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Entrepreneurial intentions among medical laboratory technology students: effect of education and self-efficacy

Putu Gede Subhaktiyasa[1], I Gusti Putu Agus Ferry Sutrisna[1], Nyoman Putri Sumaryani[2], Ni Wayan Sunita[2]
[1]Department of Medical Laboratory Technology, Sekolah Tinggi Ilmu Kesehatan Wira Medika Bali, Denpasar, Indonesia
[2]Department of Biology Education, Faculty of Teaching and Education, Universitas Persatuan Guru Republik Indonesia Mahadewa Indonesia, Denpasar, Indonesia

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ABSTRACT

The role of entrepreneurship in addressing the issue of educated unemployment is well acknowledged, while its specific implications for health professions students remain inadequately explored. This study's main objective is to investigate entrepreneurship education's effect on entrepreneurial intention by considering entrepreneurial self-efficacy as a mediator in students majoring in medical laboratory technology. This quantitative research uses an exploratory approach involving 300 respondents determined through simple random sampling techniques and analyzed using partial least square structural equation model (PLS-SEM). The analysis revealed that entrepreneurship education directly impacts self-efficacy and entrepreneurial intention. Furthermore, entrepreneurial self-efficacy was identified to exert a positive mediating effect between these variables. However, the effect size between the relationships of the research variables is low. Nevertheless, higher education offering health majors can optimize entrepreneurship education by implementing practical learning and field experience to increase confidence and intention in entrepreneurial activities.

Corresponding Author:

Putu Gede Subhaktiyasa
Department of Medical Laboratory Technology, Sekolah Tinggi Ilmu Kesehatan Wira Medika Bali
Kecak Road No. 9A, Denpasar, Bali, Indonesia
Email: pgs@stikeswiramedika.ac.id

1. INTRODUCTION

Unemployment remains a significant concern for higher education in Indonesia [1], [2]. Although the number of educated graduates continues to increase, many face challenges in finding suitable employment [3]. The Indonesian National Survey shows that the educated unemployment rate is higher than the uneducated unemployment [4], [5]. In addition, business growth that is not proportional to the supply of educated graduates is another issue that complicates the situation [6], [7]. Therefore, the government encourages entrepreneurship education (EE) to improve entrepreneurial competencies, increasing the number of entrepreneurs [8].

Entrepreneurship's importance in reducing unemployment and promoting economic growth has been widely recognized [9], [10]. Entrepreneurship seeks to transform the perspective of graduates from seeking employment to establishing their businesses [11], [12]. Entrepreneurship goes beyond being the result of a discipline and refers to a creative, innovative, and opportunity-oriented process through the educational process [13], [14]. EE is crucial in cultivating the necessary attitudes, knowledge, and abilities for individuals aspiring to embark on entrepreneurial endeavours.

While the critical role of EE has been recognized, some emerging challenges exist in understanding its actual impact on students' intention to start a business. Several studies provide evidence of a significant relationship between education and entrepreneurial intention (EI) [15]–[18], but recent meta-analyses describe more complex outcomes and weak effect sizes [19]. Previous findings even found that EE could not increase EI [20], [21]. Various research also has yielded diverse outcomes in different countries [22].

Previous studies on EE research among higher institution students have been conducted extensively in Indonesia [23]–[26]. Meta-analysis demonstrates the critical role of education in increasing higher education students' intention to engage in entrepreneurship [27], [28]. However, more specific research subjects, such as students majoring in medical laboratory technology, are still limited. It is essential to consider that the orientation and initial goals of students in this major may differ from those of students in other majors. Prior studies have pointed out that EIs in students majoring in health professions tend to be lower than in other majors [29]. It could be related to a career orientation in healthcare, which may not always align with the traits of an entrepreneur. In addition, low social support may limit the effectiveness of the education provided to gain entrepreneurial understanding [30].

Although several studies have investigated the effect of education on EI, a knowledge gap still needs to be filled in this relationship. The mediating role of entrepreneurial self-efficacy (ESE) in the relationship between EE and EI requires further investigation to enhance comprehension [31]. High self-efficacy gained through EE [32]–[35] means that people are highly motivated to be entrepreneurs [36], [37], and this makes people more likely to become entrepreneurs [38]–[42]. Although previous findings indicate the mediating capability of self-efficacy as a mediator [11], [43]–[46], it is limited to the context of medical laboratory technology students.

The study enhances our comprehension of the intricate connection between EE and EI within health professions education. This study explores EE's effect on EI, considering the mediating role of ESE in medical laboratory technology students. This study provides a valuable contribution to developing EE among students in the context of health professional education in Indonesia, especially in the medical laboratory technician profession. Previous literature has demonstrated that EE affects ESE and EIs. Likewise, ESE on EIs shows a significant effect and can mediate the impact of EE on student EIs. Therefore, the conceptual framework of this study can develop as presented in Figure 1. This study hypothesizes that EE significantly positively affects EI (H1) and self-efficacy (H2). ESE positively affects EI (H3) and mediates (H4).

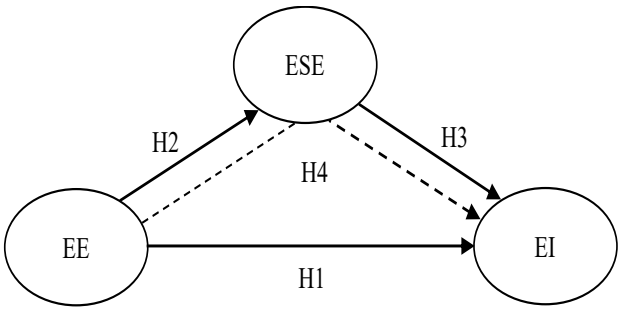

Figure 1. Conceptual framework of the research

2. METHOD

2.1. Research design, population, and sampling

This quantitative study uses an exploratory approach to test hypotheses and explain the influence between research variables. The population of this study is all medical laboratory technology students at higher education institutions in Bali, Indonesia, who have passed the EE subject. Due to limited information, the sample size determination uses the Roscoe concept [47], which states that the sample size is at least ten times or greater than the number of variables in the multivariate research model. According to that concept, the determination of the number of samples used is 100 times the number of variables or 300 students obtained through a simple random sampling technique. Table 1 presents the characteristics of the respondents, where the majority (88%) were female, and 60% were medical laboratory technology students in the applied undergraduate program. Most respondents came from cities with parents as private civil employees (38%). While 33% of their parents are entrepreneurs, The data also shows that 61.7% of respondents do not come from a family environment with a background as an entrepreneur.

Table 1. Demographic characteristics of respondents

Demographics	Classification	Number of Respondents	Percentage (%)
Gender	Male	36	12.0
	Female	264	88.0
Education	Diploma 3	120	40.0
	Applied Bachelor	180	60.0
District of Origin	Village	131	43.7
	City	169	56.3
Parent's Occupation	Entrepreneur	99	33.0
	Private Sector Employee	114	38.0
	Government employee	87	29.0
Background from Entrepreneurial Family	No	185	61.7
	Yes	115	38.3

2.2. Instruments

The study adopted a closed-ended questionnaire as the main instrument to obtain primary data. According to Puni *et al.* [34], the EE questionnaire consists of an opportunity recognition dimension with four questions and entrepreneurship knowledge acquisition with six questions. The EI and self-efficacy questionnaires refer to Liñán and Chen [48], each consisting of 5 questions. Each questionnaire statement uses a Linker scale with odd scores, from 1 for a strongly disagreeing answer to 5 for a strongly agreeing answer.

2.3. Data collection and analysis

Data collection was conducted online using Google Forms by engaging enumerators from each higher education institution to obtain appropriate respondents. Furthermore, the data were analyzed using partial least square structural equation model (PLS-SEM) with SmartPLS 3.0 software to examine the research hypothesis. The first stage in evaluating the measurement model involved evaluating construct validity (convergent and discriminant validity) and reliability of the reflective model. Convergent validity was assessed based on an outer loading value of more than 0.7 and an average variance extracted (AVE) of more than 0.5. An outer loading value of more than 0.5 is acceptable if the measurement model passes the internal consistency threshold and convergent validity criteria [49]. Discriminant validity with the heterotrait-monotrait ratio (HTMT) approach is smaller than 0.9. While reliability refers to a composite reliability (CR) value of more than 0.7, a second stage was conducted on the structural model to test the hypothesis regarding the t-statistic value and the p-value. The model's goodness evaluation uses criteria such as R-squared, f-square, upsilon mediation statistical value, standardized root mean square residual (SRMR), and Q2 prediction [50].

3. RESULTS AND DISCUSSION

3.1. Result

This analysis applies a reflective model with a first-order method. The research model's evaluation starts with the measurement model's evaluation through convergent and discriminant validity testing. Table 2 provides the outer loading, CR, and AVE values of indicators and variables of EE (X1), ESE (Y1), and EI (Y2). The outer loading value of all indicators has met the criteria of exceeding 0.7, except for indicators EE1, EE3, and EE6, with outer loading values above 0.6. Indicators with more than 0.6 are not removed from the model as the measurement model passes the internal consistency threshold and convergent validity criteria [49]. The outer loading value indicates that each indicator represents the measured latent variable. The AVE value exceeds 0.5, which suggests that the latent variable has absorbed information from its indicators by more than 50%. The higher the AVE value, the better a latent variable explains the variance of its indicators. While the CR value exceeds 0.7, it provides information on the reliability and consistency of the indicators in measuring the latent variable constructs. The evaluation results indicate that the constructs measured in the research model are reliable, consistent, and valid.

Discriminant validity refers to the extent to which a construct differs from other constructs in the model. We are testing through the HTMT approach by evaluating the ratio between heterotrait correlation (correlation between indicators of different constructs) and monotrait correlation (correlation between indicators of the same construct). Table 3 shows that the value of HTMT is smaller than 0.9, which indicates that the construct has good discriminant validity.

The convergent and discriminant validity results in the measurement model have met good validity and reliability criteria [49], [51]. According to these results, the analysis continued with an evaluation of the structural model. Figure 2 explains the relationship between the research variables, where the model shows a

t-statistical value above 1.96, which indicates an influence in the relationship. The effect of direct and indirect effects is explained in Table 4.

Table 2. Research model construct results

Variable	Indicator	Outer Loading	CR	AVE
X (EE)	EE1	0.632	0.921	0.538
	EE2	0.718		
	EE3	0.683		
	EE4	0.742		
	EE5	0.783		
	EE6	0.686		
	EE7	0.781		
	EE8	0.742		
	EE9	0.755		
	EE10	0.797		
Y1 (ESE)	ESE1	0.782	0.897	0.637
	ESE2	0.829		
	ESE3	0.852		
	ESE4	0.814		
	ESE5	0.705		
Y2 (EIs)	EI1	0.859	0.924	0.708
	EI2	0.837		
	EI3	0.857		
	EI4	0.797		
	EI5	0.855		

Table 3. Results of discriminant validity

	X (EE)	Y1 (ESE)
X (EE)		
Y1 (ESE)	0.538	
Y2 (EI)	0.547	0.647

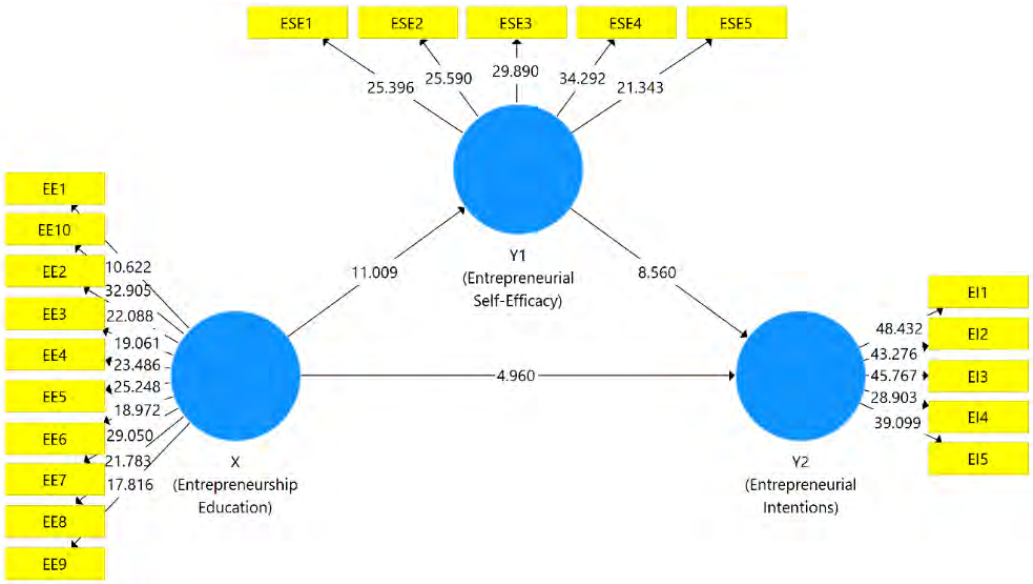

Figure 2. Structural model of research

Table 4. Research hypothesis testing results

	Path coefficient	Mean	Standard deviation	t-statistics	p-values	Decision
X (EE) → Y2 (EI)	0.287	0.287	0.058	4.960	0.000	H1 supported
X (EE) → Y1 (ESE)	0.481	0.489	0.044	11.009	0.000	H2 supported
Y1 (ESE) → Y2 (EI)	0.435	0.437	0.051	8.560	0.000	H3 supported
X (EE) → Y1 (ESE) → Y2 (EI)	0.209	0.214	0.036	5.875	0.000	H4 supported

Table 4 illustrates the significant direct and indirect effects among research variables with a t-statistic over 1.96 and a p-value below 0.05. The analytical results conclude that all study hypotheses are statistically accepted. The results indicate that EE had a more significant impact on enhancing ESE compared to EI in the path coefficient value.

The research indicates that the R square value for ESE is 0.232, suggesting that the EE variable can account for 23.2% of the variance in ESE, categorized as having a low influence. EE and ESE can explain 39.2% of the variance in entrepreneurial ambitions, indicating a moderate contribution. We evaluate the effect size of the direct effect using the f square and the indirect effect using the Upsilon (v) statistic value. EE has a moderate impact on ESE (effect size f square 0.301) and a low effect on EI (effect size f square 0.104). ESE moderately influences EI, with an f-square value of 0.239 [51]. The size effect on the indirect effect is shown by a statistical value of 0.044 (upsilon v), suggesting that the mediating role of ESE in the impact of EE on EI at the cultural level is low [52]. The smart-pls model fit study employs the Q square blindfolding process, resulting in a Q^2 value of 0.142 for ESE and a Q^2 value of 0.270 for EI. The Q^2 value is positive, indicating the model has predictive solid capability. The calculation findings indicate that the SRMR value of 0.061 is below the threshold of 0.08, confirming that the model aligns with empirical data.

3.2. Discussion

Prior studies have not clearly explained the impact of EE on EI in students majoring in medical laboratory technology. More empirical evidence is needed to describe EIs among students in health professions. In addition, ESE also needs to be analyzed to determine the impact of EE and the antecedent of students' EIs in this major. Therefore, this study examined the effect of EE on EI, with ESE as a mediator in the relationship. The analysis findings confirm Hypothesis 1 (H1), indicating that EE has a significant and favorable impact on students' entrepreneurial inclinations in the medical laboratory technology field. It demonstrates that teaching entrepreneurship can boost students' desire to start their businesses. Higher-quality EE programs lead to increased student engagement in entrepreneurial activity. This finding is consistent with research [53]–[55], which found that active student participation in EE subjects increases student EIs. Transferring knowledge and skills through EE opens students' understanding of and interest in entrepreneurship. Effective education improves students' ability to analyze opportunities and provide added value through creative and innovative ideas. However, the findings show that the effect size is low. The learning outcomes of EE, which are to gain an understanding of generating business ideas and improve the ability to see business opportunities in the context of students majoring in medical laboratory technology, still need to be improved. In addition, EE has not yet fostered students' optimal sense of independence. It explains why EE requires more practical approaches that provide real-life experience.

EE also significantly and positively affects the ESE of students majoring in medical laboratory technology. This finding confirms Hypothesis 2 (H2). Higher quality EE leads to increased self-confidence in entrepreneurial endeavors among students. The results are consistent with prior studies indicating that EE empowers students to take initiative in starting their businesses and effectively manage the earliest stages of business development [33], [56]. Experiential learning fosters ESE [57]. However, the effect is only in the moderate category. ESE also has a significant effect on EI, which confirms Hypothesis 3 (H3).

Students who have self-confidence show more effort in entrepreneurship. Students are prompted to consider managing the process of initiating a new business and sustaining its operations. These results align with prior research indicating that ESE is a predictor of EI [41], [56], [58]. Although the effect size of the influence of ESE on EI is moderate, the findings are close to high impact. This study demonstrates students' confidence in starting a business by providing practical details to foster EIs. In addition, the empirical results also confirm Hypothesis 4 (H4), where ESE can mediate the influence of EE on the EIs of students majoring in medical laboratory technology. ESE plays a crucial role in enhancing the impact of EE on students' EIs. The better the self-confidence formed through education, training, and experience in entrepreneurship, the more it will impact their desire to create a business independently [31], [59]. However, the impact is still relatively low. The findings explain that students majoring in medical laboratory technology do not have reasonable confidence in starting a business. It is possible due to their career mindset, which focuses on providing professional medical laboratory services at healthcare facilities.

4. CONCLUSION

The research provides an understanding of the role of EE in fostering the self-confidence and EIs of students majoring in medical laboratory technology. EE is proven to increase students' entrepreneurial confidence to start a business through creative and innovative ideas. It directly and indirectly fosters their EIs. However, the effect size of the influence is still less than optimal. This condition explains the tendency of students majoring in medical laboratory technology who have a career orientation as health professionals rather than entrepreneurs. It reflects a significant difference in mindset compared to other majors. The

findings highlight the importance of more in-depth and relevant EE in the context of medical laboratory technology majors in higher education. Additional efforts are needed to change the mindset of students and make them more open to entrepreneurial opportunities. The learning evaluation suggested that practical learning methods and field experience can increase confidence and EI. In addition, it is essential to involve experienced practitioners in entrepreneurship in the learning process to get objective evidence of entrepreneurial activities. These measures can positively impact the entrepreneurial skills of medical laboratory technology students, opening up alternative career opportunities and enriching their learning experience in higher education.

Although the study contributes to understanding the relationship between EE, ESE, and EI, some limitations exist. The location of this research is a higher education institution in Bali that provides medical laboratory technology majors. Therefore, further research is needed involving students with the same majors at higher education institutions in various provinces in Indonesia to provide a more general and consistent understanding. In addition, it is necessary to integrate other variables as antecedents of EIs, especially for students majoring in the health sector. Applying more varied qualitative research methods can increase the validity of the research.

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BIOGRAPHIES OF AUTHORS

Putu Gede Subhaktiyasa is a lecturer in Management at Sekolah Tinggi Ilmu Kesehatan Wira Medika Bali. He completed his master's degree in management at Udayana University, Indonesia, and his doctoral degree in education management at Universitas Pendidikan Ganesha, Indonesia. He is Vice Chairman of student affairs, alumni, career centre, partnership, and public relations. Her research focuses on organizational behavior and management, including education and health. He can be contacted at email: pgs@stikeswiramedika.ac.id.

I Gusti Putu Agus Ferry Sutrisna Putra is a lecturer in the medical laboratory at Sekolah Tinggi Ilmu Kesehatan Wira Medika Bali. He completed his master of science degree at Universitas Udayana, Indonesia. Her research focuses on the field of medical laboratory, including hematology, immunology, and mycology. He is also active as a board member of a professional organization for medical laboratory experts. He can be contacted at email: ferry.vikana@gmail.com.

Nyoman Putri Sumaryani is a lecturer in agribusiness at Universitas Persatuan Guru Republik Indonesia Mahadewa Indonesia. She completed her master's degree in agribusiness management at Universitas Udayana, Indonesia. His research focuses on agribusiness management, including education and entrepreneurship. She has served as the Biology Education Department secretary at Universitas Persatuan Guru Republik Indonesia Mahadewa Indonesia. She can be contacted at email: putri.sumaryani83@gmail.com.

Ni Wayan Sunita is a lecturer in mathematics education at Universitas Persatuan Guru Republik Indonesia Mahadewa Indonesia. She completed her master's degree in education at Universitas Pendidikan Ganesha, Indonesia. Her research focuses on the field of education and entrepreneurship. She can be contacted at email: wayansunita4@gmail.com.