HOW PERSONALITY TRAITS SHAPE AI USE AND LIFELONG LEARNING?

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Abstract: Integrating generative AI into higher education introduces a complex dynamic that holds potential to enrich learning experiences but also raises concerns about students becoming overly reliant on technology. This study examines how two personality traits, namely Novelty Seeking and Perfectionism, influence students' patterns of AI use and their attitudes toward Lifelong Learning. It distinguishes between Constructive AI Use, where students use AI to deepen understanding and support exploration, and Dependent AI Use, where AI becomes a crutch to bypass effort or uncertainty. Drawing on data from 167 undergraduates and analysed using partial least squares structural equation modelling (PLS-SEM), the findings show that personality traits play a key role in shaping how students engage with AI. Those who lean toward constructive use tend to show stronger connections to lifelong learning behaviours, reflecting a more self-motivated and engaged approach to education. In contrast, students who exhibit dependency on AI are less inclined toward lifelong learning. These insights emphasize that the effectiveness of generative AI in education is shaped not just by the technology itself, but by how individual students choose to use it, choices that are heavily influenced by personal tendencies. As a result, the study advocates more tailored, student-centred strategies when incorporating AI into educational environments.

Keywords: Generative AI, Lifelong Learning, Novelty Seeking, Personality, Perfectionism

1. Introduction

The Generative AI (GenAI) technologies are no longer future novelties and science fiction; they have become a daily routine and useful utility in higher education. Since its inception in 2022, platforms like ChatGPT, Gemini, Claude, and Bing AI have been adopted by students worldwide for activities including information summarization, problem-solving, test preparation, and even emotional support (Zawacki-Richter et al., 2019). While these technologies offer immense promise to democratize access to information, they also expose students towards risk fostering cognitive outsourcing, where they grow

to be highly dependent on AI as a replacement for critical thinking and self-regulation (Sullivan et al., 2023).

The key educational question is no more whether to embrace AI, but how to ensure that technology is employed in ways that improve, rather than degrade, lifelong learning. Lifelong learning (LLL) refers to more than skill acquisition, it involves a persistent disposition toward curiosity, strategic awareness, and resilience in the face of uncertainty (Crick et al., 2004). As AI becomes omnipresent, the potential emerges that students might offload not just duties, but the basic cognitive and dispositional work that drives lifelong learning.

However, not all students interact with AI in the same manner. Some may use AI constructively as a reflective partner to improve knowledge, while others may deeply be dependent and use it as a shortcut to skip effort. What explains this distinct variation? We assert that personality traits may play a crucial role. The current research evaluates how these qualities predict students' style of AI use: whether constructive or dependent, and how this, in turn, influences Lifelong Learning disposition (Ku et al., 2022). We also explore whether AI conduct mediates the impact of personality on learning. By concentrating on these dynamic interactions, we want to develop more nuanced, student-sensitive approaches to AI in education.

2. The Dual Role of AI: Constructive vs. Dependency

As AI becomes more common in higher education, students are finding unique ways to engage with GenAI. Two tendencies have emerged: constructive and dependent AI use (Ivanov, 2023; Zhang et al., 2024). Thoughtful AI usage deepens comprehension, generates ideas, and supports metacognitive abilities, matching with lifelong learning objectives including curiosity, resilience, and strategic thinking. Dependent usage, on the other hand, shows students using AI for fast answers or to minimize cognitive work, which may decrease independent thinking and learning autonomy.

Previous research have demonstrated that constructive AI use is related with better learning results, particularly when learners participate in active dialogue with AI systems, reflect on feedback, or use AI to test hypotheses and generate new knowledge (Zawacki-Richter et al., 2019). This form of usage enhances cognitive presence and builds habits of self-regulation, which are important for lifelong learning (Kara et al., 2024). In contrast, dependent AI use, which is characterized by limited reflection and overreliance on AI-generated outputs, which can lead to cognitive offloading, lower problem-solving effort, and loss of deep learning dispositions (Ivanov, 2023; Zhai et al., 2024).

The patterns of usage reflect previous worries in educational psychology regarding “help-seeking behaviours.” In this context, learners may either pursue instrumental help-seeking to grasp problems better or engage in executive help-seeking to obtain answers without truly understanding them (Cheong et al., 2004; Chou & Chen, 2025). GenAI tools, if used uncritically, may encourage the latter by making quick solutions easily accessible. Moreover, emerging evidence shows that students’ prior dispositions, including personality traits and motivational orientations, influence which pattern of AI use they adopt (Adams et al., 2024).

Thus, AI is not a tool that automatically led to better learning, as it can amplify either productive or passive learning strategies, depending on how it is used. When used thoughtfully, AI can support deeper understanding and active learning. However, if students often rely on it to avoid thinking or doing the work themselves, it may lead to shallow learning. Over time, this kind of dependency could limit their ability to think critically, solve problems, and learn independently.

2.1 *Hypotheses Development*

This study delineates a conceptual framework that relates personality features, patterns of AI usage, and learning outcomes. More precisely, the research looks at how Novelty Seeking and Perfectionism are

associated to both Constructive and Dependent AI usage, and how these two forms of AI use impact Lifelong Learning. This study suggests that different student attitudes can lead to fundamentally different uses of AI, which could significantly impact learning. The following section explores the anticipated connections between various personality traits, the ways AI is utilized, and how these factors might impact Lifelong Learning.

2.2 *Novelty Seeking and AI Usage*

Novelty Seeking refers to the tendency to seek out new, complex, and exciting experiences (Cloninger et al., 1993; De Fruyt et al., 2000). When it comes to AI-assisted learning, students who enjoy exploring new ideas often turn to tools like GenAI to generate concepts, reflect on them, and consider various perspectives (Kovbasiuk et al., 2025). This curiosity can foster meaningful interaction, particularly when supported by thoughtful approaches (Zawacki-Richter et al., 2019). Although those who seek novelty show enthusiasm for exploring AI, this approach works best when combined with thoughtful reflection and structured guidance (Kovbasiuk et al., 2025; Zawacki-Richter et al., 2019). With the right guidance and support, this interaction can inspire deeper exploration, ongoing learning, and innovative knowledge building, which are key features of effective AI use in education (Adams et al., 2024; Crick et al., 2004). Thus, we posit:

H1: Novelty Seeking is significantly related to Constructive AI Use

While the pursuit of novelty can lead to exciting discoveries, it also carries risks if not managed carefully. People with high novelty-seeking are more likely to act on impulse driven by curiosity, rather than having a deliberate plan in mind (Kara et al., 2024; Kovbasiuk et al., 2025). In GenAI environments, this frequently results in a shallow approach in which tools are employed to get fast answers instead of fostering a deeper comprehension through thoughtful consideration (Zhai et al., 2024). This activity shows a tendency to choose stimuli instead of taking time to reflect, leading to cognitive offloading and less independence (Xu et al., 2025). These inclinations correspond with studies on surface learning and digital distraction, especially among students who demand novelty but lack regulatory frameworks (Zhang et al., 2024). Students seeking constant engagement but struggling with self-discipline often use generative AI in shallow or scattered manners. Research shows that students who lack strong metacognitive skills tend to use AI in basic or superficial ways, rather than tapping into it for more profound thinking. For instance, Ji et al. (2025) discovered that students who do not get help for introspection and self-regulation prefer to interact with AI in low-effort, unreflective ways. Kovbasiuk et al. (2025) observed that students who are motivated by novelty tend to use AI technologies in a scattered manner, showing a lack of focus or strategic engagement. Likewise, Wei et al. (2025) found that students lacking clear goals often turn to AI for quick answers rather than engaging in meaningful learning. Rahman et al. (2025) further asserts that without adequate guidance, even the most creative applications of AI can turn dull and ineffective.

H2: Novelty Seeking is significantly related to Dependent AI Use

2.3 *Perfectionism and AI Usage*

Perfectionism entails the desire of flawlessness, high standards, and discomfort with uncertainty (Frost et al., 1990). For some students, these qualities seem to manifest as a strong enthusiasm for organization, precision, and thoroughness in their academic work (Ku et al., 2021, 2022). The GenAI technologies can serve as supportive companions for these learners, providing help in honing arguments, clarifying thoughts, and evaluating papers through ongoing processes. When approached thoughtfully, this engagement enhances deeper understanding, produces higher quality results, and fosters a sense of control over academic achievement (Stranges & MacNutt, 2025). When used thoughtfully, AI tools can assist perfectionist learners in honing their writing, rewording thoughts, and ensuring conceptual clarity, thereby supporting their quest for accuracy and mastery. This type of intentional involvement showcases metacognitive learning strategies (Kara et al., 2024; Stranges & MacNutt, 2025). Hence, we posit:

H3: Perfectionism is significantly related to Constructive AI Use

Nonetheless, striving for perfection can sometimes lead to avoidance. Some students may feel so afraid of failing or making mistakes that they end up depending too much on GenAI to validate their answers or tackle difficult tasks. In these situations, AI serves more as a source of comfort than a means of education, showing a reliance on the technology. (Zhang et al., 2024). While striving for perfection can drive us toward accuracy, it can also lead to unhealthy behaviours when fuelled by worry. Students driven by perfectionism might turn to GenAI not as a tool for learning, but as a way to sidestep making mistakes. Zhang et al. (2024) revealed that such learners frequently turn to passive strategies, outsourcing cognitive activity to retain emotional comfort. This weakens exploration and limits tolerance for uncertainty, diminishing the advantages of active learning (Frost et al., 1990; Stranges & MacNutt, 2025). Based on the preceding discussion, the study postulates:

H4: Perfectionism is significantly related to Dependent AI Use

2.4 *AI Usage and Lifelong Learning*

Constructive AI usage is the thoughtful employment of GenAI tools, such as brainstorming, refining drafts, or exploring new perspectives. When used thoughtfully, these interactions enhance learners' capacity for curiosity, self-direction, and critical thinking, which are essential markers of lifelong learning (Crick et al., 2004; Zawacki-Richter et al., 2019). Students who use GenAI to explore ideas or gradually improve their work typically show a deeper level of thinking. This thoughtful method promotes independence, adaptability, and strength, all of which are characteristics crucial to ongoing learning beyond formal education (Stranges & MacNutt, 2025). The study posits:

H5: Constructive AI Use is positively related to Lifelong Learning

On the contrary, dependent AI usage is characterized by low-effort, reassurance-seeking conduct. Students with this tendency may depend on GenAI to avoid thinking or presumably to accomplish assignments with minimum metacognitive process. Over time, this disposition would inhibit the establishment of independent learning habits, compromising Lifelong Learning (Zhai et al., 2024; Zhang et al., 2024). Henceforth:

H6: Dependent AI Use is negatively related to Lifelong Learning

3. Methodology

This study featured 167 undergraduate students from a public institution in East Malaysia, recruited using purposive sampling. All participants were first-degree students enrolled in business or information technology programs (mean age = 21.3 years, 64% female). Data were collected in person during planned lecture sessions using printed questionnaires administered directly by the researchers. Figure 1 depicts the theoretical framework for present study. The model postulates that two personality traits, namely Novelty Seeking and Perfectionism, influence students' engagement styles with generative AI, namely Constructive AI Use and Dependent AI Use. In turn, these interactions are believed to affect Lifelong Learning inclinations. The framework outlines six direct hypotheses (H1–H6) that map the expected relationships between personality traits, AI usage patterns, and learning orientation.

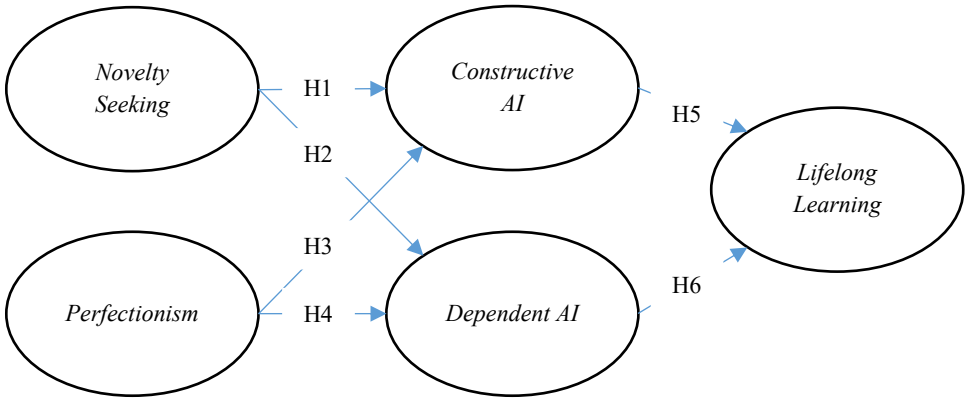

Figure 1: Framework

3.1 *Measures*

This study employed a combination of standard and modified measures. Novelty Seeking was measured using five questions derived from Cloninger's Character Inventory specifically to reflect dispositions toward curiosity, stimulation, and exploratory behaviour (Cloninger et al., 1993). Perfectionism was measured using five questions from the Multidimensional Perfectionism Scale (Frost et al., 1990; 1993), that focuses on high personal standards and fear of making mistakes. The interaction styles of Constructive AI were examined using five questions that reflect deliberate and strategic engagement with AI tools (e.g., "I use AI tools to help me think through complex problems"; "I treat AI as a partner in my learning process"). This measure focuses on notions of metacognitive learning, curiosity, and strategic thinking (Crick et al., 2004; Stranges & MacNutt, 2025). Dependent AI Use was studied using five battery-item to identify passive dependency on AI, such as copying replies or avoiding attempts (e.g., "I use AI because I don't want to spend time figuring things out on my own"; "I copy AI responses with little or no modification"). These items are anchored in ideas of cognitive offloading and surface learning (Zhai et al., 2024; Zhang et al., 2024). Lifelong Learning was measured using nine modified questions from Crick et al.'s (2004) Effective Lifelong Learning Inventory that cover key areas of strategic awareness, curiosity, and learning fragility. All items employed a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The organizational flow and contents of the survey instrument are illustrated in Figure 2, which outlines the progression from demographic data to the core research variables.

The research design enables an evaluation of the six primary hypotheses grounded in the research literature. Specifically, each section of the questionnaire is organized to capture the influence of individual dispositions (Novelty Seeking and Perfectionism) on the two pathways of use (Constructive or Dependent), ultimately providing insight into how these traits contribute to the measure of Lifelong Learning.

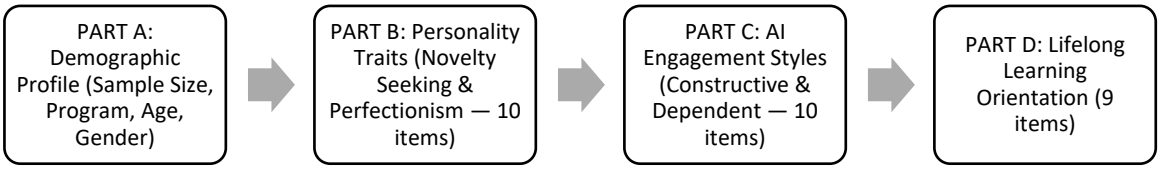

Figure 2: Questionnaire Structure

4. Results and Data Analysis

Data were analysed using partial least squares structural equation modelling (PLS-SEM), which is a variance-based method ideal for exploratory and moderate sample sizes (Hair & Alamer, 2022). This method permits simultaneous assessment of both measurement and structural models. The path coefficients and indirect effects analysis were tested by bootstrapping with 5,000 subsamples, producing robust estimates of significance (Huang, 2021).

4.1 *Measurement Model*

As presented in Table 1, the results indicate all latent constructs produce good internal consistency reliability, with Cronbach's alpha (α) values ranging from .82 to .89, exceeding the threshold of .70 (Vaske et al., 2017). Convergent validity was also established, as the average variance extracted (AVE) for all constructs above the suggested criterion of 0.50 (Fornell & Larcker, 1981). Discriminant validity was tested using the Heterotrait-Monotrait ratio (HTMT), with all values below 0.85, suggesting appropriate distinctiveness between constructs (Henseler et al., 2015).

Table 1: Model Reliability and Validity

Construct	Cronbach's Alpha (α)	Composite Reliability (CR)	AVE
Novelty Seeking	0.84	0.88	0.621
Perfectionism	0.87	0.89	0.654
Constructive AI	0.89	0.91	0.682
Dependent AI	0.82	0.87	0.598
Lifelong Learning	0.85	0.89	0.632

4.2 *Path Analysis*

The findings in Table 2 reveal that Novelty Seeking served as a robust predictor for both Constructive AI Use *(β =.79, p<.001)* and Dependent AI Use *(β =.36, p<.001)*, which suggests that students with high levels of curiosity are driven to interact with AI tools in diverse ways, utilizing them for deep inquiry as well as for quick solutions. Perfectionism was substantially linked with Dependent AI Use *(β =.71, p<.001)*, indicating that students with high personal standards typically depend on AI to ensure accuracy and mistake avoidance. However, the association between perfectionism and constructive AI activity was just modest *(β =.22, p<.001)*, implying that while perfectionists do engage in meaningful AI interaction, their primary motivation is strongly skewed toward risk avoidance and validation.

Constructive AI Use showed a substantial positive influence on Lifelong Learning *(β =.59, p<.001)*, supporting the hypothesis that intentional interaction with AI increases curiosity and strategic awareness. On the other hand, the linkage between Dependent AI Use and Lifelong Learning was also supported *(β =–.38, p<.001)*, showing that chronic reliance on AI may impede the development of independent learning abilities.

Table 2: Path Coefficient

	Path	*β*	*t*-value	*p*-value
H1	Novelty Seeking→Constructive AI	0.79	13.52	<.001
H2	Novelty Seeking→Dependent AI	0.36	5.21	<.001
H3	Perfectionism→Constructive AI	0.22	3.55	<.001
H4	Perfectionism→Dependent AI	0.71	12.84	<.001
H5	Constructive AI→Lifelong Learning	0.59	8.15	<.001
H6	Dependent AI→Lifelong Learning	–0.38	5.03	<.001

5. Discussion

This study examined the influence of personality factors on students' involvement with generative AI and their broader lifelong learning tendencies. The findings support the view that personality dispositions, specifically novelty seeking and perfectionism, influence how students approach AI tools in academic settings. These tendencies do not just affect whether students use AI, but how they interact with it strategically, reflectively, or as a shortcut. Previous studies have emphasized that student attributes influence digital learning behaviours (Kara et al., 2024; Zhong et al., 2024), and the present work extends this by concentrating explicitly on generative AI environments.

The results demonstrate the unequal educational value of different AI usage approaches. Constructive AI, defined by reflection and metacognitive engagement, was positively connected to lifelong learning dispositions, mirroring earlier work on self-directed learning and critical curiosity (Crick et al., 2004; Kara et al., 2024). On the other hand, dependent AI use, marked by low-effort reliance and task avoidance, was negatively associated with these outcomes. These findings corroborate with concerns raised in recent studies; in that, while effective, AI can perpetuate surface learning if applied passively (Zhai et al., 2024; Zhang et al., 2024). As generative AI becomes more ingrained in education, the key question is no longer access but approach: how learners choose to engage with these systems. Educators and instructional designers must move beyond tool availability and start shaping how students are taught to think with AI, not just through it (Zhang et al., 2024).

These results also have important implications for educators. They indicate that the introduction of AI into educational systems may be refractive, not merely passive or additive. For perfectionists, AI provides not only answers, but also an affective buffer against the fear of error. The "digital safe space" created by this technology permits students to maintain an external image of superior performance while gradually diminishing their inner reserve of cognitive endurance, which is critical to long-term learning.

5.1 *Limitations and Future Works*

While this study provides valuable early insight into how personality and AI usage combine to form lifelong learning tendencies, several limitations should be acknowledged. First, the sample size *(N = 167)* was drawn from a unique regional setting, which restricts the generalizability of the findings. Although PLS-SEM methodologically offers robust analysis for non-normal data distributions (Hair & Alamer, 2022), further research should validate these findings across wider and more demographically diverse student groups, particularly in varied institutional and cultural environments. Cross-country comparisons could reveal how technology-driven learning settings influence both students' AI use and learning dispositions (Zawacki-Richter et al., 2019).

Second, the study relied on self-reported survey data, which may impose potential response biases. To improve construct validity, future works should consider combining students' behavioural data, such as AI usage logs, prompt histories, document revision timelines, or interaction timestamps (Althubaiti, 2016; Krumpal, 2013). These approaches would offer better and real-time evidence of how students really engage with generative technologies, bridging the gap between intention and behaviour.

Third, the study only focuses novelty seeking and perfectionism. While these were theoretically justifiable and statistically informative, incorporating other personality traits (e.g., self-efficacy, conscientiousness, or digital confidence) may enhance the predictive power of the theoretical model (Sörman et al., 2024). In addition, longitudinal studies are needed to explore how AI usage habits evolve over time, and whether students shift toward more constructive or more dependent use with prolonged exposure (Ji et al., 2025; Wei et al., 2025).

Finally, the present study measured lifelong learning using a reduced and modified scale. Although this may be appropriate for exploratory research, future research should consider applying the entire Effective Lifelong Learning Inventory (ELLI) scale or combine quantitative and qualitative approaches to capture deeper dispositional changes. Employing mixed-method designs would allow researchers to

monitor not only what students do with AI, but why, offering a more nuanced understanding of how personality, behaviour, and learning interact.

6. Conclusion

This research shows how Generative AI's effect on education is influenced by both the tool itself and the personal characteristics of each student. Thus, while traits such as Novelty Seeking are associated with productive use of exploratory behaviour when using AI, they also have the potential to be negatively impacted by excessive dependence on it. Most importantly, however, Perfectionism serves as the primary motivator behind a student's tendency to rely excessively on AI due to the student's fear of making mistakes or failing academically, versus mastering course material.

Thus, this research indicates there exists a "Lifelong Learning Paradox." These tools were developed to aid students, yet the very same tools that may provide assistance to students during their educational process could ultimately lead to an erosion of their long-term ability to learn independently. As a result, it is essential for educators to develop a strategy that extends past providing students technical instruction and teaches them about their own metacognitive awareness so that they will be aware of their own psychological vulnerabilities regarding excessive dependence upon AI. By educating students about their psychological vulnerabilities regarding excessive reliance on AI, educational institutions will help prepare students for a future of independent, lifelong learning in a world saturated with Generative AI.

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