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Unveiling students' experiences and perceptions of Artificial Intelligence usage in higher education

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Abstract

This study explores the utilization and perception of Artificial Intelligence (AI) tools among students in higher education. With the growing accessibility of AI technologies, their integration into educational settings presents a new frontier for enhancing learning experiences. This research adopts a mixed-methods approach, including surveys and interviews, to delve into how students employ AI tools and their perceived benefits and drawbacks of AI usage in the context of entrepreneurship education in a business school. The findings reveal a diverse range of AI applications, highlighting benefits such as increased productivity, personalized learning, and enhanced linguistic capability. However, concerns regarding academic integrity, over-reliance on AI, and the need for clear usage guidelines are also identified. This study contributes to the understanding of AI's role in higher education and provides much-needed empirical evidence of AI usage from students' perspectives. Our findings underscore the importance of balanced, informed, and ethical use of AI tools in higher education.

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Introduction

In this transformative era, Artificial Intelligence (AI) stands at the forefront of innovation, redefining the realms of computer science and human interaction. Characterized by its capacity to emulate human cognitive functions such as memory, creativity, analysis, and learning, AI tools are revolutionising how we perceive and interact with technology (Krittanawong et al., 2017). It is not surprising that education, a sector where AI's impact has been profoundly acclaimed, is undergoing a significant shift due to the emergence of AI technologies. Known as AI in Education (AIEd), this integration is reshaping the educational landscape by enhancing learning, decision-making, and instructional processes across various educational stakeholders, including administrators, students, and teachers (Hwang et al., 2020). AI tools can offer intelligent, personalized solutions that may revolutionise the traditional educational models. It extends beyond mere academic assistance, providing tailored feedback and fostering a collaborative learning environment (Chatterjee & Bhattacharjee, 2020; Holmes et al., 2019).

At the same time, there are ongoing debates about whether AI will enhance or undermine student learning, including the development of critical thinking and problem-solving skills (Kasneci et al., 2023). It is understandable that some academics remain distrustful and uncomfortable about AI usage in learning and assessment (Nazaretsky et al., 2022). With AI still in the early adoption stages in higher education (HE), universities have yet to establish comprehensive guidance and regulations on students' AI usage. Regardless, students are trailblazing with new AI tools, especially since OpenAI launched ChatGPT and Microsoft embedded it into products, granting broad access. This leaves little time for governance on appropriate AI usage. Meanwhile, AI text detectors like Turnitin falter against advanced language models, and students can access free AI detection tools (Williams, 2023; Tate, 2023). At this critical point, understanding which tools students use and their experiences is essential. This knowledge could assist educators in harnessing AI’s potential for high-quality teaching and learning while guiding safe and effective adoptions of these technological tools.

While there has been a move towards integrating AI into educational practices and recognizing its benefits in HE, the extant research tends to focus on educators' perspectives. Hence, our understanding of students’ usage and perspectives is limited (Baidoo-Anu & Ansah, 2023). Moreover, the discourse often revolves around hypothetical advantages and potential risks rather than grounded in empirical evidence, and there is a call for further exploration in different subject areas (O’Dea & O'Dea, 2023). To bridge this gap, our paper will investigate the following research questions in the context of entrepreneurship education in HE: 1) How are generative AI tools utilized, and for what specific learning needs? 2) What are students’ perceived benefits of adopting AI? 3) What are students' perceived barriers to adopting AI in their learning? Our study contributes to the AIEd literature and offers scholarly and practical insights to inform policymaking in this important and emergent realm.

Literature Review

AI Adoption in Entrepreneurship Education

The rise of large language models like GPT-3.5 has sparked interest in using generative AI to enhance teaching and learning in various disciplines, including entrepreneurship education. Encompassing diverse goals and objectives, entrepreneurship education has been viewed as

a fertile ground for integrating AI tools for learning (Bell & Bell, 2023). So far, discussion about using generative AI for entrepreneurship education tends to focus on assisting processes like opportunity discovery, business model design, and product design. For instance, AI-powered tools for analysing markets, trends, and competitors could help students conduct market research for potential ventures (Korzynski et al., 2023). Large language models may aid in rapidly generating creative ideas and early business plan drafts. Chatbots like Claude and ChatGPT could allow students to query for relevant examples and perspectives when developing proposals (Chalmers et al., 2021). Automated prototyping and simulation systems could enable testing concepts quickly at low cost and effort (Matsuda et al., 2020). Such capabilities may provide useful scaffolds for core entrepreneurial competencies like innovativeness, risk-taking, and decision-making (Short & Short, 2023).

Benefits of Adopting AI and Self-Directed Learning (SDL)

Literature has suggested that integrating AI technologies may present a wide range of benefits for students in HE. For instance, large language models like GPT-3.5 streamline the synthesis of information and aid in drafting documents, saving time and enhancing productivity (Cascella et al., 2023; Essien et al., 2024). Automated writing support, chatbots and digital tutors boasting natural language processing capabilities deliver on-demand academic assistance, improving the revision and feedback process (Xue et al., 2023). AI-facilitated search and text summarization tools, coupled with data mining techniques, allow for efficient gathering and analysis of sources, revealing literature patterns tailored to students' interests (Cribben & Zeinzli, 2023). As one of the key benefits of AI in HE is personalised learning and developing critical thinking skills for students (Crompton & Burke, 2023; Essien et al., 2024), we adopt the lens of Self-Directed Learning (SDL) in this study. SDL underscores the vital role of learners in steering their educational journey, from pinpointing learning needs to assessing outcomes (Knowles, 1975). While universities increasingly focus on SDL to nurture independent learning skills essential for thriving in the digital era, the challenge remains in overcoming obstacles such as limited social interaction and a lack of intrinsic motivation.

AI emerges as a potent solution, providing specialized knowledge, fostering engaging learner interactions, and encouraging group discussions (Rosenberg-Kima et al., 2020; Ali et al., 2023). Research has suggested that AI technologies may enhance SDL by offering personalized learning experiences and materials that cater to each student's distinct preferences and requirements, thereby enabling learners to pursue their educational objectives in alignment with their interests (Yildirim et al., 2023). For instance, AI-driven recommendations and adaptive learning platforms tailor education to meet diverse student needs, enhancing engagement (Fariani et al., 2022; Tapalova & Zhiyenbayeva, 2022). Intelligent tutoring systems that adapt to individual competencies and challenges have shown promise in improving outcomes for students facing difficulties (Farrokhnia et al., 2023). Further, the support for adjustable learning strategies, immediate feedback, and access to a broad spectrum of information empowers students to take charge of their learning process effectively. The provision of instantaneous feedback through automated writing evaluations encourages the iterative refinement of drafts before submission (Zhang & Aslan 2021). Investigations into AI-driven adaptive platforms, such as the study by Tapalova and Zhiyenbayeva (2022) on second-year university students, demonstrate an appreciation for 24/7 accessible training, timely feedback, and personalized content delivery. Dhara et al. (2022) further validate AI as an effective tool in identifying students' performance levels, enabling educators to offer tailored

support. In sum, AI's integration into educational settings may support SDL by equipping students with the necessary tools and strategies for independent lifelong learning.

Challenges of Adopting AI in Learning

While AI technologies spur much excitement, adopting them in HE also raises challenges that directly impact student learning. To use AI tools effectively as learning aids, students must understand the limitations of these tools, and navigate the concerns around data quality, academic integrity, overreliance, and loss of original thinking. A top concern remains the variable and unreliable quality of auto-generated content. Errors, bias, and misinformation in AI outputs like ChatGPT essays require extensive oversight before use in academic work (Sallam, 2023). Safeguards against misuse remain inadequate (Choi et al., 2023). For instance, Shoufan (2023) conducted research to explore students' views on ChatGPT usage in computer engineering studies, and most students are not against the usage of ChatGPT, but they have reservations about ChatGPT due to its inaccuracy. There needs to be clearer standards of appropriate versus inappropriate uses of generative text capabilities.

Existing studies indicate that without proper ethical usage training, academic integrity remains a major concern for students adopting AI in their education (Sullivan et al., 2023; Cotton et al., 2023; Rudolph et al., 2023). Students are inclined to utilize the text-generation capabilities of systems like ChatGPT to complete essay assignments or even online exams (Susnjak, 2022). This concern has intensified with empirical findings revealing that current AI detection methods have not proven effective at identifying AI-generated content (Davis & Kumar, 2023). Dependence on AI for content risks diminishing original analysis, and critical thinking is needed to engage deeply with course material (Townsend & Hunt, 2019; Rudolph et al., 2023). If students treat AI as a black box solution rather than a creativity aid, it could undermine learning goals. Students need support developing digital literacy to evaluate strengths, weaknesses, and appropriate applications. Poorly implemented AI also threatens student agency and diversity. Biased algorithms or limited training data can propagate harm (Zhai, 2022). Over-reliance on standardized systems can ignore individual needs. Students with disabilities or other challenges may be disadvantaged if AI systems fail to accommodate their circumstances and ways of thinking.

Gap in the AIEd literature

Recent innovations in AI have furthered the potential for SDL in HE. For instance, pri (Sun, 2023) and feedback-based self-learning approaches in conversational AI (Ponnusamy, 2022) demonstrate how AI can be designed to support SDL strategies, enhancing learner autonomy and engagement. Liu (2021) presented a framework for self-initiated open-world learning in autonomous AI agents, enabling them to learn in a self-motivated and self-supervised manner. However, these advancements also highlight a significant research gap: there is a lack of comprehensive studies examining how AI technologies specifically support SDL principles to enhance personalised learning in educational settings, particularly in the context of entrepreneurship education (Bell & Bell, 2023). Moreover, empirical research remains limited on whether generative AI is being adopted by students, and if so, how students use AI to assist their learning in entrepreneurship education. Most discussion consists of speculative benefits and perceived risks rather than evidence-based studies, there is a need for more empirical studies to understand how students utilise generative AI for their entrepreneurship education and its effectiveness in supporting students to meet their learning needs and outcomes (O'Dea & O'Dea, 2023).

Method

This preliminary study utilized a mixed methods approach combining surveys and semi-structured interviews to understand how students use AI in their learning. This exploratory small-scale research aimed to uncover which specific AI tools students employ and how the usage of these technologies influences their educational experiences. Participants include 28 undergraduate and postgraduate students enrolled in entrepreneurship modules at Queen Mary University of London, sampled purposefully based on AI use. Maximum variation sampling aims to capture diverse perspectives across gender, age, courses, year level, and entrepreneurship module types (capstone projects, group-based projects, etc.). Students, both using and not using AI, were included to understand motivations in each group. Any student over 18 enrolled in an entrepreneurship module may volunteer to participate. The sample size of 28 is adequate for an exploratory qualitative study to identify major themes and inform future research.

A cohort of 16 students completed an online survey that provided quantitative data on the types and frequency of AI tool use. The survey also gathered qualitative open-ended feedback on perceived benefits and concerns of using AI for learning. Descriptive statistical analysis was performed on the closed-ended responses regarding AI adoption. Open-ended comments were thematically coded to identify recurring perceptions. Additionally, 12 of the surveyed students participated in 30-60 minute semi-structured interviews to elaborate on their AI use and perspectives. Table 1 below shows the demographic characteristics of the interviewees and survey participants. The interview questions consisted of open-ended questions probing students' motivations, contexts, processes and views on integrating AI into their learning and assignments. Questions encouraged specific examples of AI applications and reflections on the value added versus potential pitfalls experienced.

Table 1

Demographic Characteristics of the Interviewees and Survey Participants

Variable	Category	Count	Percentage (%)
Gender	Females	17	61%
	Males	11	39%
AI usage level	High AI Usage	7	25%
	Medium AI Usage	11	39%
	Low AI Usage	10	36%
Year of study	1st Year	8	29%
	2nd Year	*9*	36%
	3rd Year	5	18%
	Postgraduate	6	21%

All interviews were conducted remotely via the Team platform and recorded with participant consent for subsequent analysis. After automatic transcription, the researchers reviewed recordings against transcripts to verify complete and accurate data. Transcripts and responses to the open-ended questions in the survey were then analysed by the researchers for inductive coding to identify key themes, following Braun and Clarke's (2006) six-phase thematic analysis

framework, including familiarisation with data, initial coding, theme searching, theme reviewing, theme defining and naming, and producing the report. In the study's analysis process, an initial understanding of the data was developed by closely and repeatedly examining the interview responses from participants. Each author independently identified the main arguments of the responses, then collectively cross-checked and searched for similar patterns to generate codes. Following this, the authors collaborated to search for overarching themes in the codes. To ensure high quality and rigour in the research, all authors reviewed the themes independently (Gioia et al., 2013). The themes were narrowed down to the use of AI tools in education and the main benefits and concerns of AI adoption in education.

Results

AI-assisted Learning needs

Our findings revealed six primary intended purposes of AI usage in entrepreneurship education and general academic settings, namely, writing assistance, text summarization, generation of academic essays, execution of administrative tasks, market research, and advertising, as shown in Table 2. While it's clear that AI serves many general purposes, enhancing productivity and learning outcomes, students' adoption of AI tools specifically for entrepreneurial education is not prevalent. This might be due to the novelty of AI tools, as students may not yet have discovered how to apply these tools in specialized areas like entrepreneurship. Interviewees are open to exploring further usage of AI, specifically for entrepreneurship education in the future. This interest in future exploration suggests that as students become more familiar with AI tools and their capabilities, they may find innovative ways to apply them in their entrepreneurial pursuits.

Table 2

AI-assisted Learning needs

AI-assisted Learning needs	Examples of AI tools applied
Writing assistance	**Grammarly –** popular among students for grammar and spelling checks. **Quill bot** – a paraphrasing tool that also offers text summarization and translation features. **ChatGPT –** generate essays with one-click
Summarising text	**ChatGPT –** create summaries of lengthy essays using generative AI **Notion AI –** develop a summary function for a popular note-taking app
Administrative tasks	**ChatGPT –** free AI tool that everyone can use to do simple tasks
Market research	**Appen –** AI market research solution that offers a wide range of data services

	ChatGPT – a general AI tool that can also be used in competitor analysis, analysing market trends and creating email campaign
Advertising	**Canva –** "Magic Studio" with all-in-one AI tools for design **Surfer SEO –** AI-powered SEO content writing

Writing assistance

Students have reported using AI tools for writing assistance to help express their ideas more effectively, including grammar checks, improved tone and sentence structure and paraphrasing. For instance, approximately 80% of students reported using "Grammarly" for spelling and grammar checks. The remaining participants relied on the autocorrect and grammar functions of their document applications, such as Google Docs or Microsoft Word. In addition to using AI-powered grammar-checking tools, some students use AI tools such as QuillBot for paraphrasing. Our data shows that approximately 15% of students reported using QuillBot.

These tools are particularly beneficial for international students who are required to write academic essays in English. As student 2 mentioned,

> *"As a non-native speaker, I initially used Grammarly because my grammar wasn't the best. Universities often require academic writing styles, so I use Grammarly for that purpose." — Student 2*

One-third of the students have observed an improvement in their own writing skills since using AI writing-assistant tools. This suggests that AI tools can contribute to personal skill development.

> *"It gives me more confidence to be on the same level as a native speaker, for example. I can see that even my own writing has improved before putting it through Grammarly." — Student 4*

> *"After inputting my work into ChatGPT and doing additional research, I was able to gather a wealth of information and gain inspiration for my writing." — Student 2*

Some students also emphasized the importance of validating the information generated by AI tools against other sources, demonstrating a responsible approach to using these tools. At the same time, identifying whether a student has used AI in their work can be challenging, as students typically rephrase and edit the output. These practices can effectively bypass plagiarism checkers like Turnitin at the moment.

Summarising text

20% of students have been turning to tools like ChatGPT to distil these lengthy academic articles and papers. This enables them to grasp the central themes and points swiftly. According to feedback, this method saves time and enhances their study efficiency. Second-year student 4, currently involved in the entrepreneurship module, uses AI to summarize articles relevant to her project research. This method could improve her comprehension of the information and allow her to learn more efficiently. It shows that the use of AI may potentially

enhance learning outcomes, suggesting its role as a supplementary educational tool for understanding and time management.

> *"For example, for an article recommended by the lecturer, I would use Chat GPT to provide a summary. It enhances my understanding and makes my learning more efficient." — Student 4*

> *"In Notion, there's an AI summary tool for shortening your notes. It creates a quick summary for you. When you add more to your notes, you can refresh the summary in one click. I often use this to keep my notes neat and short." — Student 3*

Administrative tasks

Around 40% of the students use AI for simple tasks, such as "drafting emails" and "writing weekly progress updates". This frees up time for students to focus on tasks requiring more critical thinking or creativity. Approximately 15% of the students use AI heavily to automate administrative tasks. From the conversation with student 3, it was revealed that AI makes work less monotonous. It manages repetitive and low-skilled tasks, enabling them to concentrate on more engaging activities. A similar view has also been echoed by student 7.

> *"It allows me to enjoy my work more as I can now focus on the things that I enjoy, such as conducting interviews with students to gain insights, reading, and creating post designs for marketing." — Student 3*

> *"I rely heavily on AI for my work. I juggle three part-time roles while being a student, and without AI to automate my tasks, I wouldn't complete them on time. For example, I use AI to draft invitation emails and promotional posts for events." — Student 7*

Market research

7% of students also shared that they use AI-powered market research tools to simplify the process of analysing data from surveys, social media, and other sources in their marketing projects. These tools help overcome the challenges often associated with data analysis, which can be time-consuming and challenging due to its numerical nature. By leveraging AI, students can analyse larger databases, leading to more accurate marketing predictions and promoting data-driven decision-making in their projects.

> *"I used ChatGPT in researching the market and key players in the field; it provided some useful information. But of course, I will also check the accuracy of the data before I use it" — Student 10*

> *"What I love about using AI for market research is that it saves us so much time. This way, we can focus more on the fun parts of creating a business and improve our product design." — Student 4*

Advertising

Advertising is a crucial element for achieving entrepreneurial success and is often covered in entrepreneurship education. 10% of students investigated the use of AI such as Canva and ChatGPT in creating marketing content, post design and marketing-related tasks. The students report that these tools perform well and save a significant amount of time, suggesting efficiency and effectiveness. This points to the broader potential of AI in entrepreneurial activities, including content creation and digital marketing.

“I'm currently exploring the integration of AI in advertising. I frequently use Canva, which has recently introduced new AI features such as "Magic Write," "Magic Morph," and "Magic Animate."— Student 3

"I currently use ChatGPT or Notion AI to generate captions for Instagram and LinkedIn posts for the marketing project I'm working on. It usually works well and saves me a lot of time.” — Student 7

"I am aware that there are AI-generated images and illustrations that I could use for marketing.”— Student 5

Perceived Benefits of AI

As demonstrated earlier, every student who experimented with AI tools in their entrepreneurship module discovered that AI was user-friendly, especially with the appropriate prompts. They also found that generative AI, such as ChatGPT improved their learning experience by streamlining tasks and quickly accessing the necessary information. Our study suggests four benefits of the usage of AI tools from students’ perspective, namely increased productivity, personalised learning, idea generation and improved linguistic capabilities.

Increased Productivity

All students using AI tools reported that could increase their productivity. AI could be utilised to automate routine tasks, such as drafting emails, conducting efficient information searches and fixing grammar errors. This allows them to focus on more complex and creative aspects of their works. Students expressed that generative AI increases their efficiencies and provides them with the opportunity to explore new ideas and strategies in the entrepreneurship modules. International students found that generative AI could enhance their writing. This is because generative AI can assist with grammar checks, allowing them to focus on writing and critical thinking.

"Use AI when you need to quickly learn about an industry or grasp the basics of a topic. It's extremely handy." — Student 21

“It's also good for seeking general information. In summary, it saves time when searching for general information. Time management is the primary benefit, but its usefulness varies based on how you use it.” — Student 11

"Generally, the advantage is that it saves time on routine tasks like meeting, a word count or checking spelling and grammar. It's very straightforward."

— Student 4

The primary goal for students using AI appears to enhance efficiency and boost productivity. This is particularly evident when they employ AI in entrepreneurial activities. 7% of students expressed that they would continue to use AI when they start their own businesses, where they may have to work in small teams with limited manpower in the early stage. They recognize how AI can be extremely useful for automating simple tasks and reducing the overall workload.

"I've been involved in entrepreneurial activities, including assisting with our family business. I've used AI tools like ChatGPT for creating presentations to pitch business ideas." — Student 11

"At QHack, a start-up boot camp, I employed AI for brainstorming my business name and writing the pitch script. This method helped me come

up with business ideas much faster, giving me the chance to explore more options instead of sticking to less effective ones just because I spent a lot of time on them." — Student 3

Personalized Learning

It was the shared perspective of students that AI could also enable personalized learning experiences by tailoring educational content and strategies to individual student's needs and preferences. 50% of students responded positively to AI's capacity to serve as an intelligent tutor who can evaluate each learner's ability, strengths, weaknesses, and gaps and deliver customized instruction and feedback. For instance, some students said they use “AI to summarize lengthy academic papers”, “generate ideas for essays”, and “assist in drafting academic essays”. Approximately 40% of students use AI tools like ChatGPT to comprehend a subject or area. While the results resemble those from traditional search engines (e.g., Google, Yahoo, Chrome), AI tools can provide more targeted answers immediately, eliminating the need for users to find the information themselves. The student views ChatGPT as an expert-like AI tool with vast knowledge. It's seen as a reliable and comprehensive source of information, demonstrating the potential of AI in facilitating learning and research through instant access to diverse information.

"I believe ChatGPT simply has a 'larger brain'. It's akin to consulting someone who’s particularly knowledgeable in a specific field. ChatGPT is nearly omniscient; it's mechanical." — Student 2

“ChatGPT can provide me with feedback 24/7, and it can clarify some concepts for me immediately.” — Student 23

"What I do is put all my tutorial questions into Notion, a note-taking app with AI functions. This allows me to get a basic idea of how to approach the question, and I can then refer to my textbook for further research. Ultimately, I prefer to rely on the teacher's official answer rather than the AI's. However, getting immediate solutions is beneficial, as waiting to ask in my tutorials might make me lose interest in the question."— Student 3

Idea Generation

The feedback from our interview and survey highlighted that students extensively use AI for brainstorming and generating innovative ideas, especially in entrepreneurial activities. Interviews have shown that using generative AI helps overcome creative blocks when ideas are scarce. While the initial ideas inspired by AI might not be revolutionary, students can expand on them to develop more complex concepts. Approximately 25% of students have used AI for idea generation in entrepreneurship education.

“ChatGPT provides me with a launching platform to either find or build on an idea. It's not always precise, but it's useful. Even when an idea it suggests doesn't work, it still sparks new ones.” — Student 16

“In QIncubator, an 8-week entrepreneurial workshop, I utilized AI when I struggled to come up with business names. While the generated names weren't perfect, they provided some inspiration. I also employed AI to create the pitch deck.” — Student 3

Students emphasized that the effectiveness of generative AI's creative contributions largely hinges on the user's application, underscoring the essential role of human input in the creative process. They believe that while AI can initiate ideas and assist in brainstorming, its true value is unlocked when these ideas are further refined and enhanced with personal insight.

> *"Utilize AI tools for generating ideas and brainstorming, and to further develop what they provide. It's not about using every suggestion they offer but incorporating personal input." — Student 6*

> *"No, I don't consider the output creative. It's more about how you utilize this output." — Student 11*

Improved linguistic capability

From the responses, it's clear that students frequently use AI tools like ChatGPT and Grammarly to review grammar and rephrase essays or emails for a more professional presentation. The students highlighted that their use of AI extends beyond academic work. Some students also use AI tools for career development, such as enhancing their CVs to make them more appealing to potential employers/investors and practising mock interviews.

> *"Grammarly greatly assists in enhancing my professional tone, while Quill Bot improves the accuracy of my essay's tone." — Student 4*

> *"As an international student, it's not possible for me to immediately improve my English and grammar. However, I need to become fluent to write essays and secure a job." — Student 8*

International students, who naturally think in their native language, faced difficulties in translating their thoughts into English. They expressed that the assistance of AI tools has given them greater assurance in expressing their views, leading to more effective communication. This indicates the potential of these tools to bridge language gaps and enhance overall communication skills.

> *"Coming from an international background, I often conceptualize my ideas in my native language, which makes it challenging to express them clearly in English. Thankfully, AI tools have been a great help. They've given me more confidence in how I present my thoughts, significantly improving my communication." — Student 3*

Concerns over usage of AI in Learning

While students appreciate the benefits of AI in their learning, our research highlights five main concerns over the usage of AI in learning from students' perspective: laziness, lack of accuracy, limited applicability in academic settings, data privacy concerns, and limited awareness and understanding of AI.

Laziness

> *"AI tools might promote laziness, making us overly rely on AI-generated content rather than our own ideas". — Student 22*

> *"It seems that many students rely entirely on AI tools and unquestioningly accept whatever results they produce for use in their essays." — Student 11*

Similar views have been commonly shared by 25% of students who used AI for their learning. They assert that students should not use AI, as it could negatively impact their learning

outcomes. This could result in a lack of thorough understanding of class concepts and the production of low-scoring essays generated by AI. In addition, they also believed that overreliance on AI tools can potentially reduce critical thinking and personal input in academic work. On the other hand, despite acknowledging these potential drawbacks of AI, 75% of the students believe the issue of laziness largely depends on the student's sense of responsibility and the level of AI literacy. Students tend to agree that AI is simpler to use than traditional search engines and offers more accuracy than information sources like Wikipedia. Consequently, its convenience and ease with which it aids in diverse tasks could result in excessive dependence, which might hinder the cultivation of critical thinking and problem-solving abilities.

> *“I don't think ChatGPT inherently promotes laziness. It really comes down to the individual students.” — Student 11*

> *"I wouldn't classify ChatGPT as a tool only for students who don't want to write an essay. I mean, frankly, who enjoys academic tasks? However, I believe that diligent students who complete their work on time and read extensively can also greatly benefit from ChatGPT.” — Student 4*

Lack of Accuracy

75% of students during the interviews reported that they have encountered several mistakes in the outputs produced by AI. They noted that while AI tools are generally helpful, they are not infallible and sometimes provide incorrect or misleading information. All the students are aware that the information generated by the AI might be out-of-date or inaccurate. This awareness led them to approach AI-generated content with a degree of scepticism, especially in entrepreneurship education, where up-to-date or highly accurate information is crucial. One interviewee points out that:

> *"I know that GPT-4 has a cut-off date of around the start of 2022, which means it can’t accurately handle questions related to matters that happen recently. Therefore, it could generate some inaccurate answers due to being out-of-date.” — Student 4*

Students further underscored the potential hazards associated with using AI-generated data that may be inaccurate, especially in the context of their entrepreneurship studies or activities. They expressed concerns about the implications of relying on flawed information for business decision-making, market analysis, and strategy development. The students noted that inaccurate data could lead to misguided business plans, misinformed market assessments, and ultimately, detrimental choices in their entrepreneurial ventures.

> *“I once attempted to use it for market research related to my entrepreneurial activities. However, due to my limited knowledge of market research, I was uncertain if it conducted calculations correctly or made accurate predictions. I understand there may have been inaccuracies.” — Student 3*

> *“I believe that AI often provides inaccurate responses, and I would not use it at all.” — Student 17*

Limited applicability in academic settings

Due to the absence of explicit regulations governing AI use in universities, coupled with a lack of agreement among academics on its role in teaching and learning, students shared their concerns about using AI in their studies during the interview. There's a risk that universities might impose penalties for over-reliance on AI tools, restricting their use in educational environments. One interviewee voiced a concern regarding this:

> *"I haven't used AI much in my studies because the professors appear to discourage its use. They portray AI as something that could negatively impact learning outcomes. Additionally, I'm concerned that I might be penalized for using AI in my studies." — Student 6*

Students noted that not all academics encourage the use of AI in educational contexts, with some academics explicitly forbidding its use for assignments and research. At present, guidelines regarding the use of AI in academic settings are not fully developed. This lack of clarity can lead to student confusion due to mixed attitudes and messages about AI in their educational institutions. Students who disregard these rules risk facing penalties for academic misconduct. There is a fine line between using AI to assist in learning and engaging in dishonest behaviours during assessments. Other interviewees believed that clearer guidelines should be established regarding the use of AI in education. Another student also added that a more lenient and flexible approach regarding the use of AI in education settings.

> *"I believe that using AI in assessments under any circumstances is completely unacceptable, as it equates to cheating." — Student 19*

> *"If the school explicitly bans it in assessments, I will refrain from using it. However, there are instances where they encourage us to use it to enhance our literacy yet prohibit its use in assessments. This mixed messaging is quite confusing." — Student 4*

> *"For plagiarism, there's a certain acceptable percentage in Turnitin. A similar approach could be applied to AI usage. I don't believe universities should penalize every case of AI use. It has potential benefits." — Student 11*

Data privacy concerns

42% of students raised their concerns with data privacy in the use of AI tools. These tools, like AI learning systems, typically need access to extensive personal data to operate efficiently. As students engage with these systems, they end up revealing a lot of personal information. If this data isn't properly handled or protected, it could be misused, resulting in privacy violations. They are concerned that such scenarios could lead to serious consequences like identity theft, targeted phishing attacks, and various forms of cybercrime.

> *"It's about the personal information leak. This is a highly sensitive matter. AI systems require a large amount of personal data. As you interact with AI, you disclose more information about yourself. If this information falls into the wrong hands, it could pose a danger." — Student 5*

> *"AI is a rapidly progressing field, and its regulations struggle to keep up with the pace of its development. We need data protection laws, specifically designed for AI." — Student 3*

Limited awareness and understanding of AI

75% of students displayed limited knowledge of current AI trends, with some not showing initiative to improve their AI literacy through the exploration of AI tools or resources. 14% of students are unaware of any other AI tools besides ChatGPT, largely due to their frequent mentions in news, media, and peer discussions. Their inability to suggest any other AI tool suggests a low level of AI awareness. However, 35% of students recognised the importance of AI in careers and businesses and expressed a desire to learn more about it. They hope to not only enhance their AI literacy through such training but also to receive better guidance on using AI more effectively and in an ethical manner.

> *"I'm not familiar with any AI. I've only heard of ChatGPT and tried it briefly out of curiosity. I am not usually interested in tech stuff, so I don't know much about it." — Student 8*

Discussion

While the AIEd literature has suggested that AI tools offer many potential benefits in education, empirical evidence is scant, and the discussion about the implications for entrepreneurship education still needs to be expanded (Bell & Bell, 2023; Wahl & Munch, 2022). Further, while the discussion in the literature has considered multiple level factors, including national, institutional, and individual levels, adding students' voices to this conversation is critical (O'Dea & O'Dea, 2023). Adopting a student-centric approach, this study provides valuable contributions to the AIEd and entrepreneurship education literature in the following areas.

The Impact of AI on Entrepreneurship Education

Our findings provide further insights into the benefits of AI in HE. The AIEd Literature has suggested diverse benefits of AI in HE, including 1) Assessment/Evaluation, (2) Predicting, (3) AI Assistant, 4) Intelligent Tutoring System (ITS), and (5) Managing Student Learning (Crompton & Burke, 2023). Most of the studies focus on the educators' perspective. Further, there are speculations that the actual usage might be low (O'Dea & O'Dea, 2023), our study provides empirical evidence of students' adoption and perception of AI usage. First, our findings show that students have been adopting AI tools in their learning in various ways in entrepreneurship education, providing a more nuanced picture of students' usage of these tools. It supports the view that it is necessary to embrace technology in a managed way (Bell & Bell, 2023). Second, our findings show that while students have discovered many benefits of AI, such as improving linguistic capabilities, enhancing productivity, and aiding personalized learning (Short & Short, 2023), their adoption of AI tools in subject-specific areas such as entrepreneurship education is still limited. It echoes the recent research that AI can potentially promote critical thinking skills, although a high level of cognitive skill development requires appropriate AI affordances (Essien et al., 2024). It supports the view that there is a need to integrate digital technology, such as AI tools, in entrepreneurship education to prepare students for future entrepreneurial endeavours (Wahl & Munch, 2022).

Third, our findings suggest that whilst generic AI literacy is vital for students to develop their competencies, subject-specific AI literacy for both students and staff is critical to encourage students to utilise the full potential of different AI tools. It supports the Technology, Pedagogy, and Content Knowledge (TPACK) framework, which proposes that successful and effective technology integration into education requires a combination of three types of knowledge: Technology, Pedagogy and Content (Fabian et al., 2019). This implies that academic tutors need to have some basic knowledge and understanding of AI technology in order to integrate it into their curriculum design and delivery.

Supporting Self-Directed Learning through AI

Our findings affirm that AI supports personal learning needs in HE, particularly in assisting with writing, summarizing texts, conducting market research, and crafting advertisements. These tasks, integral yet time-consuming within the entrepreneurship curriculum, can be efficiently managed with AI tools, thereby optimizing the self-learning process. This aligns with the observations in previous studies (Esiyok et al., 2024), highlighting AI's role as a 24/7 tutor in addressing students' learning requirements such as locating available resources and facilitating personalized learning experiences. Our findings also proved that AI can effectively enhance the principles of SDL, which emphasizes the importance of learners taking initiative in their education, setting learning objectives, and finding resources to achieve their goals (Kim et al., 2014). By acting as on-demand resources and providing immediate feedback, AI tools empower learners from diverse backgrounds to navigate their educational journey more autonomously, making informed decisions based on AI-generated insights and analyses (Farrokhnia et al., 2023; Crompton & Burke, 2023). Further, aligning with the assumption made by Lin (2023), our findings provide empirical evidence on the efficacy of AI in supporting SDL through its substantial contributions towards realizing distinct learning objectives, including heightened productivity, personalised learning experiences, facilitation in the generation of ideas, and advancements in linguistic proficiency.

Students' Perceived Barriers to AI Adoption

The AIEd literature has discussed the drawbacks of generative AI in students' learning (Sallam, 2023; Choi et al., 2023). Our findings further elaborate on this theme by pointing out additional barriers that could discourage students from adopting generative AI in their entrepreneurship education, including potential misuse and over-reliance, stifling of creativity, unreliable information, and potential laziness. In addition, it is interesting to note that some students felt compelled to use the tools on the belief that they would 'miss out' if not using the tools in their studies and assessments. Further, while the extant literature emphasises staff's concern over academic integrity as a critical barrier to AI adoption in HE, our study provides insights from students' perspectives. While many students deemed it inevitable that the usage of these tools will become widespread, just like the Google search engine, they were unsure if they should use these tools in their learning mainly due to vague, inconsistent, and mixed messages from lecturers and universities. While some lecturers proactively promote the usage of AI, others appear to associate students' AI usage with academic misconduct. It is also reflected in contrasting practices and policies at institutional levels. For instance, some education bodies have banned AI tools such as ChatGPT, although it is unclear whether such actions reduce potential academic misconduct (Eliot, 2023). Other institutions have adopted AI detection tools in assessment, which appears to be counterproductive (Topinka, 2024). Our findings strongly suggest that clear guidance and training on how to use AI in HE is urgently required.

Conclusions

In summary, this exploratory study combined surveys and in-depth interviews to provide empirical insights into how students utilise AI in their self-directed learning, including perceived benefits and challenges. Findings help address gaps in understanding actual versus speculative student practices. Results may inform institutional policies and pedagogies on effectively integrating AI tools in HE. Further large-scale research is warranted to build on this initial mixed methods investigation.

Theoretical Implications

This research enriches the AIEd field by detailing students' application of AI in meeting their educational requirements within entrepreneurship studies. While existing research has pinpointed specific learning needs addressed through AI utilization, our investigation illuminates the potential for AI to underpin learning within entrepreneurship, a discipline inherently reliant on student-directed and experiential learning modalities. This necessitates a learner's engagement in autonomous study and the proactive identification of suitable learning strategies and resources. Additionally, this work enhances discussions on AI's utility in fostering self-directed learning. Previous studies have acknowledged AI's role in supporting autonomous learning across various disciplines, including adult education (Lin, 2023) and second language education (Hong, 2023). Our findings bolster this narrative, presenting evidence of AI's capability to elevate self-directed learning within entrepreneurship education, notably improving productivity, idea generation, and linguistic proficiency. Our analysis also addresses the broader discourse regarding AI's integration into HE and identifies barriers to its adoption, including over-dependence, creativity suppression, misinformation risks, and fostering of passivity among learners.

Practical Implications

Our findings suggest educational institutions should adopt a proactive, transparent, and consistent approach to integrating and managing AI tools. This reinforces the notion that faculty support and institutional backing are crucial for fostering student engagement with AI (Wang et al., 2021). Consequently, universities should formulate explicit policies governing AI tool usage. Moreover, the ethical and proficient deployment of such technologies mandates AI literacy education for both students and faculty. This research advocates for a re-evaluation of educational objectives and assessment methods in the AI era, urging a redesign of pedagogical strategies to leverage the potential benefits of AI rather than restrict its use.

Limitations and Future Research

The primary limitation of this exploratory study was its restricted sample size from a single institution. Nonetheless, the mixed-methods approach yielded insightful preliminary data for guiding subsequent inquiries into AI's adoption and its broader effects across diverse student demographics. Future research could employ a wider sample size, encompassing entrepreneurship students from various institutions and levels.

Conflict of Interest

The author(s) disclose that they have no actual or perceived conflicts of interest. The authors disclose that they have not received any funding for this manuscript beyond resourcing for academic time at their respective universities. The authors report no usage of artificial intelligence during this study or write-up.

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