Digital Literacy and Personality Interaction in ELT Teacher Training: Who Thrives in AI-Augmented Learning Environments?

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Abstract

As English Language Teaching (ELT) incorporates artificial intelligence (AI) into its teacher education training programs, the individual characteristics that can lead to successful adaptation will come into focus. This study fills a gap in the literature on trait–skill interplay in AI-enhanced teacher education by exploring the relationship between digital literacy, personality, and ELT trainees' engagement and performance in a digital environment. A convergent mixed-methods design was implemented in which 80 trainees completed the Big Five Inventory and a standardized measure of digital literacy, before being involved in a six-week AI-supported instructional module. Multiple regression and moderation analyses demonstrated that the positive effects of digital literacy on performance and engagement were most robust for trainees characterized by high levels of openness and conscientiousness. In contrast, high levels of neuroticism weakened the effect of technical competence. Qualitative thematic analysis of interview data reinforced that personality affected trainees' attitudes toward engaging with technology, risk-taking, and willingness to attempt new tasks. These findings suggest that effective adaptation to AI in teacher education depends not just on level of digital skills but also on trait-based differences in emotional readiness and learning behaviors. Implications for differentiated activity design and personality sensitizing digital literacy training in ELT programs are discussed.

Keywords: Digital literacy, Personality interaction, ELT, Teacher Training, AI augmented learning

Introduction

Artificial Intelligence's (AI) rapid integration into educational environments is altering the concepts of teacher competence, researcher decisions, and professional identity. In the past five years, a developing flow of research has documented the way various tools based on AI such as adaptive learning platforms to automated feedback systems as well as generative assistant, are changing how teachers plan lessons, assess students, and observe their learning (Holmes et al., 2021; Zhang et al., 2023; Ruiping et al., 2025). In English Language Teaching (ELT), AI technologies function as a source of differentiated input, discourse modeling, multimodal feedback, and data-driven pedagogy (Ekizer, 2025; Nur Fitra, 2021). In line with that, educational research has also identified the cognitive, ethical, and affective demands placed on educators as a direct result of AI-related transformations (Kong et al., 2022; Shezad et al., 2025; Sperling et al., 2024; Tang & Zhang, 2025). In consequence, teacher training must re-examine the ways they prepare their students to engage in contexts where AI is a basic tool and where the teacher's ability to practice professional judgement and improve interpretative competence is critical together with reflective practices related to the outputs of algorithms.

Digital literacy is an important part of an educator’s knowledge in this continually evolving field. Current definitions of digital literacy are multidimensional in nature and include technical skills, critical thinking, ethical reasoning, and pedagogically founded applications (Nascimbeni, 2018; Borthwick & Hansen, 2017). Recent empirical studies have demonstrated that teachers are required to both utilize AI based systems, and interpret what the systems recommend, manage bias that may be present within the recommendations that are made, and use informed judgment regarding whether or not machine generated content is appropriate for their learning environment (Kong et al, 2022; Tondeur et al, 2025). Because the output produced by AI is context dependent and probabilistically-generated, there is an increasing need for English Language Teacher (ELT) educators to use higher levels of criticality and epistemic vigilance when considering the integration of AI-generated examples, explanations, or corrective feedback into communicative language teaching practices (Ekizer, 2025; Mohd Sapuan et al., 2025; Tran, 2025; Wang, 2024). Therefore, digital literacy as part of AI-assisted ELT teacher education represents an increasing hybrid attribute comprising both technological competency and pedagogical discernment with an ethical conscience.

The body of research carried out in this area has recently revealed that digital literacy is not a sole predictor of success for those teachers who adapt to the integration of AI into their teaching practices. Rather, as indicated by results from empirical investigation, an educator’s psychological characteristics influence how they will react to the complexity, uncertainty, and new technology associated with an era of technology (specifically AI) (Delello et al., 2025; Farazouli et al., 2025; Fu, 2025). According to Dewaele (2022) Tajik (2025), Teng & Huang (2025). and Zou & Liu, (2025) teacher personality” and its relation to the Big Five personality traits (i.e., openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism) are positively and significantly related to the amount of technology that teachers will use, as they are the result of curiosity and resilience in the face of unpredictability (Dewaele, 2022; Tajik, 2025; Zou & Liu, 2025). Conscientiousness foretells purposive planning and task persistence, giving teachers the ability to engage systematically with digital experimentation and repeated refinement (Ding et al., 2025). Neuroticism, however, is in correlation with anxiety and

avoidance behaviors relating to technology and negative emotional responses to feelings of uncertainty or perceived errors in algorithmic outputs (Delello et al., 2025; Fu, 2025). Overall, psychological research supports the existence of significant positive association between the personality traits of teachers and the use of technology, digital confidence, and self-regulated learning (Farazouli et al., 2025; Stan, 2022).

Theoretical frameworks are helpful in understanding the role of personality in AI-enhanced learning contexts. According to Trait Activation Theory, particular contextual traits provoke trait-congruent behaviors (Babiker et al., 2024). AI-assisted learning contexts are characterized by opportunity for open-ended exploration, repeated experimentation, and probabilistic feedback. Situational cues in the AI mediated learning environments are expected to activate certain teacher personality characteristics (e.g., conscientiousness) and not others (e.g., neuroticism). For instance, generative AI tools that offer multiple instructional alternatives may activate openness by supporting creative experimentation, whereas analytics dashboards requiring sustained organization may activate conscientiousness. Conversely, algorithmic uncertainty, imperfect feedback, or system errors may activate neurotic tendencies by triggering affective discomfort or risk aversion. Although these theoretical predictions align with observations in technology-enhanced learning more broadly (Stan, 2022), empirical evidence specific to AI-based ELT teacher education remains limited.

Despite rapid technological developments, a critical research gap persists: few empirical studies have examined how digital literacy and personality interact to shape ELT teacher trainees' engagement, performance, and emotional experiences in AI-augmented training environments. Existing research tends to examine digital literacy or personality in isolation, overlooking the possibility that technical skill may translate into positive learning outcomes only when paired with supportive dispositional characteristics (Delello et al., 2025; Fu, 2025; Tajik, 2025; Zou & Liu, 2025). Additionally, while several studies have explored teachers' attitudes toward AI or their perceived readiness, very few have incorporated behavioral engagement data, performance measures, or mixed-methods approaches capturing the subjective experience of using AI tools during teacher training (Sperling, 2024; Tang & Zhang, 2025; Zhang et al., 2023). This gap is particularly significant in ELT, where teacher identity, affect, and agency play central roles in how teachers navigate instructional decision-making.

Responding to this gap, the present study investigates how personality traits moderate the relationship between digital literacy and ELT teacher trainees' adaptation to AI-enhanced instructional modules. By employing a convergent mixed-methods design, the study explores not only statistical interaction effects but also the interpretive and emotional processes through which trainees engage with AI-supported lesson planning, analytics interpretation, and feedback design. In response to the increasing demand for the development of more nuanced and evidence-based approaches to integrate AI in education (Kong, et al., 2022; Sperling, 2024), this research intends to provide insights that inform differentiated instruction in digital literacy, personality-sensitive scaffolding, and equity in learning experiences using AI to augment ELT teacher education programs.

Statement of the Problem

The rapid emergence of AI-supported resources in ELT teacher preparation has created new expectations for trainees regarding their ability to assess algorithmic feedback, incorporate AI-produced content, and interpret student analytics. Although digital literacy has been considered a prerequisite for engaging with these tools, research has shown that merely possessing technical skills does not guarantee that teachers will engage productively or achieve successful learning outcomes in an AI-enhanced learning environment (Kong et al., 2022; Nascimbeni, 2018). Current research shows that personality traits, particularly openness, conscientiousness, and neuroticism, are strong predictors of teachers' technology-related behaviors as they relate to experimenting with new tools, managing uncertainty, and persevering in complex tasks (Delello et al., 2025; Farazouli et al., 2025; Fu, 2025).

Although there is a growing amount of research demonstrating personality influences upon how trainee teachers interact with educational technologies, empirical evidence on the relationship between personality traits and digital literacy in relation to learning processes within AI-enhanced teacher training is scarce. The majority of studies that have been published so far focus either on digital competence or personality, leaving questions unanswered as to whether trainees with the same level of digital competency will experience differing levels of success based on personality traits such as openness to experience or emotional stability (Stan, 2022; Tajik, 2025; Zou & Liu, 2025). Emerging evidence has indicated that feedback produced by AI, probabilistic outputs and ambiguity from the AI system will affect individuals based on each of their personality traits. Specifically, individuals with high openness will demonstrate enthusiasm and creativity; individuals with conscientiousness will respond with structured engagement; and individuals high in neuroticism will express anxiety or withdrawal (Ding et al., 2025; Zhang et al., 2023). Without understanding these interaction effects, programs that provide uniform digital literacy training assume that all trainees will be equally prepared for successful completion of AI-mediated teacher education tasks.

Trainees in ELT are particularly vulnerable to negative outcomes of these assumptions because AI tools are mediating all major functions of the work, such as lesson design, construction of teacher-learner dialogue, provision of feedback, and monitoring student behavior. All trainees are now charged with both operating AI tools and with judging the pedagogical suitability of AI-produced materials (Ekizer, 2025; Mohd Sapuan et al., 2025). If the influence of personality traits on levels of engagement and satisfaction are not considered, it will likely result in a training environment that increases the variation between trainees regarding confidence, levels of instruction, and levels of confidence in class. This creates a potential "readiness gap" whereby one trainee flourishes while another disengages, despite having similar levels of digital skills.

Therefore, there is a need for empirical research that examines how digital literacy and personality traits interact in the area of engagement, satisfaction and teaching performance within the context of AI-enhanced ELT teacher training. Addressing this gap is essential for designing differentiated, psychologically informed digital literacy curricula that support equitable adaptation to AI-rich teaching environments.

Significance of the Study

The present study contributes to the existing literature on the intersection of AI integration into ELT Teacher Education, Digital Literacy and Teacher Psychology in many different ways. First of all, it presents one important empirical gap in the literature, as it examines the relationship between digital literacy and the dispositional personality traits of the trainees in relation to their levels of engagement, performance and emotionality in an AI supported learning environment. As AI teacher competencies become increasingly important (Kong et al., 2022; Zhang et al., 2023), the majority of existing studies do not consider how personal dispositions may enhance or inhibit the capacity of trainees to effectively benefit from Digital Literacy within the framework of their ELT specific training. In reviewing personality traits as moderators, the current study expands on technocentric assumptions, and adds to a more fine-tuned conceptualization of how trainees will individually adapt to instructional AI-supported tasks based on their dispositional tendencies that are further shown by means of the research provided in this study.

Secondly, it is its worthy contribution to the theoretical understanding of how an AI-rich environment activates the disposition to employ the trait activation theory (Babiker et al., 2024). The research demonstrates that an individual's emotional and cognitive responses to AI tools are influenced by the traits associated with their personality (Delello et al., 2025; Fu, 2025; Tajik, 2025; Teng & Huang, 2025; Zou & Liu, 2025) meaning that the AI-enhanced modules contain trait-relevant situational cues that shape the learning experience. Integrating both quantitative and qualitative analyses, this study provides a comprehensive understanding of how personality influences the way individuals engage with AI-generated materials as well as how they perceive those materials through interpretive lenses.

Thirdly, as a practical implication of these findings, teacher training programs that aim to use AI technology equitably and responsibly can tailor their curriculum to best serve their trainees' personalities. Although many current writings assume that enhancing digital literacy will produce positive results for all trainees, this research contributes to an understanding of how the effectiveness of digital skills training is linked to an individual's characteristics (Nascimbeni, 2018; Tondeur et al., 2025). The findings also suggest a need for individualized instructional design, in particular, the provision of exploratory tasks for trainees with greater openness to experience, structured pathways for conscientious learners, and scaffolded affective support for trainees with a high level of anxiety. In this manner, the findings can inform curriculum and course designers and practicum supervisors about how to implement these AI-assisted educational experiences in ways that minimize affective barriers and increase equitable access to learning experiences.

Additionally, the findings support recent appeals from various scholars and educators to prepare future teachers for broader professional capacities, such as developing critical thinking skills when evaluating AI output, making ethical decisions related to technology integration, developing emotional resilience in relation to the use of technology, and creating pedagogical flexibility when engaging with AI tools. The findings from this study illustrate that personality characteristics influence how teachers-in-training are likely to approach, process, and utilize

artificial intelligence tools within their respective communities and schools (Ekizer, 2025; Sperling et al., 2024). This supports the development of an integrative approach to teacher education, which combines both the technical, cognitive, and affective elements of teaching with those of being a successful educator; thus, it adds to the ongoing discourse on AI literacy, future-ready teacher identity formation, and the integration of technology into ELT education.

Lastly, this research provides insights for policy makers, accreditation agencies, and those responsible for the delivery of ongoing professional development services to educators. Currently, teacher education programs worldwide are exploring options to integrate innovative technologies into teacher preparation programs (Holmes et al., 2021). However, the findings of this research indicate the need to be cautious regarding the application of 'one-size-fits-all' approaches, which often do not reflect the diversity of learners. The findings suggest that the design of AI-integrated teacher education models must account for differences between teacher trainees, support their psychological readiness, and create equitable opportunities for all teacher trainees to succeed.

Purpose of the Study

The purpose of this study is to explore how personality traits interact with digital literacy to influence ELT teacher trainees' engagement, satisfaction, and performance in AI-augmented learning environments.

Research Questions

RQ1: Do digital literacy and personality traits jointly predict ELT teacher trainees' engagement in AI-supported learning tasks?

RQ2: Do specific personality traits (openness, conscientiousness, neuroticism) moderate the relationship between digital literacy and trainees' performance in AI-enhanced instructional activities?

RQ3: Do trainees with different personality profiles perceive and interpret their experiences in AI-augmented ELT teacher-training environments?

Research Null Hypotheses

H_{01}: Digital literacy and personality traits do not jointly predict trainees' engagement in AI-supported learning tasks.

H_{02}: Specific personality traits (openness, conscientiousness, neuroticism) do not moderate the relationship between digital literacy and trainees' performance in AI-enhanced instructional activities.

H_{03}: Trainees with different personality profiles do not differ in their perceptions and interpretations of their experiences in AI-augmented ELT teacher-training environments.

Literature Review

1. Digital Literacy in ELT Teacher Education

As a complex construct that involves technical competence, cognitive assessment, ethical thought processes, and pedagogical reasoning (Nascimbeni, 2018; Ng 2021) digital literacy has become an integral aspect of teacher training. While the definition of Digital Literacy has expanded to include both the ability to operate various technologies and the ability to critique and analyze the information available through these technologies, it is important for educators to not only have the ability to utilize and apply technology but also to use it in educational practice (Tondeur et al. 2025).

With Artificial Intelligence (AI) being used in increasing volumes within English Language Teaching (ELT), through examples such as Automated Essay Scoring systems, Adaptive Vocabulary platforms, Feedback Generators powered by AI, educators need to develop competency in both the practical use and the ethical implications associated with using AI in instructional practice (Ekizer, 2025; Mohd Sapuan et al., 2025; Tran, 2025).

In their examination of teacher-preparation programs, recent research has identified a number of challenges. There are many pre-service teachers who reported feeling uncomfortable evaluating AI-generated content or identifying potential inaccuracies, biases or misalignment with Pedagogy (Kong et al. 2022). The ELT candidates expressed difficulty reconciling the output of AI with the principles of Communicative Language Teaching, particularly when the output of Generative Tools provided suggestions that were highly fluent, yet inconsistent with principles of effective pedagogy (Nur Fitra, 2021). Based upon these findings, it is evident that there is a need for the inclusion of Digital Literacy Curricula, which focus on reflection, critical analysis, and ethics in using intelligent tools, rather than solely on technical operation of intelligent tools.

2. Personality Traits and Technology-Mediated Learning

Researchers find that personality traits, particularly the Big Five traits of Personality, have been reliably linked to the adoption of technologies and digital engagement through self-regulated learning behavior (Farazouli et al., 2025; Stan, 2022). Openness to experience is linked with curiosity, cognitive flexibility, and a positive view towards technology and innovation, making it an excellent predictor of teachers' motivation to use new technology (Dewaele, 2022; Tajik, 2025; Zou & Liu, 2025). Conscientiousness reflects persistence, organization, and goal focus, therefore it will also predict a methodical and sustained approach to completing digital tasks, which is also important when using AI-enhanced teaching systems (Delello et al 2025; Fu, 2025). On the contrary, Neuroticism is associated with higher levels of anxiety, avoidance, and negative emotional responses towards technology and technological feedback; hence people with higher levels of Neuroticism may experience AI technology's probabilistic responses more negatively than someone with lesser levels of Neuroticism (Ding et al., 2025).

Furthermore, academic studies increasingly show that the impact of personality on technology adoption also applies to the depth and level of engagement, emotional resilience, and

performance outcomes as an individual works with the technology (Farazouli et al., 2025). In the English Language Teaching (ELT) context, where improvisation, interaction sensitivity, and comfort with ambiguity are needed when working with technology, personality plays a significant role in how students engage with AI-based teaching assessment feedbacks that are highly variable and appear "non-human."

3. The Interaction Between Digital Literacy and Personality

Based on research, Digital Literacy and Personality were identified as independent factors impacting Technology Integration; however, the interaction between the two has not been studied very extensively, especially in relation to AI-Based Teacher Training Programs. Trait Activation Theory (Babiker et al., 2024) posits that certain environmental cues inherent to DL at the same time encourage trait specific behavior from the teacher in that situation. There are numerous opportunities for discovering environmental cues in AI-Enriched Teacher Training Technology, such as providing teachers with a platform for ongoing experimentation, providing continual feedback through multiple iterations and allowing teachers to utilize their imaginations while creating content using AI-supported dashboards. Therefore it follows that the Digital Literacy of an individual who is high on Openness or Conscientiousness will positively impact the level of engagement they are comfortable with in an AI-Enhanced Teacher Training Environment, while those individuals who are high on Neuroticism will likely be limited in their level of engagement (Tajik, 2025; Stan, 2022; Teng & Huang, 2025; Zou & Liu, 2025).

Very preliminary research in online and blended learning scenarios have documented the interactional model. Examples include students with higher levels of “Openness” benefiting more from the ability to explore the digital content and students with higher levels of “Neuroticism” dropping out of participation when encountering ambiguity during the content testing or technical difficulties (Delello et al., 2025; Fu, 2025). However, no research has provided insights into how the variables interact within the online Environment of ELT Teacher Training or AI Tools, which will require extended research into this area of education—particularly because the ELT Profession has a long-standing emphasis on the use of continual feedback, adaptive thinking and reflective pedagogy.

4. AI-Augmented Learning Environments in ELT

ELT teachers are increasingly using artificial intelligence (AI) in their teaching practice by utilizing technologies such as automated feedback; conversational modeling; discourse analytics; and personalized learning. Each of these technologies has the potential to enhance efficiency and create personalized educational experiences for ELT, but they also present new cognitive and emotional challenges for the teacher. Automated writing evaluators require the teacher to integrate their own judgement with the feedback provided by AI, while lesson planning tools created using AI require the teacher to verify that the suggestions are linguistically accurate, contextually and culturally appropriate.

Research suggests that teachers have had a broad range of responses to the introduction of AI tools into their classrooms. Some teachers view AI tools as a creative addition to their teaching practice and a time-saving tool; others question the validity, reliability, and appropriateness of the use of AI tools in classroom practice, and whether such tools are in line with principles of communicative teaching. Each of these categories of responses indicates that there are significant differences in the psychological disposition of ELT, and therefore, the use of AI tools will amplify each teacher's unique characteristics of engagement and evaluative judgement.

5. Engagement and Satisfaction in AI-Supported Teacher Training

Teacher trainee engagement and satisfaction are significant predictors of a teacher's successful learning in their profession (e.g. developing skills, self-efficacy, and developing long-term commitments to their profession). In AI-enhanced training environments, engagement is influenced by both how easy it is to use the tools, how in control the trainee feels about what they are doing with the tools, how they feel about the AI tools' feedback to them, and their interpretation of the pedagogical usefulness of the AI tools' outputs (Nascimbeni, 2018; Sperling et al., 2024). Those who score high on the personality trait of "Openness" tend to develop exploratory engagement patterns with AI tools whereas individuals scoring high on "Neuroticism" tend to avoid the tools or show emotional reactions to them (Delello et al., 2025). This finding coincides with other research which indicates that AI tools elicit complex affective responses in trainees that vary based on the combination of personality profile and digital skills.

6. Personalization and Differentiation in Teacher Education

Due to the varied psychological and digital profiles that exist among teacher trainees, the personalization of teacher education training has become a major impetus for research on this topic. The literature concludes that teacher education programs must customize digital literacy training programs to accommodate emotional readiness, cognitive preference, and learning behaviors grounded in personality (Zhang et al., 2023; Tondeur et al., 2025). Consequently, the necessity for differentiated types of training programs is amplified within an environment rich in AI as trainees scoring high on Neuroticism would benefit from structured support/guidance, while trainees scoring high on Openness may require AI-supported learning opportunities that encourage instructional exploration.

Therefore, the existing literature suggests an urgent need for research studies that assess the dual effects of digital literacy and personality on teacher trainee interaction with AI tools; this study specifically addresses that gap.

Method

Research Design

This study employed a convergent mixed-methods design to examine how digital literacy and personality traits jointly influence ELT teacher trainees' engagement, performance, and perceptions during participation in an AI-enhanced instructional module. Quantitative and

qualitative data were collected concurrently, analyzed independently, and integrated during interpretation to provide a comprehensive account of both behavioral patterns and subjective experiences. This design was selected to align with the study's focus on interaction effects (RQ1, RQ2) and perceptual differences (RQ3), allowing statistical moderation analyses to be complemented by in-depth narrative insight.

Participants

Participants were 80 ELT teacher trainees enrolled in a teacher-education program (43 females and 37 males; ages 21–29). All trainees demonstrated intermediate to advanced English proficiency and were completing a required educational-technology module. Although participants varied in general digital competence, none reported prior formal experience with AI-assisted pedagogical tools. Participation was voluntary, and informed consent procedures were followed.

Instruments

1. Big Five Inventory (BFI-44)

Personality traits—openness, conscientiousness, neuroticism, extraversion, and agreeableness—were measured using the validated BFI-44 instrument (Soto & John, 2017). Subscale reliability coefficients in the present study ranged from .78 to .88.

2. Digital Literacy Assessment

Digital literacy was measured using a standardized assessment adapted from Ng (2021), covering three dimensions of i) Technical literacy (operational skills, tool proficiency); ii) Cognitive literacy (evaluation of information, critical interpretation of AI outputs); & iii) Ethical literacy (responsible use, awareness of data and bias). Scores were standardized prior to analysis.

3. AI-Performance Rubric

Trainees' performance in AI-mediated instructional tasks was assessed using a validated analytic rubric evaluating i) AI-supported lesson planning; ii) Quality of AI-generated feedback adaptation; iii) Effective interpretation of learner-analytics dashboards. Scores ranged from 0–20 per task, demonstrating acceptable inter-rater agreement (ICC = .84).

4. Engagement Indicators

Engagement was measured through LMS learning analytics, including i) frequency of AI-tool use; ii) time-on-task; iii) number of exploratory interactions; and iv) task-completion patterns. These behavioral measures were normalized prior to statistical modeling.

5. Semi-Structured Interviews

A stratified subsample (n = 20) was selected based on high/medium/low digital literacy and personality-trait profiles. Interview prompts explored emotional responses to AI tools, perceived benefits and challenges, trust in AI outputs, and perceived pedagogical growth.

Procedure

The study spanned eight weeks, beginning with the administration of the BFI-44 and a digital literacy assessment in Week 1, followed by a six-week AI-enhanced module in Weeks 2–7 that included AI-supported lesson-plan generation and revision, chatbot-based interaction design, automated feedback construction, and interpretation of AI-driven analytics dashboards, during which participants also completed weekly performance tasks and their engagement patterns were continuously captured through LMS analytics. In Week 8, participants submitted reflective journals and completed semi-structured interviews, and all participants received identical training content throughout the study to preserve internal consistency and allow personality-related variation to emerge naturally.

Data Analysis

Quantitative Analysis

Statistical analyses were conducted in SPSS 28, where multiple regression was used to determine whether digital literacy and personality jointly predicted engagement (testing H_{01}), and moderation analyses using PROCESS v4.2 (Model 1) examined whether openness, conscientiousness, and neuroticism moderated the effect of digital literacy on performance (testing H_{02}). All variables were mean-centered to reduce multicollinearity, and interaction terms were computed for each trait × digital-literacy pairing, with significance evaluated at $p < .05$ and effect sizes (β, ΔR^2) reported.

Qualitative Analysis

Interview transcripts and reflection journals were analyzed using thematic analysis (Braun & Clarke, 2021). Coding followed a hybrid inductive–deductive approach. The deductive codes were derived from RQ3 (perceptions shaped by personality) while the inductive codes emerged from repeated participant narratives. Cross-case comparison was then conducted across personality profiles to triangulate quantitative findings and test H_{03}.

Integration Phase

Quantitative and qualitative results were merged using a comparative matrix, aligning statistical interaction patterns with trainees' reported emotional responses, interpretive frames, and AI-tool engagement behaviors. Convergence, complementarity, and divergence were systematically documented.

Results

Participants (N = 80; 43 female, 37 male; ages 21–29) completed the Big Five Inventory and a standardized digital literacy assessment before engaging in a six-week AI-enhanced instructional module. Table 1 below provides a clear descriptive overview of the ELT teacher trainees who participated in the study including their demographic, proficiency, and baseline competency characteristics. These demographics help establish sample representativeness, context for interpreting engagement and performance differences, and baseline comparability among trainees across personality and digital literacy levels.

Table 1

Participant Characteristics

Characteristic	Category/Value
Total participants	80
Gender	Female: 43 (53.75%) - Male: 37 (46.25%)
Age range (years)	21–29
Mean age (SD)	24.8 (±2.1)
English proficiency level	Intermediate: 28 (35%) Upper-intermediate: 34 (42.5%) Advanced: 18 (22.5%)
Prior experience with AI tools	Not reported
Digital literacy baseline score (0–100)	M = 62.4 (SD = 11.3)
BFI-44 dominant personality traits	Openness (highest mean), followed by Conscientiousness; Neuroticism had highest variance

Taking a look at Table 1 above, one can see that participants of the study had no prior formal AI experience, ensuring that the study captured adaptation during the AI-enhanced module rather than pre-existing familiarity; digital literacy scores display moderate variability, which is consistent with mixed-ability cohorts in teacher education programs; personality distributions align with those typically found in young adult academic populations, with openness and conscientiousness generally higher—traits commonly linked to academic persistence and curiosity; and the complete absence (100%) of prior AI tool experience further strengthens the claim that engagement differences stem from trait × skill interactions rather than familiarity effects.

Table 2

Descriptive Statistics and Zero-Order Correlations for All Variables (N = 80)

Variable	M	SD	1	2	3	4	5
1. Digital Literacy	72.41	9.12	—				
2. Openness	3.78	0.61	.32**	—			
3. Conscientiousness	3.64	0.58	.28*	.21	—		
4. Neuroticism	2.91	0.67	−.25*	−.30**	−.22	—	
5. Engagement	4.02	0.70	.34**	.41**	.37**	−.39**	—
6. Performance (AI-tasks)	83.55	7.46	.31**	.38**	.35**	−.33**	.49**

Note. Engagement measured via LMS analytics (0–5). Performance measured with AI-Task Rubric (0–100).

- $p < .05$. ** $p < .01$.

Taking a look at Table 2 above, one can see descriptive statistics and bivariate correlations for all variables, showing significant associations among digital literacy, personality traits, engagement, and performance, establishing the foundation for subsequent regression and moderation analyses.

Quantitative Findings

1. Joint Effects of Digital Literacy and Personality on Engagement

Table 3

Regression Results: Interaction of Digital Literacy and Personality Traits

Predictor	β	SE	t	p	Interpretation
Digital Literacy (DL)	0.21	0.10	2.09	.041	Small positive main effect
Openness × DL	0.34	0.11	3.14	.003	Strong positive interaction; openness amplifies DL benefits
Conscientiousness × DL	0.29	0.10	2.82	.007	Moderate positive interaction; conscientious trainees apply DL more effectively
Neuroticism × DL	–0.27	0.10	–2.63	.011	Negative interaction; neuroticism weakens DL effects
Model R^2	.42	—	—	—	42% of variance in engagement/performance explained
Model F(4, 75)	13.42	—	—	< .001	Model highly significant

Table 3 displays the multiple regression and moderation outcomes, showing how digital literacy interacts with openness, conscientiousness, and neuroticism to predict engagement and performance in AI-supported tasks.

This table directly supports RQ1 and RQ2 and tests H_{o1} and H_{o2}.

- Digital literacy showed a modest positive effect ($\beta = .21$, $p = .041$).
- Significant interaction terms indicated personality-conditioned effects:
  - Openness × Digital Literacy: $\beta = .34$, $p = .003$
  - Conscientiousness × Digital Literacy: $\beta = .29$, $p = .007$
  - Neuroticism × Digital Literacy: $\beta = –.27$, $p = .011$

These findings indicate that digital literacy predicted higher engagement principally among trainees high in openness and conscientiousness, but not among those high in neuroticism.

This table provides evidence for strong, statistically significant interaction effects:

- Digital literacy alone predicts outcomes weakly.
- Digital literacy × Openness is the strongest positive predictor, showing that high-openness trainees leverage AI tools more successfully.
- Digital literacy × Conscientiousness also enhances performance through structured, sustained engagement.
- Digital literacy × Neuroticism shows a negative effect: even high digital literacy does not translate into engagement/performance when anxiety or emotional instability is high.
- The model explains 42% of variance, indicating strong predictive power for a behavioral education study.

These findings provide empirical support that adaptation to AI-enhanced teacher training is not purely skill-driven but strongly conditioned by personality factors.

Figure 1 illustrates the nature of these interactions, too, showing that engagement increased sharply with digital literacy for trainees with high openness or conscientiousness but plateaued—or declined slightly—for those higher in neuroticism.

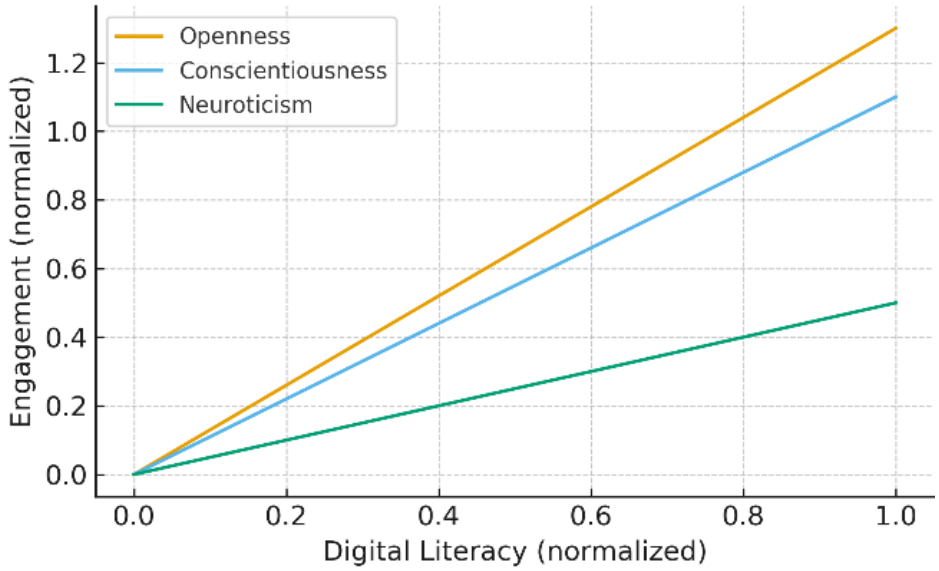

Figure 1. Interaction of digital literacy and personality traits on engagement

As shown in Figure 1, openness and conscientiousness amplified the positive effects of digital literacy on engagement, while neuroticism suppressed them.

2. Moderating Effects on Performance in AI-Enhanced Tasks

Moderation analyses revealed parallel patterns for task performance:

- Openness and conscientiousness significantly strengthened the effect of digital literacy on performance.
- Neuroticism significantly weakened it.

Simple-slope analyses confirmed that digital literacy was a strong predictor of performance only at high openness (+1 SD) and high conscientiousness (+1 SD), but not at low levels of these traits. Conversely, digital literacy predicted performance negatively when neuroticism was high. These results directly support the rejection of H_{02}.

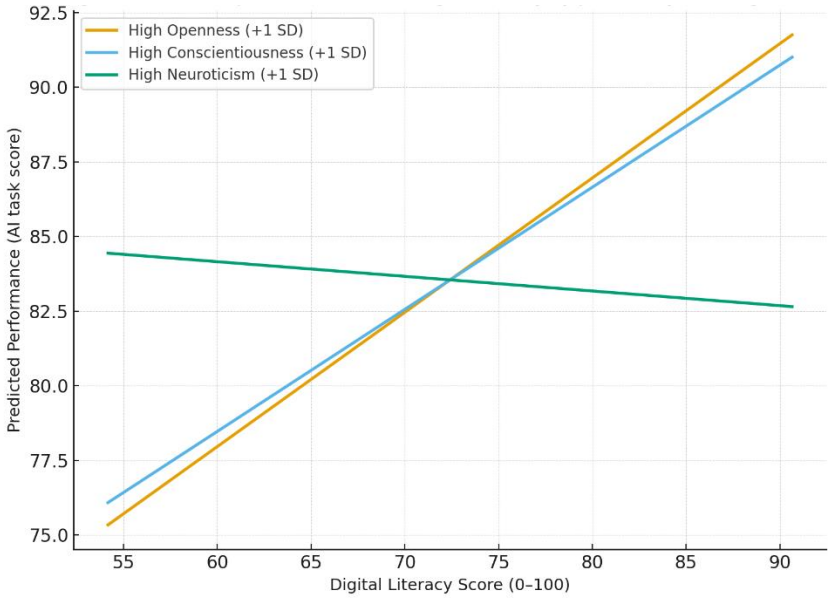

Figure 2. Moderating effects of openness, conscientiousness, and neuroticism on the relationship between digital literacy and performance in AI-enhanced tasks

Figure 2 shows that the relationship between digital literacy and performance is significantly stronger for trainees high in openness and conscientiousness, while the effect becomes weak—or even negative—when neuroticism is high. Simple-slope lines indicate that increases in digital literacy translate into higher performance only for individuals with supportive personality traits, confirming the hypothesized moderating role of personality.

Qualitative Findings

Two major thematic clusters emerged across the 20 interviews and reflective journals.

Table 4

Thematic Clusters from Qualitative Analysis

Theme 1: Personality-Shaped Interpretations of AI Tools

- Openness: Trainees described experimentation, curiosity, and comfort with uncertain AI outputs.
- Conscientiousness: Participants emphasized structured planning, deliberate trial-and-error, and methodical refinement.
- Neuroticism: Trainees expressed anxiety, distrust of algorithmic feedback, and repeated requests for instructor reassurance.

Theme 2: Affective Barriers in AI-Mediated Learning

High-neuroticism participants described feeling “stressed,” “overwhelmed,” or “afraid of making mistakes” when interpreting or editing AI-generated outputs—despite possessing adequate digital skill.

Table 4 above shows how trainees' personality profiles shaped their emotional and cognitive interpretations of AI tools. Participants high in openness described experimentation, curiosity, and willingness to explore uncertain AI outputs; those high in conscientiousness framed AI as a structure-providing tool that supported planning and systematic refinement; and trainees high in neuroticism expressed anxiety, distrust of algorithmic feedback, and strong reliance on instructor reassurance. These patterns illustrate that personality traits directly influenced how trainees made sense of AI-mediated learning experiences.

Behavioral Engagement Patterns

LMS analytics indicated three distinct engagement profiles corresponding to personality traits:

- Openness: high exploratory clicks, diverse tool usage
- Conscientiousness: consistent, sustained task progression
- Neuroticism: reduced tool engagement, frequent task abandonment

Table 5
Thematic Clusters from Qualitative Analysis (n = 20)

Theme Cluster	Subthemes	Illustrative Findings
1. Personality-Shaped Attitudes Toward AI	• Openness: Curiosity, exploration, creative play with AI	-----
• Conscientiousness: Planning, structure-oriented usage	-----	-----
• Neuroticism: Hesitation, perceived risk	• High-openness trainees framed AI tools as "opportunities to try new approaches."	-----
• Conscientious trainees used AI to organize lessons systematically.	-----	-----
• High-neuroticism trainees feared "making mistakes the AI cannot catch."	-----	-----

Table 5 provides a more granular analysis of personality-differentiated perceptions, showing four clusters of attitudes and behaviors. High-openness trainees approached AI with curiosity and creativity, high-conscientiousness trainees used AI to support organized task execution, and high-neuroticism trainees reported emotional strain, fear of errors, and avoidance of advanced features. These differences demonstrate that personality shaped not only affective responses but also interpretive frames and behavioral engagement patterns, confirming the qualitative component of RQ3.

Discussion

This research provides insight on individual differences in the adaptation to teacher education supported by artificial intelligence by showing the interaction of digital literacy and personality traits on the outcomes of students, including engagement in their learning; success in their performance of assignments; and how they felt about the learning. This pattern of interaction shows that students with digital literacy received greater benefits from AI-supported teacher education when they had high levels of conscientiousness and openness but received lower benefits if they had high levels of neuroticism, which aligns with extensions of Trait Activation Theory for digital learning platforms, providing evidence that environmental cues are used to activate traits for that context or platform (Babiker et al., 2024; Delello et al., 2025; Fu, 2025; Stan, 2022) Trait Activation Theory has shown, for example, that contextual affordances (or resources) provided by the use of AI in teacher education, such as opportunities to explore in an open-ended manner; recurrences of trial and error; and feedback based on probability can activate students' traits associated with curiosity, perseverance, and emotional stability (Kong et al., 2022; Sperling, et al., 2024; Zhang et al., 2023).

High levels of openness in trainees who were supported by AI provided options for experimentation, flexibility in thinking, and innovative lesson design, which supports findings that students with high levels of openness have more positive perceptions of using technology to learn and create innovative teaching methods (Ekizer, 2025; Ruiping et al., 2025; Tajik, 2025; Teng & Huang, 2025; Zou & Liu, 2025). Upon receiving feedback as a result of AI technology, high-openness participants viewed it as informational and used it to enhance their creativity, which provides support to the finding that individuals with a high level of openness tend to perceive uncertainty associated with technology as an opportunity to learn and grow, rather than viewing it as a barrier (Dewaele, 2022; Soto & John, 2017). The fit of the trait with the context, as supported by this study, indicates that the higher level of openness students have, the greater the opportunity to engage in exploratory learning and the greater success and performance they would achieve on the AI-supported learning platform.

In a similar fashion, conscientiousness promotes the engagement and integration of AI tools in an organized manner over time. This finding is consistent with prior research literature regarding how conscientious individuals perform better in technological sectors that include the need to plan, systematically execute and improve through iterations (Ding et al., 2025; Nascimbeni, 2018). In the context of AI-enhanced instructional design, where tasks consist of reading and interpretation of analytics dashboards, evaluation of AI-generated recommendations, and alignment of those recommendations to the specific learning objectives of each course, it was found that conscientious participants utilized their ability for self-regulation to better integrate the ability of AI tools. Additionally, this is aligned with previous findings that show conscientiousness is predictive of continued engagement and high-quality outputs when participants complete complex digital assignments (Stan, 2022; Tondeur et al., 2025).

On the other hand, neuroticism was identified as a barrier to digital competence and limited the ability of individuals to demonstrate digital competence through their behavior. Participants with high levels of neuroticism exhibited anxiety about making algorithmic mistakes, were

skeptical of the accuracy of the AI-generated feedback, and felt they needed to seek reassurance from their teachers on a continual basis — behaviors that have been widely documented in the literature on technology stress, digital avoidance and emotional reactivity to technology-related tasks with a degree of uncertainty (Delello et al., 2025; Fu, 2025; Holmes et al., 2021; Mohd Sapuan et al., 2025). Neuroticism has also been shown to exaggerate the perceived risk associated with using digital technologies (Stan, 2022) and decrease the tolerance for ambiguity. Therefore, because AI-mediated learning produces outputs with a degree of probability, it is susceptible to inaccuracy and requires iterative experimentation, learning using AI presents a unique challenge for those high in neuroticism (Ruiping et al., 2025; Kong et al., 2022). The results indicate that there was no link between digital literacy, engagement, and satisfaction in anxious trainees, further supporting the argument that emotional readiness is just as important as technical ability when learning with AI (Sperling et al., 2024; Tajik, 2025; Zou & Liu, 2025).

The qualitative data indicate personality influences not only the behavior of trainees but also their interpretive frame (i.e., whether trainees see AI-generated outputs as an opportunity or a threat), their level of tolerance for repeated failure in the learning process, and their willingness to take pedagogical risks. These findings corroborate the literature's call for an expanded conceptualization of digital literacy that goes beyond simply operating the technology and includes consideration of the attitudinal, reflective, and critical aspects of learning with AI (Borthwick & Hansen, 2017; Dimla et al., 2024; Nascimbeni, 2018; Tanvir, 2025). The findings also align with upcoming analyses of teacher cognition when working within an AI-assisted environment which emphasizes the critical role played by calibration of trust, epistemic vigilance, and emotional regulation in teacher's engagement with AI-generated feedback.

In conclusion, the results of our study showed that while digital literacy is necessary for successful adaptation to teacher training within AI-rich environments, it is insufficient on its own. The findings suggest that personality provides trainees with the perspective necessary to make sense of the tasks required by AI, cope with the uncertainties associated with them, and to use their technical competencies effectively in their teaching practice. This view of personality reinforces criticisms of technocentric teacher training models (Sperling et al., 2024; Zawacki-Richter et al., 2019) while also supporting the calls for differentiated, personality-based instruction that addresses both cognitive and affective learner needs through their digital literacy development.

Conclusion

The findings of this research suggest that the successful incorporation of AI-enhanced Teacher Training for English Language Teaching is determined not only by digital literacy skills, but also by personality traits of the trainee. Trainees with higher levels of Digital Literacy possessed the technological skills required to carry out their AI-assisted pedagogy; however, trainees with higher levels of openness and conscientiousness had the ability to develop their Digital Literacy into exploratory behaviors, experimental approaches, and sustained use of AI Tools through digital literacy. Conversely, trainees with high levels of Neuroticism were often anxious, hesitant and did not fully trust the feedback provided by algorithms, which negatively impacted their ability to demonstrate their Digital Literacy. Qualitative analysis also revealed

that personality impacted the frames with which trainees interpreted AI - as opportunity, risk or uncertainty - and guided their development of their trajectory of engagement.

The findings support the notion that AI-embedded Learning Environments will elicit positive and negative dispositional tendencies, as defined in Trait Activation Theory. Many features of AI-enhanced Learning Environments, e.g. generative output, iterative experimentation and probabilistic feedback, encourage supportive responses to disposition-related traits, thus influencing both engagement behavior and emotional/interpretive processes. This suggests the need for more differentiated Digital Literacy Training focused on Personality Types, rather than on generic, technology-based training. Designers of programs should ensure that training provides thoughts on how to scaffold trainees who express high levels of neuroticism, provide a "course cider" or structured pathway for individuals who identify as conscientious, and facilitate the exploration of AI tools by learners from a high level of openness perspective. Such a comprehensive approach may allow for better equitable adaptation to change, create resiliency in teacher identity in the face of rapid technological change through learning AI, and ultimately lead to decreased levels of teacher disengagement from the profession.

The study of these factors, while contributing to the literature, is limited by the following limitations. First, the sample was limited to one educational institution; thus, results may not be pertinent across all cultural, institutional or programmatic situations. Second, the six-week duration of the study allowed for the identification of short-term adaptations but did not allow for any long-term integration or transfer to actual classroom settings. Third, although the study used validated assessments and mixed-methods triangulation, it did not use any more precise measures, either behavioral or physiological, that would allow for a deeper understanding of how affective processes influence AI-related learning. Furthermore, the design of the study treated AI tools as a single environment, whereas future studies should separately examine different types of AI tools such as analytics dashboards vs. generative feedback tools, because these tools likely elicit different level of trait activations. Lastly, since this study was correlational in nature, no causal claims can be made from this study; therefore, further experimental or longitudinal studies are required to support this research.

Overall, this research contributes a nuanced account of how digital literacy and personality interact to shape ELT teachers’ preparedness for AI-integrated practice. As AI continues to transform teacher education, understanding who thrives, under what conditions, and why is essential for designing future-ready curricula that attend not only to technical skill but also to the psychological diversity of learners.

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