Jurnal Inovasi Teknologi Pendidikan
Volume 12, No. 4, December 2025 (408-418)
Online: http://journal.uny.ac.id/index.php/jitp

Growth mindset and innovative ideas: The critical role of beliefs about intelligence among higher education students

Moh. Sulthon Amien[1], Achmad Hidayatullah[2] *, Rafista Deviyanti[3], Sri Lestari[4]
[1] Universitas Muhammadiyah Surabaya, Indonesia.
[2] Universitas Muhammadiyah Surabaya, Indonesia.
[3] Universtas Lampung, Indonesia.
[4] Universitas Muhammadiyah Surabaya, Indonesia
* Corresponding Author. E-mail: achmadhidayatullah@um-surabaya.ac.id

ARTICLE INFO

Article History
Received:
25 July 2025;
Revised:
22 October 2025;
Accepted:
3 November 2025;
Available online:
31 December 2025.

Keywords
Beliefs; Fixed mindset;
Growth mindset;
Innovative ideas;
Students

ABSTRACT

The purpose of this study is to explore the levels of innovative thinking, growth, and a fixed mindset among higher education students in Indonesia. This study also examined the association between mindset and innovative ideas. This cross-sectional study involved 294 students from 2 higher education institutions. Descriptive statistics, t-test, and regression analysis were employed to analyse the data. The results of this study suggest that most students tend to generate new ideas frequently. Students in the health program have lower growth beliefs, growth practices, and effort, and firmer fixed beliefs than students in another program. A growth mindset significantly predicts the generation of innovative ideas. This study contributes to the literature review and teaching practice.

How to cite:
Amien, M. S., et al., (2025). Growth mindset and innovative ideas: The critical role of beliefs about intelligence among higher education students. *Jurnal Inovasi Teknologi Pendidikan. 12*(4), 408-418. https://doi.org/10.21831/jitp.v12i4.88707

INTRODUCTION

Over the last decade, the urgency of promoting students' innovative ideas has been a central focus in higher education. The extent to which higher education should be more innovative to produce innovative ideas has been discussed in many places around the world (Jurgena & Cēdere, 2016). Innovation, as the product of an innovative idea, can be defined as a process of introducing something better or of creating a never-before-seen item of hardware (Krskova & Breyer, 2023; Tanuwijaya et al., 2024). Nowadays, innovation in digital technology, such as the revolution in algorithms for artificial intelligence, can support education on the one hand (Afriani et al., 2024) and create uncertainty about the future of professions on the other hand (Harari, 2018). Researchers argued that those who can generate new ideas, solve problems, and think outside the box would have an advantage in surviving in a dynamic world (Bedir, 2019). Accordingly, higher education should rethink how to shape students' innovative ideas.

In the higher education context, stimulating students' innovative ideas can take many forms, ranging from simple innovations, such as creating a start-up product, to creative solutions to overcome social problems. From a cognitive science perspective, Dweck (2012) stated that cognitive skills, behaviours, attitudes, and academic performance are determined by mindset. For instance, some students with high ability may perform poorly and achieve little in life. At the same time, other students with lower intelligence perform better in school and accomplish far more than one might expect (Dweck, 2002). The differences in this performance result from students' beliefs about their intelligence or mindset (Dweck, 2002). Accordingly, an innovative idea may also be associated with a mindset.

In real life, those with a growth mindset tend to overcome obstacles through innovative solutions and to be resilient when they face difficulties (Claro et al., 2016; Liu & Tong, 2022). A growth mindset is the belief that thinking ability and intelligence can be developed through specific means, such as education and experience (Barbouta & Barbouta, 2020; Limeri et al., 2020; Seo et al., 2019). In an academic context, students with a growth mindset view challenges, such as complex tasks and exams, as opportunities to learn and improve their abilities. Conversely, those with a fixed mindset tend to avoid social problems and difficulties because they think their ability cannot overcome challenging situations. A fixed mindset is the belief that intelligence and ability are fixed and unchangeable (Dweck & Leggett. Students with a fixed mindset may tend to avoid obstacles, rely on familiar strategies, and limit their effort to discover solutions that may hinder the generation of innovative ideas (Hidayatullah et al., 2026; Hidayatullah et al., 2023; Limeri et al., 2020; Peixoto et al., 2023).

From a policy perspective, the Indonesian government has been fostering students' innovative ideas through the curriculum and competitions. In line with behaviourism theory that stated academic performance and behaviour are determined by the stimuli or the pattern of students' behaviour, including skills to innovate, comes from the association between stimulus and response (Edwards et al., 2011), the Indonesian government sedimented the character of innovative idea through the curriculum Merdeka (Kurikulum Merdeka). Creative thinking to generate new ideas has been emphasised in each subject in the teachers' textbooks as one of the profiles of character Pancasila (Profil Pelajar Pancasila) at the school level (Kemdikbud, 2022). In the higher education context, students' innovative ideas have been stimulated through annual competition, namely the students' college creativity program or *program kreativitas mahasiswa* (Sukino et al., 2024). Through this program, students can propose their innovative projects to get funding. The funding state has been awarded to the innovative project that passed the assessor's evaluation. It can be said that higher education students in Indonesia are familiar with the concept of an innovation project competition.

Existing research recognises the critical role played by a growth mindset in promoting intelligence and academic performance. An empirical study by Rahardi & Dartanto (2021) pointed out that a growth mindset is associated with academic performance. Krskova & Breyer (2023) argued that a growth mindset is beneficial for students because it encourages them to adopt a performance-goal orientation in management to ensure future career success. Growth mindset is associated with students' academic performance, indicating that students across various economic statuses. Although the association between a growth mindset and academic performance has been extensively studied, little research has examined the relationship between innovative ideas and a growth mindset, especially in Indonesia. Existing research predominantly evaluates the effect of a growth mindset on academic achievement rather than on innovative behaviour. Consequently, whether a growth mindset significantly predicts innovative ideas remains underexplored.

Prior studies suggested that demographic factors, such as culture and educational background, influence students' skills and cognitive factors (Hidayatullah et al., 2023; Hidayatullah & Csíkos, 2023; Kismiantini et al., 2021; Seo et al., 2019). For instance, Hofer (2000) found that background study influences students' beliefs about abilities through field study. It can be stipulated that students' innovative ideas and mindset may be associated with their gender and field of study (Hidayatullah & Csíkos, 2023; Van der Beek et al., 2024; Vuletich et al., 2020).

As a result, the current study would describe the level of students' growth and fixed mindset and their influence on innovative ideas. Relevant factors, such as background studies, would also be

explored, particularly their influence on the level of innovative ideas, growth, and a fixed mindset. The research questions below would guide our research:

1. To what extent do higher education students in Indonesia demonstrate innovative ideas?
2. What is the level of growth and fixed mindset among higher education students in Indonesia?
3. Do students' innovative ideas and mindset (growth vs fixed) vary across different educational programs?
4. Do students' growth and fixed mindset significantly predict students' innovative ideas?

METHOD

Participants

The participants in the current study were students from two higher education institutions in Indonesia, comprising 164 students (55.8%) from one institution and 130 students (44.2%) from the other. The data were collected using snowball random sampling. 294 students participated in the current study, with backgrounds in Education (35%), Health (15%), and Economics (50%). The participants were 65 % female and 35% male. As we discussed earlier, the students are familiar with the innovation and creativity project since the program has been conducted annually.

Measurements

The instrument was divided into three parts. The first part contained the question about the demographic information: age, gender, and background. In the second part, the question focused on students' growth and fixed mindset. We adapted the Multidimensional Mindset Scale (Alvarado et al., 2024). Students' conceptions of their intelligence were evaluated for a growth mindset. The scales were translated into Bahasa Indonesia and contextualised with the Indonesian culture. This process involved bilingual scholars with expertise in educational psychology. We adapted six growth-mindset items into three factors. In the current study, two items were selected for each factor. For instance, "my level of intelligence has changed over time (growth beliefs)", "I feel attracted to challenges (growth challenges)", and "I believe in effort to become better (Growth practice and effort). Furthermore, six items were also selected to evaluate students' fixed mindset. For example, "My level of intelligence cannot be modified because it always has been the same since my first year (Growth beliefs)", "I prefer to avoid challenges", and "People do not need effort to improve their intelligence (fixed practice and effort)". The items were rated using 6-point Likert scale (1 = strongly disagree, 6 = strongly agree)

The third part of the questionnaire focuses on innovative ideas. In the current study, five items were adapted from the Innovative Work Behaviour Scale (Jong & Hartog, 2010). For instance, "how often do you put effort into the development of a new idea "and "how often do you create new ideas ". These scales were rated using a 6-point Likert scale (1 = never, 6 = always).

Procedures

Prior to commencing the study, ethical clearance was obtained from the Institute for Research and Community Service (LPPM) of Muhammadiyah University of Surabaya. We translated the instrument into Indonesian. The data collection was conducted online using the Google platform. Higher education students were invited to complete the questionnaire via WhatsApp numbers. Students were informed that the study is voluntary. Accordingly, they can decide whether to join the survey.

Data Analysis

The data were processed using Jeffreys's Amazing Statistics Program (JASP) software. Several steps in the data analysis were conducted in the current study. First, the normality of the data was evaluated using skewness and kurtosis (Blanca et al., 2013; Kim, 2013). Validity and reliability of the instruments were evaluated by performing exploratory factor analysis (CFA) and Cronbach's alpha (Gliner et al., 2017). In the CFA, maximum likelihood was used for parameter estimation, with a cutoff of 0.4 for loading factors (Ho, 2006). Second, descriptive statistics were employed to

evaluate the extent of students' growth mindset and fixed mindset. Descriptive statistics were also employed to evaluate students' innovative ideas. Third, students' innovative ideas and mindsets were compared based on their background studies using ANOVA. Fourth. The effects of growth and fixed mindsets on students' innovative ideas were evaluated using regression analysis.

RESULTS AND DISCUSSION

Results

Skewness and kurtosis analyses were conducted before EFA. Kline (2005) suggested that skewness values of +/-3 and kurtosis values of +/-7 for the data are not severe departures from normality. Table 1 presents the results of the skewness and kurtosis analyses for each construct in the current study.

Table 1. Mean and Normality Data

No.	Variables	Means (SD)	Skewness	Kurtosis
1	Innovative Ideas	3.84 (0.86)	0.20	- 0.41
2	Growth Beliefs	4.21 (0.87)	- 0.24	0.63
3	Growth Challenges	4.32 (1.00)	- 0.24	- 0.30
4	Growth, Practice, and Effort	4.62 (1.03)	- 0.71	0.29
5	Fixed Beliefs	2.64 (0.85)	0.29	- 0.58
6	Fixed Challenges	2.44 (0.55)	- 0.73	- 0.13
7	Fixed Practice and Effort	2.41 (0.56)	- 0.66	- 0.34

We conducted an exploratory factor analysis (EFA) to evaluate the instruments' validity. Using maximum-likelihood parameter estimates with eigenvalues > 1, the innovative ideas scale appears to be a single factor, accounting for 57% of the variance. The KMO value is 0.84, and Barlett's test of sphericity is 672. 56 ($p < 0.001$), indicating that the current study's sample is adequate (Lloret et al., 2017). The loading factors for the items ranged from 0.73 to 0.81. This means that each item on the scales was valid and could serve as an indicator of innovative ideas (Ho, 2006; Wong, 2013). The items also meet the requirement of internal reliability, as indicated by Cronbach's alpha of 0.87 (Gliner et al., 2017).

Furthermore, the EFA results for the growth and fixed mindsets showed that the scales met the validity requirements. By performing maximum-likelihood parameter estimation and identifying eigenvalues greater than 1, two factors have been identified, accounting for 47.2% of the variance. The sample meets the adequacy of EFA with the value of KMO 0.82 and Barlett's test of sphericity 1412.33 ($p < .001$). The loading factors for growth and fixed mindset ranged from 0.67 to 0.84 and from 0.45 to 0.90, respectively. The internal reliability of the two variables was 0.87 and 0.79, respectively.

Students' Innovative Ideas and Mindset

Table 2 presents students' innovative ideas and beliefs about intelligence. In general, higher education students in Indonesia expressed the ability to generate innovative ideas fairly frequently but not consistently, such as creating and developing new ideas, exploring new solutions, and attempting to discover new approaches to complete the task.

Table 2. Innovative Ideas, Growth, and a Fixed Mindset

No.	Items	Means	SD
1	**Innovative Ideas**		
	How often do you create new ideas?	3.83	1.07
	How often do you put effort into developing new ideas?	3.96	1.01
	How often do you explore new products or solutions?	3.86	1.04
	How often do you create original solutions for problems?	3.64	1.18
	How often do you find a new approach to execute a task?	3.92	1.01
2	**Growth Beliefs**		
	I can change my level of intelligence over time	4.21	0.99
	I can be smarter if i learn regularly	4.21	1.00

No.	Items	Means	SD
3	**Growth Challenges**		
	I feel attracted to challenges	4.38	1.07
	I can participate whenever there are challenges	4.26	1.19
4	**Growth Practices and Effort**		
	I believe i can improve my intelligence by putting in an effort	4.79	1.23
	I believe that by practising, I can improve the result	4.46	1.07
5	**Fixed Beliefs**		
	My intelligence cannot be changed	2.48	1.41
	If I am smart because I was born that way	2.81	1.01
6	**Fixed Challenges**		
	I prefer to avoid any challenges and difficulties	2.43	0.65
	I think I cannot overcome the challenges	2.44	0.66
7	**Fixed Practices and Effort**		
	I think effort will not change my intelligence	2.54	0.63
	I do not think I can be a brilliant student, even if I spend a lot of time studying.	2.28	0.75

With respect to the level of growth mindset, students in higher education in Indonesia generally agreed with statements in each growth mindset dimension, such as growth beliefs, beliefs in practices and effort, and beliefs about the ability to overcome challenges, even though the level of these beliefs does not reach the strongly agree category. We compare this result with other surveys in Greece (Barbouta & Barbouta, 2020), the United States (US), and China (Sun et al., 2021). Surprisingly, higher education students in Indonesia have a higher level of growth beliefs compared to Greek and Chinese students, and quite similar to US students, especially for beliefs about intelligence (M = 4.21, SD = 0.99; M = 2.7, SD =1.00; M = 3.08, SD = 0.83; and M = 4.12, SD = 1.09, respectively). Furthermore, students in Indonesia generally expressed disagreement with the fixed-mindset statements. In comparison, students in Greece tend to hold stronger fixed beliefs, such as the belief that intelligence cannot change over time (M = 3.6, SD = 0.40).

Innovative Ideas, Growth, and a Fixed Mindset from Background Study

ANOVA was employed to determine whether innovative ideas, growth, and a fixed mindset differ across students' educational backgrounds. Students' creative ideas and their growth and fixed mindsets are almost equal across different field studies. However, students' growth beliefs differ by educational background (F (2) = 3.85, $p < 0.05$). Figure 1 shows that students in the health program had the lowest level of growth beliefs compared to students in another program.

Table 3. Innovative Ideas, Growth, and a Fixed Mindset based on Educational Background

No.	Variables	Educational Background	Mean (SD)	F	*p*
1	Innovative Ideas	Economic Program	3.93 (0.76)	2.73	0.06
		Health Program	3.91 (0.99)		
		Education Program	3.68 (0.91)		
2	Growth Beliefs	Economic Program	4.32 (0.75)	3.85	0.02*
		Health Program	3.91 (1.01)		
		Education Program	4.19 (0.94)		
3	Growth Challenges	Economic Program	4.35 (0.92)	1.27	0.28
		Health Program	4.11(1.18)		
		Education Program	4.38 (1.03)		
4	Growth, Practice, and Effort	Economic Program	4.77 (0.89)	3.74	0.02*
		Health Program	4.34 (1.25)		
		Education Program	4.53 (1.08)		
5	Fixed Beliefs	Economic Program	2.82 (0.91)	8.45	< .001
		Health Program	2.27 (0.63)		
		Education Program	2.56 (0.78)		
6	Fixed Challenges	Economic Program	2.45 (0.52)	2.15	0.12
		Health Program	2.30 (0.65)		
		Education Program	2.51 (0.53)		
7	Fixed Practice and Effort	Economic Program	2.41 (0.58)	0.11	0.89

No.	Variables	Educational Background	Mean (SD)	F	*p*
		Health Program	2.38 (0.64)		
		Education Program	2.43 (0.49)		

Furthermore, significant differences have been found between growth practice and effort (F (2) = 3.74, $p < 0.05$; Fig. 2) and fixed beliefs by educational background (F (2) = 8.45, $p < 0.001$; Fig.3). Students from health program seem to have the lowest level of those beliefs consistently compare to students from economic and education program.

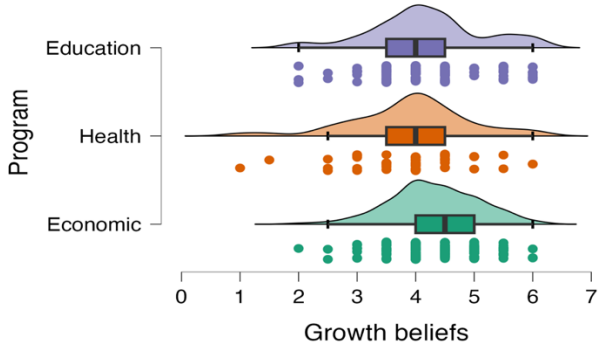

Figure 1. Result of ANOVA on the Growth Beliefs by Educational Background

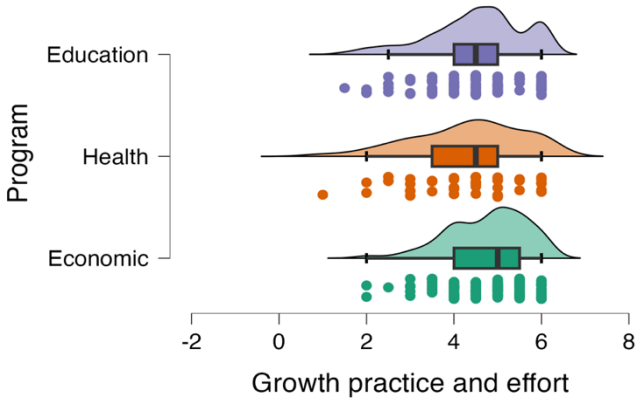

Figure 2. Result of ANOVA on the Growth, Practice and Effort by Educational Background

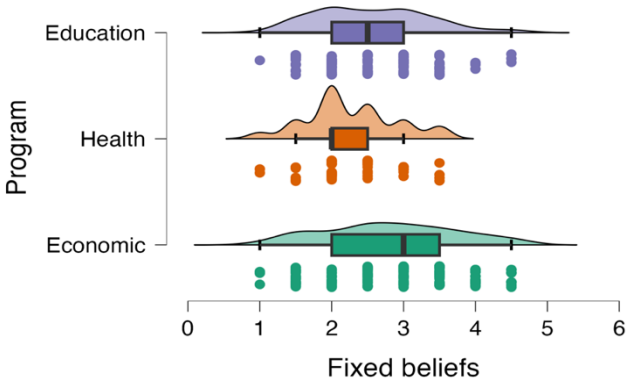

Figure 3. Result of ANOVA on the Fixed Beliefs by Educational Background

The Significant Effect of Growth and Fixed Mindset on Innovative Ideas

To evaluate the effect of growth and fixed mindset on students' innovative ideas, the current study employed multiple regression analysis (See Table 4). Growth mindset significantly predicts innovative ideas, with R2 = 33.45% ($p < .001$). In particular, growth beliefs ($\beta = 0.22$, $p < 0.05$) and

growth practice and effort (β = 0.33, p < 0.001) significantly influence innovative ideas but not growth challenges (β = 0.09, p = 0.21).

Table 4. The Effect of Growth and the Fixed Mindset on Innovative Ideas

No	Variables	r	β	r.β.100	t	*p*
1	**Growth Mindset**					
	Growth Beliefs	0.51	0.22	11.22	3.04	0.003
	Growth Challenges	0.49	0.09	4.41	1.25	0.21
	Growth Practices and Effort	0.54	0.33	17.82	4.78	< 0.001
	Total Variance Explained (R^2)			33.45%		
2	**Fixed mindset**					
	Fixed Beliefs	-0.17	-0.08	1.36	-1.34	0.18
	Fixed Challenges	-0.33	-0.19	6.27	-2.84	0.005
	Fixed Practices and Effort	-0.34	-0.21	7.14	-3.28	0.001
	Total Variance Explained (R^2)			14.77%		

Furthermore, a fixed mindset accounts for 14.77% of innovative ideas. The stronger the students' fixed mindset, the less likely they are to generate new ideas. Partially, both fixed challenges (β = -0.19, p < 0.05) and fixed practice and effort (β = -0.21, p < 0.001) negatively predict innovative ideas but not fixed beliefs (β = -0.08, p = 0.18).

Discussion

The first question in this study sought to investigate the level of innovative ideas of higher education students in Indonesia. The findings of this study revealed that students expressed their ideas fairly frequently but not consistently during the activity of generating innovative ideas. For instance, students frequently generated new ideas, explored new solutions, and attempted to discover new approaches to complete the task, though this behaviour was not consistent. This finding suggests that higher education students in Indonesia tend to generate innovative ideas, although not to a substantial extent. Accordingly, intervention and support from external sources are still necessary.

The second question in this research was the level of students' growth and fixed mindset in higher education in Indonesia. The findings of this study suggest that students agreed with statements related to growth beliefs, beliefs in practices and effort, and beliefs about the ability to overcome challenges, even though the levels of these beliefs did not reach the strongly agree category. In other words, Indonesian students agree with the notions that intelligence can be developed through intervention (Barbouta & Barbouta, 2020; Limeri et al., 2020; Seo et al., 2019). Compared with students in Greece (Barbouta & Barbouta, 2020) and China (Sun et al., 2021), Indonesian students have stronger growth beliefs. Surprisingly, the level of these beliefs about intelligence appears to be similar to that of students in the US (Sun et al., 2021). A possible explanation for this result may be Indonesian culture, which emphasises effort and self-control to achieve goals. This level is likely comparable to that of US students educated with a more psychologically positive approach. Indonesian students expressed disagreement with the fixed mindset statements, indicating that they are more open to the idea that intelligence and abilities can grow over time. This tendency indicates that Indonesian students have been more open to knowledge than students in Greece. In the US, students expressed disagreement with the fixed beliefs. Accordingly, higher education students in Indonesia are considered more open than perceived as having fixed intelligence.

The third question identified the level of students' innovative ideas, growth, and fixed mindset based on the program study background. Surprisingly, growth beliefs, growth effort, and practice have been found to differ among students across different programs. Although students from the three programs agreed with the indicators of growth beliefs, growth effort, and growth practice, students from the Economic and Education program showed a higher level of agreement with these mindsets. Furthermore, students expressed disagreement with a fixed mindset. Surprisingly, the ambiguity was identified when students in the Health program expressed the most vigorous disagreement about fixed beliefs. Although the level of agreement about students' growth beliefs in the Health program was not particularly strong, the level of disagreement with their fixed beliefs was

the strongest across programs. It could be that students from this program were not really optimistic about their intelligence. At the same time, these students also oppose the idea of fixed beliefs.

The fourth question in the current study examines the significant effects of growth and fixed mindsets on students' innovative ideas. This study found that a growth mindset significantly predicts innovative ideas. This finding aligns with existing research that has found significant effects of beliefs about intelligence on students' academic performance (Hidayatullah et al., 2024; Kismiantini et al., 2021; Rahardi & Dartanto, 2021) and on innovative thinking (Krskova & Breyer, 2023). It can be stated that when students believe their intelligence can be changed and that effort affects their achievement, it enhances their motivation to develop and create new ideas. Interestingly, a fixed mindset has been found to influence the generation of innovative ideas negatively. The stronger the students' fixed mindset, the less likely they are to generate new ideas. This finding aligns with previous studies that suggest individuals who hold beliefs about the certainty of their abilities tend to fail in academic contexts (Bai & Wang, 2020; Claro et al., 2016; Hofer, 2000). Accordingly, when students believe that intelligence is unchanging and effort is not useful, they are less likely to generate new ideas.

The findings of this study enrich the literature on the levels of innovative ideas, growth, and fixed among higher education students, as well as the relationships among those variables. In the teaching practice, changing students' fixed mindset to a growth mindset promotes innovative ideas. Emphasising students' effort or the process rather than their score in the classroom would be more beneficial for promoting a growth mindset. If students fail to generate innovative ideas even after hard work, the teacher can help them understand why their strategy is not effective and guide them with other strategies and sources to generate innovative ideas (Dweck, 2016). Teachers in higher education can also help students shape their innovative ideas by demonstrating examples of innovators and showing how far they have advanced new ideas.

CONCLUSION

This study set out to explore the extent of students' growth and the prevalence of a fixed mindset regarding their innovative ideas. Differences have been found in growth beliefs, growth practices, effort, and fixed beliefs by educational background. Moreover, both growth and fixed mindsets significantly influenced the generation of innovative ideas. Although the current study provides important insights into promoting innovative ideas in higher education, several limitations should be noted. The current study employs a cross-sectional design, where the prediction of the variables requires clarification. As we employed the snowball random sampling method, the sample in the current study may be somewhat homogenous. Accordingly, it affects the finding that it may not fully represent the broader target population. The combination of qualitative and quantitative approaches in the future would deepen the information and understanding of the relationship among these variables. Since the sample in the current study is small, future research should increase the sample size to include individuals from diverse backgrounds.

REFERENCES

Afriani, F., Suyato, S., Devi, I., Syafitri, A., Harahap, N., Indri Y., & Yakub, A. M. (2024). Case study: Impact analysis of educational Chatbot use in supporting students in the online learning process. *Jurnal Inovasi Teknologi Pendidikan*, *11*(4), 439–453. https://doi.org/10.21831/jitp.v11i4.69941

Alvarado, N. O., Domínguez, C. Q., Gaytan, E. A., & Fuente, E. D. C. de la. (2024). Development and validation of the multidimensional mindset scale: Growth and fixed mindsets. *International Journal of Consumer Studies*, *48*(3), 1–13. https://doi.org/10.1111/ijcs.13054

Bai, B., & Wang, J. (2020). The role of growth mindset, self-efficacy, and intrinsic value in self-regulated learning and English language learning achievements. *Language Teaching Research*, *27*(1), 1-22. https://doi.org/10.1177/1362168820933190

Barbouta, A., & Barbouta, C. (2020). Growth mindset and grit: How do university students' mindsets and grit affect their academic achievement? *International Journal of Caring Sciences*, *13*(1), 654–664. https://www.internationaljournalofcaringsciences.org/docs/72.%20kotrotsiou%206-2-2020.pdf

Bedir, H. (2019). Pre-service ELT teachers' beliefs and perceptions on 21st century learning and innovation skills (4Cs). *Journal of Language and Linguistic Studies*, *15*(1), 231–246. https://www.jlls.org/index.php/jlls/article/view/1263/457

Blanca, M. J., Arnau, J., López-Montiel, D., Bono, R., & Bendayan, R. (2013). Skewness and kurtosis in real data samples. *Methodology*, *9*(2), 78–84. https://doi.org/10.1027/1614-2241/a000057

Claro, S., Paunesku, D., & Dweck, C. S. (2016). Growth mindset tempers the effects of poverty on academic achievement. *Psychological and Cognitive Sciences*, *113*(31), 8664–8668. https://doi.org/10.1073/pnas.1608207113

Dweck, C. S. (2002). Messages that motivate: How praise molds students' beliefs, motivation, and performance (in surprising ways). In J. Aronson (Ed.), *Improving academic achievement: Impact of psychological factors on education* (pp. 37–60). Academic Press. https://doi.org/10.1016/B978-012064455-1/50006-3

Dweck, C. S. (2012). Mindsets and human nature: Promoting change in the Middle East, the schoolyard, the racial divide, and willpower. *American Psychologist*, *67*(8), 614–622. https://doi.org/https://doi.org/10.1037/a0029783

Dweck, C. S. (2016). *Mindset: The new psychology of success how we can learn to fulfill our potential*. Random House.

Dweck, C. S., & Legget, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, *95*(2), 256–273. https://doi.org/https://doi.org/10.1037/0033-295X.95.2.256

Edwards, A. R., Esmonde, I., & Wagner, J. F. (2011). Learning mathematics. In *Handbook of Research on Learning and Instruction* (pp. 55–77). Routledge.

Gliner, J. A., Morgan, G. A., & Leech, N. L. (2017). *Research methods in applied settings*. Routledge.

Harari, Y. N. (2018). *21 lesson from 21st century*. Jonathan Cape.

Hidayatullah, A., & Csíkos, C. (2023). Exploring students' mathematical beliefs: Gender, grade, and culture differences. *Journal on Efficiency and Responsibility in Education and Science*, *16*(3), 186–195. https://doi.org/10.7160/eriesj.2023.160303

Hidayatullah, A., Csíkos, C., & Setiyawan, R. (2024). The role of belief sources in promoting goal orientation beliefs, self-efficacy, and beliefs about the role of teachers in mathematics learning. *The Asia-Pacific Education Researcher*, *33*(1), 1383–1393. https://doi.org/10.1007/s40299-024-00813-w

Hidayatullah, A., Csíkos, C., & Syarifuddin, S. (2026). Beliefs in mathematics learning and utility value as predictors of mathematics engagement among primary education students: The mediating role of self-efficacy. *Education 3-13: International Journal of Primary, Elementary and Early Years Education*, *December*, *54*(1), 1–14. https://doi.org/10.1080/03004279.2023.2294141

Hidayatullah, A., Csíkos, C., & Wafubwa, R. N. (2023). The dimensionality of personal beliefs: The investigation of beliefs based on the field study. *Revista de Educación a Distancia (RED)*, *23*(72), 1–26. https://doi.org/https://doi.org/10.6018/red.540251

Ho, R. (2006). *Handbook of univariate and multivariate data analysis and interpretation with SPSS*. Taylor & Francis.

Hofer, B. K. (2000). Dimensionality and disciplinary differences in personal epistemology. *Contemporary Educational Psychology*, *25*(4), 378–405. https://doi.org/10.1006/ceps.1999.1026

Jong, J. D., & Hartog, D. D. (2010). Measuring innovative work behaviour. *Creativity and Innovation Management*, *19*(1), 23–36. https://doi.org/10.1111/j.1467-8691.2010.00547.x

Jurgena, I., & Cēdere, D. (2016). Students' ideas on innovations in higher education. *Signum Temporis*, *8*(1), 30–36. https://doi.org/10.1515/sigtem-2016-0014

Kemdikbud. (2022). *Learning achievement of mathematics subject phase A-phase F*. Kurikulum Merdeka. https://kurikulum.kemdikbud.go.id/kurikulum-merdeka/capaian-pembelajaran#filter-cp

Kim, H.-Y. (2013). Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis. *Restorative Dentistry & Endodontics*, *38*(1), 52-54. https://doi.org/10.5395/rde.2013.38.1.52

Kismiantini, Setiawan, E. P., Pierewan, A. C., & Montesinos-López, O. A. (2021). Growth mindset, school context, and mathematics achievement in Indonesia: A multilevel model. *Journal on Mathematics Education*, *12*(2), 279–294. https://doi.org/10.22342/jme.12.2.13690.279-294

Kline, R. B. (2005). *Principles and practice of structural equation modeling*. The Guilford Press.

Krskova, H., & Breyer, Y. A. (2023). The influence of growth mindset, discipline, flow and creativity on innovation: Introducing the M.D.F.C model of innovation. *Heliyon*, *9*(3), 1-11. https://doi.org/10.1016/j.heliyon.2023.e13884

Limeri, L. B., Carter, N. T., Choe, J., Harper, H. G., Martin, H. R., Benton, A., & Dolan, E. L. (2020). Growing a growth mindset: Characterizing how and why undergraduate students ' mindsets change. *International Journal of STEM Education*, *7*(35), 1–19. https://doi.org/10.1186/s40594-020-00227-2

Liu, Q., & Tong, Y. (2022). Employee growth mindset and innovative behavior: The roles of employee strengths use and strengths-based leadership. *Frontiers in Psychology*, *13*, 1–12. https://doi.org/10.3389/fpsyg.2022.814154

Lloret, S., Ferreres, A., & Tomás, A. H. e. I. (2017). The exploratory factor analysis of items: Guided analysis based on empirical data and software. *Anales de Psicología /Annals of Psychology*, *33*(2), 417–432. https://doi.org/10.6018/analesps.33.2.270211

Peixoto, F., Mata, L., Campos, M., Caetano, T., Radišić, J., & Niemivirta, M. (2023). 'Am I to blame because my child is not motivated to do math?': Relationships between parents' attitudes, beliefs, and practices towards mathematics and students' mathematics motivation and achievement. *European Journal of Psychology of Education*, *39*, 1561-1586. https://doi.org/10.1007/s10212-023-00774-6

Rahardi, F., & Dartanto, T. (2021). Growth mindset, delayed gratification, and learning outcome: Evidence from a field survey of least-advantaged private schools in Depok, Indonesia. *Heliyon*, *7*(4), 1-10. https://doi.org/10.1016/j.heliyon.2021.e06681

Seo, E., Shen, Y., & Alfaro, E. C. (2019). Adolescents' beliefs about math ability and their relations to STEM career attainment: Joint consideration of race/ethnicity and gender. *Journal of Youth and Adolescence*, *48*(2), 306–325. https://doi.org/10.1007/s10964-018-0911-9

Sukino, S., Jobih, J., Noor, R., Astuti, I., & Nuni, G. (2024). Program kreativitas mahasiswa 2024. In *Kemendikbudristek*. Ditjen Diktiristek - Kemendikbudristek.

Sun, X., Nancekivell, S., Gelman, S. A., & Shah, P. (2021). Growth mindset and academic outcomes: A comparison of US and Chinese students. *Npj Science of Learning*, *6*(21), 1–9. https://doi.org/10.1038/s41539-021-00100-z

Tanuwijaya, E., Kurniawan, J. E., & Rahmawati, K. D. (2024). Development of an innovative behaviors Android application and website for teachers using the waterfall method. *Jurnal Inovasi Teknologi Pendidikan*, *11*(3), 285–297. https://doi.org/10.21831/jitp.v11i3.68133

Van der Beek, J. P. J., Van der Ven, S. H. G., Kroesbergen, E. H., & Leseman, P. P. M. (2024). How emotions are related to competence beliefs during mathematical problem solving: Differences between boys and girls. *Learning and Individual Differences*, *109*(1), 1–11. https://doi.org/10.1016/j.lindif.2023.102402

Vuletich, H. A., Kurtz-Costes, B., Cooley, E., & Payne, B. K. (2020). Math and language gender stereotypes: Age and gender differences in implicit biases and explicit beliefs. *PLoS ONE*, *15*(9 September), 1–22. https://doi.org/10.1371/journal.pone.0238230

Wong, K.K.K (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. *Marketing Bulletin*, *24*(1), 1–32. https://marketing-bulletin.massey.ac.nz/v24/mb_v24_t1_wong.pdf