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ANALYSIS OF ENTREPRENEURSHIP EDUCATION AND CREATIVITY ON TECHNOPRENEURSHIP READINESS, MEDIATED BY TECHNOPRENEURSHIP INTENTION IN VOCATIONAL SCHOOLS MAJORING IN INFORMATION TECHNOLOGY

Shofiyatul Hidayah[1], Agus Wibowo[2], Suparno[3]
Faculty of Economics, Universitas Negeri Jakarta, Indonesia [123]
Email: yatulhidayah226@gmail.com[1], agus-wibowo@unj.ac.id[2], suparno@unj.ac.id[3]

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Abstract

This study investigates the effect of entrepreneurship education and creativity on technopreneurship readiness, mediated by technopreneurship intention, among vocational high school students in information technology. Using a quantitative approach, data were collected from 115 respondents out of a total population of 162 students at SMKN 45 and SMKN 53 Jakarta. Structural Equation Modelling–Partial Least Squares (SEM-PLS) version 4.0.2 was employed for hypothesis testing. The results show that both entrepreneurship education and creativity have positive and significant effects on technopreneurship intention, and together they positively and significantly influence technopreneurship readiness through technopreneurship intention. These findings highlight the critical role of entrepreneurship education, creativity, and technopreneurship intention in strengthening technopreneurship readiness among vocational high school students in the information technology field.

1. INTRODUCTION

In recent decades, entrepreneurship has become a strategic issue in global economic development. The role of entrepreneurship as a driver of economic growth, job creation, and innovation has been widely recognised (Klapper & Love, 2011). With the development of information and communication technology (ICT), a new form of technology-based entrepreneurship known as technopreneurship has emerged. This concept integrates technological skills and entrepreneurial spirit to produce innovative, adaptive, and competitive digital solutions (Wahyuningsih & Usman, 2019). In a competitive and digital global context, technopreneurship has become an important strategy in enhancing national competitiveness (Hoque et al., 2017; Koe et al., 2018)

Indonesia, through its grand vision of Indonesia Emas 2045 and the National Medium-Term Development Plan (RPJPN) 2025–2045, has established technopreneurship as one of the pillars of economic transformation. However, the 2024 Global Innovation Index (GII) ranks Indonesia 54th out of 133 countries, lagging behind ASEAN countries such as Singapore (4th) and Malaysia (33rd). This fact indicates that Indonesia's innovation capacity and entrepreneurial ecosystem are still suboptimal. Especially among the productive age group, enhancing technopreneurship capacity has become an urgent need to reduce dependence on the formal sector and enhance the economic independence of the younger generation.

The open unemployment rate for vocational high school graduates in February 2024 reached 8.62%, the highest among all educational levels (BPS, 2024). This condition indicates a mismatch between the output of vocational education and the needs of the job market or business world. Although SMKs are designed to produce graduates who are ready for work and entrepreneurship, in reality, many graduates lack the necessary skills and entrepreneurial mindset (Aprilianty, 2019; Sulistyowati, 2022). One strategic approach relevant to contemporary developments is integrating technopreneurship into the learning process at SMKs, particularly in the Information Technology (IT) specialisation programme.

Preliminary research conducted at two SMKs with IT specialisations in West Jakarta revealed that the majority of Grade 12 students prefer formal employment over starting a business. The main barriers identified include low technopreneurship intent (29.4%), lack of self-confidence (20.6%), insufficient entrepreneurship education (20.6%), and low environmental support (11.8%). This finding suggests that although entrepreneurship education has been provided, it has not effectively fostered technopreneurship readiness. The central research problem, therefore, lies in understanding how entrepreneurship education and creativity influence technopreneurship readiness, and to what extent this relationship is mediated by technopreneurship intention.

Prior studies emphasise that entrepreneurship education equips students with knowledge and entrepreneurial skills essential for starting a business (Mahmudin, 2023; Souitaris et al., 2007), while creativity is vital for developing innovative and distinctive business solutions (Ratnasari et al., 2024; Sukma et al., 2023). However, technopreneurship readiness is influenced not only by cognitive and affective factors but also by an individual's intention to start a business. According to Ajzen's Theory of Planned Behaviour - Ajzen (1991), intention serves as the primary predictor of actual behaviour, including in the technopreneurship context.

Most existing research tends to analyse entrepreneurship education, creativity, and technopreneurship readiness separately, often overlooking the role of intention as a psychological bridge between knowledge, creativity, and actual readiness. Limited empirical evidence is available on whether technopreneurship intention mediates the relationship between entrepreneurship education and creativity toward technopreneurship readiness, especially in the context of vocational high school students majoring in IT. This study aims to fill this research gap by examining these relationships simultaneously, focusing on SMKs in West Jakarta. By doing so, it contributes to a deeper understanding of the factors that shape technopreneurship readiness among the younger generation in Indonesia's digital economy era.

2. LITERATURE REVIEW

2.1 Theory of Planned Behavior

Most human behaviour is influenced by intention, which acts as a bridge between beliefs, attitudes, and actual actions. The Theory of Planned Behaviour (TPB) developed by Ajzen (1991) explains that intention is the strongest predictor of planned behaviour. Intention is shaped by three determinants: (1) Attitude toward behaviour, or how positively individuals perceive certain actions and outcomes; (2) Subjective norms, referring to perceived social pressures from family, peers, or institutions; and (3) Perceived behavioural control, namely the individual's belief in their ability and resources to perform a behaviour (Ozaralli & Rivenburgh, 2016; Paço et al., 2011; Yordanova & Tarrazon, 2010). Importantly, TPB also recognises that intention does not automatically translate into behaviour unless supported by skills, resources, and environmental conditions.

In the context of technopreneurship, this framework is highly relevant. Entrepreneurship education and creativity shape positive attitudes, enhance perceived behavioural control, and influence subjective norms, thereby strengthening students' intention to become technopreneurs. This intention then acts as a psychological bridge toward readiness, reflecting the extent to which individuals can convert knowledge and creativity into concrete action. Thus, TPB provides a solid foundation for positioning technopreneurship intention as a mediator between entrepreneurship education, creativity, and technopreneurship readiness.

2.2 Social Cognitive Theory

Social Cognitive Theory Bandura (1986) emphasises learning as a reciprocal interaction between personal factors, environment, and behaviour, referred to as reciprocal determinism. Individuals actively shape their environment through observation, reflection, and experience, not merely as passive recipients of external influence (Schunk, 2012). Entrepreneurial competencies, including self-confidence and creativity, can be developed through social learning, modelling, and practice (Abdullah, 2019; Pervin Lawrence et al., 2012).

Applied to technopreneurship, SCT explains how entrepreneurship education fosters knowledge and skill acquisition while also building self-efficacy, social support, and creative problem-solving. Students who observe entrepreneurial role models, engage in project-based learning, and receive feedback from their environment are more likely to develop strong technopreneurship intentions. These intentions, in turn, become the first step toward readiness. SCT therefore complements TPB by providing a behavioural and learning-based rationale for how education and creativity interact with social factors to build technopreneurship readiness.

2.3 Technopreneurship Readiness

Technopreneurship readiness reflects an individual's comprehensive capacity to pursue technology-based entrepreneurship. It extends beyond technical ability to include psychological preparedness, adaptive attitudes, and resilience in facing market challenges (Herlina et al., 2024; Riwayati et al., 2022). The readiness concept in technopreneurship is more complex than general entrepreneurial readiness because it demands technological mastery, digital innovation, and the capacity to integrate them into viable business models (Kertiasih, 2024; Koe et al., 2018).

Prior studies highlight that readiness develops through experiential learning, reflection, and work-based practices (Jack, 2024; Jan, 2024). Cognitive, affective, and psychomotor aspects all play a role (Rafiana, 2024).

However, what remains less clear is how readiness is shaped by upstream factors such as entrepreneurship education and creativity, and whether intention functions as a necessary condition in this process. This creates a gap that the present study seeks to fill, by examining readiness not in isolation but as an outcome influenced by both direct and mediated effects.

2.4 Technopreneurship Intention

Technopreneurship intention serves as the initial psychological foundation for entrepreneurial action. It reflects an individual's determination to transform technological ideas into viable business ventures (Okorie et al., 2014; Singhry, 2015). While technopreneurship involves innovation and problem-solving (Hartatik et al., 2023), intention is what directs behaviour toward opportunity recognition, risk-taking, and execution (Hoque et al., 2017; Suffian et al., 2018).

Empirical studies emphasise that intention is shaped by both internal factors (creativity, motivation, technological competence) and external influences (education, role models, social support) (Rosly et al., 2015). Yet, although entrepreneurship education and creativity are often studied as direct predictors of readiness, their indirect effects through intention remain underexplored, particularly in the vocational school context. This indicates a literature gap: existing studies have not sufficiently examined intention as a mediating mechanism linking education and creativity to readiness.

From the theoretical perspectives of TPB and SCT, it is evident that entrepreneurship education and creativity influence technopreneurship readiness both directly and indirectly through intention. TPB clarifies the psychological mechanism, while SCT highlights the learning and social environment that strengthen self-efficacy and creativity. However, prior research has largely treated these variables separately, focusing on education–readiness or creativity–readiness links without integrating intention as a mediating pathway.

Therefore, this study contributes by addressing two critical gaps: (1) it integrates TPB and SCT to construct a model that explains how entrepreneurship education and creativity jointly shape technopreneurship readiness, and (2) it empirically tests the mediating role of technopreneurship intention in the vocational high school IT student context, where readiness for digital-based entrepreneurship is most crucial.

3. RESEARCH METHODOLOGY

This study employed a quantitative research design with a survey method, as it is suitable for testing the relationships among variables and examining mediation effects in large populations. The research population consisted of 162 students enrolled in Grade 12 of the Information Technology (IT) major at State Vocational High Schools (SMK) 45 and 53 in Jakarta. These schools were purposively selected because they represent leading state vocational schools with IT specialisations in West Jakarta, aligning with the study's focus on technopreneurship readiness in technology-related fields.

The sample size was determined using the Yamane (1973) formula, resulting in 115 respondents. A non-probability purposive sampling technique was employed, with inclusion criteria set as: (1) students enrolled in the IT major, (2) currently in the final year of study, and (3) having completed at least one entrepreneurship course. This selection ensures that participants possess relevant exposure to both technological learning and entrepreneurship education, thereby strengthening the validity of the data collected.

Primary data were gathered through a structured questionnaire distributed to respondents. The questionnaire utilised a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) to measure the level of agreement with each item. The measurement indicators for entrepreneurship education, creativity, technopreneurship intention, and technopreneurship readiness were adapted from prior validated studies, ensuring content validity. For example, entrepreneurship education indicators were drawn from Souitaris et al. (2007), creativity indicators from Sukma et al. (2023), technopreneurship intention from Singhry (2015), and technopreneurship readiness from Koe et al. (2018). The instrument was translated and adjusted to the vocational school context through expert judgment involving two lecturers in entrepreneurship education and one vocational teacher, followed by a pilot test with 20 students outside the main sample. The pilot test results confirmed that all items met the criteria for reliability (Cronbach's Alpha > 0.70) and validity (factor loadings > 0.60).

Data analysis was conducted using the Structural Equation Modelling–Partial Least Squares (SEM-PLS) approach with SmartPLS version 4.0.2. The analysis comprised two stages: (1) the outer model assessment, which tested construct validity, reliability, and convergent validity of measurement items; and (2) the inner model assessment, which examined structural relationships among entrepreneurship education, creativity, technopreneurship intention, and technopreneurship readiness. This method was chosen because it is appropriate for analysing complex models with mediating variables and relatively small sample sizes, while also being robust against data distribution assumptions.

The overall research model applied in this study is illustrated in Figure 1.

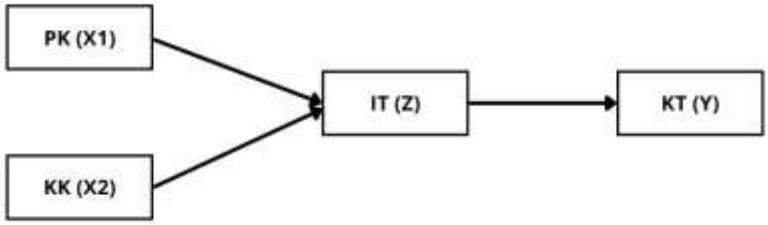


Figure 1. Conceptual Model of the Study
Source: Authors (2025)

4. RESULT AND DISCUSSION

4.1 Result

Instrument Validity Test

In Figure 1, several variable item s do not have external loading values above 0 . 700 a n d AVE values above 0.5, which means that several of these variable items are invalid.

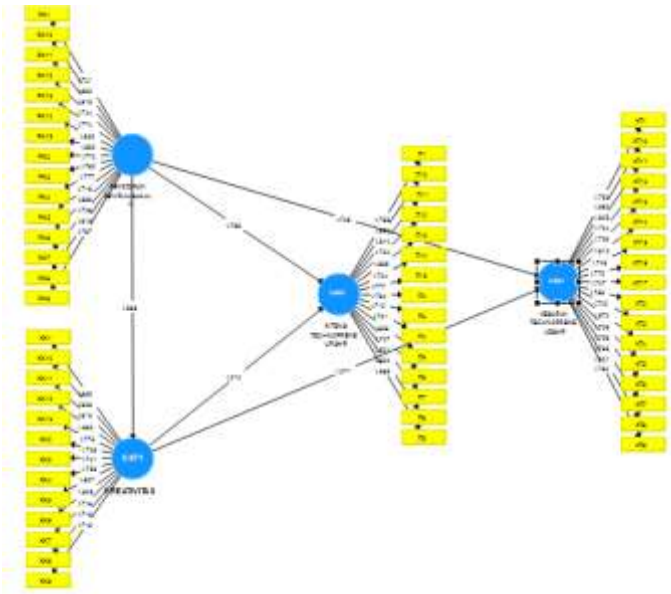


Figure 1 Convergent Validity Test Results
Source: PLS 4.0.2 processed data

There are 8 items with an Outer Loading value below 0.700, which means they are invalid. Therefore, the researcher removed several invalid items, including 2 items from the technopreneurship readiness variable (Y), namely KT.4 and KT.10; 2 items from the technopreneurship intention variable (Z), namely IT.9 and IT.13; 3 items from the entrepreneurship education variable, namely PK10, PK 15, PK 6; and 1 item from the creativity variable, namely KK.12. The researcher then conducted a re-test until all items had an Outer Loading value above 0.700.

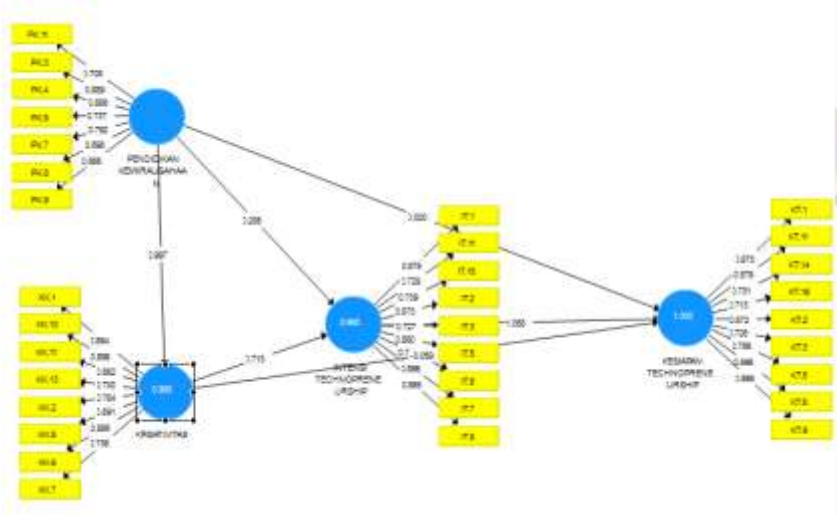


Figure 2 Convergent Validity Test Results
Source: PLS 4.0.2 processed data

I n Table 1 , all variables have a value o f less than 0.90, which means that discriminant validity has been achieved.

Table 1 HTMT

	technopreneurship intention	technopreneurship readiness	creativity	Entrepreneurship education
technopreneurship intention	**0.839**			
technopreneurship readiness	0.516	**0.840**		
creativity	0.362	0.624	**0.870**	
Entrepreneurship education	0.343	0.410	0.501	**0.849**

Source: Processed by researchers

Reliability test

Based on Table 2, the Reliability test results are obtained and all items have a Cronbach ' s Alpha and Composite Reliable value above 0.7 so that all items can be declared reliable and have the accuracy, consistency, and accuracy of the instrument in measuring constructs.

Table 2 Composite Reliability

	Cronbach's alpha	*Composite Reliability*
technopreneurship intention	0,944	0,957
technopreneurship readiness	0,937	0,944
creativity	0,936	0,951
Entrepreneurship education	0,927	0,948

Source: Processed by researchers

Inner Model
Determination Test (R^2)

Table 3 R - Square

	R-Square
technopreneurship intention	0.940
technopreneurship readiness	0.922
creativity	0,966

Source: Processed by researchers

These results show that 92% of the technopreneurship readiness (Y) variable is influenced by the Entrepreneurship education (X1), creativity (X2) variables, and technopreneurship intention (Z). Then 96% of the Creativity variable (X2) is influenced by Entrepreneurship education (X1), and 94% technopreneurship intention (Z) Entrepreneurship education (X1) and creativity (X2) variables.

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F^2 test

Table 4 Effect size

	technopreneurship intention	technopreneurship readiness	creativity	Entrepreneurship education
technopreneurship intention				
technopreneurship readiness	0.569			
creativity	0.428	0.511		
Entrepreneurship education	0.185	0.395	0.495	

Source: Processed by researchers

F-square value o f technopreneurship intention on technopreneurship readiness is 0.569, indicating a significant effect, creativity on technopreneurship readiness is 0.428, indicating a significant effect, creativity on technopreneurship intention is 0.511, indicating a significant effect, entrepreneurship education on technopreneurship readiness is 0.185, indicating a moderate effect, entrepreneurship education on technopreneurship intention is 0.395, indicating a significant effect, and entrepreneurship education is 0.495, indicating a significant effect.

Q-Square Test

Table 5 Q - Square

	Q^2 predict
technopreneurship intention	0.940
technopreneurship readiness	0.922
creativity	0,966

Source: Processed by researchers

The Q-square of the Technopreneurship Intensity variable was 0.940, Technopreneurship Readiness was 0.922, and Creativity was 0.966, which means that these variables were well reconstructed and the model had predictive relevance.

Model Fit

Table 6 Model Fit

	Saturated model	Estimated model
SRMR	0,062	0,062

Source: Processed by researchers

The result of the estimation model is 0.062, which means it has an acceptable fit or meets the criteria for model goodness of fit.

Hypothesis Testing and Mediation Analysis

Table 7 Specific indirect effects and Path coefficients

Path coefficients					
	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
X1 -> Z	0.013	0.010	0.003	5.306	0.000
X2 -> Z	0.524	0.508	0.034	4.921	0.030
Specific indirect effects					
X1 -> Z -> Y	0.056	0.057	0.047	2.197	0.023
X2 -> Z -> Y	0.200	0.202	0.058	3.464	0.001

Source: Processed by researchers

Based on the table above, the path coefficient results show that the entrepreneurial knowledge variable has an original sample value of 0.013 > 0, indicating a positive effect on technopreneurship intention. The t-statistic of 5.306 > 1.65 and p-value of 0.000 < 0.05 confirm that this effect is statistically significant, thus supporting the hypothesis. Similarly, the creativity variable has an original sample value of 0.524 > 0, also indicating a positive effect on

technopreneurship intention. With a t-statistic of 4.921 > 1.65 and p-value of 0.030 < 0.05, it can be concluded that creativity has a significant positive effect on technopreneurship intention, thereby accepting the hypothesis.

Based on the results of the mediation test above, it is known that the indirect effect of the entrepreneurial knowledge variable on technopreneurship readiness through technopreneurship intention is 0.056 > 0. t-statistic 2.197 > 1.96 and p-value 0.023 < 0.05, which means it can be concluded that the technopreneurship intention variable positively and significantly mediates the relationship between entrepreneurial knowledge and technopreneurship readiness (hypothesis accepted). Additionally, the indirect effect of the creativity variable on technopreneurship readiness through technopreneurship intention was found to be 0.200 > 0. t-statistic 3.464 > 1.96 and p-value 0.001 < 0.05, which means it can be concluded that the technopreneurship intention variable positively and significantly mediates the relationship between creativity and technopreneurship readiness (hypothesis accepted).

4.2 Discussion

The Influence of Entrepreneurship Education on Technopreneurship Intentions.

The findings of this study indicate that entrepreneurship education has a positive and significant influence on students' technopreneurship intentions. This suggests that the higher the quality of entrepreneurship education provided, the stronger the students' intention to become technopreneurs. This result supports the Theory of Planned Behavior (Ajzen, 1991), which argues that education contributes to shaping attitudes, subjective norms, and perceived behavioural control, all of which foster entrepreneurial intention.

The result is consistent with the studies of Hoque et al. (2017); Jiatong et al. (2021); Sulyman et al. (2024), which confirm the essential role of entrepreneurship education in enhancing entrepreneurial self-efficacy and stimulating innovative thinking. However, unlike Lorz (2011) and Mason & Arshed (2020), whose research primarily examined higher education institutions, the present study highlights the context of vocational schools specializing in information technology. This distinction contributes new evidence that entrepreneurship education at the vocational level not only enhances knowledge but also directly strengthens the psychological bridge leading to technopreneurship intention, particularly when integrated with students' technical expertise.

The Influence of Creativity on Technopreneurship Intention.

The study also reveals that creativity exerts a positive and significant effect on technopreneurship intention. This finding aligns with Social Cognitive Theory (Bandura, 1986), which emphasizes that creativity is developed through observation, practice, and self-efficacy, and subsequently influences entrepreneurial behaviour. The result is in line with Kertiasih (2024) and Rosly et al. (2015), who argue that creativity is a fundamental factor in generating entrepreneurial ideas.

Nevertheless, this study provides a broader contribution by situating creativity in the digital and technological context of vocational schools. Unlike previous research that generally examined creativity in a broader entrepreneurial framework, the present study demonstrates that technology-oriented creativity, such as application development, digital platforms, and IT-based services, plays a decisive role in motivating students to pursue technopreneurship. This highlights that creativity in vocational education is not only about idea generation but also about transforming technological knowledge into concrete entrepreneurial opportunities.

The influence of technopreneurship intensity in mediating the influence of entrepreneurship education and creativity on technopreneurship readiness.

The mediation analysis shows that technopreneurship intention significantly bridges the relationship between entrepreneurship education, creativity, and technopreneurship readiness. This finding is theoretically supported by both the Theory of Planned Behavior (Ajzen, 1991) and Social Cognitive Theory (Bandura, 1986), which explain that intention emerges from the interaction of personal factors, learning experiences, and environmental influences before it develops into actual behaviour.

This result resonates with the findings of Su et al. (2021), who emphasized the predictive role of entrepreneurial intention in determining entrepreneurial readiness. However, it differs from Sulistyowati (2022), who highlighted the dominance of external ecosystems in shaping readiness. The present study instead provides empirical evidence that internal factors, particularly intention, are more decisive in the context of vocational schools. In other words, knowledge and creativity alone are insufficient to foster readiness unless supported by strong technopreneurship intention.

Taken together, the results of this study contribute in three main ways. First, from a theoretical perspective, the findings reinforce TPB and SCT by confirming the critical mediating role of intention in the relationship between

entrepreneurship education, creativity, and readiness. Second, from an empirical perspective, this research fills the gap left by prior studies by focusing on vocational schools specializing in IT, whereas most previous research examined university students or broader entrepreneurial ecosystems. Third, from a practical perspective, the results suggest that vocational education should not only emphasize technical and entrepreneurial knowledge but also actively nurture technopreneurship intentions through contextualized curricula, experiential learning, and digital innovation projects.

5. CONCLUSION

According to the findings of the data analysis and discussion, entrepreneurship education has a positive but not yet significant impact on vocational high school students' readiness for technopreneurship. Therefore, in order to maximize its impact, entrepreneurship education quality must be improved. Both technopreneurship intention, which is a major factor in encouraging students to start technology-based firms, and creativity have been shown to have a good and significant influence on improving technopreneurship preparedness. Technopreneurship intention and inventiveness are positively and significantly impacted by entrepreneurship education, and via these two factors, technopreneurship preparedness is indirectly improved. Technopreneurship intentions also have a favourable impact on creativity, suggesting that intentions are a key component in realizing students' creative potential.

The results of this study suggest that in order to sustain students' intentions and inventiveness in developing technology-based business opportunities, it is critical to enhance entrepreneurship education that is pertinent to technopreneurship needs through contextual learning materials, digital entrepreneurship practices, and ongoing mentoring. The self-confidence in creativity that has been developed also needs to be facilitated through innovation projects and exploratory tasks so that creative potential can be actualised into market-worthy products. However, this study has limitations in terms of the relatively large number of instruments, which may affect the consistency of respondents' answers, as well as the questionnaire method, which is not fully capable of describing the actual conditions in the field. Therefore, further research is recommended to use a data triangulation approach and expand the research object to obtain a more comprehensive understanding of technopreneurship readiness among vocational high school students.

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