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Role of AI in the Entrepreneurial and Innovative Mindset of University Students in MENA and Canada and its overall impact on students' readiness: A Comparative Study

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ABSTRACT: *Since the beginning of 2023, we have been exposed extensively to a new feature of Revolution 4.0 called artificial intelligence (AI). Recently, AI has been extensively implemented in different sectors and industries. Accordingly, AI has become a core component of different business processes and sectors. Among these sectors in which AI is disrupted are the entrepreneurship and education sectors. This study investigates how university students in the United Arab Emirates (UAE) and Canada view innovation and entrepreneurship in relation to AI. AI has the potential to revolutionize how students approach innovation, creativity, and opportunity recognition as it becomes more integrated into business processes, education, and entrepreneurship. Through the application of a cross-sectional comparative quantitative methodology, the study evaluates how AI improves students' ideation, prototyping, and market analysis skills, thereby increasing their preparedness for the workforce. Surveys were used at universities in both regions to gather data, with an emphasis on the opinions and experiences of students using AI-driven tools. This study contributes to the continuing academic conversation on the role of AI in forming future entrepreneurs by offering insights into regional variations in AI adoption and its implications for*

educational programs.

Keywords: Entrepreneurship, Artificial Intelligence, International Education, Innovation, Career advancement.

INTRODUCTION

AI has been widely used in a variety of fields and industries. Robotic machines and AI in academia are examples of AI in action. These systems use AI to perform tasks, resolve complex issues, and make predictions rather than relying on human intelligence. As a result, AI has been integrated into many industries and business processes. The domains of education and entrepreneurship are among those that AI has disrupted. Accordingly, a growing body of evidence supports the disruptive potential of AI and its beneficial effects on entrepreneurship. Moreover, Giuggioli and Pellegrini (2023) concluded in their recent study that AI significantly affects entrepreneurship in four main ways: opportunity identification, decision-making, performance, and research and education. Furthermore, from a human resource perspective, AI started disrupting educational programs and future career opportunities. Since the main aim of educational programs is to equip graduates with job market skills, given the AI-driven changes that are occurring in the current job market and are anticipated to occur in the future job market, universities need to restructure their educational programs to equip graduates with job market needs.

On the other hand, the incorporation of AI into educational programs and entrepreneurial environments represents a double-edged sword. According to Wilson & Daugherty (2018), AI has the potential to rehumanize work by freeing up time and enabling people to work less robotically and more humanly. This should allow them to be more creative and innovative. On the other hand, scholars such as (Whittaker et al., 2018; Chalmers et al., 2021; Shwedeh et al., 2024) stated that AI could also result in an increase in unemployment and inequality. As targeting algorithms can lead to behavior manipulation, software can result in uncontrolled monitoring, and facial recognition software can lead to discrimination. Furthermore, there are differing opinions about AI in the MENA area. While excitement about AI's potential is present, concerns about job displacement and ethical issues are also present. These concerns may impact how AI tools are adopted and used in business endeavors. Currently, the academic discussion concerning AI generally and the effect of AI on entrepreneurship and education is still filled with divergent findings and discussions. Therefore, our primary focus in this study is to investigate the role

of AI in transforming and disrupting entrepreneurship and education by assessing the impact of AI on the entrepreneurial mindset (EM) and innovative mindset (IM) of college students. An innovative mindset incorporates creativity, problem-solving, and a willingness to experiment. In contrast, an entrepreneurial mindset is defined as the capacity to recognize opportunities, take calculated risks, and innovate. By providing students with access to cutting-edge resources for ideation, prototyping, and market analysis, AI technologies such as machine learning, natural language processing, and predictive analytics can improve these mindsets.

However, owing to the regional variations in technology access, educational infrastructure, and cultural perspectives on innovation and entrepreneurship and the adoption of AI in educational programs, the effects of AI may differ significantly. This cross-sectional comparative quantitative study aims to answer the research question related to the effects of AI usage on university students' EM and IM in two countries: the UAE as a representative of a MENA region and Canada. We hypothesize that although AI can foster an innovative and entrepreneurial mindset, its effects are mediated by regional variations. Furthermore, we hypothesize that AI positively affects students' entrepreneurial and innovative mindsets in both regions.

Hypotheses

The following hypotheses were proposed:

H1: AI usage positively affects the EM of UAE and Canadian university students.

H2: AI usage positively impacts the innovative mindset of UAE and Canadian university students.

H3: AI usage positively affects the EM of UAE university students.

H4: AI usage positively affects the EM of Canadian university students.

H5: AI usage positively impacts the innovative mindset of UAE university students.

H6: AI usage positively impacts the innovative mindset of Canadian university students.

H7: The positive effect of AI usage on the innovative mindset of university students is stronger in the UAE than in Canada (multigroup effect).

H8: The positive effect of AI usage on the EM of university students is stronger in the UAE than in Canada.

LITERATURE REVIEW

Artificial intelligence and the entrepreneurial landscape

Academically, AI studies how algorithms and computers perform complex problems and tasks that traditionally require human reasoning, predictive capabilities, and intelligence (Giuggioli & Pellegrini, 2023). The rapid advancement in AI has catalyzed a profound transformation in the entrepreneurial landscape, particularly within digital business venturing (Abaddi, 2023). Recently, Entrepreneurs reported that AI-powered technologies offer them unprecedented opportunities for innovation and growth (Upadhyay et al., 2022). AI is revolutionizing how entrepreneurs optimize their business processes and enhance their operational efficiency. By improving product creation through big data analytics and machine learning, AI transforms entrepreneurship and enables well-informed decisions that align with consumer choices and market trends (Duong et al., 2024). Entrepreneurs can utilize the power of AI-driven analytics to help them obtain more information about a certain product, aiding them in making more informed decisions (Huy et al., 2023) and ensuring that their offerings resonate with the target audience and meet their demands (Gupta et al., 2023). For instance, e-commerce entrepreneurs use around-the-clock AI-driven chatbots to deliver personalized and continuous customer support, improving customer satisfaction while minimizing human intervention (Duong et al., 2024). AI helps entrepreneurs scale their businesses more effectively by leveraging AI-powered technologies such as predictive analytics and recommendation systems; entrepreneurs can identify growth opportunities, optimize resource allocation, and forecast market trends more accurately (Abaddi, 2023). AI can also help entrepreneurs predict customer preference shifts and anticipate market dynamics, allowing them to modify their business strategies and stay ahead of their competitors (Duong et al., 2024). AI offers newfound opportunities for entrepreneurs since they can easily access its solutions at very affordable prices, which can greatly impact entrepreneurship development.

A study by Jebolise Chukwuka & KONYE Igweh (2024) investigated the effects of AI on entrepreneurial creativity and management. The conclusions of this study indicate that AI has significant positive and negative effects on the entrepreneurial mindset. To elaborate, while AI is taking all aspects of work from humans, it will also lead to a lack of creativity and redundancy on their part, while some entrepreneurs might be inspired to show more creativity and innovation. Furthermore, the study revealed several quantitative impacts of AI on entrepreneurship, such as a 300% increase in investment in AI across all businesses and that approximately 80% of executives declare that AI will increase productivity and create new positions.

Applying AI to entrepreneurship can occur through the application of several techniques. The first technique stresses the human touch and promotes

the idea that AI is a technology that supports human creativity and that entrepreneurs may integrate their creativity and human values into AI technologies; this requires a well-balanced strategy that combines human judgment and AI analytical power. The second technique is to promote constant learning for business owners so that this knowledge can enable them to take advantage of the full potential of AI capabilities. The third technique is to foster the application of AI in entrepreneurship in academic institutions and regulatory agencies, and business executives should work together to establish an AI-enabled ecosystem that serves this goal (Jebolise Chukwuka & KONYE Igweh, 2024).

Entrepreneurship and the Entrepreneurial Mindset

Entrepreneurship involves the creation, development, sustenance, and scaling of businesses (Silva et al., 2022). It has also been described as a process that requires strategy organization skills that are effective in transforming ideas into useful actions (Tao et al., 2024). To guarantee success in such activity, an EM is of paramount importance to ensure that young potential entrepreneurs have the required inclination toward resilience and exceptional productivity (Tao et al., 2024). According to Zion & Crum (2018), mindset is a psychological construct that defines how individuals understand themselves and interact with situations and objects in their world. This nature is what connects and orients individuals from what they expect to achieve and what is achieved by such interactions. From an entrepreneurship standpoint, scholars have defined EMs in several ways to capture the capacity for action or thought under uncertain conditions, which distinguishes entrepreneurs from nonentrepreneurs (Akbari et al., 2024). However, a more recent and comprehensive definition is given by (Daspit et al., 2023). The authors defined an EM as "a cognitive perspective that enables an individual to create value by recognizing and acting on opportunities, making decisions with limited information, and remaining adaptable and resilient in often uncertain and complex conditions." This meaning is more encompassing, as it comprises factors likely to guarantee entrepreneurs' success in ever-present uncertain conditions. This includes a drive for value creation, opportunity orientation, intuitive decision-making, adaptability, resilience, and risk tolerance.

In this context, an EM-driven entrepreneur can overcome situational uncertainties and complexity using his or her personality, education, relationships, and available technology to drive products and business creation. This is evident with the current fast pace of technological innovations in fields such as AI, as many businesses are being created and existing businesses are being improved significantly, especially by entrepreneurs who have embraced and utilized EM effectively (Broekhuizen et al., 2023; Tang et al., 2020). This translates to innovation evident in creating new businesses, problem-solving by offering new products/services and growing or scaling businesses for increased profit—a desired outcome for most entrepreneurs.

IMPORTANCE FOR ENTREPRENEURSHIP

Studies have shown that personality traits that are important for determining an entrepreneur's future among young people include a show of creativity in handling tasks, a propensity to innovate, strategic risk-taking, good decision-making skills, risk tolerance, emotional intelligence, and problem-solving (Caliendo et al., 2014; López-Núñez et al., 2020; Rosado-Cubero et al., 2022). Other less-mentioned characteristics involve those that are more general and can also be developed by non-entrepreneurs. These include a good education, a specific family environment or relationships, creativity clusters, an attitude to efficiency, and open-mindedness. Surprisingly, these factors have been shown to be the most significant for driving entrepreneurial mindsets among young people (Rosado-Cubero et al., 2022). The availability of higher education, which involves the development of business-relevant social skills, contributes positively to the development of entrepreneurial skills and encourages entrepreneurship. However, advanced education does not readily translate to an increased inclination toward entrepreneurship among students everywhere. This is the case in China, where people with higher education rarely go into business as entrepreneurs (Huang et al., 2021; Rosado-Cubero et al., 2022); in contrast, such individuals in Spain are more likely to be business starters.

Similarly, growing up in a family that owns businesses is a determinant for young people to become successful businesses through succession, training, or developed passion (Rosado-Cubero et al., 2022). Students who take part in entrepreneurship training, mentorship, and extracurricular activities in school can also develop the skills needed through the relationships they build in the educational environment (Duong, 2023; Kakouris et al., 2023). However, as with education, while relationships with parents influence the development of entrepreneurship skills among young people in Spain (Zion & Crum, 2018), family influence did not lead to interest in entrepreneurship in another study conducted in Poland (Staniewski & Awruk, 2021). This finding shows that the desire to develop an interest in entrepreneurship skills is likely to be cultural across regions well beyond the controls of these highly influencing characteristics (i.e., education, family environment, etc.).

This implies that a psychological factor is necessary to activate the development of a successful entrepreneur nature, and this factor is the entrepreneurial mindset, which may have been inadvertently introduced into the culture of some countries. Cultural modification and ways of thinking can be changed through education. Building entrepreneurship programs that encourage EM in the higher education curriculum has shown superior results by providing students with skills in adaptability, creativity, networking, and leadership, which can help them to become successful entrepreneurs. (Cui & Bell, 2022).

HOW AN EM MAKES SUCCESSFUL ENTREPRENEURS

The following themes that define an EM have been highlighted in terms of how it contributes to the successful entrepreneur, sustenance, and growth of its business.

Adaptability: This is an EM attribute that allows an entrepreneur to adjust their characteristics or situations in the face of dynamic conditions or setbacks that are always present in the business world. It allows the entrepreneur to reconcile existing norms to versions that guarantee success for the business. (Zhang & Chun, 2018) showed how Chinese immigrants modified their entrepreneurial identity to match the values of the new country in which they relocated so that they could serve their communities better. With AI taking over most traditional ways of doing business (Broekhuizen et al., 2023), EM-guided students are more likely to leverage AI for increased opportunities instead of competing against its application or businesses adopting it.

Value creation: An EM-minded entrepreneur can seek a market gap in business, build his vision around this gap, and transform this vision into values. Products or services are then developed to serve these values to identify customers (Hnátek, 2015). AI's ability to massively transform businesses through task automation, data-driven data, and informed decision-making opens an avenue for creating values that can be offered through products and services (Broekhuizen et al., 2023). Young entrepreneurs can explore the technology to create any product of choice they imagine and drive their vision to reality much faster.

Opportunity Oriented: an EM-oriented entrepreneur should see and act on opportunities when faced with new situations, challenges, and uncertainties. For instance, social entrepreneurs use EMs to see challenges in society and act on them as opportunities to create social enterprises to provide solutions (Daspit et al., 2023; Żur, 2015). Whereas most workers and businesses see the adoption of AI as a threat to their jobs or profitability, EM-minded entrepreneurs see it as an opportunity to improve current business processes and an opportunity to offer more and better services (Broekhuizen et al., 2023).

Intuitive Decision Making: An EM-oriented entrepreneur knows how to think effectively and make decisions using limited data available in otherwise uncertain situations. It requires a special cognitive ability to structure thoughts effectively, which leads to good decision-making (Daspit et al., 2023). AI uses both internal and external data to augment human decision-making (Broekhuizen et al., 2023). It offers the opportunity for entrepreneurs to utilize their EM with the possibility of AI to make effective decisions to continuously improve business processes.

Resilience: This relates to how EM-oriented entrepreneurs persevere through challenging business processes or failure. Studies have shown that the ability to maintain long-term goals when faced with challenges can be linked to individuals who have a growth mindset as a precursor (Park et al., 2020). When faced with possibilities of failure or failure, an EM entrepreneur takes it as a learning episode and reventures it in the best way possible (Daspit et al., 2023).

Risk tolerance refers to the willingness of an EM entrepreneur to take calculated risks in the presence of uncertain conditions. Given that new opportunities are risky when there is no full understanding of what they entail, an EM entrepreneur leverages the network, available resources, and support from others to reduce the risk of failure and succeed with novel ideas and technology such as AI (Cui & Bell, 2022).

In summary, we can see how an entrepreneurial mindset will lead to more benefits in driving innovation, driving growth, and ensuring success for students who want to venture into entrepreneurship using AI. The newness of the technology presents uncertain conditions that are more likely to be used and viewed as an advantage when EM is employed in their venture design and setup.

AI USAGE AND ENTREPRENEURIAL MINDSET

Wesarat et al. (2022) reported that incorporating AI into educational frameworks significantly encourages students to think like entrepreneurs. A tendency to innovate, take chances, and seize opportunities are characteristics of the entrepreneurial mindset, which is becoming increasingly acknowledged as crucial for success in the modern business environment. AI technologies can help students develop this mindset by providing them with access to resources that support creativity, critical thinking, and problem-solving abilities, all of which are essential for starting a business. Moreover, they stated that to adequately prepare students for future entrepreneurial endeavors, it is imperative that universities foster an EM, which should be incorporated into the curriculum and course design.

Furthermore, Fang (2023) highlights the potential of AI to drive enterprise transformation and innovation in business models, underscoring its transformative potential in entrepreneurship. In addition to gaining technical skills, students who use AI in their entrepreneurial projects also cultivate an innovative and adaptable mindset. This is consistent with the findings of Chang et al. (2022). who contend that encouraging students to develop entrepreneurial skills and mindsets is essential for long-term entrepreneurship, especially for underrepresented groups such as female students, Institutions can foster an inclusive atmosphere that supports a range of innovative and entrepreneurial expressions by incorporating AI into their educational practices.

In addition, entrepreneurship education and artificial intelligence improve learning outcomes. Chen and other scholars emphasize that students are encouraged to adopt an entrepreneurial perspective through experiential learning processes, which AI technologies can enhance (Chen et al., 2021). This hands-on method improves both cognitive preparedness and a proactive mindset for spotting and taking advantage of business opportunities. Thus, incorporating AI into classroom settings can foster a dynamic environment in which students are inspired to try new things, think creatively, and forge their own entrepreneurial identities.

On a separate note, concerns have been raised about the possible harm that AI may do to students' entrepreneurial mindsets when incorporated into educational settings, especially in entrepreneurship education. The widespread application of AI may unintentionally inhibit critical thinking, creativity, and the proactive behaviors necessary for entrepreneurship, even though it can improve learning and offer new resources for innovation. One major concern is that an overreliance on AI tools may compromise students' ability to solve problems and think critically on their own. Zhou noted that using AI in higher education can lead to dependency, which can impair students' capacity for critical analysis and deep learning—two skills essential for successful entrepreneurship (Zhou, 2024).

In conclusion, while AI has the potential to enhance entrepreneurship education, its negative effects on students' EMs need to be investigated further in different contexts. Accordingly, we hypothesize the following:

H1: AI usage positively affects the EM of UAE and Canadian university students.

H3: AI usage positively affects the EM of UAE university students.

H4: AI usage positively affects the EM of Canadian university students.

H8: The positive effect of AI usage on the EM of university students is stronger in the UAE than in Canada.

Innovative mindset

An innovative mindset is indeed a necessary form of intelligence among individuals, some of which can be considered innate (Wang, 2021). Indisputably, such individuals' innate abilities are developed and best exploited by skill development, the exploitation of digital technology (DT), and AI (Jiang et al., 2024; Sahin et al., 2024).

For instance, the use of DTs, such as Google search and similar tools on the internet, has reduced the time to innovate (Jiang et al., 2024). This is because these tools provide faster, easier, and more efficient access to resources and

reduced time for accessing information (Jiang et al., 2024). Furthermore, this ability to innovate in the modern era, especially in areas relevant to career growth, is considered more feasible when DT related to information and communication technology or ICT is adopted (Yunis et al., 2018). Adoption of new technology is also known to enhance personal and organizational abilities for innovation and entrepreneurship (Barra et al., 2024). Indeed, it has been proven that the best innovation results occur when humans work well with technological tools such as AI (Fügener et al., 2022). However, natural or human intelligence is sharpened by the challenge of solving some of these problems that AI helps with (Korteling et al., 2021). In conducting creative tasks such as developing a report or researching a novel concept, the mindset for innovation develops while making the individual more efficient at innovative thinking. Thus, an important drawback related to the use of AI for an individual's innovativeness is that it weakens because of the user's dependence on AI (Barrat, 2023).

The gender of fellow learners can also influence one's innovativeness (Barra et al., 2024). For instance, while the male gender is more predisposed to risk-taking, the female gender tends to be more adaptive, and cooperation between both in a learning or working environment can foster better synergy for achieving collective goals (Zhang et al., 2022). Furthermore, the inspiration to solve problems faced by gender has often led to innovative transformations of how things work in a place (Suseno & Abbott, 2021; Wajcman, 2001). However, studies still find that the absence of social support and access to technology are among the issues limiting the innovativeness of females in some environments (Abaddi & AL-Shboul, 2024; Barra et al., 2024; Trauth & Connolly, 2021). It is believed that the development of social and psychological support for the adoption and proper use of technology and the provision of knowledge and skills development would not only enhance innovativeness but also reduce the digital divide affecting some genders and those in developing nations (Barra et al., 2024). Indeed, impressive efforts to further reduce gender-related hindrances to innovation have entailed the earmarking of leadership positions in organizations to women (Weber-Lewerenz & Vasiliu-Feltes, 2022), supporting women associations and developing efforts to inspire women to exploit their full potential for innovation (Weber-Lewerenz & Vasiliu-Feltes, 2022).

The environment in institutions of learning also affects students' innovation mindset. This is because this environment provides students with opportunities for interaction with fellow students to form teams that facilitate their individual capabilities for innovation (Ahmad et al., 2021). Furthermore, students develop through their interactions, collective problem-solving, and imitation of the positive attitudes of their peers (Zhi et al., 2021). Additionally, by creating a curriculum that challenges students to think critically and design solutions to current global problems, educational institutions, through their instructors, provide an important means for developing an innovation mindset relevant to job preparedness (Patel et al., 2024). Indeed, the employment of

competent instructors/teachers and the adoption of technology are regarded as important factors leading to the quality of education of students (Sahin et al., 2024) and encouraging them to think creatively, as indeed they define the ecosystem around which students develop their knowledge, gain experience, and develop their mindset (Abaddi & AL-Shboul, 2024; Prencipe et al., 2020). Furthermore, the optimal learning environments for students consider them not only as end users or products to be developed but also as partners in the development of innovative mindsets and skills for their individual selves as well as for their peers (Patel et al., 2024).

Institutions have also recognized the need for entrepreneurship education for students to challenge their creativity. By learning to be entrepreneurs, they develop the ability to find solutions to tough problems and develop the core competencies for innovation (Kirby et al., 2022). Rightly so, entrepreneurship experiences and education are the primary means of developing innovative mindsets among students (Abaddi & AL-Shboul, 2024), as they utilize the resources around them to create unique value. Quite interestingly, the effective utilization of digital technologies for innovation occurred when entrepreneurship training was present (Abaddi, 2024), indicating that the attempt to solve challenging problems was more impactful as a means for developing an innovation mindset than just the interest in or tendency to adopt technology. While indeed entrepreneurship drives innovation, the mindset for innovation is also seen to drive the proactive behavioral traits that lead to entrepreneurship (Iddris et al., 2022; Shah et al., 2016). Thus, both entrepreneurship and innovation go hand in hand.

Overall, it is clear from the literature that both individual efforts and environmental influences affect students' knowledge of innovation. Despite its challenges, adopting technology and AI indeed promotes the ability and efficiency of students to be innovative. Technology and AI also help institutions create an enabling environment to increase the innovation mindset of young learners. The benefits of providing opportunities across genders and environments lead to advantages that make efforts toward addressing related imbalances worthy of support. Most importantly, the drive to solve problems is seen as the major factor influencing student innovation.

In conclusion, even though AI can potentially improve innovative mindsets, more research is needed to determine how it affects students' innovative mindsets. Thus, we developed the following hypothesis.

H2: AI usage positively impacts the innovative mindset of UAE and Canadian university students.

H5: AI usage positively impacts the innovative mindset of UAE university students.

H6: AI usage positively impacts the innovative mindset of Canadian university students.

H7: The positive effect of AI usage on the innovative mindset of university students is stronger in the UAE than in Canada (multigroup effect).

RESEARCH METHOD

The researchers in this study collected primary data using a questionnaire distributed to university students in the UAE and Canada. A sample of 320 senior students in their final semester was targeted in both countries. Since AI, innovation, and entrepreneurship are universal topics, no specific preferences were considered in terms of major or gender. A structural equation model was estimated using IBM's SPSS, version 26, and Smart PLS software, version 4.

Measures

The data were collected from universities in both countries. This study used a comparative methodology to examine how AI has influenced university students' innovative and entrepreneurial mindsets in Canada and the MENA region. In this study, the AI was tested using the "Student Attitudes Toward AI" (SATAI) prevalidated by Suh & Ahn (2022). The scale tested three main components: cognitive components, affective components, and behavioral components. The total number of scale items is 26. The researchers adopted Jung & Lee's (2020) scale regarding the entrepreneurial mindset. The scale includes 5 components: innovativeness, need for achievement, risk taking, autonomy, and proactiveness. The total number of scale items is 19. Finally, the innovative mindset was tested using Sidhu et al. (2016). The construct has five components, namely, resilience, diversity, mental strength, perfection, and collaboration.

To ensure the quality and convenience of the adopted scales, the researchers conducted a pretest. The survey instrument was tested on 10 students from the targeted sample to evaluate the questionnaire's accuracy, structure, and relevance. The overall feedback was positive except for the "Perfection" subsection of the innovative mindset scale. The participants struggled to relate to the items in this subsection. Accordingly, the researchers removed this subsection because of the feedback received and the low Cronbach's alpha score (0.511). Overall, the questionnaire included 62 items.

Data Analysis

The first step in the data-cleaning process involves checking for missing values and unengaged responses. There are no missing data in rows in the dataset, as all the survey items were mandatory, and survey participants were not enabled to skip any item. With respect to unengaged responses, the standard deviation of the items was checked to eliminate lengthy strings from the data

(DeSimone et al., 2015), whereas a standard deviation of 0 indicated no variance. In this study, in the UAE sample, 9 responses were considered unengaged responses. In the Canadian sample, 28 responses were highlighted as unengaged responses. In total, 37 responses were excluded from the overall dataset. The total sample size is 278: 151 UAE university students and 127 Canadian university students. No outliers were detected for continuous variables.

Following this, the researchers tested the data normality of the two datasets using Skewness and kurtosis statistical tests. For the UAE dataset, all the variables' skewness scores were below the threshold of 1.96 for the 0.5 significance level, meaning that the distribution is normal (Hair et al. (2014). The skewness scores of the UAE dataset ranged between -0.617 and -1.357, whereas the kurtosis scores ranged from -0.224 to 1.717. Finally, simple deviations are acceptable and normal in the dataset and do not affect the quality of the data. Table (1) shows the skewness and kurtosis of the dataset sample.

Table 1 *Normality Statistics for the Main Study Variables*

Variable	Valid *N*	Skewness	SE Skewness	Kurtosis	SE Kurtosis
AI cognitive competence	278	-1.357	0.146	1.717	0.291
AI affective competence	278	-0.841	0.146	0.558	0.291
AI behavioral competence	278	-0.617	0.146	-0.462	0.291
Entrepreneurial innovativeness	278	-0.989	0.146	1.130	0.291
Entrepreneurial achievement	278	-0.813	0.146	0.847	0.291
Entrepreneurial risk-taking	278	-0.759	0.146	-0.224	0.291
Entrepreneurial autonomy	278	-0.436	0.146	-0.403	0.291
Entrepreneurial proactiveness	278	-0.789	0.146	0.794	0.291

Innovative mindset resilience	278	-0.966	0.146	0.893	0.291
Innovative mindset diversity	278	-0.931	0.146	0.709	0.291
Innovative mindset strength	278	-1.192	0.146	2.124	0.291
Innovative mindset collaboration	278	-1.104	0.146	1.374	0.291

Note. N = sample size; SE = standard error; AI = artificial intelligence. Skewness and kurtosis values were used to assess the normality of the main study variables. All variables had complete data, with no missing responses.

The survey was administered to students at two universities in the UAE and Canada. It was sent to 165 students in the UAE and 150 students in Canada. After unengaged responses were removed, the total sample size was 278. The response rate is approximately 98%. After unengaged responses were removed, 151 participants from the UAE and 127 participants from Canada remained.

The frequencies show that the dataset varied and included university students from different colleges, genders, and age groups. The participants' majors were as follows: 111 were Engineering and Physical Sciences students (39.9%), 60 were Medicine & Health Sciences students (21.6%), 59 were Computing, Mathematical, and Software Engineering students (21.2%), and 48 were Humanities and Arts & Business students (7.3%). Regarding the age distribution, 147 students (52.9%) were aged 17 to 20 years, 112 students (40.3%) were aged 21 to 29 years, 11 students (4%) were aged 30 to 39 years, and 8 students (2.9%) were aged more than 40 years. With respect to the sex distribution, 167 students (60.1%) were females, and 106 students (38.1%) were males. Moreover, 5 students (1.8%) from the Canadian sample reported their gender as (others). The overall sample distribution is strong evidence of the high generalizability level of the findings and shows that the data sample well represents different university student groups. *Measurement Model*

The first stage in structural equation modeling involves evaluating the construct quality criteria. This involves assessing the construct's validity and reliability. Assessing the measurement model aids in determining whether the tested indicators are appropriate for the measurement objectives. The lower-order and higher-order measurement models were tested in the first stage, and the structural model was tested in the second stage. Using data from both the UAE and the Canadian sample, the researchers assessed three different measurement and structural models in this study: (1) a combined measurement and structural model, (2) a UAE measurement and structural model, and (3) a

Canadian measurement and structural model. The results presented are limited by word count and concentrate on the overall model, which includes both regions, as well as the hypothesis testing outcomes.

Lower-order measurement model

The researchers assessed the reliability and validity of the first (lower)-order constructs to evaluate the measurement model. The researcher assessed internal consistency reliability, composite reliability and convergent validity by reporting outer loadings, Cronbach's alpha, rho_A (ρA), and AVE values. The values should range from 0.70 to 0.95 (Hair et al., 2014). For the AVE, the value should be above 0.50. Table (2) highlights the cross-loadings, Cronbach's alpha, rho_A, CR, and AVE. All the values were above the threshold. Therefore, according to the (Chin, 1998) rule, all the current study constructs account for more than 50% of the variance of the item.

Table 2 *Lower Order Measurement Model Results: Factor Loadings, Reliability, and Convergent Validity*

Construct	Dimension	Item	Loading	Cronbach's α	rho_A	CR	AVE
AI competence	Cognitive component	Cogn2	0.905	0.869	0.871	0.920	0.793
		Cogn3	0.895				
		Cogn4	0.870				
	Affective component	Aff1	0.766	0.851	0.857	0.893	0.626
		Aff2	0.802				
		Aff6	0.825				
		Aff7	0.798				
		Aff9	0.764				
	Behavioral component	Beh1	0.793	0.942	0.945	0.951	0.658
		Beh3	0.784				
		Beh4	0.727				
		Beh5	0.796				

		Beh6	0.852				
		Beh7	0.842				
		Beh8	0.870				
		Beh9	0.749				
		Beh10	0.838				
		Beh11	0.851				
Entrepreneurial mindset	Innovativeness	Innv1	0.817	0.876	0.885	0.906	0.617
		Innv2	0.785				
		Innv3	0.824				
		Innv4	0.705				
		Innv5	0.803				
		Innv6	0.773				
	Need for achievement	Achv2	0.811	0.805	0.811	0.885	0.720
		Achv3	0.885				
		Achv4	0.847				
	Risk-taking	Risk1	0.883	0.871	0.874	0.921	0.795
		Risk2	0.893				
		Risk3	0.899				
	Autonomy	Aut1	0.782	0.771	0.772	0.868	0.687
		Aut2	0.861				
		Aut3	0.842				
	Proactiveness	Pro1	0.867	0.797	0.807	0.880	0.711
		Pro2	0.840				

		Pro3	0.821				
Innovative mindset	Resilience	Res1	0.833	0.838	0.859	0.892	0.674
		Res2	0.866				
		Res3	0.715				
		Res4	0.862				
	Diversity	Div1	0.787	0.841	0.860	0.893	0.675
		Div2	0.797				
		Div3	0.835				
		Div4	0.866				
	Mental strength	MenSt1	0.798	0.858	0.859	0.898	0.638
		MenSt2	0.849				
		MenSt3	0.813				
		MenSt4	0.772				
		MenSt5	0.759				
	Collaboration	Collab1	0.843	0.844	0.856	0.895	0.682
		Collab2	0.856				
		Collab3	0.759				
		Collab4	0.841				

Note. AI = artificial intelligence; CR = composite reliability; AVE = average variance extracted. Cronbach's α, rho_A, CR, and AVE are reported at the dimension level. Factor loadings are reported at the item level.

Furthermore, the researchers assessed the measurement model of the lower order and reported the collinearity values. Academics disagree in terms of the value of the collinearity threshold. e. 3. In accordance with Sarstedt and Mooi (2014), a value less than 10.00 was specified. Conversely, other academics (Diamantopoulos & Siguaw, 2006; Hair, Ringle, and Sarstedt, 2011) advocated for more stringent values, such as 5. In all the cases, the VIF values ranged from

1.404 to 3.743. Therefore, all the values were less than 5. Table (3) shows the VIF scores. The lower-order measurement model is shown in Figure (1).

Table 3 *Collinearity Statistics for Measurement Items*

Construct	Dimension	Item	VIF
AI competence	Cognitive component	Cogn2	2.476
		Cogn3	2.439
		Cogn4	2.059
	Affective component	Aff1	1.709
		Aff2	1.801
		Aff6	1.951
		Aff7	1.998
		Aff9	1.659
	Behavioral component	Beh1	2.739
		Beh3	2.487
		Beh4	3.165
		Beh5	3.067
		Beh6	3.743
		Beh7	2.004
		Beh8	2.834
		Beh9	3.195
		Beh10	2.511
		Beh11	1.860
Entrepreneurial mindset	Innovativeness	Innv1	2.124
		Innv2	1.974
		Innv3	2.084

		Innv4	1.587
		Innv5	2.178
		Innv6	2.079
	Need for achievement	Achv2	1.555
		Achv3	2.002
		Achv4	1.853
	Risk-taking	Risk1	2.275
		Risk2	2.343
		Risk3	2.325
	Autonomy	Aut1	1.404
		Aut2	1.861
		Aut3	1.715
	Proactiveness	Pro1	1.809
		Pro2	1.877
		Pro3	1.535
Innovative mindset	Resilience	Res1	2.142
		Res2	2.335
		Res3	1.521
		Res4	2.092
	Diversity	Div1	1.603
		Div2	1.844
		Div3	2.157
		Div4	2.010
	Mental strength	MenSt1	1.933

		MenSt2	2.382
		MenSt3	1.947
		MenSt4	1.779
		MenSt5	1.622
	Collaboration	Collab1	2.356
		Collab2	2.103
		Collab3	1.723
		Collab4	2.217

Note. AI = artificial intelligence; VIF = variance inflation factor.

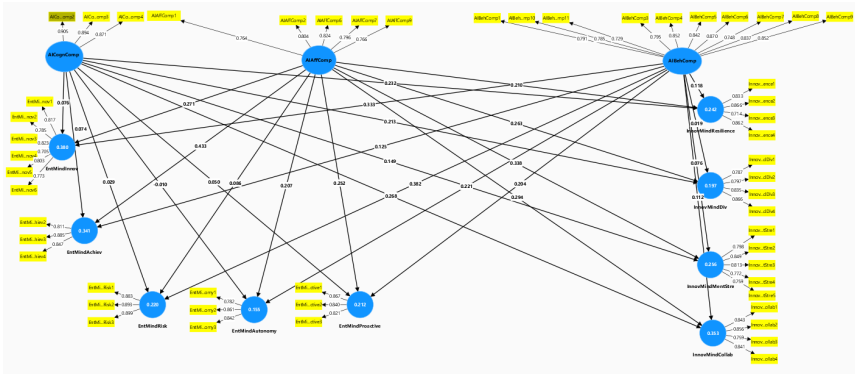

Figure 1 *Lower-order measurement model*

After evaluating convergent validity, discriminant validity was assessed using bootstrapping techniques, heterotrait–monotrait ratio values, cross-loadings, and the Fornell–Larcker criterion. Each item loaded more strongly on its intended construct than on the other constructs, as Appendix A demonstrates. These results indicate that the measurement model demonstrated acceptable discriminant validity.

Discriminant validity was further evaluated using the Fornell–Larcker criterion. The discriminant discriminant discriminant discriminant discriminant discriminant construct construct. Additionally, the square root of the AVE should be greater than the interconstruct correlations. The diagonal values, which

represent the square roots of AVE, were higher than the corresponding correlations with other constructs, as Appendix B demonstrates. As a result, the Fornell–Larcker results show that the current study has no discriminant validity issues.

With respect to the results of the HTMT test, the HTMT value should not surpass the threshold of 0.90. All the HTMT values are less than the 0.90 threshold. Table (4) highlights the HTMT values.

Table 4 *Heterotrait–Monotrait Ratio of Correlations for Discriminant Validity*

Construct	1	2	3	4	5	6	7	8	9	10	11	12
1	—											
2	.834	—										
3	.714	.653	—									
4	.683	.563	.495	—								
5	.444	.435	.304	.561	—							
6	.641	.627	.502	.891	.613	—						
7	.520	.480	.395	.745	.668	.796	—					
8	.445	.508	.354	.734	.473	.740	.637	—				
9	.627	.544	.595	.690	.469	.701	.624	.548	—			
10	.469	.378	.441	.718	.491	.749	.680	.543	.737	—		
11	.556	.460	.466	.888	.597	.829	.828	.644	.767	.691	—	
12	.508	.467	.492	.618	.528	.672	.718	.591	.867	.688	.717	—

Note. HTMT = heterotrait–monotrait ratio of correlations. 1 = affective component; 2 = behavioral component; 3 = cognitive component; 4 = entrepreneurial achievement; 5 = entrepreneurial autonomy; 6 = entrepreneurial innovativeness; 7 = entrepreneurial proactiveness; 8 = entrepreneurial risk-taking; 9 = innovative mindset collaboration; 10 = innovative mindset diversity; 11 = innovative mindset mental strength; 12 = innovative mindset resilience. Values below .90 indicate acceptable discriminant validity.

With respect to the bootstrapping process, the researcher used the accelerated bootstrap confidence interval (2.5% - 97.5%) to check the HTMT values and the bias-corrected bootstrapping procedure. The values should be significantly different from 1 (Hair et al., 2014; Sarstedt et al., 2019). Table (5) shows the bootstrap confidence intervals of the constructs. All values are different from 1. Therefore, discriminant validity was fully achieved.

Table 5 *Bootstrapped HTMT Confidence Intervals for Discriminant Validity*

	Original Sample (*O*)	**Sample Mean (*M*)**	**2.5%**	**97.5%**
BehComp–AffComp	.834	.835	.772	.889
CognComp–AffComp	.714	.712	.595	.809
CognComp–BehComp	.653	.652	.549	.742
EntAchiev–AffComp	.683	.682	.554	.792
EntAchiev–BehComp	.563	.563	.444	.672
EntAchiev–CognComp	.495	.492	.325	.643
EntAutonomy–AffComp	.444	.443	.283	.591
EntAutonomy–BehComp	.435	.435	.286	.573
EntAutonomy–CognComp	.304	.302	.126	.471
EntAutonomy–EntAchiev	.561	.558	.393	.704
EntInnov–AffComp	.641	.638	.508	.753
EntInnov–BehComp	.627	.627	.523	.720
EntInnov–CognComp	.502	.498	.324	.652
EntInnov–EntAchiev	.891	.890	.824	.946
EntInnov–EntAutonomy	.613	.611	.455	.744
EntProactive–AffComp	.520	.517	.343	.667
EntProactive–BehComp	.480	.479	.344	.602
EntProactive–CognComp	.395	.392	.216	.548
EntProactive–EntAchiev	.745	.742	.621	.845
EntProactive–EntAutonomy	.668	.667	.523	.798
EntProactive–EntInnov	.796	.794	.677	.888
EntRisk–AffComp	.445	.446	.314	.568
EntRisk–BehComp	.508	.508	.391	.620

EntRisk–CognComp	.354	.353	.214	.488
EntRisk–EntAchiev	.734	.735	.648	.815
EntRisk–EntAutonomy	.473	.473	.323	.613
EntRisk–EntInnov	.740	.741	.657	.817
EntRisk–EntProactive	.637	.639	.524	.747
InnovCollab–AffComp	.627	.624	.487	.740
InnovCollab–BehComp	.544	.543	.430	.650
InnovCollab–CognComp	.595	.592	.448	.714
InnovCollab–EntAchiev	.690	.687	.529	.818
InnovCollab–EntAutonomy	.469	.467	.309	.609
InnovCollab–EntInnov	.701	.697	.574	.796
InnovCollab–EntProactive	.624	.621	.460	.755
InnovCollab–EntRisk	.548	.547	.418	.665
InnovDiv–AffComp	.469	.467	.298	.623
InnovDiv–BehComp	.378	.377	.232	.521
InnovDiv–CognComp	.441	.437	.276	.581
InnovDiv–EntAchiev	.718	.717	.579	.836
InnovDiv–EntAutonomy	.491	.490	.327	.641
InnovDiv–EntInnov	.749	.748	.639	.842
InnovDiv–EntProactive	.680	.679	.521	.815
InnovDiv–EntRisk	.543	.545	.400	.678
InnovDiv–InnovCollab	.737	.736	.608	.843
InnovMentStre–AffComp	.556	.553	.400	.683
InnovMentStre–BehComp	.460	.459	.325	.585
InnovMentStre–CognComp	.466	.461	.278	.618
InnovMentStre–EntAchiev	.888	.886	.806	.958

InnovMentStre–EntAutonomy	.597	.595	.448	.723
InnovMentStre–EntInnov	.829	.825	.734	.898
InnovMentStre–EntProactive	.828	.826	.730	.904
InnovMentStre–EntRisk	.644	.644	.542	.742
InnovMentStre–InnovCollab	.767	.764	.650	.857
InnovMentStre–InnovDiv	.691	.690	.563	.798
InnovResilience–AffComp	.508	.504	.346	.641
InnovResilience–BehComp	.467	.466	.332	.587
InnovResilience–CognComp	.492	.489	.339	.622
InnovResilience–EntAchiev	.618	.614	.458	.750
InnovResilience–EntAutonomy	.528	.526	.371	.666
InnovResilience–EntInnov	.672	.669	.535	.786
InnovResilience–EntProactive	.718	.716	.585	.832
InnovResilience–EntRisk	.591	.592	.455	.720
InnovResilience–InnovCollab	.867	.867	.785	.936
InnovResilience–InnovDiv	.688	.688	.553	.801
InnovResilience–InnovMentStre	.717	.714	.592	.815
InnovResilience–InnovPerf	.564	.567	.394	.741

Following this, the researcher moved on to the second stage of the measurement model, which is the higher (second) order model for the AI, entrepreneurial mindset, and innovative mindset constructs. The researchers assessed the collinearity and outer weights. Collinearity is checked using VIF values. As previously stated, there is a debate between scholars about the collinearity threshold value (less than 10.00). Table (6) shows the VIF values of the higher-order constructs. All the VIF values are less than 5, which is the strictest cutoff. Therefore, no collinearity issues exist in this study.

Table 6 *Collinearity Statistics for the Structural Model*

	VIF
AI affective competence	3.079
AI behavioral competence	2.849
AI cognitive competence	1.742
Entrepreneurial achievement	2.424
Entrepreneurial autonomy	1.485
Entrepreneurial innovativeness	2.862
Entrepreneurial proactiveness	2.045
Entrepreneurial risk-taking	1.931
Innovative mindset collaboration	2.666
Innovative mindset diversity	1.849
Innovative mindset mental strength	2.380
Innovative mindset resilience	2.377

To determine the significance of the outer weights of the model items, the higher-order model's bootstrapping procedure is the last step in evaluating the measurement model. Using 5000 samples, the researcher performs the bootstrapping process. All the outer weights of the higher-order model are significant. In addition, the researchers checked the outer weights and loading significance results (Table 7 and Table 8). All the outer loadings of the constructs are significant. On the basis of these two criteria, we conclude that the quality of the higher-order measurement model is high.

Table 7 *Outer Weights*

Path	Original Sample (*O*)	Sample Mean (*M*)	*SD*	*t*	*p*
AI affective competence ← AI usage	.407	.407	.017	23.246	< .001
AI behavioral competence ← AI usage	.386	.388	.021	18.203	< .001
AI cognitive competence ← AI usage	.333	.330	.024	13.721	< .001
Entrepreneurial achievement ← Entrepreneurial mindset	.262	.262	.019	13.765	< .001
Entrepreneurial autonomy ← Entrepreneurial mindset	.199	.199	.019	10.386	< .001
Entrepreneurial innovativeness ← Entrepreneurial mindset	.303	.304	.018	16.588	< .001
Entrepreneurial proactiveness ← Entrepreneurial mindset	.233	.233	.018	12.703	< .001
Entrepreneurial risk-taking ← Entrepreneurial mindset	.227	.228	.018	12.808	< .001
Innovative mindset collaboration ← Innovative mindset	.291	.292	.020	14.577	< .001

Innovative mindset diversity ← Innovative mindset	.216	.215	.016	13.721	< .001
Innovative mindset mental strength ← Innovative mindset	.249	.249	.016	15.765	< .001
Innovative mindset resilience ← Innovative mindset	.245	.245	.015	16.640	< .001

Note. AI = artificial intelligence; *O* = original sample; *M* = sample mean; *SD* = standard deviation.

Table 8 *Outer Loadings*

Path	**Original Sample (O)**	**Sample Mean (M)**	**SD**	**t**	**p**
AI affective competence ← AI usage	.926	.926	.010	90.430	< .001
AI behavioral competence ← AI usage	.908	.909	.009	97.088	< .001
AI cognitive competence ← AI usage	.821	.817	.035	23.147	< .001
Entrepreneurial achievement ← Entrepreneurial mindset	.854	.853	.022	38.803	< .001
Entrepreneurial autonomy ← Entrepreneurial mindset	.683	.680	.048	14.089	< .001
Entrepreneurial innovativeness ←	.896	.895	.015	61.692	< .001

Entrepreneurial mindset					
Entrepreneurial proactiveness ← Entrepreneurial mindset	.814	.811	.032	25.612	< .001
Entrepreneurial risk-taking ← Entrepreneurial mindset	.788	.789	.021	37.135	< .001
Innovative mindset collaboration ← Innovative mindset	.867	.866	.018	47.082	< .001
Innovative mindset diversity ← Innovative mindset	.775	.773	.037	20.796	< .001
Innovative mindset mental strength ← Innovative mindset	.851	.848	.028	30.263	< .001
Innovative mindset resilience ← Innovative mindset	.840	.838	.025	33.820	< .001

Note. AI = artificial intelligence; *O* = original sample; *M* = sample mean; *SD* = standard deviation.

To summarize, the evaluation of the measurement model revealed that every construct reasonably satisfied the threshold and benchmark values for all statistical tests on the basis of prior research. The next step is to assess the structural model.

Structural Model and Hypothesis Testing

As recommended by Hair et al. (2014), the primary goal of evaluating the structural model is to test the predicted relationships between the constructs and the model's predictive power. The researchers looked at the R^2 values of the endogenous variables to evaluate the sample model's predictive ability. The R^2 value varies from 0 to 1. When R^2 increases, the explanatory power increases.

The R^2 thresholds are as follows : R^2 values of 0.25, 0.50, and 0.75 denote weak, moderate, and strong impacts, respectively (Hair et al. (2014)). The R^2

value of the entrepreneurial mindset is 0.372, and that of the innovative mindset is 0.353. Therefore, the R^2 values in this study are acceptable and indicate a moderate impact. Table (9) reports the R^2 values. The structural model is shown in Figure (3). The structural model explains 37.3% of the variation in entrepreneurial mindsets and 35.3% of the variation in innovative mindsets.

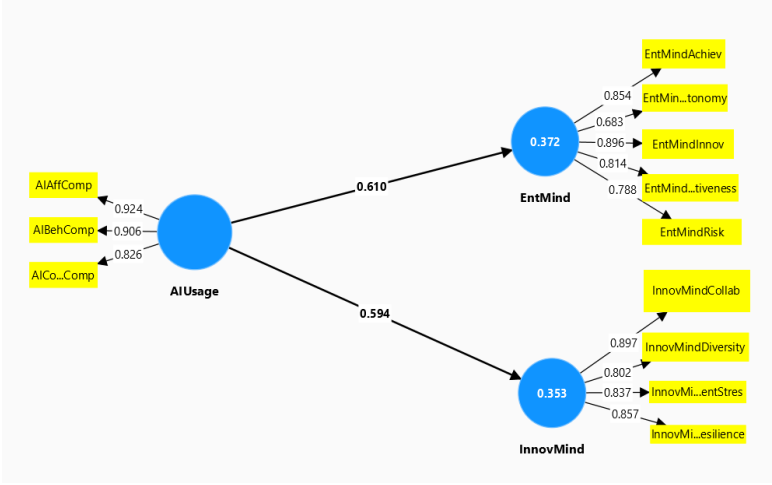

Figure 2 *Higher-Order Structural Model*

Table 9 *R^2 Values*

Construct	***R*²**	**Classification**
Entrepreneurial mindset	.372	Medium
Innovative mindset	.353	Medium

Note. R^2 = coefficient of determination. The R^2 values indicate the proportion of variance explained in each endogenous construct.

Additionally, a further step involves reporting the Q2 value to evaluate the structural model's predictive ability. To determine the Q2 value, the researcher blindfolded the participants. Hair et al. (2014) reported that a Q2 value greater than 0 indicates the path model's predictive relevance.

The Q^2 value for the entrepreneurial mindset is 0.363, and for the innovative mindset, it is 0.345. Thus, the Q^2 values of the entrepreneurial and innovative mindsets show that predictive relevance was established in this study. Table (10) presents the Q^2 values of the endogenous variables. Given that the Q^2 values are greater than 0, the study model represents high predictive relevance.

Table 10 *Q^2 Values*

Construct	Q^2
Entrepreneurial mindset	.363
Innovative mindset	.345

Note. Q^2 = Stone–Geisser's predictive relevance value. Values greater than zero indicate that the model has predictive relevance for the endogenous constructs.

After assessing the model's predictive potential, the researchers tested the hypotheses. Bootstrapping procedures must be performed to evaluate the structural model, and the study hypotheses must be accepted or rejected on the basis of the reported t values and P values. All hypothesis values are reported in the following section.

The impact of AI on the entrepreneurial mindset and innovative mindset of UAE and Canadian university students. The findings of the structural model path analysis indicate that the relationship between AI and the entrepreneurial mindset of UAE and Canadian university students is supported: AI usage positively affects the entrepreneurial mindset ($\beta = 0.610$, t value = 11.776, $p < 0.05$). Moreover, AI usage was significantly positive and positively correlated with the innovative mindset of UAE and Canadian university students (B= 0.594, t= 10.579, $p < 0.05$). Therefore, *H1: AI usage positively affects the entrepreneurial mindset of UAE and Canadian university students*. and *H2: AI usage positively affects the innovative mindset of UAE and Canadian university students*.

Moreover, the UAE structural model path analysis findings indicate that the relationship between AI and the entrepreneurial mindset of UAE university students is supported: AI usage positively affects UAE university students' entrepreneurial mindset (β =0.374, t value = 5.049, $p < 0.05$). Moreover, AI usage was significantly positively correlated with UAE university students' innovative mindset (B 0.399, t= 5.637, $p < 0.05$). Accordingly, *H3: AI usage positively affects the innovative mindset of UAE university students*. and *H5: AI usage positively affects the innovative mindset of UAE university students*.

With respect to the impact of AI on the entrepreneurial and innovative mindsets of Canadian university students, the results of the Cox structural model path analysis indicate that the relationship between AI and the entrepreneurial mindset of Canadian university students is supported: AI usage positively affects the entrepreneurial mindset of Canadian university students (β =0.751, t value = 13.852, $p < 0.05$). Moreover, AI usage was significantly positively correlated with the innovative mindset of Canadian university students (B 0.736, t= 13.583; $p < 0.05$). Accordingly, *H4: AI usage positively affects the entrepreneurial*

mindset of Canadian university students, and *H6: AI usage positively impacts the innovative mindset of Canadian university students*.

The positive effect of AI usage on the entrepreneurial and innovative mindset of UAE and Canadian university students should be considered. The beta coefficient of AI usage on entrepreneurial mindset for the UAE is 0.374 (P<0.05), and that for Canada is 0.751 (P<0.05). The beta coefficient of AI usage on innovation mindset for the UAE is 0.399 (P<0.05), and for Canada, it is 0.736 (P<0.05). Therefore, we reject the following hypotheses: *H7: The positive effect of AI usage on the innovative mindset of university students is stronger in the UAE than in Canada,* and *H8: The positive effect of AI usage on the entrepreneurial mindset of university students is stronger in the UAE than in Canada.* To conclude, the effect of AI usage on entrepreneurial and innovative mindsets is stronger among Canadian university students than among UAE university students. Table (11) shows the path coefficient, t statistics, and p values, and Table (12) summarizes the overall research hypotheses.

Table 11 *Structural Model Hypothesis Testing*

Path	β	SD	t	p	Result
AI usage → Entrepreneurial mindset, overall sample	.610	.052	11.776	< .001	Supported
AI usage → Innovative mindset, overall sample	.594	.056	10.579	< .001	Supported
AI usage → Entrepreneurial mindset, UAE sample	.374	.074	5.049	< .001	Supported
AI usage → Innovative mindset, UAE sample	.399	.071	5.637	< .001	Supported
AI usage → Entrepreneurial mindset, Canadian sample	.751	.054	13.852	< .001	Supported

AI usage → Innovative mindset, Canadian sample	.736	.054	13.583	< .001	Supported

Note. AI = artificial intelligence; β = standardized beta coefficient; *SD* = standard deviation. All paths were statistically significant at $p < .001$.

Table 12 *Hypothesis Testing Summary*

Hypothesis	**Result**
H1: AI usage positively impacts the entrepreneurial mindset of UAE and Canadian university students.	Supported
H2: AI usage positively impacts the innovative mindset of UAE and Canadian university students.	Supported
H3: AI usage positively impacts the entrepreneurial mindset of UAE university students.	Supported
H4: AI usage positively impacts the entrepreneurial mindset of Canadian university students.	Supported
H5: AI usage positively impacts the innovative mindset of UAE university students.	Supported
H6: AI usage positively impacts the innovative mindset of Canadian university students.	Supported
H7: The positive effect of AI usage on the innovative mindset of university students is stronger in the UAE than in Canada.	Not supported
H8: The positive effect of AI usage on the entrepreneurial mindset of university students is stronger in the UAE than in Canada.	Not supported

DISCUSSION

AI Usage and Innovative Mindset

Building on the growing body of literature that highlights the critical role of artificial intelligence (AI) in advancing inclusive and sustainable international education, this study contributes by providing empirical evidence on the cognitive impact of AI on university students. While prior studies, such as Duke (2026), Ayesha et al. (2026) and Vasandani et al. (2026), emphasize the

importance of employability skills and the integration of AI into education to enhance critical thinking, creativity, and engagement with sustainability, our findings extend this understanding by demonstrating that AI positively and significantly influences students' entrepreneurial and innovative mindsets. This contribution bridges the gap between conceptual discussions of AI in education and measurable student outcomes, showing how AI-driven learning environments can foster the cognitive capabilities necessary for innovative and sustainability-oriented students.

The research findings clearly reveal that incorporating AI into the classroom strongly affects students' innovative mindsets by encouraging their creativity and improving their problem-solving ability. AI technologies make more dynamic and interactive learning experiences possible, especially in educational frameworks, which help replace traditional learning paradigms. According to the findings of Sari and Purwanta, integrating AI into STEM-based creative learning improves student performance and helps teachers develop successful teaching methods (Sari & Purwanta, 2021).

Furthermore, Zhou (2024) previously investigated students' experiences with AI tools in higher education. The researcher highlighted the role of AI in encouraging an innovative mindset. According to Zhou (2024), the study indicates that students view AI as a useful tool that improves their educational experiences and fosters creativity. Moreover, Marrone et al. (2022) confirmed this, emphasizing that the integration of AI into education facilitates the development of students' creativity, which is a critical skill needed in the 21st century (Marrone et al., 2022). Additionally, the impact of AI on students' innovative mindsets is evident in the context of science, technology, engineering, arts, and mathematics (STEAM) education. This pedagogical approach emphasizes the importance of creativity in scientific and technological fields, promoting an interdisciplinary understanding that is crucial for innovation (Shen et al., 2021). The incorporation of AI into STEAM education allows for a more dynamic learning environment in which students can experiment and innovate across disciplines. This cross-pollination of ideas is essential for developing a robust innovative mindset, as it encourages students to draw connections between seemingly disparate fields of knowledge.

Nonetheless, there is a complicated link between students' innovative mindsets and the use of AI. Although AI can potentially increase creativity and innovation, it also raises questions about dependency and the possibility of less independent thought. Accordingly, the current study partially disagrees with Yang's (2024) study. Yang discusses how generative AI can help with personalized learning, but she also flags a warning that if not used appropriately, it may limit students' capacity for autonomous and creative thought (Yang, 2024). Because of this duality, AI must be integrated into the classroom to balance students' use of AI tools with their own development of critical thinking and problem-solving abilities.

In conclusion, incorporating AI in the classroom significantly promotes students' innovative mindsets. Nevertheless, educators must be aware of the possible negative effects of relying too much on AI tools, even if they foster

innovative thinking and problem-solving skills. The next generation of creative thinkers must be fostered through a balanced strategy that promotes autonomous thought in addition to AI support.

AI Usage and Entrepreneurial Mindset

With respect to the impact of AI on the entrepreneurial mindset of university students, it is evident that students' entrepreneurial mindset is significantly impacted by the introduction of AI into the classroom. As AI technologies advance, they improve operational effectiveness and change how entrepreneurs think strategically and innovate. Giuggioli & Pellegrini (2023) note that AI has the potential to drastically change the tactics used by business owners; thus, students should carefully consider when and how to use AI in their projects (Giuggioli & Pellegrini, 2023). Because of the revolutionary potential of AI, students' perspectives on entrepreneurship must change from conventional approaches to more creative, AI-driven approaches. Moreover, studies conducted by Manafe et al. (2023) highlighted that students who have an entrepreneurial mindset are better prepared to launch and grow their businesses. This mindset can be developed through focused educational interventions rather than just being an innate characteristic. Additionally, Burnette et al. (2019) show how students' entrepreneurial self-efficacy can be greatly increased through structured exposure to entrepreneurial concepts, leading to the development of a more resilient entrepreneurial mindset (Burnette et al. (2019). These results highlight how crucial it is to incorporate AI into entrepreneurship education since these tools can give students access to real-time data and insights, improving their ability to make decisions and stimulate creative thinking. Moreover, the study results are consistent with those of Rodriguez and Lieber, who claim that educational interventions can result in notable enhancements in aspects of an entrepreneurial mindset, such as problem-solving and critical thinking (Rodriguez & Lieber, 2020).

On a separate note, the influence of AI on entrepreneurial orientation is also noticeable in family businesses, where its implementation can increase competitiveness and innovation. Upadhyay et al. (2022) emphasize the significance of cultivating an entrepreneurial mindset that welcomes technological advancements by delving deeper into the ways in which digital entrepreneurship and entrepreneurial orientation impact family businesses' intentions to implement AI (Upadhyay et al., 2022). This emphasizes how AI training must be incorporated into educational programs to prepare students for the realities of contemporary entrepreneurship. In conclusion, this study investigates the research question, and the results confirm the impact of AI usage on university students' EM and IM. Students' entrepreneurial mindset is significantly impacted when AI is used in entrepreneurship education. AI technology integration allows educational institutions to improve students' creativity, adaptability, and entrepreneurial self-efficacy. As a result, students are better equipped to handle the difficulties of contemporary entrepreneurship and use AI as a tool for innovation and value generation. Accordingly, to meet the demands of the digital age, educators must embrace AI and foster an

entrepreneurial mindset as the landscape of entrepreneurship continues to change.

Implications

The practical implications of this study include encouraging policymakers and educational institutions to consider several suggestions:

1. AI education can be improved by including hands-on training and AI courses in university curricula to provide students with fundamental knowledge and abilities in AI. Universities must incorporate AI-focused curricula to give students the technical know-how and abilities they need to succeed in AI-related fields. Providing practical training opportunities, such as projects, simulations, and internships, can help close the knowledge gap between theory and practice. These courses can concentrate on various artificial intelligence subfields that are becoming increasingly important across industries, such as robotics, machine learning, and natural language processing. Impact: By preparing students to use AI in entrepreneurial contexts, this approach improves their ability to recognize and seize AI-driven business opportunities. It also encourages creative thinking by introducing students to cutting-edge technology.

2. The access to AI resources should be promoted by increasing the financing for workshops, labs, and industry partnerships to provide students with practical experience. Gaining real-world AI experience is essential for cultivating technical know-how and an entrepreneurial mindset. Securing funds for AI labs, workshops, and partnerships with business executives should be a top priority for educational institutions to provide students with practical experience with AI tools and real-world applications. Access to resources should increase students' capacity to innovate in business endeavors by encouraging them to access cutting-edge AI resources, which can help them better understand the opportunities and practical challenges that AI poses. Such experience is crucial for preparing students to drive technological innovation by integrating AI into their own startups or businesses.

3. Public–private partnerships should be promoted to assist AI-driven entrepreneurial endeavors and promote cooperation between academic institutions, tech firms, and governmental organizations. The advancement of AI education and entrepreneurial endeavors depends on industry, government, and academic cooperation. Public–private partnerships have the potential to offer students the necessary financial support as well as real-world challenges to enable them to apply their knowledge in creative and useful ways. These collaborations may make creating AI-focused startup programs, accelerators, and incubators that provide resources and mentorship easier. Additionally, government assistance can lower entry barriers to entrepreneurship for students in AI-driven fields.

4. Finally, policymakers and educational institutions must address AI-relevant ethical and societal concerns to increase confidence in AI technologies, raise awareness of the ethical issues surrounding AI, and address concerns about data privacy and job displacement. Examining the ethical and societal

ramifications of AI is essential as it becomes more widely used. The public needs to be made aware of issues such as algorithmic bias, data privacy, and job displacement by policymakers and educational institutions. One way to address this would be to incorporate ethics as a fundamental element in AI courses and offer discussion platforms for pertinent subjects.

Limitations and Future Research

There is no research with limitations. Research limitations represent future research opportunities. One of the limitations of this study is the limited variety of the sample. The sample included university students in the UAE and Canada. Despite the high generalizability of the study outcomes, it is recommended that scholars conduct future research to assess the same relationships in different GCC and MENA region contexts as well as in U.S. and European contexts. Another limitation is that the study was cross-sectional, and the data were collected from university students once. Accordingly, future scholars need to conduct longitudinal studies to evaluate the long-term effects of AI on the innovative and entrepreneurial mindsets of university students and its effects on their careers. Furthermore, more studies are needed to monitor how students' perspectives change over time and how they interact with AI. Moreover, future studies need to investigate methods to address regional differences in AI adoption and accessibility. In addition, the current study did not focus on the regulatory aspect of AI adoption and usage; future research needs to assess the impact of ethical considerations of AI usage.

More investigations into the long-term effects of AI on students' innovative and entrepreneurial mindsets are needed. Longitudinal research is an important source of information about the effects of AI training on career paths and entrepreneurial success. These studies monitor how students' perspectives change over time and how they interact with AI. Impact: By enhancing AI training programs and curricula, academic institutions can promote long-term entrepreneurial success. They would also offer a foundation for comprehending the ways in which AI education affects employment and economic expansion. For instance, universities could interview former students who finished AI-related courses again to determine how these courses affected their business endeavors and career choices.

Conclusion

More investigations into the long-term effects of AI on students' innovative and entrepreneurial mindsets are needed. Longitudinal research is an important source of information about the effects of AI training on career paths and entrepreneurial success. These studies monitor how students' perspectives change over time and how they interact with AI. Impact: By enhancing AI training programs and curricula, academic institutions can promote long-term entrepreneurial success. They would also offer a foundation for comprehending the ways in which AI education affects employment and economic expansion.

For instance, universities could interview former students who finished AI-related courses again to determine how these courses affected their business endeavors and career choices. The findings of the current study proved that students with more access to AI resources, such as workshops, educational initiatives, and industry collaborations, are more likely to have higher levels of entrepreneurial and innovative mindsets and, accordingly, are more ready for future job market needs. This study offers insights into the different effects of AI on students' innovative and entrepreneurial mindsets in the UAE and Canada, two areas with different approaches to adopting and integrating AI. The impact on entrepreneurial activities will probably mirror a growing trend of AI-based ventures in Canada and the UAE as AI becomes a more powerful force in education. These results should provide insight into how AI might completely change the entrepreneurial scene, especially by enticing young people to start tech-focused companies.

This study is among the first comparative studies carried out in Canada and the MENA area; this research aims to investigate how AI affects university students' innovative and entrepreneurial mindsets and has wider consequences for their preparedness for the workforce. In summary, AI greatly impacts how the innovative and entrepreneurial mindsets of students develop. Although the scope and type of its effects vary depending on local contexts and resources, AI has the potential to significantly change both education and entrepreneurship. This study highlights the transformative potential of AI and its capacity to produce a new breed of tech-savvy entrepreneurs in the UAE and Canada.

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REFERENCES

Akbari, M., Irani, H. R., Zamani, Z., Valizadeh, N., & Arab, S. (2024). *Self-esteem, entrepreneurial mindset, and entrepreneurial intention: A moderated mediation model.* The International Journal of Management Education, 22(1), Article 100934. https://doi.org/10.1016/j.ijme.2024.100934

Abaddi, S. (2023). *GPT revolution and digital entrepreneurial intentions*. Journal of Entrepreneurship in Emerging Economies. https://doi.org/10.1108/JEEE-07-2023-0260

Abaddi, S. (2024). *Factors and moderators influencing artificial intelligence adoption by Jordanian MSMEs*. Management & Sustainability: An Arab Review.

Abaddi, S., & Al-Shboul, M. D. A. (2024). *"Revealing the hidden"–challenges facing early digital entrepreneurs in Jordan*. Management & Sustainability: An Arab Review, 3(1), 69–88.

Ahmad, N., Nor, K. M., & Sakarji, S. R. (2021). *The relationship between teamwork and employee job satisfaction in an organization*. Prof. Dr Deddy Mulyana Universitas Padjajaran, Indonesia, 93.

Ayesha, A., et al. (2026). *Transforming language teacher education in the Global South*. Journal of International Students, 16(6), 155–176. https://doi.org/10.32674/jnytvp10

Barra, C., Grimaldi, M., Muazzam, A., Troisi, O., & Visvizi, A. (2024). *Digital divide, gender gap, and entrepreneurial orientation: How to foster technology adoption among Pakistani higher education students?* Socio-Economic Planning Sciences, 93, 101904.

Barrett, S. A. M., & Williams-Shakespeare, E. S. (2024). *A study of digitalization of higher education institutions in the Caribbean*. Journal of Comparative & International Higher Education, 16(2), 117–126. https://ojed.org/jcihe

Barrat, J. (2023). *Our final invention: Artificial intelligence and the end of the human era*. Hachette UK.

Broekhuizen, T., Dekker, H., de Faria, P., Firk, S., Nguyen, D. K., & Sofka, W. (2023). *AI for managing open innovation: Opportunities, challenges, and a research agenda*. Journal of Business Research, 167, 114196. https://doi.org/10.1016/j.jbusres.2023.114196

Broekhuizen, T., Dekker, H., de Faria, P., Firk, S., Nguyen, D. K., & Sofka, W. (2023). *AI for managing open innovation: Opportunities, challenges, and a research agenda*. Journal of Business Research, 167(July), 114196. https://doi.org/10.1016/j.jbusres.2023.114196

Burnette, J., Pollack, J., Forsyth, R., Hoyt, C., Babij, A., Thomas, F., … & Coy, A. (2019). *A growth mindset intervention: Enhancing students' entrepreneurial self-efficacy and career development*. Entrepreneurship Theory and Practice, 44(5), 878–908. https://doi.org/10.1177/1042258719864293

Caliendo, M., Fossen, F., & Kritikos, A. S. (2014). *Personality characteristics and the decisions to become and stay self-employed*. Small Business Economics, 42(4), 787–814. https://doi.org/10.1007/s11187-013-9514-8

Chalmers, D., MacKenzie, N. G., & Carter, S. (2021). *Artificial intelligence and entrepreneurship: Implications for venture creation in the fourth industrial revolution*. Entrepreneurship Theory and Practice, 45(5), 1028–1053.

Chang, A., Chang, D., & Chen, T. (2022). *Detecting female students transforming entrepreneurial competency, mindset, and intention into sustainable entrepreneurship*. https://doi.org/10.20944/preprints202209.0078.v1

Chen, K., Wan, X., & Chen, P. (2021). *Learning outcomes for improving science entrepreneurship in higher education*. Sage Open, 11(1). https://doi.org/10.1177/2158244020974678

Chin, W. W. (1998). *Commentary: Issues and opinion on structural equation modeling*. MIS Quarterly, vii–xvi.

Cui, J., & Bell, R. (2022). *Behavioral entrepreneurial mindset: How entrepreneurial education activity impacts entrepreneurial intention and*

behavior. International Journal of Management Education, 20(2), 100639. https://doi.org/10.1016/j.ijme.2022.100639

Daspit, J. J., Fox, C. J., & Findley, S. K. (2023). Entrepreneurial mindset: An integrated definition, a review of current insights, and directions for future research. Journal of Small Business Management, 61(1), 12–44. https://doi.org/10.1080/00472778.2021.1907583

DeSimone, J. A., Harms, P. D., & DeSimone, A. J. (2015). *Best practice recommendations for data screening*. Journal of Organizational Behavior, 36(2), 171–181.

Diamantopoulos, A., & Siguaw, J. A. (2006). *Formative versus reflective indicators in organizational measure development: A comparison and empirical illustration*. British Journal of Management, 17(4), 263–282.

Duong, C. D., Nguyen, T. H., Chu, T. V., Pham, T. V., & Do, N. D. (2024). *Whether ChatGPT adoption inspires higher education students' digital entrepreneurial intention? An integrated model of the SCCT and the TPB*. International Journal of Innovation Science. https://doi.org/10.1108/IJIS-01-2024-0020

Duong, C. D. (2023). *Entrepreneurship: Nature, nurture, or both? Empirical evidence from a moderated polynomial regression with response surface analysis*. International Journal of Management Education, 21(3), 100877. https://doi.org/10.1016/j.ijme.2023.100877

Duke, B. (2026). *Artificial intelligence for inclusive and sustainable international education*. Journal of International Students, 16(10), 167–198. https://doi.org/10.32674/96t36095

Fang, J. (2023). *Research on the design of business models and transformation management of new entrepreneurial ventures driven by artificial intelligence*. BCP Business & Management, 49, 36–41. https://doi.org/10.54691/bcpbm.v49i.5383

Fornell, C., & Larcker, D. F. (1981). *Evaluating structural equation models with unobservable variables and measurement error*. Journal of Marketing Research, 18(1), 39–50.

Fügener, A., Grahl, J., Gupta, A., & Ketter, W. (2022). *Cognitive challenges in human–artificial intelligence collaboration: Investigating the path toward productive delegation*. Information Systems Research, 33(2), 678–696.

Giuggioli, G., & Pellegrini, M. M. (2023). *Artificial intelligence as an enabler for entrepreneurs: A systematic literature review and an agenda for future research*. International Journal of Entrepreneurial Behavior and Research, 29(4), 816–837. https://doi.org/10.1108/IJEBR-05-2021-0426

Gupta, B. B., Gaurav, A., Panigrahi, P. K., & Arya, V. (2023). *Analysis of artificial intelligence-based technologies and approaches on sustainable entrepreneurship*. Technological Forecasting and Social Change, 186. https://doi.org/10.1016/j.techfore.2022.122152

Hair, J. F., Black, W. C., Rabin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis* (7th ed.). Prentice Hall.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). *PLS-SEM: Indeed a silver bullet*. Journal of Marketing Theory and Practice, 19(2), 139–152.

Hnátek, M. (2015). *Entrepreneurial thinking as a key factor of family business*

success. Procedia - Social and Behavioral Sciences, 181, 342–348. https://doi.org/10.1016/j.sbspro.2015.04.896

Huang, B., Tani, M., & Zhu, Y. (2021). *Does higher education make you more entrepreneurial? Causal evidence from China*. Journal of Business Research, 135, 543–558. https://doi.org/10.1016/j.jbusres.2021.06.044

Huy, P. Q., Shavkatovich, S. N., Abdul-Samad, Z., Agrawal, D. K., Ashifa, K. M., & Arumugam, M. (2023). *Resource management projects in entrepreneurship and retain customer based on big data analysis and artificial intelligence*. Journal of High Technology Management Research, 34(2). https://doi.org/10.1016/j.hitech.2023.100471

Iddris, F., Dogbe, C. S. K., & Kparl, E. M. (2022). *Innovation education and entrepreneurial intentions among postgraduate students: The role of innovation competence and gender.* Cogent Education, 9(1), 2083470.

Ivenicki, A. (2024). *Digital learning and higher education in Brazil: A multicultural analysis*. Journal of Comparative & International Higher Education, 16(2), 127–135. https://doi.org/10.32674/jcihe.v16i2.5846

Jebolise Chukwuka, E., & Konye Igweh, F. (2024). *Strategic impact of artificial intelligence (AI) on entrepreneurial creativity and management*. https://www.researchgate.net/publication/377498381

Jiang, Y., Xie, Y., & Shao, Q. (2024). *How did internet usage affect life satisfaction before and after COVID-19? Mediating effects and heterogeneity analysis*. Socio-Economic Planning Sciences, 95, 102007.

Jung, E., & Lee, Y. (2020). *College students' entrepreneurial mindset: Educational experience innovativeness override gender and major*. Sustainability, 12(19), 8272.

Kakouris, A., Morselli, D., & Pittaway, L. (2023). *Editorial: Educational theory driven teaching in entrepreneurship*. International Journal of Management Education, 21(2). https://doi.org/10.1016/j.ijme.2023.100814

Kirby, D. A., El-Kaffass, I., & Healey-Benson, F. (2022). *A new harmonized approach to sustainability: Implications for entrepreneurial leadership in the Middle East and globally*. Management & Sustainability: An Arab Review, 1(2), 127–138.

Korteling, J., van de Boer-Visschedijk, G. C., Blankendaal, R. A., Boonekamp, R. C., & Eikelboom, A. R. (2021). *Human-versus artificial intelligence*. Frontiers in Artificial Intelligence, 4, 622364.

Le Thi Thanh, T. T. (2024). *Digitalization of higher education in Vietnam*. Journal of Comparative & International Higher Education, 16(2). https://doi.org/10.32674/jcihe.v16i2.5710

López-Núñez, M. I., Rubio-Valdehita, S., Aparicio-García, M. E., & Díaz-Ramiro, E. M. (2020). *Are entrepreneurs born or made? The influence of personality*. Personality and Individual Differences, 154, 109699. https://doi.org/10.1016/j.paid.2019.109699

Manafe, M. W. N., Ohara, M. R., Gadzali, S. S., Harahap, M. A. K., & Ausat, A. M. A. (2023). *Exploring the relationship between entrepreneurial mindsets and business success: Implications for entrepreneurship education*. Journal on Education, 5(4), 12540–12547.

Marrone, R., Taddeo, V., & Hill, G. (2022). *Creativity and artificial intelligence—a student perspective*. Journal of Intelligence, 10(3), 65. https://doi.org/10.3390/jintelligence10030065

Mejri, S., et al. (2025). *Internationalization as transformation: Teaching, research, and innovation in Gulf STEM education*. Journal of Comparative & International Higher Education, 17(6), 9–13. https://doi.org/10.64899/2151-0407.1933

Park, D., Tsukayama, E., Yu, A., & Duckworth, A. L. (2020). *The development of grit and growth mindset during adolescence*. Journal of Experimental Child Psychology, 198, 104889. https://doi.org/10.1016/j.jecp.2020.104889

Patel, N. S., Puah, S., & Kok, X.-F. K. (2024). *Shaping future-ready graduates with mindset shifts: Studying the impact of integrating critical and design thinking in design innovation education*. Frontiers in Education.

Prencipe, A., Corsi, C., Rodríguez-Gulías, M. J., Fernández-López, S., & Rodeiro Pazos, D. (2020). *Influence of the regional entrepreneurial ecosystem and its knowledge spillovers in developing successful university spin-offs*. Socio-Economic Planning Sciences, 72, 100814.

Rodriguez, S., & Lieber, H. (2020). *Relationship between entrepreneurship education, entrepreneurial mindset, and career readiness in secondary students*. Journal of Experiential Education, 43(3), 277–298. https://doi.org/10.1177/1053825920919462

Rosado-Cubero, A., Freire-Rubio, T., & Hernández, A. (2022). *Entrepreneurship: What matters most*. Journal of Business Research, 144, 250–263. https://doi.org/10.1016/j.jbusres.2022.01.087

Sahin, A., Imamoglu, G., Murat, M., & Ayyildiz, E. (2024). *A holistic decision-making approach to assessing service quality in higher education institutions*. Socio-Economic Planning Sciences, 92, 101812.

Sarstedt, M., & Mooi, E. (2014). *A concise guide to market research: The process, data, and methods using IBM SPSS Statistics* (2nd ed.). Springer.

Sarstedt, M., Ringle, C. M., & Hair, J. F. (2017). *Partial least squares structural equation modeling*. Handbook of Market Research, 26(1), 1–40.

Sari, J., & Purwanta, E. (2021). *The implementation of artificial intelligence in STEM-based creative learning in the Society 5.0 era*. Tadris Jurnal Keguruan Dan Ilmu Tarbiyah, 6(2), 433–440. https://doi.org/10.24042/tadris.v6i2.10135

Schuetze, H., De Vries, W., & Alvarez Mendiola, G. (2024). *Digitalization of higher education: An introduction to the issues*. Journal of Comparative & International Higher Education, 16(2). https://doi.org/10.32674/jcihe.v16i2.5975

Shah, M. F. M., Wahab, S., & Tahir, M. S. (2016). *Customer-supplier relationship management performance model for SMEs: The integration of financial and technology strategy*. Advances in Business Research International Journal,2(2), 17–26.

Shen, S., Wang, S., Qi, Y., Wang, Y., & Yan, X. (2021). *Teacher suggestion feedback facilitates creativity of students in STEAM education*. Frontiers in Psychology, 12. https://doi.org/10.3389/fpsyg.2021.723171

Shwedeh, F., Salloum, S. A., Aburayya, A., Fatin, B., Elbadawi, M. A., Al Ghurabli, Z., & Al Dabbagh, T. (2024). *AI adoption and educational sustainability in higher education in the UAE*. In Artificial Intelligence in Education: The Power and Dangers of ChatGPT in the Classroom (pp. 201–229). Springer Nature Switzerland.

Sidhu, I., Goubet, J. E., & Xia, Y. (2016, June). *Measurement of innovation mindset: A method and tool within the Berkeley Innovation Index Framework*. In 2016 International Conference on Engineering, Technology and Innovation/IEEE International Technology Management Conference (ICE/ITMC) (pp. 1–10). IEEE.

Silva, P. M., Moutinho, V. F., & Moreira, A. C. (2022). *Do social and economic factors affect the technical efficiency in entrepreneurship activities? Evidence from European countries using a two-stage DEA model*. Socio-Economic Planning Sciences, 82. https://doi.org/10.1016/j.seps.2022.101314

Staniewski, M. W., & Awruk, K. (2021). *Parental attitudes and entrepreneurial success*. Journal of Business Research, 123, 538–546. https://doi.org/10.1016/j.jbusres.2020.10.039

Suh, W., & Ahn, S. (2022). *Development and validation of a scale measuring student attitudes toward artificial intelligence*. Sage Open, 12(2), 21582440221100463.

Suseno, Y., & Abbott, L. (2021). *Women entrepreneurs' digital social innovation: Linking gender, entrepreneurship, social innovation and information systems*. Information Systems Journal, 31(5), 717–744.

Tang, X., Li, X., Ding, Y., Song, M., & Bu, Y. (2020). *The pace of artificial intelligence innovations: Speed, talent, and trial-and-error*. Journal of Informetrics, 14(4). https://doi.org/10.1016/j.joi.2020.101094

Tao, Y., Muneeb, F. M., Wanke, P. F., Tan, Y., & Yazdi, A. K. (2024). *Revisiting the critical success factors of entrepreneurship to promote Chinese agriculture systems: A multicriteria decision-making approach*. Socio-Economic Planning Sciences, 94, 101951. https://doi.org/10.1016/j.seps.2024.101951

Tooka, T., et al. (2024). *Digitalization of higher education in Japan: Challenges and reflections for education reform*. Journal of Comparative & International Higher Education, 16(2). https://doi.org/10.32674/jcihe.v16i2.5252

Trauth, E., & Connolly, R. (2021). *Investigating the nature of change in factors affecting gender equity in the IT sector: A longitudinal study of women in Ireland*. MIS Quarterly, 45(4).

Upadhyay, N., Upadhyay, S., & Dwivedi, Y. K. (2022). *Theorizing artificial intelligence acceptance and digital entrepreneurship model*. International Journal of Entrepreneurial Behavior and Research, 28(5), 1138–1166. https://doi.org/10.1108/IJEBR-01-2021-0052

Vasandani, M., et al. (2026). *Understanding the strengths, challenges, and opportunities within the international student life cycle*. Journal of International Students, 16(6), 37–58. https://doi.org/10.32674/g9fbsx65

Wajcman, J. (2001). *Gender and technology*. In N. J. Smelser & P. B. Baltes (Eds.), International Encyclopedia of the Social & Behavioral Sciences (pp. 5976–5979). Pergamon. https://doi.org/10.1016/B0-08-043076-7/03170-3

Wang, J. X. (2021). *Meta-learning in natural and artificial intelligence*. Current Opinion in Behavioral Sciences, 38, 90–95.

Weber-Lewerenz, B., & Vasiliu-Feltes, I. (2022). *Empowering digital innovation by diverse leadership in ICT–A roadmap to a better value system in computer algorithms*. Humanistic Management Journal, 7(1), 117–134.

Wesarat, P., Benrit, P., Panrod, W., Tongsamsi, K., Useng, N., Kaewsaeng-on, R., … & Tansui, D. (2022). *Identifying students' entrepreneurian mindset for the Bachelor of Business Administration program, Faculty of Humanities and Social Sciences, Prince of Songkla University*. Kne Social Sciences. https://doi.org/10.18502/kss.v7i14.11946

Whittaker, M., Crawford, K., Dobbe, R., Fried, G., Kaziunas, E., Mathur, V., ... & Schwartz, O. (2018). *AI now report 2018* (pp. 1–62). AI Now Institute at New York University.

Yang, Z. (2024). *Revisiting educational issues in the age of generative artificial intelligence*. Journal of Contemporary Educational Research, 8(1), 159–164. https://doi.org/10.26689/jcer.v8i1.5810

Yunis, M., Tarhini, A., & Kassar, A. (2018). *The role of ICT and innovation in enhancing organizational performance: The catalyzing effect of corporate entrepreneurship*. Journal of Business Research, 88, 344–356.

Zhang, G., Jia, Z., & Yan, S. (2022). *Does gender matter? The relationship comparison of strategic leadership on organizational ambidextrous behavior between male and female CEOs*. Sustainability, 14(14), 8559.

Zhang, Z., & Chun, D. (2018). *Becoming entrepreneurs: How immigrants developed entrepreneurial identities*. International Journal of Entrepreneurial Behavior and Research, 24(5), 947–970. https://doi.org/10.1108/IJEBR-07-2016-0214

Zion, S. R., & Crum, A. J. (2018). *Mindsets matter: A new framework for harnessing the placebo effect in modern medicine* (pp. 137–160). https://doi.org/10.1016/bs.irn.2018.02.002

Żur, A. (2015). *Social problems as sources of opportunity: Antecedents of social entrepreneurship opportunities*. Entrepreneurial Business and Economics Review, 3(4), 73–87. https://doi.org/10.15678/EBER.2015.030405

Zhi, C. P., Zulkefli, M. Y., Qi, L. W., Yi, K. S., Fuad, A. F. A., & Aris, A. (2021). *Adaptation of the social learning theory in the drama series "It's Okay to Not Be Okay" among young audiences*. Prof. Dr. Deddy Mulyana Universitas Padjajaran, Indonesia, 1.

Zhou, X. (2024). *Unveiling students' experiences and perceptions of artificial intelligence usage in higher education*. Journal of University Teaching and Learning Practice, 21(06). https://doi.org/10.53761/xzjprb23

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Appendix A

Cross-Loadings of Measurement Items Across Latent Constructs

Item	Aff Comp	Beh Comp	Cogn Comp	Ent Achiev	Ent Autonomy	Ent Innov	Ent Proactive	Ent Risk	Innov Collab	Innov Div	Innov MentStre	Innov Resilience
AffComp1	**0.766**	0.604	0.535	0.401	0.243	0.423	0.354	0.329	0.431	0.244	0.327	0.344
AffComp2	**0.802**	0.486	0.433	0.528	0.308	0.466	0.327	0.319	0.465	0.365	0.454	0.398
AffComp6	**0.825**	0.680	0.519	0.484	0.364	0.540	0.370	0.384	0.459	0.368	0.427	0.374
AffComp7	**0.798**	0.609	0.392	0.402	0.228	0.370	0.296	0.253	0.307	0.295	0.258	0.243
AffComp9	**0.764**	0.586	0.559	0.428	0.281	0.415	0.368	0.239	0.458	0.327	0.419	0.363
BehComp1	0.501	**0.791**	0.407	0.348	0.273	0.416	0.272	0.348	0.357	0.273	0.287	0.296
BehComp10	0.707	**0.784**	0.495	0.480	0.288	0.523	0.357	0.388	0.478	0.318	0.359	0.384
BehComp11	0.652	**0.727**	0.552	0.337	0.287	0.461	0.378	0.272	0.354	0.283	0.349	0.327
BehComp3	0.550	**0.796**	0.487	0.353	0.298	0.410	0.290	0.354	0.365	0.293	0.287	0.354

BehComp4	0.687	**0.852**	0.501	0.444	0.289	0.483	0.296	0.441	0.400	0.284	0.314	0.291
BehComp5	0.632	**0.842**	0.573	0.412	0.282	0.485	0.349	0.317	0.433	0.249	0.384	0.351
BehComp6	0.592	**0.870**	0.532	0.438	0.328	0.556	0.358	0.429	0.447	0.318	0.430	0.383
BehComp7	0.449	**0.749**	0.304	0.327	0.338	0.394	0.377	0.303	0.300	0.223	0.246	0.260
BehComp8	0.625	**0.838**	0.474	0.368	0.301	0.487	0.365	0.427	0.411	0.250	0.346	0.344
BehComp9	0.650	**0.851**	0.480	0.464	0.319	0.466	0.382	0.455	0.409	0.283	0.355	0.348
CognComp2	0.602	0.609	**0.905**	0.375	0.240	0.434	0.308	0.297	0.467	0.363	0.358	0.415

CognComp3	0.533	0.509	**0.895**	0.362	0.228	0.364	0.302	0.274	0.446	0.331	0.375	0.344
CognComp4	0.514	0.466	**0.870**	0.377	0.197	0.379	0.264	0.256	0.466	0.339	0.344	0.394
EntAchiev2	0.475	0.403	0.272	**0.811**	0.401	0.532	0.415	0.442	0.418	0.479	0.530	0.354
EntAchiev3	0.531	0.425	0.416	**0.885**	0.384	0.686	0.565	0.486	0.546	0.535	0.708	0.494
EntAchiev4	0.446	0.428	0.366	**0.847**	0.341	0.696	0.542	0.633	0.496	0.482	0.640	0.453

EntAutonomy1	0.283	0.310	0.180	0.294	**0.782**	0.402	0.441	0.249	0.236	0.346	0.338	0.294
EntAutonomy2	0.310	0.295	0.211	0.412	**0.861**	0.445	0.470	0.324	0.317	0.334	0.456	0.367
EntAutonomy3	0.316	0.314	0.229	0.390	**0.842**	0.406	0.394	0.386	0.383	0.318	0.410	0.397
EntInnov1	0.456	0.456	0.383	0.656	0.408	**0.817**	0.495	0.583	0.559	0.502	0.659	0.541
EntInnov2	0.353	0.428	0.306	0.550	0.375	**0.785**	0.478	0.518	0.457	0.517	0.562	0.468

EntInnov3	0.530	0.537	0.432	0.581	0.412	**0.824**	0.571	0.521	0.633	0.571	0.545	0.595
EntInnov4	0.402	0.345	0.358	0.439	0.338	**0.705**	0.447	0.390	0.473	0.536	0.496	0.429
EntInnov5	0.486	0.522	0.311	0.670	0.398	**0.803**	0.586	0.509	0.392	0.456	0.592	0.337
EntInnov6	0.414	0.410	0.276	0.633	0.440	**0.773**	0.575	0.518	0.335	0.466	0.532	0.359
EntProactive1	0.411	0.408	0.215	0.505	0.428	0.613	**0.867**	0.469	0.428	0.463	0.532	0.482

EntProactive2	0.312	0.289	0.274	0.485	0.413	0.521	**0.840**	0.429	0.404	0.464	0.562	0.466
EntProactive3	0.367	0.356	0.344	0.524	0.481	0.556	**0.821**	0.441	0.451	0.485	0.638	0.535
EntRisk1	0.300	0.400	0.224	0.539	0.400	0.604	0.494	**0.883**	0.408	0.415	0.505	0.394
EntRisk2	0.365	0.405	0.290	0.587	0.325	0.584	0.520	**0.893**	0.369	0.448	0.516	0.430
EntRisk3	0.375	0.435	0.311	0.510	0.317	0.546	0.413	**0.899**	0.471	0.376	0.470	0.517

InnovCollab1	0.399	0.315	0.425	0.468	0.342	0.485	0.437	0.340	**0.843**	0.486	0.585	0.631
InnovCollab2	0.498	0.474	0.481	0.511	0.285	0.498	0.412	0.372	**0.856**	0.564	0.514	0.614
InnovCollab3	0.399	0.410	0.308	0.382	0.296	0.460	0.459	0.444	**0.759**	0.526	0.477	0.570
InnovCollab4	0.482	0.411	0.469	0.524	0.332	0.567	0.389	0.399	**0.841**	0.510	0.579	0.616
InnovDiv1	0.338	0.272	0.312	0.405	0.297	0.473	0.511	0.323	0.510	**0.787**	0.411	0.509

InnovDiv2	0.289	0.274	0.263	0.511	0.288	0.526	0.450	0.429	0.448	**0.797**	0.508	0.473
InnovDiv3	0.293	0.224	0.263	0.527	0.319	0.511	0.414	0.381	0.470	**0.835**	0.489	0.398
InnovDiv4	0.400	0.338	0.403	0.503	0.395	0.598	0.456	0.394	0.615	**0.866**	0.526	0.543
InnovMentStre1	0.412	0.295	0.347	0.620	0.332	0.518	0.518	0.404	0.484	0.454	**0.798**	0.440
InnovMentStre2	0.404	0.301	0.319	0.579	0.376	0.609	0.544	0.402	0.542	0.511	**0.849**	0.499

InnovMentStre3	0.409	0.380	0.283	0.616	0.412	0.604	0.612	0.517	0.535	0.436	**0.813**	0.537
InnovMentStre4	0.347	0.305	0.285	0.565	0.395	0.522	0.536	0.415	0.496	0.429	**0.772**	0.456
InnovMentStre5	0.362	0.382	0.371	0.575	0.423	0.614	0.521	0.482	0.546	0.515	**0.759**	0.507
InnovResilience1	0.300	0.309	0.322	0.319	0.313	0.371	0.418	0.381	0.580	0.430	0.406	**0.833**
InnovResilience2	0.419	0.347	0.425	0.446	0.352	0.503	0.494	0.400	0.618	0.563	0.498	**0.866**

InnovResilience3	0.308	0.370	0.222	0.413	0.336	0.482	0.502	0.443	0.485	0.401	0.487	**0.715**
InnovResilience4	0.402	0.342	0.412	0.495	0.396	0.546	0.518	0.442	0.708	0.524	0.604	**0.862**

Appendix B

Fornell–Larcker Criterion for Discriminant Validity

Construct	1	2	3	4	5	6	7	8	9	10	11	12
1. AffComp	**0.791**											
2. BehComp	0.749	**0.812**										
3. CognComp	0.619	0.595	**0.890**									
4. EntAchiev	0.572	0.493	0.417	**0.848**								
5. EntAutonomy	0.366	0.370	0.250	0.442	**0.829**							
6. EntInnov	0.567	0.580	0.442	0.753	0.504	**0.785**						
7. EntProactive	0.436	0.422	0.328	0.600	0.524	0.672	**0.843**					
8. EntRisk	0.390	0.464	0.310	0.611	0.387	0.647	0.531	**0.892**				
9. InnovCollab	0.543	0.491	0.516	0.576	0.378	0.610	0.509	0.468	**0.826**			

10. InnovDiv	0.409	0.343	0.387	0.589	0.401	0.645	0.558	0.462	0.632	**0.822**		
11. InnovMentStre	0.486	0.417	0.403	0.741	0.485	0.719	0.684	0.557	0.652	0.588	**0.799**	
12. InnovResilience	0.442	0.414	0.432	0.514	0.426	0.583	0.587	0.504	0.735	0.592	0.611	**0.821**