

How Innovation and Entrepreneurship Competitions Improve Medical Students' Practical Innovation Capabilities¹

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Abstract

Promoting an innovative culture among medical practitioners is essential as the healthcare industry continues to change. Medical colleges do not have enough experience developing students' creativity and entrepreneurship skills because they began teaching these subjects to medical students quite recently. This research examines the current state of conditions and issues affecting medical students' knowledge of innovation and entrepreneurship (IE), it examines the primary causes of the issues that exist and suggests practical strategies for promoting this awareness. To evaluate the current state of student understanding of IE, a questionnaire was initially distributed to 496 medical college students. The responses from the survey were processed with SPSS software and a study was done to identify the elements that influenced students' knowledge. The study result reveals that the students' knowledge of IE is lacking and this needs to be strengthened. The factors that contribute to this weakness include a hard workload in the classroom, a lack of funding, a limited entrepreneurial approach, a lack of systematic training and insufficient promotion of the medical school. To raise medical students' understanding of IE, the government, society and educational institutions must provide appropriate direction and adequate support.

Keywords: *Innovation, Entrepreneurship, Medical Students, College, Awareness.*

1. Introduction

As current higher learning continues to be developed and reformed, teaching students about IE is becoming popular [1]. A key strategy to support reforms in education is through incorporating entrepreneurship education into college and university curricula [2]. The educational system has been discussing IE education recently. This is done with the intention of developing inventive skills, that is, learners who have the courage, adventure and independence to inquire about the current quo and who can think beyond the boundaries to find new solutions to difficulties that meet societal expectations [3]. Cultivating students' innovative spirit and entrepreneurial ability is the foundation of IE education [4]. Colleges and universities follow guidelines in improving the concept of education, developing the personnel training model, modifying the curriculum and

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delivery methods, closely integrating talent training, scientific research and social services, understanding the shift from knowledge to ability coupled with quality and enhancing the quality of personnel training [5]. Since medical students are a vital component of the nation's health sector, increasing their general standards is advantageous for the growth of the healthcare industries [6]. The foundation for developing and refining remarkable medical talent can be found in medical colleges [7]. It encourages college students to engage as soon as possible in research along with other creative and entrepreneurial endeavours to improve their capacity for entrepreneurship based on their capacity for innovation. The development of creative and entrepreneurial skills in medical colleges and universities is crucial because it addresses societal demands. Medical universities should actively seek to establish a link between their curriculum and the real needs of the public for health services. They should enhance the training of medical students' innovative and entrepreneurial abilities, which will enable them to provide greater talent resource support for fostering the rapid development of these skills as the nation becomes more and more focused on this area [8]. Through practical experience, teamwork, interpersonal abilities development and exposure to opportunities along with challenges in healthcare innovation, IE competitions act as a catalyst for medical students to develop practical innovation capabilities [9, 10]. The study [11] introduced the "theory of planned behavior" and the psychology of learning, which provides an overview of the current state of IE education in developed and emerging nations. The theory was utilized to represent the factors that influence college students' entrepreneurial goals. A questionnaire survey followed to determine the link between the influencing components and the entrepreneurial intention. The research [12] examined the implications of the theory of planned behavior and the way entrepreneurship education influences the intention to start an enterprise. The results showed that firm proposal contests, support for entrepreneurial practice and entrepreneurial education affect entrepreneurial competence. The investigation [13] developed the innovation and entrepreneurial learning quality assessment model for college students and the evaluation index system was decided. The study [14] examined the implementation of Internet IE education methodologies, including the principles of education design, instructional modifications, the team effort of instructors and the application of Internet invention and entrepreneurship. It depended on an examination of the principles, traits and developing state of Internet-based learning in China's IE. The research [15] examined the way entrepreneurial intention is influenced by entrepreneurship policy, entrepreneurial spirit and entrepreneurial practice. It discussed how EPr, when combined with ES, acts as an intermediary on EPo and the ways this can affect EI. The investigation [16] evaluated the students' entrepreneurial capabilities by considering the results of China's implementation and teaching of its business policy. According to the research, undergraduates who participated in entrepreneurship developed their entrepreneurial skills more than those who took regular entrepreneurship classes. Additionally, there was a notable difference found in the evaluation of the influence of the start-up plan between students who participated in activities and those who did not. The study [17] examined trademark considerations in light of the company and the stage of the innovation life cycle. They outlined possibilities for additional research. The special issue's three core perspectives provide various insights into trademark motivations, but they do not interact to help comprehend the underlying tactics and contingencies. The research [18] examined the way that financial technology (fintech) innovation affects a company's strategy as it enters the investment advising market, maintaining the fact that the technical advancements driving this innovation originate outside the company. They showed that innovation affects industry firms in an inconsistent way, increasing competition for larger incumbents while promoting growth for start-ups and smaller enterprises. They showed that exterior technological shocks can encourage entrepreneurial ecosystems, which can change the structure of markets. The investigation [19] examined the way exploration innovation affects the profitability of start-up firms. In particular, their potential harmful impacts are

examined through the use of the moderating function of competitive intensity and the intermediary function of entrepreneurial orientation (EO). The results showed that EO and the level of competition in start-ups have affected the influence of innovation efforts on company performance. The study provided a greater comprehension of the interaction between innovation, external environment, business performance and EO. The study [20] examined and assessed the theory that utilized entrepreneurial leadership and innovation to develop a learning environment. Every student has the ability to follow the learning process, produce original works of art and advance academically and extracurricular. The study suggested an approach of action for the school, as one of the most important aspects of learning is the imaginative and enterprising leadership of a principal. The research [21] investigated the IE that affects women-owned small and medium-sized businesses' ability to function as effective entrepreneurs. The study looked at how innovation acts as a moderator in the performance-entrepreneurship link in emerging-market women-owned businesses. The results show that creativity, entrepreneurship and entrepreneurial achievement are correlated. The investigation [22] illustrated that EO and business model innovation (BMI) influenced the globalization of small and medium enterprises (SMEs). They investigated BMI's mediating function in the association between EO and international success in SMEs that are internationalizing. The findings indicated that the association between EO and international performance is positively and significantly mediated by BMI. The study [23] examined the relationship between creativity and innovation in education and proposed a framework for teaching innovative thought, entrepreneurship and creativity that emphasizes sustainable along with innovative solutions to problems. It proposed an intermediate path for vocational and technical education in developing nations toward sustainable development, as well as curriculum design for creativity IE education at different stages of education. The aim of this study is to examine the obstacles and situations that medical students face when it involves IE. It examines the main reasons behind these problems and offers feasible options for raising awareness of these difficulties.

The following are the remaining sections: Section 2 discusses methodology, Section 3 presents results and discussions and Section 4 wraps up the study.

2. Methods

The study investigates the factors and challenges that impact medical students' comprehension of IE. Medical college students were given a questionnaire to evaluate their present level of awareness of IE. SPSS software was used to process the survey responses. It examines the root causes of the problems that are present and offers workable solutions for raising awareness of these issues.

i. Dataset

The data for the surveys were collected from [24] medical students of four medical university from Guangxi province in China. 496 (294 men and 202 women) completed the issued questionnaires. An analysis of the comprehension of IE students was conducted using a questionnaire survey [24]. The response rates were 73.8% (93/126), 73.2% (90/123), 68.6% (83/121), 69.5% (89/128), 61.2% (63/103) and 55.3% (78/141) for students in Grades 1 to 6.

ii. Study design

In total, 400 questionnaires were utilized in the research. This questionnaire is divided into three sections: (1) questions about the desire, preference, mental abilities and objective of IE; (2) questions about the creation of training programs for medical university students to increase their awareness of these concepts and (3) questions about the elements influencing medical students' IE awareness. Participants in the research were divided into two groups according to which student's participation in the IE awareness

training programs: the group of 258 received awareness training, while a group of 238 did not receive any training. Analysis was done on the differences in the two groups' knowledge about IE.

iii. Statistical analysis

ANOVA is a crucial method for research as well as conclusive data analysis. An uncertainty ratio is employed in the method to assess the importance of the data. After the initial data was entered, Statistical Analysis System (SAS) software was utilized to analyze it. Testing and illustration of the null hypothesis as:

$$\{A_0: \mu_1 = \mu_2 = \dots = \mu_o \quad A_1: \mu_1 \neq \mu_2 \neq \dots \neq \mu_o \quad (1)$$

Using the ANOVA, the variance of observations (VO) is divided into within-group and between-group variance (WG and BG, sequentially).

$$VO = BG + WG \quad (2)$$

The SB is determined by,

$$BG = \frac{1}{O-1} \sum_{A=1}^O u_A (\underline{x}_A - \underline{x})^2 \quad (3)$$

Where \underline{x}_A is the mean of the A^{th} group, \underline{x} is the mean of all data and u_A is the number of data in the A^{th} group. The WG is determined by,

$$WG = \frac{1}{(O-1)V} \sum_{A=1}^O (\sum_{r=1}^V (x_{A,r} - \underline{x}_A)^2) \quad (4)$$

Where the r^{th} data of the A^{th} group is represented by $x_{A,r}$. To test the hypothesis, the F-statistic is created, which is,

$$M = \frac{BG}{WG} \quad (5)$$

The data is presented as mean Standard deviation (SD). SPSS was used to input and analyze the original data.

3. Result

The study examines the factors affecting medical students' understanding of IE and obstacles they endure. A survey was distributed to medical college students to gauge their current familiarity with IE. The survey responses were processed by using SPSS software. The study examined and surveyed factors such as students' IE awareness, regularity of training sessions, impact of training and entrepreneurial awareness.

a. The development of a new entrepreneurial awareness among medical students

The growing number of health and medical professionals has crowded out social roles in allied industries as well as education and experience requirements rise for each program, recent graduates face disadvantages when looking for work. The knowledge of IE policies among medical students indicates the extent to which college students are acquainted with these activities and the extent to which they comprehend national policies that promote them. According to the results of the survey, 5.82% of medical students were very knowledgeable about the policies, 65.29% were not aware of them and 29.43% had no idea what the nation's policies were about entrepreneurship and innovation. The study examined the attitudes of medical students regarding engaging in relevant activities that promote innovation and entrepreneurial awareness. Table 1 depicts the significance of conducting training programs in IE.

Table 1: Significance of conducting training programs

S.no	Importance	Percentage
1.	Extremely important	15.20
2.	Essential	72.80
3.	Not mandatory	10.25
4.	NOT required	1.75

15.20% of medical students felt that participating in training sessions was extremely important, 72.80% felt that it was essential, 10.25% felt that it was not mandatory and 1.77% felt that it was not required.

b. Regularity of training sessions

The regularity of training sessions on innovation and entrepreneurial awareness can impact their effectiveness. Due to demand from numerous competitors, a large number of medical institutions and universities already provide IE education. In addition to placing a strong emphasis on learning along with skill development, medical higher education must closely examine students' creativity and entrepreneurial education. In addition to helping colleges develop the next generation of creative medical talent and maximize their educational potential, this can help them improve their own content creation and become more competitive. Table 2 and Figure 1 represent the regularity of training sessions.

Table 2: Regularity of training sessions

S.no	Regularity	Percentage
1.	Frequently	8.18
2.	Less Frequently	65.21
3.	Occasionally	20.21
4.	Rarely Conducted	4.21
5.	Not Conduct	2.79

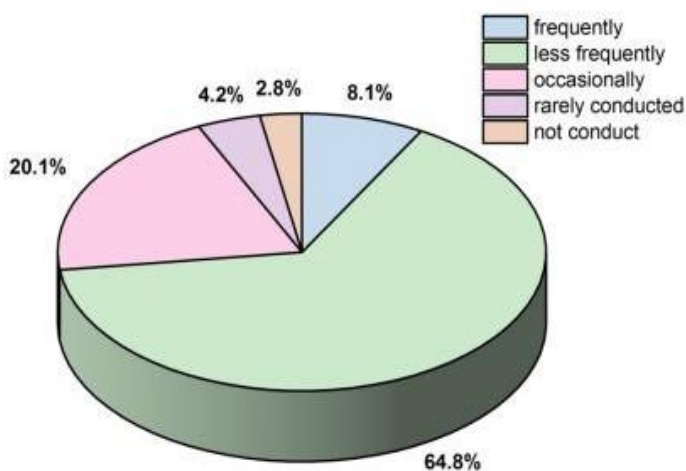


Figure 1: Regularity of training sessions

Students' perceptions of training activities were as follows: 8.18% thought they were conducted, 65.21% thought they were conducted less, 20.21% thought they were conducted on occasions, 4.21% thought they were rarely conducted and 2.79% reflected schools did not conduct training activities.

c. Awareness of IE

A comprehensive training program along with a thorough and in-depth reform of creative and entrepreneurial education are prerequisites for medical institutions to meet their goal of developing the inventive and entrepreneurial abilities of their medical students. Initially, universities could establish new professional institutions for IE education that contribute to the disciplinary and professional development of IE education. Increasing knowledge of IE entails participation in entrepreneurial communities, mentorship, exposure to real-world examples and educational programs. A higher level of awareness makes one more capable of contributing to creative solutions, adding value and even going after entrepreneurial endeavors. Considering the fact that many medical colleges offer creative and entrepreneurial meetings, few learners actively participate in them and the events' intended outcomes are not met. There are two main categories for these reasons. Medical colleges coupled with universities do not make significant investments in entrepreneurship and innovation education, nor do they construct professional spaces for entrepreneurship or buy the office supplies and professional equipment needed for it. The majority of IE activities take the form of theory and there are few opportunities for practical application. This makes it difficult for students to develop and enhance their IE skills. Students' opinion on the IE is tabulated in Table 3 and Figure 2.

Table 3: Opinions of students

S.no	Opinion	Percentage
1.	Optimistic	14.21
2.	Anxious	55.81
3.	Confused	18.51
4.	Gaming	11.47

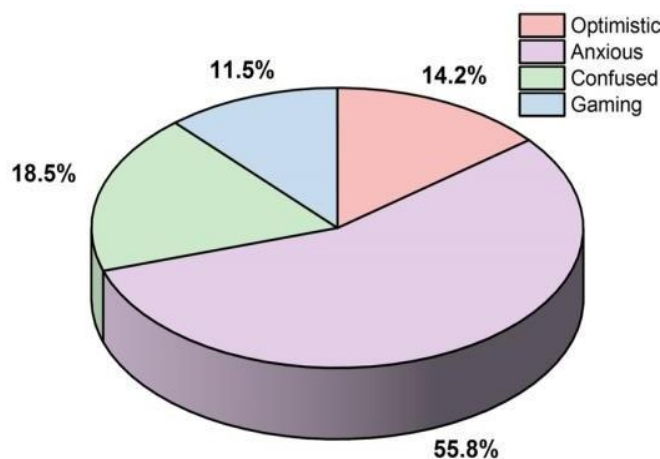


Figure 2: Opinions of students

14.21% of students are optimistic about the future of IE, 55.81% are anxious about it, 18.51% are confused about it and 11.47% perceive it as a kind of gaming. Medical

colleges and individual medical students need to start by investigating national and local policies to seek different policy assistance that is favorable to IE operations to reduce the demand for employment and expand the employment channels. For instance, to increase support for IE among college students, some places have implemented policies such as special funds for IE, patent subsidies, risk assistance, entrepreneurship subsidies, VAT refunds, enterprise income tax reductions and business tax reductions. To improve their core competitiveness and boost employment, colleges and universities should encourage medical students to get involved in IE activities related to "medical care and health" in terms of market demands, national development needs along with their own professional advantages.

d. Impact of training

Student training programs in IE have the potential to have a significant and diverse influence. Effective training programs can help people acquire the knowledge, abilities and mindset needed to succeed in their entrepreneurial efforts. Training programs in IE have a lasting effect on students, affecting them not just during their school years but also throughout their professions and social contributions. The results can go beyond personal achievement to include group advantages for economies and communities. College students are split into five distinct categories based on their degree of interest: highly intrigued, comparatively interested, general, not very engaged and not interested at all. These groups are further divided based on whether or not they have taken part in training activities for IE awareness. The results (Table 4& Figure 3) of the students' enthusiasm in IE are influenced by training activities.

Table 4: Students interest

Students	Highly Intrigued	Comparatively Interested	General	Not Very Engaged	Not Interested
Attended training activities	15	166	60	12	5
Not attended	9	102	96	20	8

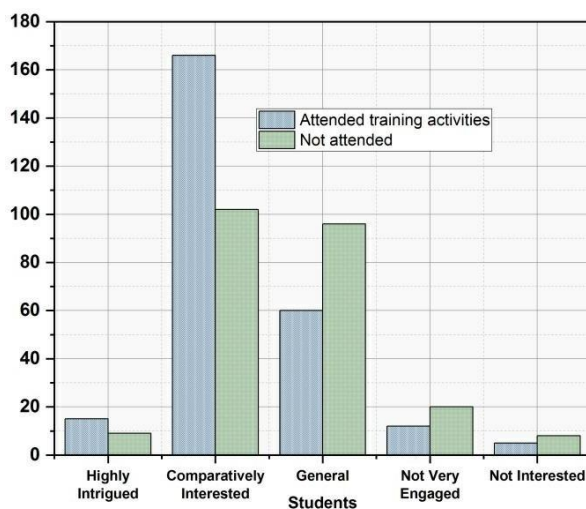


Figure 3: Students interest

10.81% of students suggest that job issues can be resolved through entrepreneurship, 32.89% of students believe that entrepreneurship and innovation are ways to become more successful, 41.28% of students contend that entrepreneurship and invention are ways to challenge oneself, practice and get better at things, 8.21% of medical students

believe that confidence is attained through IE, 5.32% of students believe that IE involves doing what they enjoy, while 1.49% believe that these concepts have different connotations.

e. Factors impacting students'

A wide range of factors affect medical students' development of IE awareness. The competition for college students' entrepreneurial endeavors is stronger due to the struggle between an abundance of business ideas and a scarcity of funding sources. As a result, many medical students who aspire to be entrepreneurs are frightened of losing and the associated risks. As a result, several innovative and entrepreneurial initiatives failed to overcome their problems and ended in the midst. These elements include cultural norms and attitudes, multidisciplinary cooperation, instructor support, educational curricula as well as funding and resource availability. Table 5 depicts the elements impacting the students.

Table 5: Impacting elements

S.no	Elements	Percentage
1.	Insufficient Time	23.21
2.	Financial Shortage	24.81
3.	Lack Of Entrepreneurial Spirit	21.82
4.	Lack Of Organized Instruction	14.80
5.	Lack Of Exposure	15.36

The main barriers to medical students engaging in IE are insufficient time (23.21%), financial shortage (24.81%), lack of entrepreneurial spirit (21.82%), additional elements affecting include lack of organized instruction (14.80%) as well as direction and lack of exposure (15.36%). Medical students are able to become more engaged and enthusiastic about IE in an environment where these concepts are strongly valued. Medical colleges and universities should correct their erroneous assumptions about the importance of teaching students about IE, give this subject top priority, actively foster an environment that encourages these subjects and mentor students in ideology and consciousness. However, schools can host lectures on IE, bringing in academics, professionals as well as notable entrepreneurs to share their successful stories with students and increase their desire to pursue these fields.

4. Conclusion

The conflict between college students' employment and societal demands has been growing more evident as a result of increased rivalry for jobs and an ongoing increase in enrolment in large colleges and universities. Competitions oriented on entrepreneurship and innovation are essential for developing medical students' capacity for applied innovation. Medical students' work prospects are not promising and their choices for employment are limited because of the unique nature of the medical field. To a certain extent, medical students' enthusiasm for IE has been impacted by their lack of training in the development of these skills. All of these contribute to medical students' lack of drive for IE as well as their low awareness of these concepts. Medical students can acquire transformative skills through IE competitions, which improve their practical innovation capabilities. These competitions help in the development of future generations of healthcare innovators and entrepreneurs by offering an opportunity for practical application, interdisciplinary collaboration and exposure to entrepreneurial thinking.

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