence, and the experimental validation of this study suggests that Chinese engineering students' EOI abilities are affected and are likely to exhibit entrepreneurial behavior in the future. To obtain empirical evidence, it would take years to track and investigate students' future development. However, the results of this study suggest that entrepreneurship education at Jiaxing University can positively impact the improvement of engineering students' EOI ability. The existing EEP can also be enhanced to improve students' EOI abilities by reinforcing the relevant factors. Combined with the EOI curriculum developed in this study, EOI can be further improved so that students can acquire the necessary EOI abilities for future entrepreneurship.

Conclusions

The result of this study is about education in the initial stage of entrepreneurship. After taking entrepreneurship courses, their ultimate learning value may be reflected in direct entrepreneurship or their work after graduation. Previous literature has experimental evidence, and the experimental validation of this study also indicates that the EOI ability of Chinese engineering students has been affected, and entrepreneurial behavior is likely to occur in the future. It takes many years to track and investigate students' future development to obtain empirical evidence. However, the results of this study indicate that entrepreneurship education in Chinese universities can positively impact the improvement of engineering students' EOI ability. By strengthening the relevant factors that affect students' EOI, modifications can be made within the existing Chinese EEP to improve students' EOI ability. Combined with the EOI curriculum developed in this study, EOI can be further improved, enabling students to achieve the necessary EOI ability in future entrepreneurship.

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Limitation and Study Forward

This study involves two major themes, entrepreneurship and education, which require the latest information and long-term follow-up research. Therefore, this study cannot solve all problems, but some limitations are proposed in this section for discussion.

Research Time

The second part of this study conducted a post-test shortly after the development of the course and did not measure the stability of EOI ability over a certain period. The time lag between intention and action may take a long time (Krueger, 2007), and the measurement of stability requires comparative research after students engage in entrepreneurial activities or social work to determine whether they have stable EOI abilities or whether their EOI abilities have improved again. However, this is beyond the time frame of this paper.

Quantitative Study

In the first part of the study, quantitative measurements were mainly used, which can only measure the causes of the impact. However, this study is confident in the effectiveness of the results as there have been studies that have confirmed the effectiveness of quantitative research. In the future, qualitative research methods such as interviews can also be used to understand students' understanding of EOI ability. In addition, students' ability assessment experts can also be invited to carry out quantitative or qualitative assessments of students' EOI ability to more accurately measure students' EOI ability levels from the perspective of third-party experts. In the second part of the research, experts can be invited to conduct quantitative or qualitative assessments before and after teaching development courses. Provide opinions from a third-party perspective.

Sample Source

In phase 1 of the study, the experiment and control groups were selected from the same university. This is because entrepreneurship education is still in the development stage in China and is personalized. EEP courses at different universities may have varying degrees of teaching impact on students. Therefore, in the selection of samples, more samples with similar educational backgrounds were selected.

Further Research

The conclusions drawn from this study and the abovementioned limitations provide multiple avenues for future research. This study was conducted at a comprehensive public university in China, and the survey methods and results can be extended to other similar universities. Copying this study in different universities can verify whether the results of this study are consistent. In addition, this study measures students' ability to identify entrepreneurial opportunities rather than entrepreneurial behavior. Only in this practical process can students' EOI ability be truly reflected in their future career or entrepreneurial behavior, and better research feedback can be obtained through further follow-up surveys. Based on research on the identification of entrepreneurial opportunities, it is worth further research to empirically test how the developed entrepreneurial opportunity identification course regulates students' EOI in more detailed factors in future research.

Educational Research

China is in a period of rapid economic development, and social entrepreneurship is in a peak period. However, the entrepreneurial rate of Chinese college students is not high, and there is a certain gap between their entrepreneurial enthusiasm and social entrepreneurship enthusiasm. Moreover, the entrepreneurial enthusiasm of students varies among different levels of universities and economic regions. A deep understanding of students' learning abilities, entrepreneurial environment, and other aspects will be a very meaningful study to determine whether and how it affects students' entrepreneurial rate motivation. Education is not a process of indoctrination but a process of stimulating students to learn active learning. After offering EEP courses in universities, how to attract students and encourage them to study entrepreneurship education-related courses is a research that can deeply improve the effectiveness of entrepreneurship education courses.

Research on Entrepreneurship Related Factors

Entrepreneurship is a behavior influenced by external and internal factors, so studying the connections between each entrepreneurial element and identifying the factors and connections that affect the ability to identify entrepreneurial opportunities is an interesting and in-depth research direction. This may require further development of the entrepreneurial learning component (Souitaris et al., 2007). For example, whether parents' professional background, family education on the sense of responsibility, the relationship between parents and children have a significant impact on students' EOI, whether the frequency of teaching interaction in entrepreneurship teaching classrooms, and the frequency of entrepreneurship activities held by schools have a significant impact on students' EOI. Therefore, investigating which self-factors and environmental factors affect the EOI ability of Chinese

university engineering students is a direction for future research.

This study supplements the existing knowledge system on EEP by revealing the positive impact of entrepreneurship education on entrepreneurial opportunity recognition. These courses include entrepreneurial foundations, entrepreneurial attitudes, practical skills, and entrepreneurial opportunity recognition skills, but most have not yet been tested for their relationship with entrepreneurial opportunity recognition. This study fills this gap by testing students' EOI ability, opening up a research gap in the slicing of entrepreneurship education, and opening up research ideas for transforming entrepreneurship education from rough education to refined and standardized education. From the perspective of educational practice, the curriculum design that combines EEP's professional education and entrepreneurship education provides a good sample and model, especially in the specialized entrepreneurship education of Chinese engineering students. This course can be considered for use, and in the teaching practice process, continuous thinking and improvement methods for entrepreneurship education of engineering students are proposed to further research the entrepreneurship education of engineering students. To achieve the goal of entrepreneurship education for engineering students, that is, to enhance their entrepreneurial level and professional technology entrepreneurship rate. It hopes to provide evidence for the research on entrepreneurship education and identify entrepreneurial opportunities through this study.

Conflict of Interest and Ethical Standards

There was no conflict of interest or unethical behavior between the research content and the current organization during the research period.

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