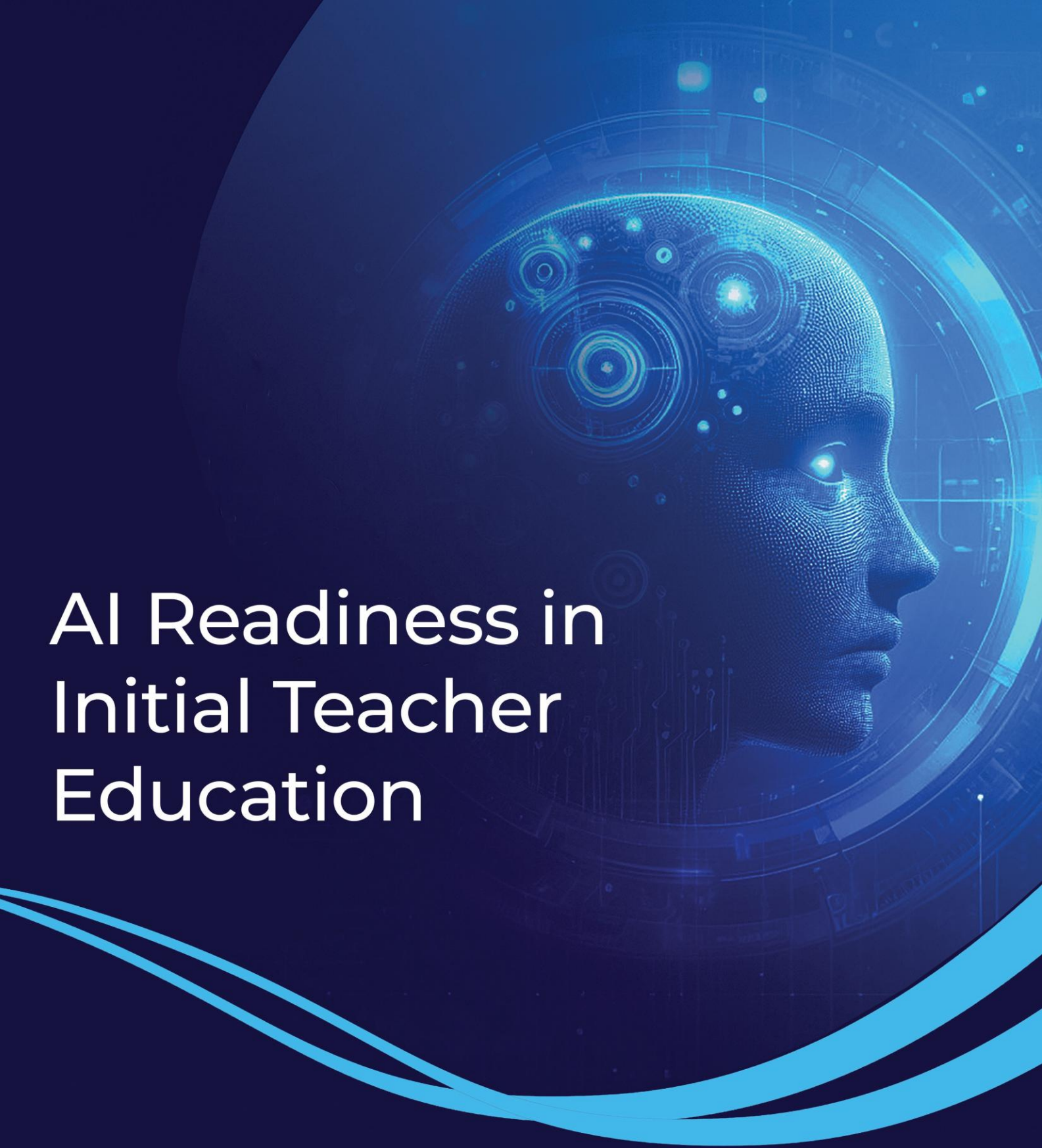

AI Readiness in Initial Teacher Education

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SCoTENS
THE STANDING CONFERENCE ON TEACHER EDUCATION, NORTH AND SOUTH

AIRED:
AI Readiness
in
Initial Teacher Education

Abstract

This report investigates what "AI readiness" looks like for student teachers as generative AI has become embedded in routine practices across Initial Teacher Education (ITE), including planning, teaching, assessment and professional reflection. It conceptualises readiness as an ecologically produced profile—captured in the proposed **AIRED** framework—comprising **AI expertise** (capability and knowledge), **AI acceptance** (perceived value and intention to use), and **AI anxiety** (concerns and unease), shaped by institutional supports, tutor modelling, school placement conditions, and governance.

Using an integrated conceptual framing (AI as an ecosystem in ITE; Touretzky et al.'s Five Big Ideas in AI; Luckin et al.'s AI readiness lens; and critical perspectives on teacher identity and autonomy), the study examines student teachers' attitudes to generative AI, patterns of current use, the relationship between readiness and anxiety, and conditions for ethically defensible practice across university and placement contexts. An online questionnaire was administered across two cross-border ITE contexts on the island of Ireland (PME in Ireland and PGCE in Northern Ireland), yielding **208 responses** (approximately **40% response rate**). Quantitative measures used adapted validated scales (attitudes to AI/ GAAIS; AI anxiety/ Wang & Wang; behavioural intention to use AI/Chai et al.) and were analysed in SPSS (including exploratory factor analysis and inferential statistics for subgroup comparisons), alongside embedded open-ended responses analysed using qualitative descriptive thematic analysis.

Findings indicate uneven self-reported AI capability and tool use (with ChatGPT most commonly used), broadly similar profiles across gender, age, and location, and **task-sensitive caution** that intensifies for higher-stakes practices such as assessment and AI-as-tutor uses. Qualitative data reveal a pattern of **bounded optimism**: participants value generative AI for workload reduction and idea generation, but position it as supplementary and contingent on verification, explicit boundaries, and clear ethical guidance. Six concern clusters recur across responses: ethical/regulatory uncertainty, dehumanisation of learning, social–emotional impacts, reliability/misinformation, equity and access, and employment/displacement. These findings align with broader strategic challenges where policy ambition and rapid technological change outpace consistent implementation supports within education systems, underscoring the need for coherent guidance, capacity-building, and placement-aligned governance.

The report concludes by outlining implications for ITE design and policy, arguing that readiness should be cultivated as **disciplined professional practice rather than tool adoption**, and that AIRED offers a practical framework for diagnosing readiness profiles and targeting supports in programme and placement contexts.

Acknowledgements

Grateful thanks are extended to SCoTENS for the seed funding which made this study possible.

We are also indebted to all the student teachers – PME and PGCE – who willingly shared their experiences, anxieties and aspirations freely and coherently when completing the questionnaire and in their honest reflections on GenAI. Their voices and insights are deeply valued, and we hope we have done justice to the meaning and intent of their contributions.

Presentations

Farrell, R. and Cowan, P. (2024). AIRED: Artificial Intelligence Readiness in Education: the Student Teacher Journey. ECER 2024, University of Nicosia, Cyprus.

Farrell, R., & Cowan, P. (2025). Reimagining teacher education: Embedding generative AI for reflective, ethical and inclusive practice. *ICERI2025 Proceedings*, 8700–8701.

Farrell, R. and Cowan, P. (2025). Readiness in Education: Cross-Border Collaboration to Develop a Framework that supports Teacher Identity in an Evolving AI Ecosystem in Initial Teacher Education. SCoTENS Annual Conference, 2025, Enniskillen, NI.

Cowan, P. and Farrell, R. (2026). Making Connections with Gen-AI: An AI Readiness Framework for Hopeful and Transformative Teacher Education. ESAI 2026, Galway, Ireland.

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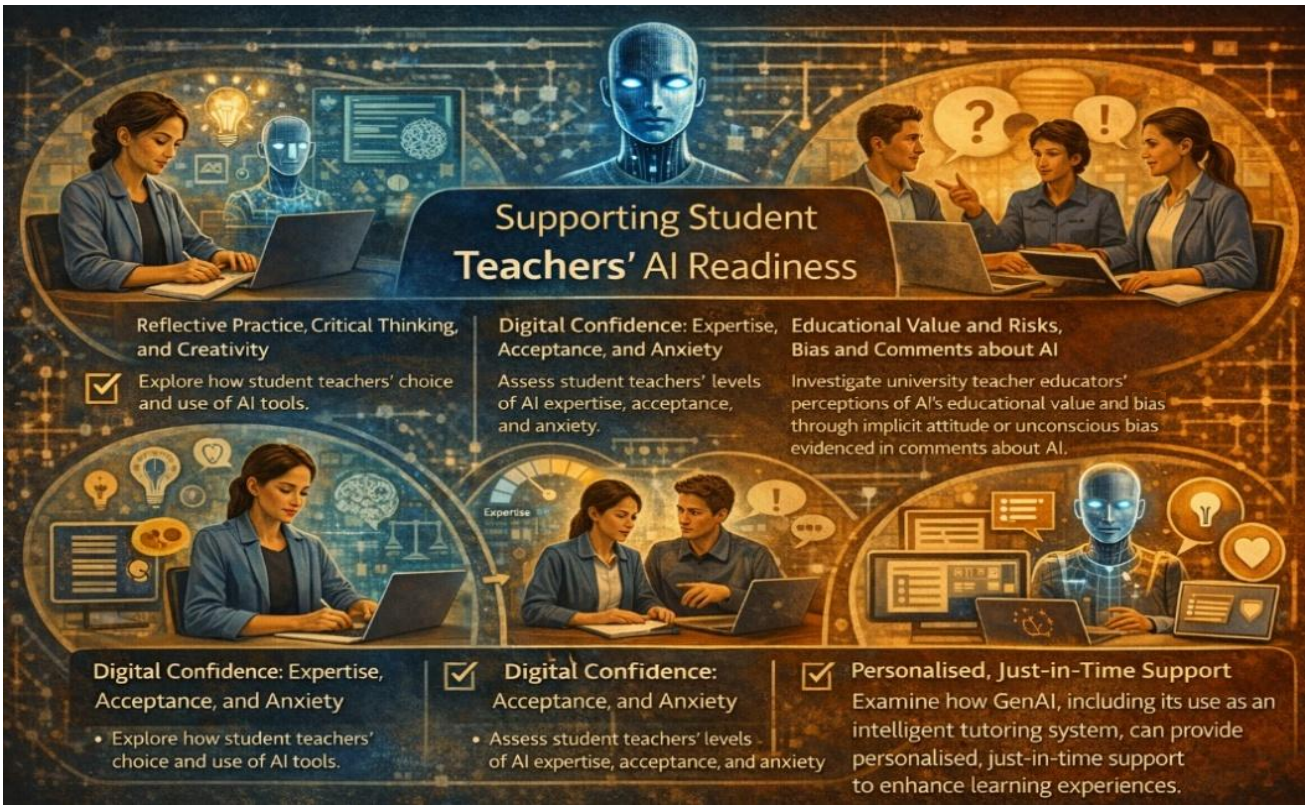
Introduction and Theoretical Framework



AI-generated image: AI-enhanced teaching and ethical practices

1 Introduction

Generative Artificial Intelligence (GenAI) has quickly become a visible feature of the educational landscape in which student teachers are learning to plan, teach, assess and reflect. For Initial Teacher Education (ITE), the central question is not whether AI will 'transform' teacher education, nor whether student teachers should be positioned as automatic adopters. Instead, the challenge is how ITE can support emerging teachers to develop the knowledge, ethical awareness and professional judgement required to make *defensible* decisions about if, when and how GenAI should be used, and when it should not.

This matters because GenAI raises distinctive pedagogical, professional and governance questions. In teaching and learning, GenAI may be used in planning, resource development and differentiation to promote inclusivity, yet its outputs can be partial, inaccurate or misaligned with curricular intent and learner needs. In assessment contexts, questions of validity, fairness, transparency and academic integrity become especially acute. At the same time, GenAI introduces wider concerns about privacy and data protection, bias and inclusion, intellectual property, and the commercial infrastructures that mediate access to AI tools. These issues do not sit 'outside' teaching; they shape what counts as responsible professional practice in classrooms, schools and universities.

ITE occupies a pivotal position in this evolving context because it is where professional identity, autonomy and judgement are deliberately cultivated. Supporting student teachers to engage critically with GenAI therefore requires more than technical familiarity. It calls for structured opportunities to practise verification and transparency, to develop ethical reasoning in AI-mediated contexts, and to understand the boundaries between legitimate support, inappropriate delegation and misconduct. It also requires coherent guidance and shared expectations across university-based learning and school placement so that student teachers are not left to navigate inconsistent norms alone.

This report sets out to support that work by articulating key considerations for GenAI in ITE that keep professional responsibility and human-centred pedagogy at the forefront. Rather than assuming inevitable uptake, it treats GenAI as a contested and rapidly evolving feature of contemporary education and considers what understandings, supports and safeguards are needed to enable responsible, inclusive and sustainable practice.

Purpose of the Study

This study seeks to develop a framework for critical engagement with AI in ITE that supports informed and context-sensitive pedagogical decision-making about whether, when, and how such tools may be used in teaching, learning, and assessment. It also aims to equip student teachers with the skills, values, and dispositions needed to navigate AI-mediated educational environments. In doing so, the study contributes to ongoing efforts to connect AI fluency with pedagogical depth, supporting student teachers to become confident, critically engaged professionals capable of co-creating inclusive classrooms characterised by responsiveness to learners' needs, commitment to professional and ethical standards, and adaptability to emerging educational realities.

Research Questions

To guide the research, consideration was given to the past, the present and the future experiences of AI by student teachers in the following research questions:

- What are student teachers' attitudes toward AI and GenAI?
- What is the relationship between AI anxiety and AI readiness?
- How is AI currently used in ITE contexts?
- What is the potential for ethical GenAI use in teacher education?

Research Goals

The overarching goal is to design a framework that supports student teachers' AI readiness as part of their wider professional formation. Specifically, the study aims to:

- Explore how student teachers' reflective practice, critical thinking, and creativity shape their choice and use of AI tools.
- Assess student teachers' digital confidence, including their levels of AI expertise, acceptance, and anxiety.
- Investigate university teacher educators' perceptions of AI's educational value and risks through implicit attitude or unconscious bias evidenced in the students' comments about AI.
- Examine how GenAI, including its use as an intelligent tutoring system, can provide personalised, just-in-time support to enhance learning experiences.

Theoretical Framework

This study is grounded in an integrated theoretical foundation that understands generative AI not simply as a discrete instructional tool but acts as part of an evolving educational ecosystem that reshapes pedagogical practice, professional learning, and teacher identity. Bringing together ecosystem, conceptual readiness, and critical sociological perspectives enables the study to examine (a) how student teachers make sense of AI, (b) how they develop capability and judgement in using it, and (c) how these encounters influence emerging professional identity and perceptions of autonomy within AI-mediated education systems.

Generative AI ecosystem in Initial Teacher Education

The primary framing positions Generative AI within a Generative AI Ecosystem in Initial Teacher Education (ITE), emphasising the interconnectedness of technology, pedagogy, ethics, and policy in shaping practice. From this perspective, AI integration is co-constructed through relationships among actors (student teachers, teacher educators, school leaders, pupils), infrastructures (platforms, data systems, institutional policies), and professional norms (assessment expectations, curriculum requirements, accountability pressures). This framing supports analysis of AI use as situated and relational: student teachers' decisions are understood as shaped by local contexts (e.g., school placement cultures and access to tools), wider regulatory and ethical considerations (e.g., data protection, transparency, academic integrity), and the pedagogical purposes that AI is recruited to serve (e.g., planning, differentiation, feedback, creativity). As a result, the ecosystem lens foregrounds both

opportunities (new forms of support, experimentation, accessibility) and tensions (risk, uncertainty, uneven capacity, and shifting expectations) in how AI becomes 'thinkable' and 'doable' within ITE.

AI as a cognitive and ethical partner: Five Core AI Concepts

To avoid treating "AI" as a vague or monolithic category, the study draws on Touretzky et al.'s (2022) Five Big Ideas in AI (perception, reasoning, learning, natural interaction, and societal impact) as an organising conceptual scaffold. These concepts allow the research to examine how student teachers understand what AI *is* and what it *does*, as well as the implications of those understandings for classroom practice. For example:

- **Perception** supports exploration of how AI 'reads' or represents information (including its limits, biases, and uncertainties).
- **Reasoning** informs analysis of how student teachers interpret AI outputs, justification, and the credibility of generated explanations.
- **Learning** provides a lens for discussing how AI systems adapt through data and feedback, and how it shapes concerns about datafication and surveillance.
- **Natural interaction** captures the distinctive conversational and multimodal interface of generative AI and how it influences pedagogical dialogue, questioning, and feedback practices.
- **Societal impact** foregrounds ethics, power, equity, and the broader social consequences of AI adoption in education.

Using these concepts, the study treats generative AI as both a cognitive partner (supporting thinking and production) and an ethical partner (raising questions of responsibility, fairness, transparency, and professional judgement). This framing is particularly important in ITE, where student teachers are forming practices and commitments that will shape their professional futures.

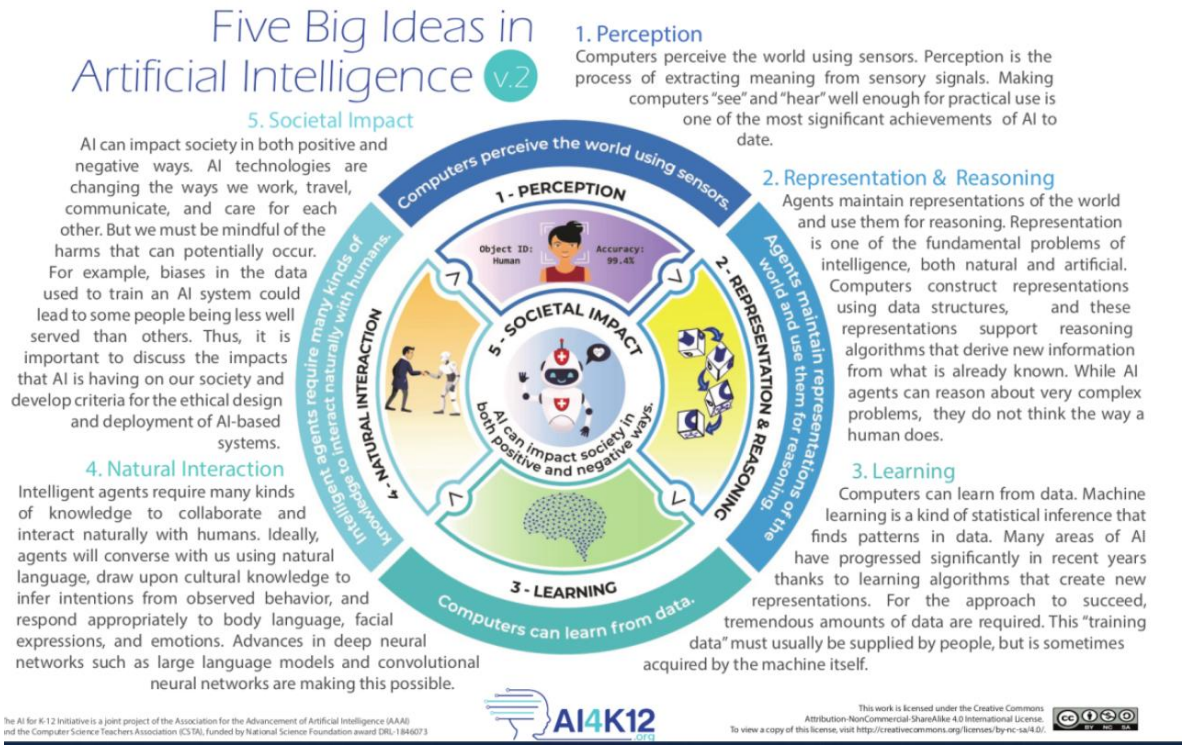


Figure 1: The Five Big Ideas in AI (Touretzky et al., 2019)

Developing capability and judgement: AI Readiness

The study is further informed by Luckin et al.'s (2022) AI Readiness Framework, which supports examination of readiness as more than technical proficiency. Within this lens, readiness encompasses: knowledge and understanding of AI, confidence and competence in pedagogical application, ethical awareness, critical evaluation of outputs, and the capacity to make context-sensitive decisions about when and how AI should be used. Importantly, readiness is treated as developmental and uneven, shaped by access, support, disciplinary traditions, placement contexts, and institutional guidance.

In this study, the readiness lens informs how student teachers' accounts are interpreted: not simply in terms of 'use' versus 'non-use', but in terms of capability, judgement, and professional responsibility. It also supports attention to the enabling conditions for readiness in ITE (e.g., modelling by teacher educators, explicit discussion of policy and ethics, opportunities for supported experimentation, and structured reflection on risks and benefits).

Theoretical framing: teacher identity and the impact of AI

Because AI integration in education is not neutral, the study also adopts an explicit framing of teacher identity and professional autonomy. Drawing on Mockler (2011, 2020), teacher identity is conceptualised as dynamic and situated: student teachers continuously negotiate who they are becoming as professionals in response to shifting social, policy, and technological contexts. This is especially salient in AI-enhanced environments where new competencies and ethical expectations emerge rapidly and where norms of 'good teaching' may be redefined through digital systems, data practices, and performance narratives.

Complementing this, Selwyn's (2022) critical perspective directs attention to how AI reshapes teachers' work, potentially reorganising labour, redistributing decision-making, and introducing new forms of surveillance, standardisation, or de-professionalisation through AI-supported analytics and automated decision systems. Selwyn's lens foregrounds power dynamics and the politics of educational technology, prompting analysis of whose interests are served, what forms of agency are enabled or constrained, and how teachers can enact critical digital pedagogy rather than passive adoption.

Together, Mockler and Selwyn provide a robust interpretive frame for exploring the identity tensions student teachers may experience, such as balancing personal commitments (care, creativity, relational teaching, equity) with perceived professional pressures (efficiency, innovation, performativity, compliance, and data-driven accountability). This framing positions student teachers not only as users of AI, but as agents navigating contested expectations and developing professional stances on ethical and effective practice in AI-mediated classrooms.

How the integrated framework informs the study

Taken together, these frameworks provide complementary levels of analysis:

- The **ecosystem lens** situates AI within the institutional, policy, ethical, and infrastructural conditions of ITE and school placement.
- The **Five Core AI Concepts** provide conceptual precision to analyse how student teachers understand AI's capabilities, limits, and implications.
- The **AI Readiness framework** supports examination of developmental capability and informed judgement as student teachers engage with AI.

- **Teacher identity (Mockler)** and **critical analysis of AI's effects on work and autonomy (Selwyn)** enable interpretation of how AI integration shapes professional becoming, agency, and ethical positioning.

This integrated foundation therefore supports a holistic account of AI in ITE: not only what student teachers do with generative AI, but how they understand it, how they become ready to use it responsibly, and how their professional identities and autonomy are negotiated within wider socio-technical systems.

Significance of the Study

By focusing on student teachers' lived experiences, this study examines AI's evolving role in Initial Teacher Education (ITE), recognising both its potential and inherent limitations for professional practice and personal growth. AI is no longer merely a digital tool but a pervasive influence on how student teachers plan, reflect, create, and communicate, shaping their evolving understanding of teaching and learning with mixed implications. While AI enables enhanced differentiation, timely feedback, and responsive learning design, these benefits are tempered by persistent challenges such as algorithmic bias, ethical risks, implementation barriers, and uncertain long-term impacts, all demanding inclusive, human-centred grounding (Ayanwale et al., 2022).

This research addresses a critical gap by equipping future teachers not just to use AI, but to critically understand, evaluate, and shape its educational role. It provides an evidence base on student teachers' current AI engagement across university learning and school placements, while identifying key supports, constraints, and emerging forms of professional judgment in AI-mediated pedagogical decisions (Barbieri & Nhu Nguyen, 2025).

Recent systematic reviews confirm educators' and learners' struggles with GenAI prompt design, critical output evaluation, and ongoing concerns over academic integrity, privacy, and bias, underscoring the need for scaffolded, assessed GenAI literacy embedded in ITE curricula rather than optional extras (Park, 2025; Bagdonaitė & Dagienė, 2025; Chiu et al., 2023; Tan, Cheng & Ling, 2025, Wieczorek et al., 2025; Heung Yue Yim, 2024). Similarly, teacher educators anticipate AI reshaping curriculum design and assessment but express uncertainty about ethical implementation and professional roles, highlighting the urgency for evidence-based guidance in ITE programs (Stenberg et al., 2025). Schools are advancing rapidly, yet system-wide implementation lacks an 'as-is' evidence picture of gaps to inform targeted supports and workable policies. Policy frameworks increasingly prioritise AI literacy and ethical competence in teacher education, but a persistent policy-practice gap emerges as high-level directives outpace ITE institutional responses (DETE, 2024).

Closing this gap demands ITE programmes translate expectations into coherent curriculum, pedagogy, and placement experiences; build teacher educators' expertise and shared AI discourse; and develop assessments, integrity guidelines, and professional learning pathways enabling critical, ethical, pedagogical AI use across subjects and contexts. This aligns with evidence that ITE institutions are still formulating GenAI responses, with teacher educators urgently needing coordinated institutional guidance (Ceallaigh et al., 2025).

Literature Review and Policy Analysis

AI-generated image: AI-enhanced teaching and ethical practices

2 Literature Review

This section is organised into two principal sub-sections. The first part examines how AI policy perspectives in Ireland and Northern Ireland have evolved in response to wider international developments, particularly within Europe and the UK. The second explores the rapid expansion of global AI research, as heightened interest, enthusiasm and concerns have increasingly shaped the educational implications of these developments for initial teacher education. It analyses student teachers' readiness to engage with AI, including their confidence, competence, and critical awareness in using AI tools for professional purposes. Particular attention is given to AI-related anxiety as a potential barrier to adoption, recognising how uncertainty, perceived risk, and ethical concerns may inhibit meaningful engagement.

The section also examines the influence of AI on emerging pedagogical practices, particularly the *framing* of AI as an 'intelligent tutor' capable of providing adaptive, personalised, and just-in-time support, while also critically considering the limitations and risks of this conceptualisation. It explores how such tools may reshape instructional design, feedback processes, and notions of teacher expertise within Initial Teacher Education (ITE).

Finally, it addresses issues of equity and ethics, including data privacy, algorithmic bias, access disparities, authorship, accountability, and the imperative to maintain human oversight, the 'human in the loop' (Jotterand & Bozco, 2020). Together, these strands position AI not simply as a technological innovation, but as a contested and evolving development with potentially consequential professional, pedagogical, and moral implications for ITE.

Policy and Strategic Context

The rapid emergence of generative AI in education has created a fast-moving policy environment in which expectations for schools and teacher education are being redefined in real time. For initial teacher education (ITE), this matters because student teachers are being prepared to enter classrooms shaped not only by new tools, but by evolving requirements around ethical practice, assessment integrity, data protection, equity, and professional judgement. Policy, in this sense, does not merely 'frame' AI adoption; it actively shapes what is permissible, supported, and valued in teaching and learning, through guidance, standards, infrastructure decisions, and regulation.

This section outlines the strategic policy landscape that informs the study, moving from international and European frameworks to national developments in Ireland and Northern Ireland. It highlights the growing convergence around AI literacy and teacher competency development, alongside stronger emphasis on human-centred governance, transparency, and safeguarding. The section also foregrounds how implementation conditions, particularly institutional guidance and school-system infrastructure, mediate how policy is enacted in placement contexts, with significant implications for equity and for what 'AI readiness' can realistically mean within ITE.

International and European Policy

At the global level, UNESCO has consistently called for the development of AI literacy and ethical awareness among both educators and learners, positioning teachers as central actors in ensuring that AI is used responsibly and inclusively. *AI and Education: Guidance for Policy-makers* frames AI as a double-edged sword: a tool that can foster personalised learning and inclusion, while also raising

concerns about equity, surveillance, and the erosion of human agency (UNESCO, 2021). Since then, UNESCO has extended its guidance to the specific challenges posed by generative AI, emphasising human-centred governance, safeguards for privacy and transparency, and the protection of educational values in rapidly changing AI ecosystems (UNESCO, 2023). Most recently, UNESCO's *AI Competency Framework for Teachers* (and the companion framework for students) operationalises this agenda by articulating concrete competency domains, spanning ethics, AI foundations, pedagogy, and professional learning, so that educators can critically evaluate AI systems, recognise bias and limitation, and make pedagogically sound decisions about when and how AI should be used (UNESCO, 2024a, 2024b). Collectively, these UNESCO publications reinforce that teacher education must equip educators not simply with functional competencies, but with the critical capacities to interrogate AI systems and their social implications, and to uphold inclusion, rights, and human agency in AI-mediated learning environments (UNESCO, 2021, 2023, 2024a).

Aspects	Progression		
	Acquire	Deepen	Create
1. Human-centred mindset	Human agency	Human accountability	Social responsibility
2. Ethics of AI	Ethical principles	Safe and responsible use	Co-creating ethical rules
3. AI foundations and applications	Basic AI techniques and applications	Application skills	Creating with AI
4. AI pedagogy	AI-assisted teaching	AI–pedagogy integration	AI-enhanced pedagogical transformation
5. AI for professional development	AI enabling lifelong professional learning	AI to enhance organizational learning	AI to support professional transformation

Figure 2: UNESCO AI Competency Framework for Teachers

The OECD (2021) similarly recognises AI as both a transformative and disruptive force in education, and its more recent work has sharpened this agenda in response to rapid developments in generative AI. In the *OECD Digital Education Outlook 2023*, the OECD highlights emerging governance challenges associated with generative AI in education, while the jointly developed guidelines and guardrails emphasise that effective adoption depends on human oversight, professional judgement, transparency, and equity of access (OECD, 2023; OECD–Education International, 2023). This equity lens is developed further in the OECD analysis of AI's potential impacts on equity and inclusion, cautioning that without deliberate design and policy action, AI can reproduce or widen existing disparities through uneven access and embedded bias (Varsik & Vosberg, 2024). The OECD has also sought to translate these priorities into education-specific capacity building through the *AI Literacy Framework for Primary and Secondary Education*, which articulates what learners should understand about AI and how they should be supported to engage critically and responsibly with AI systems (OECD, 2025). Most recently, the OECD has proposed key principles and a policy roadmap for school-system adoption of AI (Borgonovi et al., 2025) and synthesised emerging evidence on 'effective uses' of generative AI, underscoring that tools must be guided by pedagogical intent and evaluated rigorously to enhance learning rather than replace cognitive effort (OECD, 2026). Together, these international frameworks signal that teacher preparation cannot be confined to technological skills; it must include critical thinking, ethical reasoning, and pedagogical strategies for working in AI-mediated environments.

A complementary and more explicitly normative framing is offered by the Council of Europe, which situates AI in education within the principles of human rights, democracy, and the rule of law. The Council of Europe's critical report (Holmes et al., 2022) cautions against uncritical adoption that may erode privacy, amplify bias, or reduce pedagogy to surveillance and optimisation, positioning teachers (and teacher educators) as professionals who must safeguard democratic values in day-to-day practice. Since 2024, this work has moved from critique to governance design through a programme of preparatory studies and system mapping, including a preparatory study towards a legal instrument to regulate the use of AI systems in education (Council of Europe, 2023; Havinga et al., 2024) and a cross-member-state survey of current AI-and-education activity (Chounta et al., 2024). Most recently, the Council of Europe established a Committee of Experts on Artificial Intelligence and Education (EDU-IA), which met for the first time on 14–15 January 2026 and is tasked (through to 2027) with producing practical and regulatory supports, most notably a Policy Toolbox on teaching and learning about AI, a European Reference Framework for the evaluation of educational technologies, a proposal for a legal instrument to regulate AI in education, and draft guidelines on the use of educational data and analytics (Council of Europe, 2026). For ITE, this trajectory strengthens the expectation that 'AI readiness' is not only a matter of skill, but of rights-aware professional judgement, institutional governance, and educator autonomy.

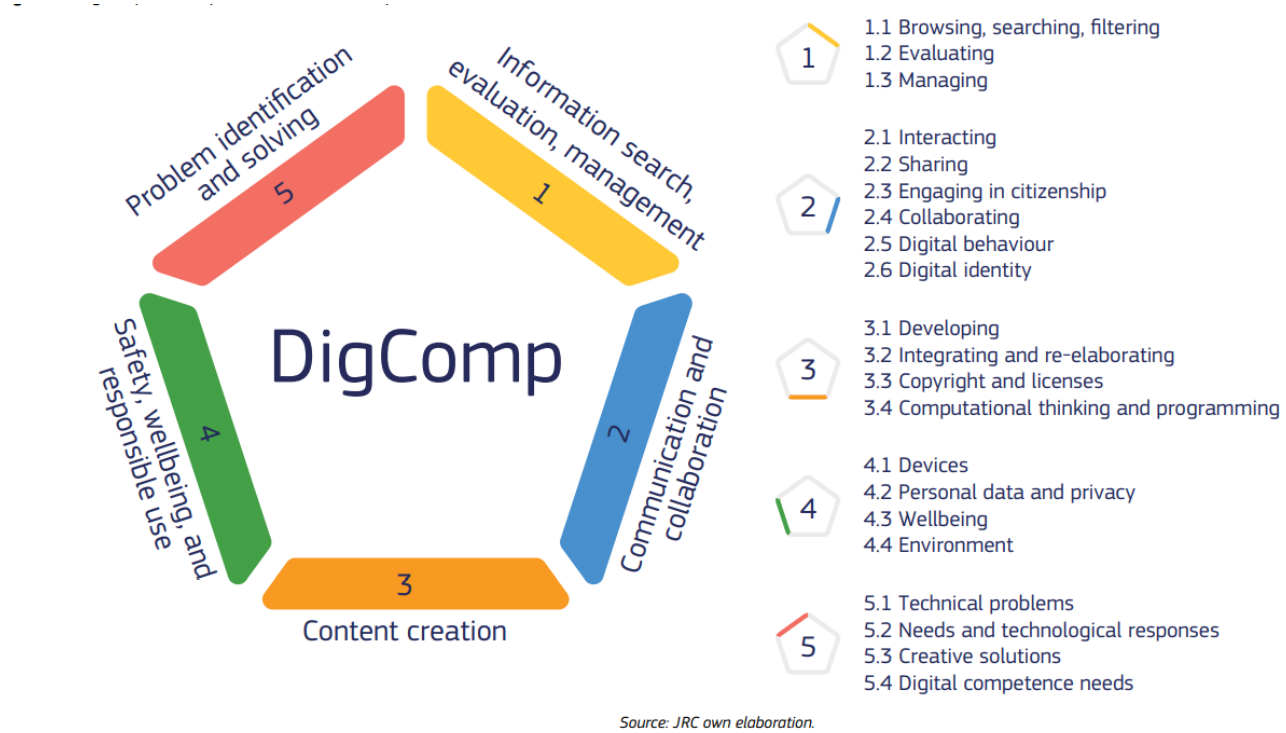


Figure 3: EU DigComp Framework 3.0 (2025)

In Europe, the European Commission has also progressively strengthened the place of AI within the Digital Competence Framework for Citizens, first through DigComp 2.2 (2022) and more recently through DigComp 3.0 (2025). DigComp 2.2 added substantial new examples of knowledge, skills and attitudes, explicitly including competences for citizens interacting with AI systems, with an emphasis on engaging confidently, critically and safely with digital technologies (Vuorikari et al., 2022). Building on this, DigComp 3.0 (the fifth edition) integrates AI competence more explicitly across the framework alongside priorities such as digital wellbeing, disinformation, cybersecurity, digital rights and sustainability, and operationalises progression through 500+ learning outcomes organised by competence and proficiency

level (Cosgrove & Cachia, 2025). This direction aligns with the *Council Recommendation on Key Competences for Lifelong Learning*, which positions digital competence as a core capability for lifelong learning and participation in society (Council of the European Union, 2018), reinforcing the responsibility of initial teacher education (ITE) to embed these competencies from the outset of teachers' careers. Importantly, this is now reinforced through regulation: the EU AI Act entered into force in 2024 and is being implemented on a phased basis, with an AI literacy obligation applicable from 2 February 2025, relevant to ITE institutions as organisations that increasingly deploy AI-enabled tools in teaching, assessment and administration (European Commission, 2024/2025). The Act becomes fully applicable on 2 August 2026 (with specified exceptions), and it classifies certain education-related uses of AI as high-risk, further strengthening the imperative for ITE to develop not only technical fluency but also critical, ethical and governance-aware professional competence in AI-mediated educational environments (European Commission, 2024/2025).

Irish Policy

In Ireland, digital competence and AI readiness are increasingly visible across education policy, professional standards, and system guidance. The Department of Education's *Digital Strategy for Schools to 2027* positions digital learning as central to curriculum development, professional learning, and equity (Department of Education, 2022). More recently, the Department of Education and Youth published *Guidance on Artificial Intelligence in Schools* (Version 1), which frames AI as an emerging, high-impact area requiring deliberate pedagogical choices and strong attention to ethics, safety, and privacy (Department of Education and Youth, 2025). This is complemented by practical supports from Oide Technology in Education, including an AI hub and related resources for school leaders and teachers (Oide Technology in Education, 2025). AI is also now explicitly visible in assessment governance: Department guidance notes requirements that AI-generated material be appropriately referenced in coursework for the State examinations, with relevant arrangements outlined in State Examinations Commission circulars (Department of Education and Youth, 2025). Alongside these school-sector developments, Ireland's national AI policy has been updated through the *National AI Strategy Refresh 2024* (Department of Enterprise, Trade and Employment, 2024), and the AI Advisory Council's *AI and Education* advice paper highlights the need for coherent, system-wide direction on generative AI, including implications for equity, integrity, and governance (AI Advisory Council, 2025). Data protection has been strengthened through the Data Protection Commission's *Data Protection Toolkit for Schools*, providing a timely compliance reference point for schools evaluating digital (and AI-enabled) tools (Data Protection Commission, 2024).

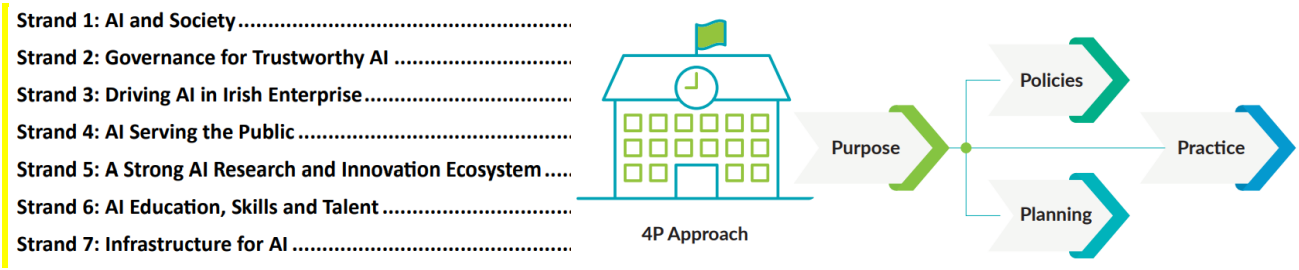


Figure 4: AI Strategy for Ireland (2024) and 4P Guidance on AI for Schools (2025)

Crucially, the Teaching Council provides a strong professional anchor for this agenda. *Cosán* positions teachers as lifelong learners who must continually adapt through reflective, inquiry-oriented

professional learning (Teaching Council, 2016), while *Céim: Standards for Initial Teacher Education* explicitly requires ITE programmes to develop student teachers' digital skills for teaching, learning, and assessment (Teaching Council, 2020). Recent reporting on the implementation of *Céim* maintains attention to digital skills within ITE programme development (Teaching Council, 2024). Taken together, these developments reinforce that ITE in Ireland must move beyond functional digital competence to include critical AI literacy, ethical judgement, and pedagogical decision-making for AI-mediated educational environments (Department of Education and Youth, 2025; Teaching Council, 2016, 2020).

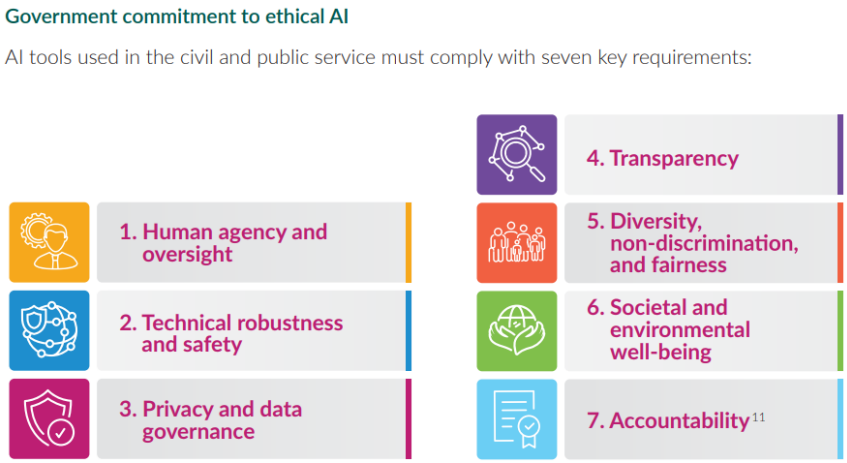


Figure 5: Department for Education and Youth guidelines for Schools

Northern Ireland Policy

In Northern Ireland, the Department of Education has long emphasised digital competence and teacher learning through initiatives such as *Learning Leaders* (Department of Education Northern Ireland, 2016). In initial teacher education (ITE) and early-career development, the General Teaching Council for Northern Ireland (GTCNI) positions the professional competences set out in *Teaching: The Reflective Profession* as the underpinning framework for accredited ITE programmes (GTCNI, 2011), operationalised through system documentation such as the *Teacher Education Partnership Handbook* (Department of Education Northern Ireland, 2024). While AI is not yet consistently embedded in statutory ITE or curriculum frameworks, Northern Ireland policy discourse has become more explicit about generative AI's implications for teaching, learning, assessment integrity, bias, and data protection. A Northern Ireland Assembly Research and Information Service paper synthesises these opportunities and risks, highlighting the need for teacher education and curriculum attention to AI literacy (Northern Ireland Assembly, 2025). Alongside this, emerging initiatives within the school system, such as the Department of Education's *Reading with AI Research Project*, signal a shift from broad digital competence priorities towards exploratory engagement with AI-enabled tools (Department of Education Northern Ireland, 2025).

Beyond policy discourse, Northern Ireland demonstrates how readiness is shaped by the practical conditions of enactment, particularly infrastructure, procurement, governance, and support. NI's centrally supported school ICT infrastructure, through the Education Authority's C2k service and the wider EdIS programme, provides a secure, managed environment intended to promote consistent access and compliance with data protection and online safety requirements across the educational community. In practice, co-ordinated infrastructure of this kind can reduce variation between placement

schools in what is feasible and permissible, however it may narrow opportunity gaps for student teachers to utilise the AI-related competence and skills developed in their university-based setting. It also illustrates how system-level decisions about platforms, subscriptions, training, and governance can function as an equity lever: where access and guidance are standardised, uncertainty and risk are more containable; however where school-based AI policies are individualised and risk-based, teachers' use of AI is fragmented making student teachers' experiences of 'acceptable use' and their opportunities to develop responsible AI practice likely to diverge sharply across placement contexts.

Policy Summary

Across international, European, and island-of-Ireland policy, a clear convergence is emerging: AI readiness in education is now framed as a professional, ethical, and governance challenge, not simply a technical skills agenda. Global bodies (UNESCO, OECD and the Council of Europe) consistently position teachers and teacher educators as key actors in ensuring AI is used responsibly, with strong emphasis on human-centred governance, equity and inclusion, transparency, privacy, and safeguarding human agency, alongside explicit calls for AI literacy and teacher competencies that include critical evaluation of AI systems and bias. In parallel, European policy is tightening both competence expectations (through DigComp's strengthened AI-related learning outcomes) and regulatory obligations (through the EU AI Act's phased implementation and AI literacy requirements), reinforcing the need for rights-aware professional judgement and institutional accountability. Nationally, Ireland's policy landscape mirrors this shift through a strengthened digital strategy, AI-in-schools guidance, assessment integrity expectations, and data protection supports, anchored by the Teaching Council's standards and professional learning framework (Cosán and Céim). Northern Ireland provides a useful near-neighbour implementation lens, illustrating how policy aspirations are mediated by infrastructure and governance (e.g., C2k/EdIS) that shape what is feasible, permissible, and equitable in placement schools. Taken together, these policy contexts underscore that ITE must align programme expectations with placement realities and develop student teachers' critical AI literacy, ethical reasoning, and pedagogical decision-making within evolving policy, regulatory, and infrastructural conditions.

Against this policy and strategic backdrop, where AI readiness is framed as a professional, ethical, and governance challenge, the next section reviews the emerging research evidence on generative AI in education and ITE, with particular attention to what is currently known about teacher preparedness, pedagogical use, ethical concerns, and the conditions that enable or constrain responsible practice.

Core Themes in AI-Ed literature

The rapid emergence of Generative Artificial Intelligence (GenAI) is reshaping education and renewing debate about the role of technology in teaching and learning. Unlike earlier waves of educational technology, GenAI does not simply deliver or store information but generates new content, including lesson ideas, assessment items, feedback prompts, and personalised learning resources (Barbieri & Nguyen, 2025). This shift is especially significant for initial teacher education (ITE), where student teachers are entering professional practice at a point when AI literacy, ethical competence, and critical digital skills are increasingly visible within policy frameworks and professional standards (Vuorikari et al., 2022). At the same time, the research base on GenAI in ITE is still developing and is uneven across contexts, leaving important questions about readiness, anxiety, and professionally defensible practice under-specified.

To keep the evidence base focused and avoid overlap, this review is organised into four thematic strands that align with the study's aims: AI readiness, AI anxiety, GenAI in pedagogical and professional practice, and Ethical and equity considerations. Across the strands, the review highlights areas of convergence and debate, foregrounds ITE-specific evidence where available, and identifies gaps that inform the rationale for the present study.

Strand 1: AI readiness in ITE

AI readiness in ITE is increasingly framed as a professional capability rather than a narrow set of technical skills. Luckin et al. (2022) describe readiness as a developmental journey from limited awareness towards informed, critical engagement shaped by calibrated trust and inquiry. UNESCO's teacher competency framework specifies progression across AI foundations, pedagogy, ethics, and professional learning (Miao & Cukurova, 2024).

Empirical work reveals uneven development across institutional contexts. Ceallaigh et al. (2025), surveying 138 European ITE educators, found staff development and coherent policy stronger predictors of GenAI integration than individual aptitude. Schepman and Rodway (2020) link attitudes to optimism and trust, while Granström and Oppi (2025) show perceived usefulness and confidence predict adoption intentions, with training and support acting as important enabling conditions. Barbieri and Nguyen (2025) show pre-service teachers use GenAI for planning during placements but hesitate on assessment due to reliability concerns.

A persistent gap concerns readiness enactment during placements. While conceptualised as multidimensional, few studies examine how readiness develops within placement norms, mentor guidance, and school constraints (Ceallaigh et al., 2025; Barbieri & Nguyen, 2025). Placement environments may support experimentation through clear governance or constrain use through unclear norms, shaping what student teachers perceive as feasible.

Strand 2: AI anxiety among pre-service teachers

While readiness captures a sense of preparedness, AI anxiety foregrounds affective barriers that can inhibit adoption. Foundational definitions describe anxiety as fear or agitation about out-of-control AI (Johnson & Verdicchio, 2017), while broader empirical work links anxiety to demographic and psychological factors that can suppress willingness to adopt new technologies (Lemay et al., 2020). Wang and Wang (2022) conceptualise AI anxiety as multidimensional, spanning concerns about learning AI, job replacement, sociotechnical blindness, and AI configuration. For ITE, these dimensions capture both competence-related concerns and deeper worries about professional displacement and reliance on opaque systems.

Teacher-focused studies suggest anxiety interacts with perceived value and conditions of use. Granström and Oppi (2025) report that confidence and perceived usefulness strongly associate with adoption intentions, whereas anxiety and limited training function as barriers. Shen, Qiu and Wang (2025) show psychological safety and trust support continued use, while anxiety tied to uncertainty, technical failures, and privacy undermines sustained engagement.

ITE-focused work highlights programme and placement influences. Barbieri and Nguyen (2025) show anxiety reduces through structured prompt training during university phases but resurfaces in

placements where expectations remain unclear. Ceallaigh et al. (2025) emphasise institutional guidance and staff development as critical for legitimising GenAI practice in teacher education.

What remains under-developed is longitudinal evidence on how AI anxiety evolves across ITE and interacts unevenly with readiness across programmes and placements. The link between anxiety and governance uncertainty, encompassing acceptable use policies, privacy concerns, and assessment integrity, warrants attention as a potential driver of risk-avoidant behaviour in placement settings.

Strand 3: GenAI in ITE pedagogy and professional practice

Research suggests GenAI can support ITE pedagogy and teachers' work, particularly in planning, adaptation, differentiation, and routine drafting, but it also places new demands on professional judgement. Selwyn et al. (2025) argue that benefits are not automatic because outputs typically require checking, contextualising, and rewriting to ensure accuracy and pedagogical fit. This aligns with emerging ITE evidence that student teachers use GenAI primarily for low-stakes support rather than high-stakes pedagogical decisions. Kerr and Kim (2025) report common uses such as brainstorming lesson ideas, generating examples, drafting explanations, and adapting resources for diverse learners, including language support and differentiation. At the same time, pre-service teachers remain cautious about assessment-related uses, with concerns about reliability, validity, and fairness shaping boundary-setting around what counts as defensible practice (UNESCO, 2021).

The literature also indicates constrained support for GenAI as an intelligent tutor for pupils without robust safeguards. More broadly, concerns recur around misinformation, hallucinations, and bias, particularly where outputs might shape pupil understanding or assessment outcomes (UNESCO, 2023). These tensions are amplified by the reality that responsible use often adds professional labour, including error-checking and contextual adaptation, even when GenAI reduces workload in other areas (Selwyn et al., 2025). For ITE, this suggests that programme design and modelling are central. Ceallaigh et al. (2025) emphasise that meaningful integration depends on programme-level adaptation, including shared norms for responsible use, alignment with assessment integrity expectations, and coherent institutional guidance.

Particularly needed is task-level evidence on how student teachers evaluate GenAI outputs and justify their decisions in authentic contexts. While studies document what GenAI is used for, there is less clarity on the criteria student teachers apply when deciding whether outputs are acceptable, how they draw boundaries between assistive and delegative use, and how these judgement practices are learned through tutor modelling, assessment design, and placement expectations. Placement variability is likely to be a key moderating factor, shaping what is feasible, permissible, and professionally defensible.

Strand 4: Ethical and equity issues in ITE contexts

Ethical, social, and equity debates are now central to GenAI adoption in education and have particular implications for ITE. Holmes et al. (2022) frame AI in education as a human rights and democratic concern, emphasising human oversight and the risks of bias, surveillance, and erosion of learner agency. UNESCO's guidance similarly positions AI as a double-edged sword that can support learning while also amplifying inequities and undermining agency if adopted uncritically (UNESCO, 2021; UNESCO, 2023). In Ireland, sector-wide governance has strengthened these expectations. The HEA National Policy Framework on Generative AI in Teaching and Learning (December 2025) foregrounds academic integrity,

transparency and accountability, equity and inclusion, critical engagement and AI literacy, privacy and data governance, and sustainable pedagogy, positioning ethical use as an institutional responsibility that must be embedded in teaching, learning, and assessment design (Higher Education Authority, 2025a). The HEA consultation report further highlights uneven readiness and the need to align governance, procurement decisions, and staff development to avoid fragmented practice and unequal protections across programmes, including ITE (O'Sullivan et al., 2025).

In the research literature, bias and fairness remain persistent concerns, with risks heightened in assessment and decision-support contexts. Recent syntheses emphasise continuing ethical and regulatory challenges, including privacy and inequality, and argue for stronger safeguards and human oversight (García-López & Trujillo-Liñán, 2025). Wieczorek et al. (2025) consolidate school-focused ethics debates, showing clustered concerns around privacy and surveillance, data ownership, responsibility and accountability, bias and discrimination, and impacts on learner autonomy. These issues connect directly to ITE because student teachers must learn to evaluate when GenAI use is inappropriate and how to justify decisions in ways that are transparent, equitable, and professionally defensible.

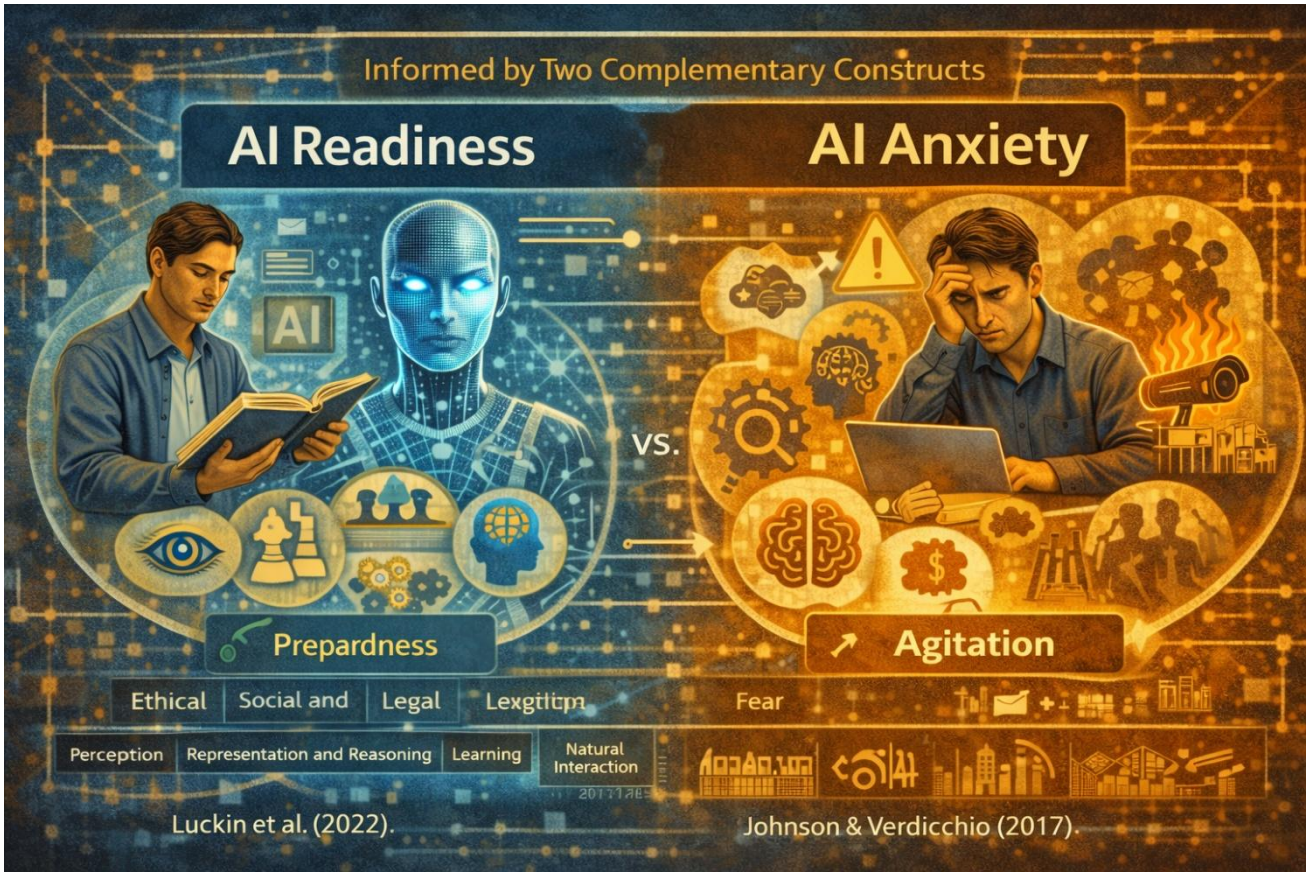
An ITE-specific gap concerns how ethics and governance are enacted in placement contexts. While policy and governance frameworks articulate principles, less is known about how student teachers interpret and apply these principles when placement schools have different norms, varying access to tools, or restrictive policies. Evidence is also needed on how infrastructure and access shape equity in practice, since uneven tool availability and guidance can create uneven learning opportunities and unequal protections for student teachers and pupils.

Conclusion

Across these four strands, the literature indicates that GenAI is already influencing the conditions of contemporary teaching, but its educational value is neither automatic nor neutral. AI readiness is increasingly framed as critical judgement and professional competence that integrates AI literacy, pedagogical intent, and ethical and governance awareness (Luckin et al., 2022; Miao & Cukurova, 2024; Holmes et al., 2022). AI anxiety emerges as a meaningful barrier, shaped by perceived risk, trust, psychological safety, and the clarity of institutional and placement norms (Granström & Oppi, 2025; Shen et al., 2025). Evidence on GenAI in practice suggests strong uptake for low-stakes support such as planning and drafting, alongside persistent caution about high-stakes uses such as assessment and tutoring, with responsible practice requiring additional professional labour and robust safeguards (Selwyn et al., 2025; UNESCO, 2023). Ethical and equity concerns are central, spanning privacy, bias, surveillance, accountability, and uneven access, and are now reinforced by sector-wide governance expectations (Higher Education Authority, 2025a; O'Sullivan et al., 2025; Wieczorek et al., 2025).

Three gaps are particularly salient for ITE and motivate the present study: **(1) how readiness and anxiety are shaped across university and placement settings, including the role of mentor modelling, assessment design, and policy clarity; (2) the task-level criteria student teachers use to evaluate GenAI outputs and justify boundaries between assistive and delegative use, especially in assessment contexts; and (3) how governance principles translate into everyday placement decisions under conditions of variable access, infrastructure, and local norms.** These gaps underpin the rationale for examining student teachers' readiness, anxiety, and experiences of professionally defensible GenAI use across cross-border ITE contexts.

Methodology



AI-generated image: AI-Readiness versus AI Anxiety infographic

3 Methodology

Design and overall approach

This study used an online survey to capture student teachers' perceptions, attitudes, and concerns about Generative Artificial Intelligence (GenAI) in initial teacher education (ITE) across two institutions on the island of Ireland. The survey included embedded open-ended items to provide contextual explanation and illustrative examples of student teachers' reasoning, experiences, and professional concerns. This approach enabled breadth through cohort-level patterns and depth through participants' own accounts, while recognising that findings represent a snapshot in time given the rapid evolution of AI and its portrayal in various media. The cross-border collaboration reflects shared educational values alongside diverse systemic contexts. The survey with embedded qualitative items follows established principles for integrating qualitative insights within predominantly quantitative designs (Creswell & Plano Clark, 2017).

Conceptual framing informing the design

The study was informed by two complementary constructs. Luckin et al. (2022) conceptualise 'AI readiness' as the journey that students and faculty undertake in moving from limited understanding of AI and its potential role towards more informed, critical, and ethically aware engagement, including attention to ethical, social, and legal implications. In contrast, Johnson and Verdicchio (2017, p. 622) use 'AI anxiety' to describe feelings of fear or agitation about out-of-control AI, a construct that may operate in tension with readiness. The Five Big Ideas in AI (Touretzky et al., 2019, 2023), Perception, Representation and Reasoning, Learning, Natural interaction, and Societal impact, provided an additional lens for considering AI capabilities, limitations, and their social implications.

Measures and instrument development

To enhance reliability and align the questionnaire with established work in the field, validated scales were adapted for use with pre-service teachers.

AI anxiety

Wang and Wang (2022) developed a 21-item survey to measure AI anxiety using a Likert scale across four factors: learning, job replacement, sociotechnical blindness, and AI configuration. This instrument informed the AI anxiety section of the AIRED questionnaire. Eighteen items were retained, as not all were relevant to pre-service teachers. Terms such as "humanoid robots" were defined as "chatbots or equivalents" to reflect current developments in AI.

Attitudes towards AI and technology readiness

An adapted form of Schepman and Rodway's *General Attitudes towards AI Scale* (GAAIS) was used to capture student teachers' attitudes towards AI, including both positive and negative dimensions and an ethical dimension (Schepman & Rodway, 2020). The GAAIS builds on the Technology Readiness Index (TRI) (Lam et al., 2008) to establish convergent and discriminant validity. Building on prior experience using TRI constructs in ITE contexts, the study sought to capture student teachers' personal innovativeness and discomfort alongside societal optimism and insecurity, and their influence on student teachers' willingness to use AI personally and professionally. The 32 items in the original GAAIS were reduced to 18 for this study. Items were removed where there was duplication with the anxiety scale, where phraseology was overly extreme (for example, "I find AI sinister"), and where items were not

relevant to the context of teacher education (for example, “Companies just use AI to boost their profits, with no benefits to ordinary people”).

Behavioural Intention to use AI

Based on the Extended Theory of Planned Behaviour combined with Davis’ Technology Acceptance Model (TAM) and the Technology Readiness Instrument (TRI) (Lam et al., 2008), Chai, Wang & Xu (2020) completed confirmatory factor analysis to reveal nine factors impacting on the Behavioural Intention to use AI as shown in Figure 24. Their 35-item Likert scale was included in the questionnaire to determine the factors impacting on Ireland’s student teachers’ intention to use GenAI.

Survey structure and demographic variables

At the outset of the research study, the primary analytical intention was to examine responses from student teachers across Ireland and Northern Ireland as a **combined cohort**, in order to identify broad patterns in self-reported AI skills and usage, perceived AI readiness, and student teachers’ experiences of engaging with generative AI in initial teacher education. This decision reflected the shared focus of the study and supported the analysis of common trends shared across participants rather than treating jurisdictional context as the principal organising variable.

At the same time, the study recognised that participants were drawn from two distinct educational programmes: the PME in Ireland and the PGCE in Northern Ireland, and that this educational context could be relevant in interpreting selected findings. For this reason, limited jurisdiction-level comparisons were included in instances where they were analytically meaningful (e.g., where differences in responses were of substantive interest to the research questions) and where reporting at this level did not compromise participant or ITE tutor anonymity.

The approach to disaggregation was therefore guided by both ethical and methodological considerations. The adapted GAAIS, the AI anxiety scale and the Behavioural Intention to use AI were incorporated into the online questionnaire to examine factors influencing all student teachers’ uptake and acceptance of AI as a tool for personalised learning and as a support for professional practice. Using the purposely limited biographical data, North/South comparative analysis of ITE students’ responses by AI readiness, AI anxiety and Behavioural intention to use AI was reported. Other potential influencing factors such as gender, age group, self-assessed AI skills and AI readiness, supported the identification of emerging patterns in AI attitudes (Schepman & Rodway, 2022).

Participants and sampling

All student teachers enrolled in two large institutions in Northern Ireland and Ireland who were registered on ITE programmes in 2024 to 2025 were invited to participate in this research. Enrolment across the two institutions for the PGCE and PME routes was broadly comparable in scale, although cohort sizes were not identical. In total, 208 student teachers completed the questionnaire. The eligible population across both institutions was approximately 515 student teachers, yielding a response rate of approximately 40 percent.

Procedure and phases of the study

A phased sequence was used to support instrument development, analysis, and synthesis.

Phase 1: Narrative literature review and policy analysis

A narrative literature review and policy analysis explored how AI is conceptualised in educational curricula and policy. The Five Big Ideas in AI (Touretzky et al., 2019, 2023) were used as a sensitising lens to identify gaps and opportunities for ITE. This phase informed the design of the online questionnaire and the open-ended prompts.

Phase 2: Online questionnaire (AIRED)

The online questionnaire examined student teachers' AI anxiety, attitudes towards GenAI, perceived usefulness, and readiness to use AI. The questionnaire included the adapted GAAIS (Schepman & Rodway, 2020) and an adapted form of the AI anxiety scale (Wang & Wang, 2022), alongside Chai et al.'s (2020) items to support the Behavioural Intention to use GenAI. Descriptive and inferential statistics were used for comparisons by gender, age group, self-assessed AI skills, and perceived AI readiness across all three scales to achieve a complete snapshot in time of student teachers' mindset towards AI.

Phase 3: Embedded open-ended responses

Open-ended items embedded within the questionnaire provided contextual insight into how AI shaped student teachers' self-efficacy, identity, ethical awareness, and confidence in classroom innovation. The open-ended responses comprised 22 detailed replies to the 'concerns' question and a further 18 comments across other items, yielding 40 units of analysis in total excluding phrases less than six words.

Phase 4: Synthesis and framework development

Quantitative patterns and qualitative insights were synthesised into an AI Readiness Framework intended to support transformative and responsible GenAI integration in ITE.

Phase 5: Practice examples of GenAI use

Student teachers also described practical experiences of using GenAI platforms such as ChatGPT, Claude, Gemini, Copilot, and Perplexity for lesson planning, resource creation, and reflective practice. These accounts are treated as practice examples that elaborate and illustrate patterns identified in the open-ended data rather than as a standalone dataset.

Data analysis

This section discusses the quantitative and qualitative approaches adopted and also how the ethical considerations were addressed for the study.

Quantitative analysis

Quantitative questionnaire data were analysed in SPSS version 29 to examine relationships between student teachers' attitudes towards GenAI, AI anxiety, and behavioural intention to use AI leading to their AI readiness. Exploratory factor analysis was completed on each scale to determine the 'best fit' models as measured by the percentage variance and reliability of the factor structures. Internal consistency estimates indicated acceptable to excellent reliability across the factors (Cronbach's alpha ranged from 0.68 to 0.94). Comparative analyses by gender, age and location (equivalent to ITE programme) using inferential statistics were used to uncover any statistically significant differences at the 5% level.

Qualitative analysis

Qualitative open-ended responses were analysed using a qualitative descriptive approach and descriptive thematic analysis (Sandelowski, 2000; Vaismoradi et al., 2013). This pragmatic approach is widely used in education research to summarise patterns in participant accounts whilst remaining close to participants' explicit statements (Maguire & Delahunt, 2017; Xu & Zammit, 2020). Analysis focused on manifest content, meaning what student teachers explicitly stated about concerns, risks, supports, and intended practices rather than interpretation of latent meanings. Six themes were generated, alongside a cross-cutting pattern described as 'bounded optimism'.

Qualitative analytic reliability and trustworthiness

To strengthen dependability and reduce single-coder bias, two researchers independently coded a subset of responses, compared codes, resolved discrepancies through discussion, and refined the codebook iteratively until the coding approach was stable. An audit trail documented coding decisions and refinements. Final themes were agreed through team discussion, supported by illustrative quotations and checks for disconfirming cases.

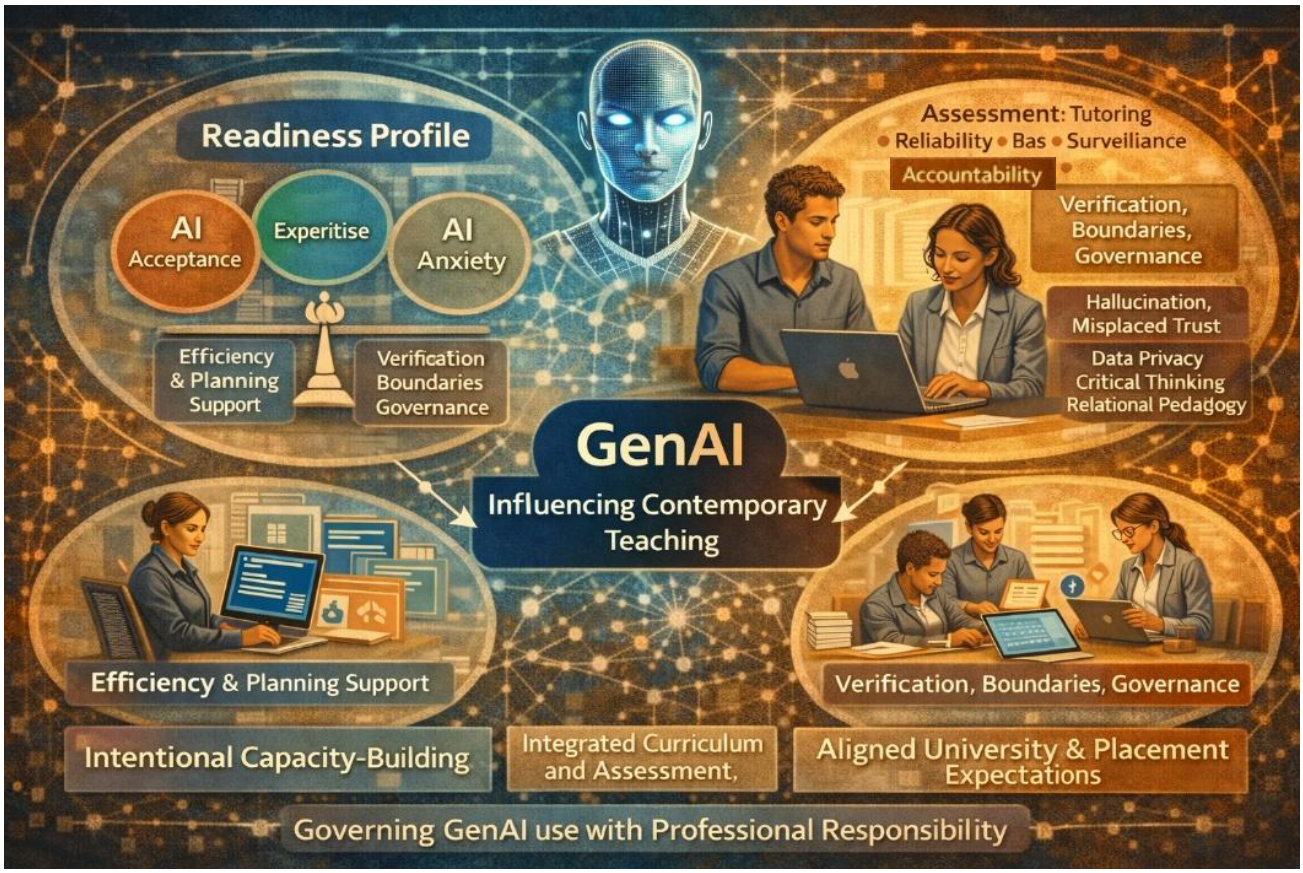
Trustworthiness, validity, and reliability

Validity and reliability provide a cornerstone for ensuring credibility in social research (Gibbs, 2007). To enhance reliability, established scales for AI attitudes, AI anxiety and behavioural intention to use AI (BI-AI) were adapted for use with pre-service teachers. Because the study aimed to capture both innovators and early adopters of GenAI as well as the rationale for lack of adoption, not all items on the original scales were retained. The GAAIS was reduced to 18 items, while the AI anxiety scale was retained largely intact with 18 of 21 items used and finally the full 35-item BI-AI scale provided a mechanism to investigate correlations between impacting factors. Minor terminology changes were made to align with the target audience of ITE students.

Research ethics

Ethical approval was obtained from the University College Dublin Research Ethics Committee prior to data collection (Reference No. HS-C-24-139-Farrell Low Risk Study). All participants provided informed consent, and data were anonymised to protect student teacher and tutor identities. The study adhered to GDPR requirements for processing personal data collected via online survey platforms. To protect identity, results are not disaggregated by subject specialism and no subject-specific differences are reported.

Analysis



AI-generated image: Gen-AI in Contemporary Teaching infographic

4 Analysis

This section reports the quantitative questionnaire findings, beginning with a descriptive overview of the respondent profile across the two ITE contexts (Ireland PME and Northern Ireland PGCE). It then presents the main analyses exploring associations between GenAI attitudes, AI anxiety, and readiness to use AI, highlighting patterns that inform a cross-border understanding of student teachers' preparedness.

The questionnaire was administered to 208 students enrolled on a two-year PME course in Ireland or a one-year PGCE course in NI. The response rate was 76.9% from Ireland and 23.1% from NI with the majority of responses coming from Women (64.4%) and 33.7% from Men. Three students identified as being non-binary (1.4%) while one student 'preferred not to say' as shown in Figure 6.

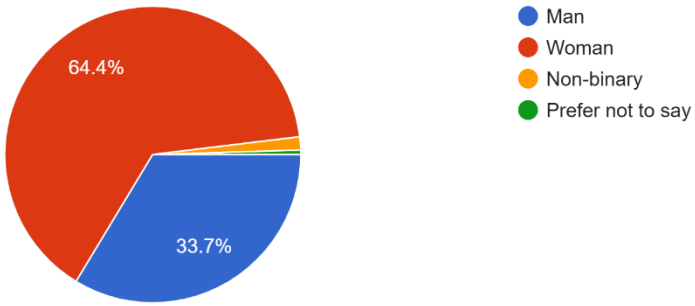


Figure 6

Most respondents had entered teaching directly after their UG degree with 68.3% being aged 22-25 years old as shown in Figure 7. Of the remaining respondents, 13.5% were aged 26-30 years old, 3.4% were aged 31-35 years and 1.9% were 36-40 years old. Small proportions of student teachers were aged 41-45 years (2.4%), 1.9% were aged 46-50 years and 1.4% were over 50 years old. 7.2% of replies came from student teachers aged under 21.

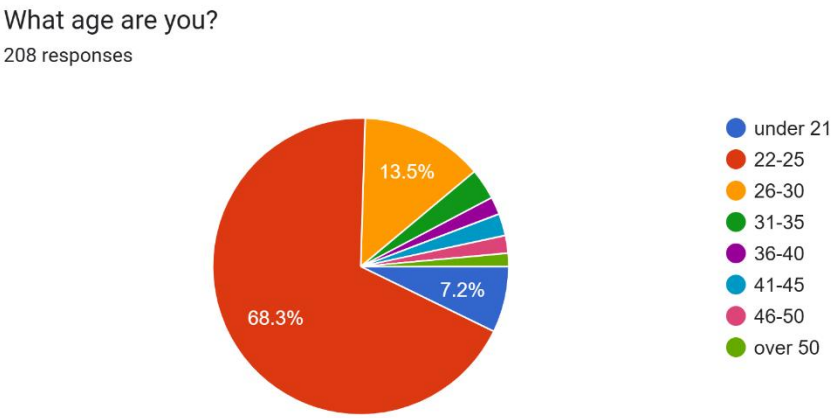


Figure 7

When asked to self-rate their knowledge and skills in using AI, the majority (42.3%) of student teachers indicated they were 'average like my friends'. However it was interesting to note that almost the same percentage (40.8%) declared themselves as being Beginners or less proficient than their friends in terms of AI capability as shown in Figure 8 while only eight 'Expert' student teachers (3.8%) felt able to demonstrate AI skills to their peers.

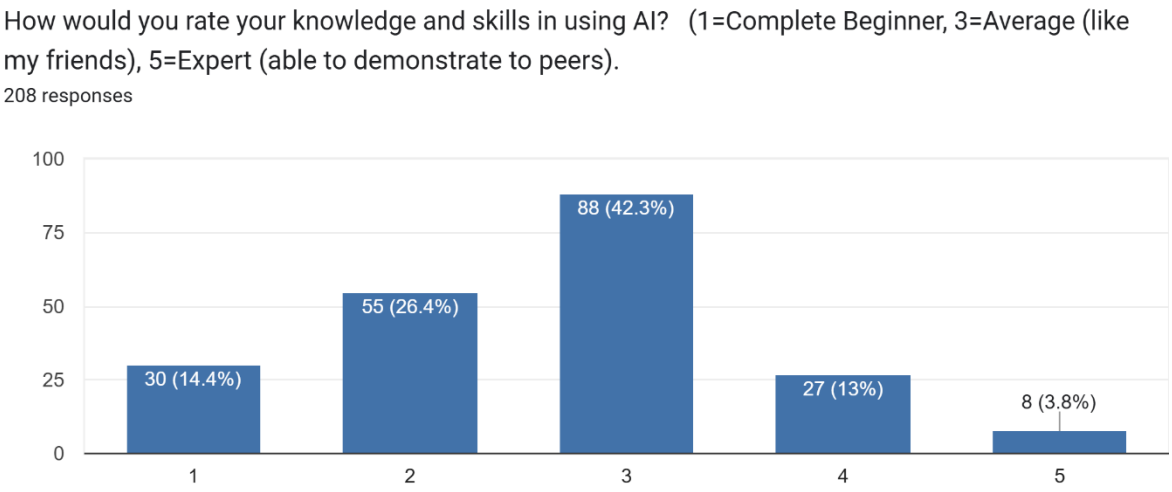


Figure 8

Building on this information, the student teachers were asked to identify which AI packages they have used and how frequently. ChatGPT was used most often being daily (blue), weekly (red) or monthly (yellow) while Google Translate was used mainly occasionally (every 2-3 months as shown in green). The third most popular AI tool was Grammarly closely followed by Canva AI as shown in Figure 9. It was interesting to note that 37 students (17.8%) and 24 students (11.5%) reported Never using ChatGPT and Google Translate respectively, however 146 (70.2%) and 134 (64.4%) students never used Canva AI and Grammarly respectively.

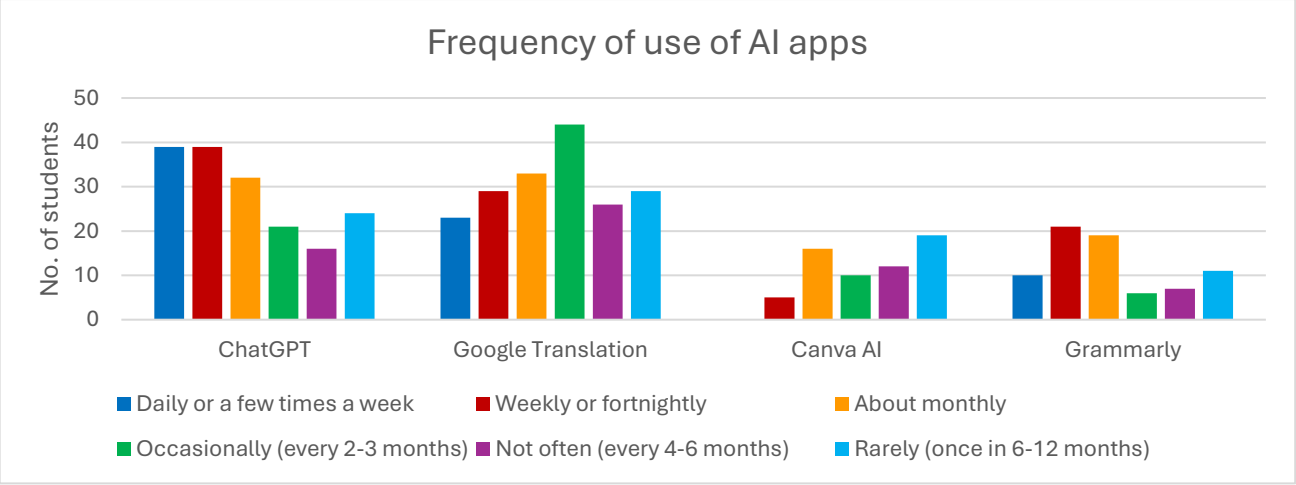


Figure 9

As denoted by the y-axis scale, Figure 10 illustrates the low-level usage of MS Co-pilot (compared to ChatGPT) and also the small number of student teachers using DALL-E for image creation. The AI built into quiz creators and ChatBots are also used infrequently with 75-80% of student teachers selecting Never for each of the AI tools shown in Figure 10.

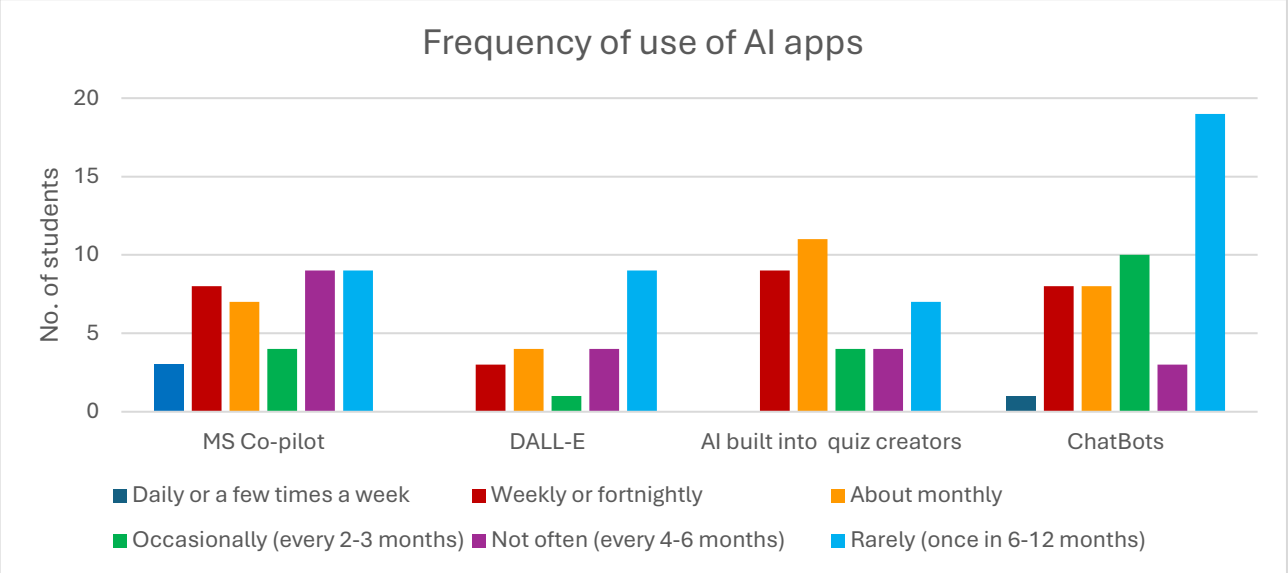


Figure 10

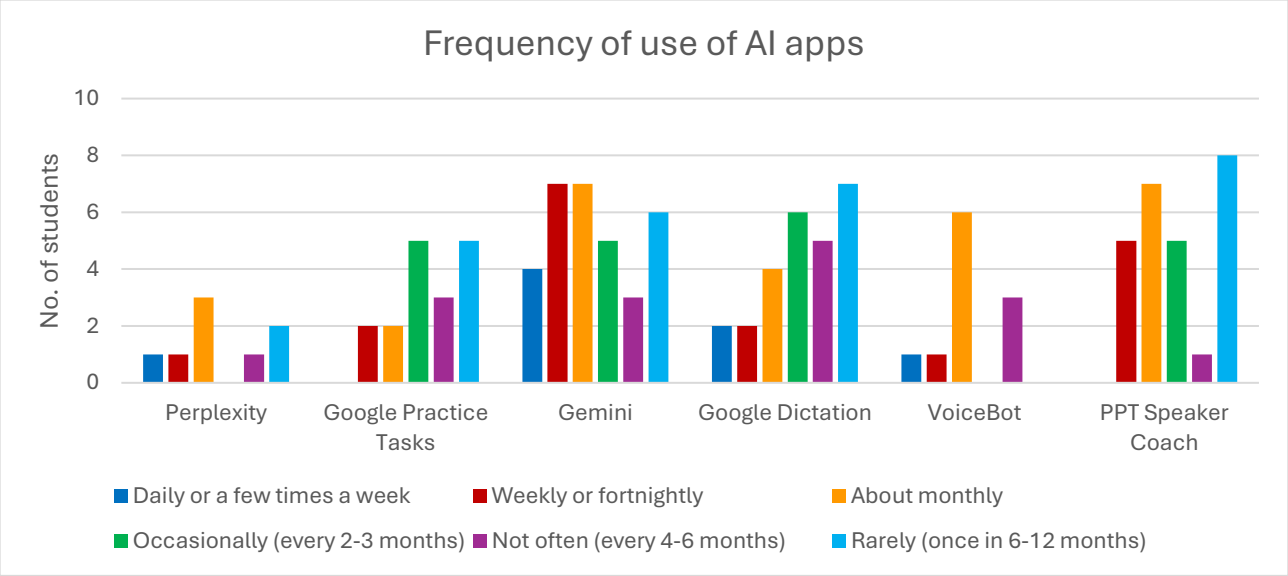


Figure 11

Looking at the y-axis scale in Figure 11, in general the student teachers had limited awareness of role of Gemini, Google Dictation and Google Practice Tasks. Even fewer student teachers were familiar with Powerpoint Speaker Coach, VoiceBots and Perplexity. Over 85% of students reported Never using the AI tools shown in Figure 11.

When asked to name any other AI tools they had used the following were suggested:

Figure 12: Other AI used

When asked if they pay subscriptions to access the higher versions of AI, 12 student teachers (5.8%) said they pay for one subscription such as ChatGPT, Grammarly or Canva Pro. Over a quarter of student teachers (26.4%) said they 'don't use AI' while over two-thirds of the student teachers 'only use the free versions'.

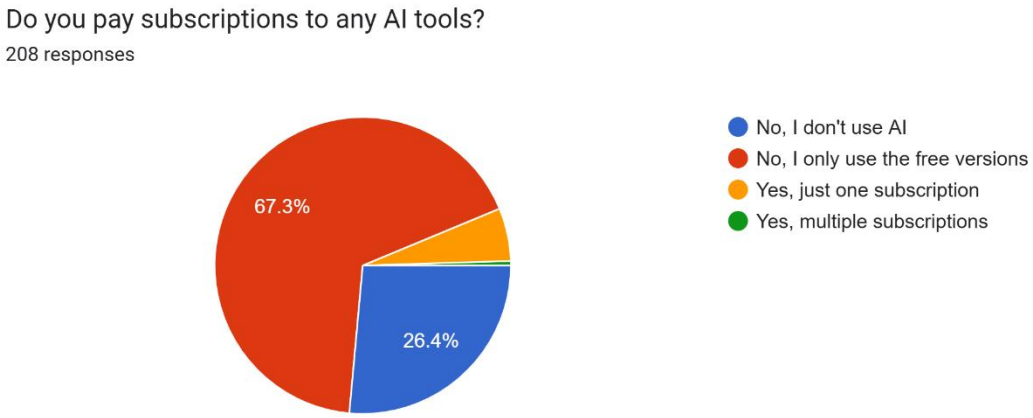


Figure 13

Based on Touretzky et al.'s (2019, 2023) ***Five Big Ideas of AI*** in Figure 1, the following pairs of statements were generated to contrast the role of AI (blue) with that of humans (red). The student teachers were then asked to prioritise the statements from 1st place to 5th place in terms of how each one best describes AI in the students' opinion (blue statements) and similarly, how they best describe humans in the students' opinion (red statements). The outcomes are reported in tables below.

1. ***Perceptions is about computers perceiving the world using sensors.***
   (a) AI lets computers see and hear by allowing them to extract meaning from sensory signals.
   (b) Human perceive the world using relationships
2. ***Representation and reasoning is the duality that agents maintain representation of the world and use them for reasoning; and computers represent the world as a series of data structures and reason using algorithms.***
   (a) AI is just a computer algorithm being used to create a representation of the world.
   (b) Humans can build their own neural networks to connect ideas to create their own understanding the world.
3. ***Learning - computers can learn from finding patterns in large amounts of data.***
   (a) AI can learn from finding patterns in large amounts of data.
   (b) Humans learn from each other, experience, resources and computers.
4. ***Natural interaction with humans***
   (a) Intelligent agents require many kinds of knowledge to interact with humans.
   (b) Humans have multiple intelligences including emotional intelligence.
5. ***Societal Impact of AI***
   (a) AI can impact society in both positive and negative ways; it is disruptive.
   (b) Humans can impact society in both positive and negative ways, however they have a conscience and are ethical.

Using these descriptors of AI, student teachers placed them in rank order from 1st to 5th:

1st	**AI can impact society in both positive and negative ways; it is disruptive**	***Societal impact***
2nd	AI can learn from finding patterns in large amounts of data	*Learning*
3rd	AI is just a computer algorithm being used to create a representation of the world.	*Representation and Reasoning*
4th	Intelligent agents require many kinds of knowledge to interact with humans	*Natural interaction*
5th	AI lets computers see and hear by allowing them to extract meaning from sensory signals	*Perceptions*

In terms of describing humans, the ranking process was repeated to reveal the following rank order of statements:

1st	**Humans perceive the world through relationships**	***Perceptions***
2nd	Humans learn from each other, experiences, resources and computers.	*Learning*
3rd	Humans have multiple intelligences including emotional intelligence.	*Natural interaction*
4th	Humans can build their own neural networks to connect ideas and create meaning to understand the world they live in.	*Representation and reasoning*
5th	Human can impact society in both positive and negative ways, but they have a conscience so are usually ethical	*Societal impact*

Comparing these two tables the most striking difference is the reversal of the positioning of Perceptions and Societal impact in first and last position. The student teachers' choice of top three statements to capture their understanding of the role of AI demonstrates an awareness of the widespread use of AI in all domains of life and also how AI operates in terms of being a large language model predicting the next words based on logic. In contrast, the student teachers view human engagement more emotionally through interaction and sharing ideas with others. It is heartening to note that Learning ranks in second place for both AI and human interaction which may be a reflection of the student teachers' priorities and resultant choice of career as a teacher.

Student Teachers' Attitudes towards AI-Readiness

Based on the variation in use of AI tools by student teachers, students' attitudes towards AI were measured to determine if there was an unconscious bias against the use of AI or a fear of AI. Previous research reveals that Technology Readiness comprises a mixture of optimism and innovativeness (positive disposition) and discomfort and insecurity (negative disposition) (Lam et al., 2008). Schepman and Rodway's (2020) attitudinal scale was found to predict the positive attitude of Optimism through measures of *Comfortableness with AI* while the negative component of Insecurity was addressed through *Perceived capability of AI*, more specifically its limitations.

An adapted form of Schepman and Rodway's General Attitudes towards AI Scale (GAAIS) was used to capture student teachers' attitudes towards AI-readiness, based on both positive and negative attitudes, with the addition of an ethical dimension of how AI may be used. Using 18 items on a Likert scale from Schepman and Rodway's (2020) framework, Exploratory Factor Analysis (EFA) revealed three factors accounting for 51.5% of variance, namely Personal Willingness to use AI, Lack of trust in the wider role of AI, and the Limitations of AI.

Personal Willingness to use AI included items such as:

I am interested in using AI systems in my everyday life, I would like to use AI in my job as a teacher, AI is Exciting, There may be beneficial applications of AI, AI can have positive impacts on people's well-being.

Lack of trust in the wider role of AI comprised of items such as:

AI is used to spy on people, I am concerned about AI applications mining personal data, Organisations use AI unethically, The rise of AI poses a threat to people's job security.

Limitations of AI (in terms of being flawed or unreliable) was revealed through items such as:

AI is limited in its abilities, I think AI systems make many errors, AI systems cannot perform better than humans, AI systems should only be used for unimportant matters, AI should not be used to make complex decisions.

Due to the breadth of these statements and the generic nature of the attitude scale, student teachers could be drawing on perceptions emerging from the media, online platforms and/or personal experiences of AI generated hallucinations or their knowledge of the mechanics of large language models (LLMs).

SPSS version 29 was used to generate the reliability, Cronbach's alpha, for each factor. All reliabilities were greater than 0.7 (to 1 decimal place) and therefore were reliable measures of the factor (Kline, 2023).

Factor scores were calculated and profile analysis was completed by gender, location, age, AI-expertise and AI-readiness as a teacher, to determine if statistically significant differences at the 5% level existed between these sub-groups.

Factor	Reliability (Cronbach's alpha)
Personal willingness to use AI	0.871
Lack of trust in the wider role of AI (Personal discomfort)	0.776
Limitations of AI (AI perceived to be unreliable/flawed)	0.588

Table I

No statistically significant difference in attitude towards AI existed by gender, ITE study location, or age group as shown in Figures 14 to 16.

Factor	Man	Woman
Personal Willingness to use AI	3.255	3.367
Lack of trust in wider role of AI	3.583	3.313
Limitations of AI (unreliable/flawed)	3.494	3.547

No significant difference by Gender $F(1, 201) = 0.68$ $p = 0.411$ ($p>0.05$)

Table II

Although there was no statistically significant difference between the profiles of men and women based on mean scores on each of the three factors, it is interesting to note that the men had a slightly greater lack of trust in AI compared to the women. While the women were slightly more conscious of the limitations of AI but were more willing to use AI based on their mean scores. As shown in Figure 14, all mean scores are greater than 3 indicating positive agreement with the factors.

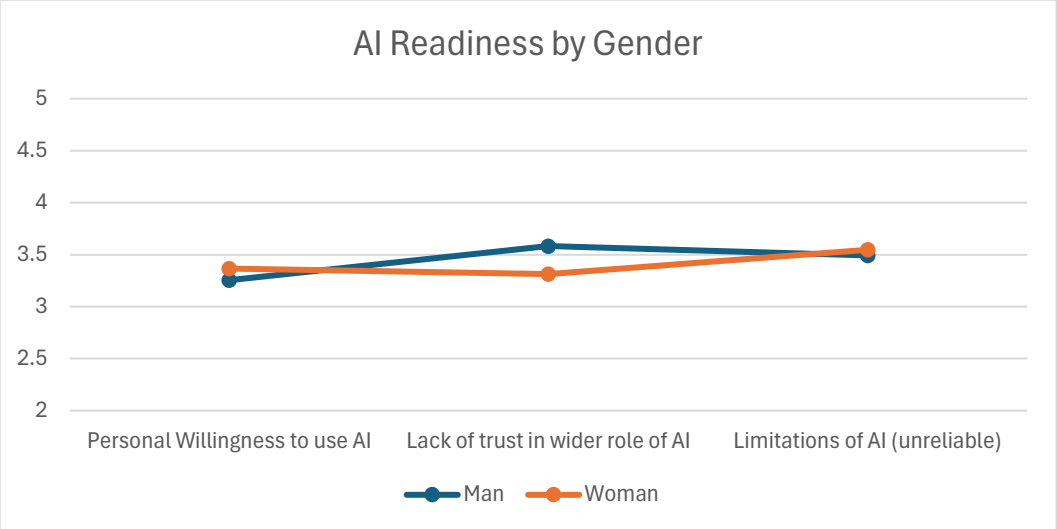


Figure 14

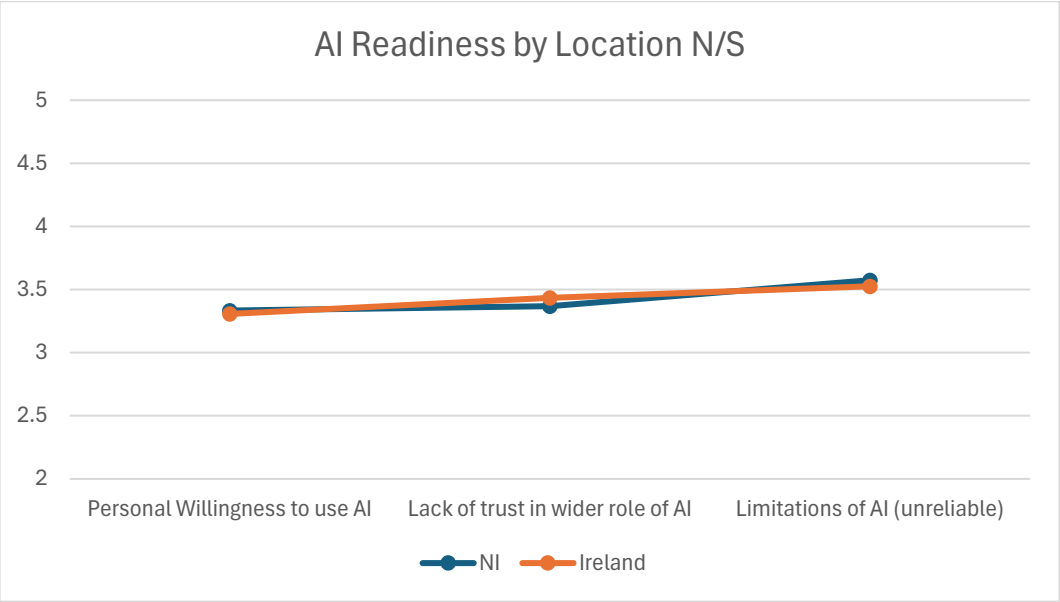


Figure 15

Although there was no statistically significant difference between the profiles by ITE programme location, it is interesting to note that two of the three mean scores for the attitude factors were slightly higher for student teachers from NI indicating they were marginally more willing to use AI personally and viewed AI as unreliable. Student teachers from Ireland had fractionally higher levels of distrust in the wider use of AI. All mean scores are greater than 3 and the two profiles are almost identical in Figure 15.

Factor	NI	Ireland
Personal Willingness to use AI	3.334	3.307
Lack of trust in wider role of AI	3.369	3.435
Limitations of AI (unreliable/flawed)	3.574	3.526

No significant difference by ITE location $F(1, 205) = 0.00$ $p = 0.951$ ($p>0.05$)

Table III

Prior research has revealed differences in the attitude to adoption of new technologies by age group so it was important to establish if there was a difference in attitudes towards AI by age group within the student teacher population. As shown in Table IV and Figure 16, those student teachers aged 26-30 years old and 36-40 years old had parallel profiles albeit with the 26-30 years old age group having slightly higher mean scores compared to their older counterparts and being slightly less trusting of the wider role of AI. Student teachers aged 22-25 years old showed more personal willingness to use AI compared to students aged 36-40 years old however it was the students in the 31-35 years age group who were most willing to adopt AI. In terms of lack of trust and awareness of the limitations of AI, the 22-25 year olds had almost the same mean scores as their 36-40 year old peers. The 31-35 year olds had an uncharacteristic dip in their mean scores for the 'Lack of trust' factor revealing a more positive disposition to the wider role of AI despite being aligned with the other age groups in terms of their attitude towards the limitations of AI.

Factor	22-25	26-30	31-35	36-40
Personal Willingness to use AI	3.332	3.061	3.612	2.893
Lack of trust in wider role of AI	3.403	3.714	2.738	3.292
Limitations of AI (unreliable/flawed)	3.556	3.557	3.571	3.400

No significant difference by ITE location $F(3, 176) = 1.25$ $p = 0.294$ ($p>0.05$)

Table IV

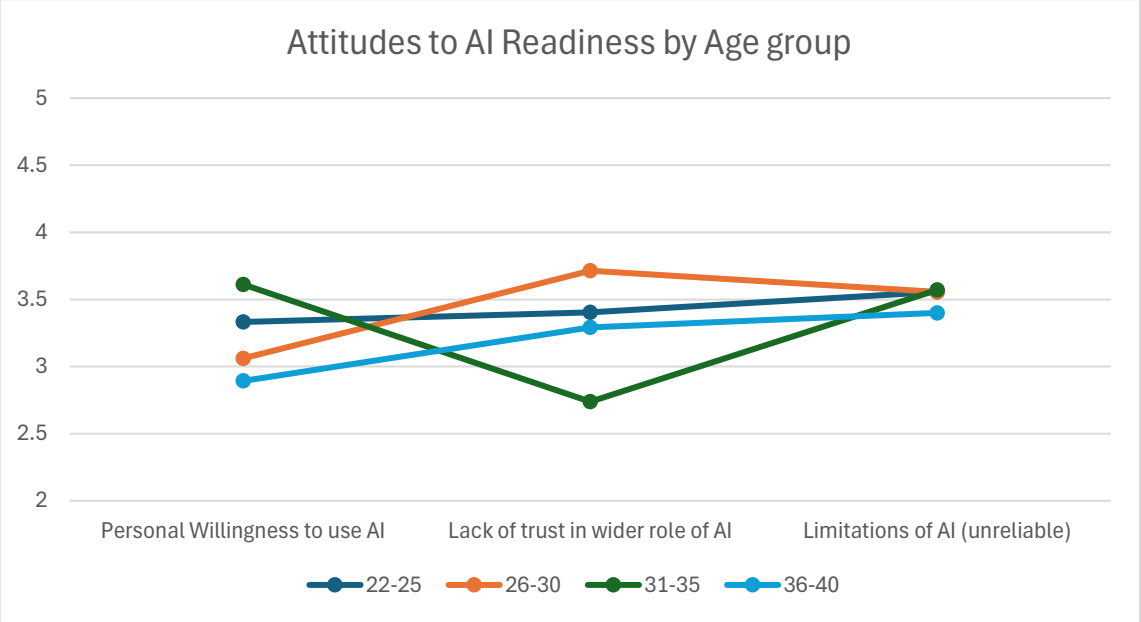


Figure 16

With scores above 3 indicating agreement and scores below 3 denoting disagreement, student teachers aged 31-35 years had highest mean score in Willingness to use AI showing a highly positive attitude towards AI, and they also disagreed with the Lack of trust in the wider role of AI. The reverse was true for the 26–30 year-olds who showed minimal agreement with personal willingness to use AI and a high lack of trust. All age groups were equally aware of the limitations of AI and its unreliable output as a LLM.

Next the student teachers were asked to self-rate their AI skill level and knowledge on a 5-point scale ranging from Beginner (not as good as friends) to Expert (could teach peers). As a marker the middle category was labelled 'Like my friends' so the student teachers could indicate if there were more or less advanced than their friends if they were not choosing the Beginner or Expert options. 41% of student teachers rated themselves as being in the Beginner or Got Started category with an additional 41.4% rating themselves to be 'Like my friends'. In total, over 80% of student teachers recorded themselves as being in the first three categories with only 37 students declaring they were more AI capable than their friends or able to teach their friends about AI.

Factor	Beginner	Got started	Like my friends	Better than friends	Expert
Personal Willingness to use AI	2.952	3.182	3.368	3.656	3.821
Lack of trust in wider role of AI	3.522	3.436	3.343	3.364	3.958
Limitations of AI (unreliable/flawed)	3.560	3.578	3.464	3.630	3.650

Statistically significant difference by self-assessed AI skill level $F(4, 202) = 6.61$ $p = 0.00$ ($p<0.05$)

Table V

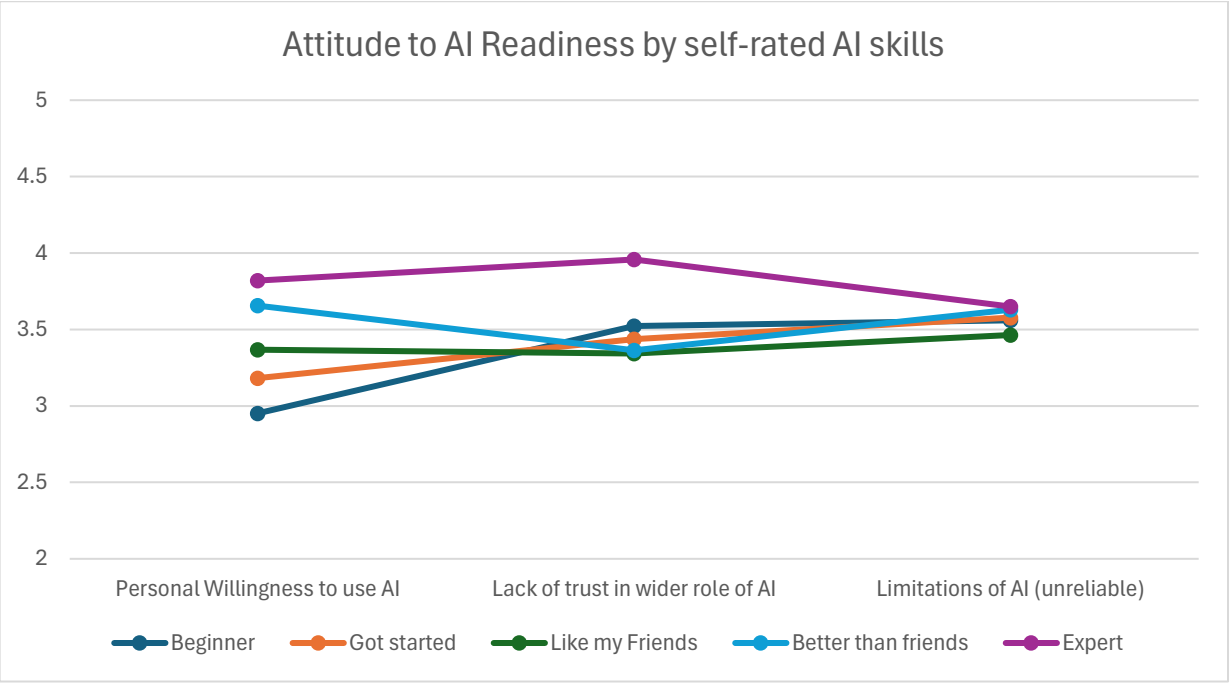


Figure 17

Once again, apart from the Beginner's score for Personal willingness to use AI, all other scores were in excess of 3 indicating agreement with the factors. As shown in Figure 17, when the self-rated skill level increased there was increased level of Personal willingness to use AI. However, the highest mean score for Lack of trust was from the Experts followed by the cluster of the 3 categories of Beginners to Like my friends. The lowest level of Lack of trust was reported by the group who rated themselves as Average (like their friends) and they were also the category with the lowest score on the Limitations of AI. For all other categories, the increased level of competence showed an increased agreement on the limitations of AI.

Due to the divergent profile for the Experts, and in the first factor related to the Personal willingness to use AI, there was a statistically significant difference by AI skills rating $F(4, 202) = 6.61$ $p = 0.000$ ($p<0.05$).

In contrast, for the self-rated AI Readiness as a Teacher, the mean scores for Personal Willingness to use AI were more divergent ranging from 2.5 to almost 4.5, although they still increased as student teachers' overall sense of readiness increased from Low to High. As shown in Figure 18, as readiness to embrace AI in the classroom increased, the student teachers' Lack of trust scores and Limitations of AI scores both decreased indicating a growing confidence that mastery of AI prompt engineering - the use of suitable prompts - would create more reliable and trustworthy resources for teaching. It would appear that the more competent the student teachers, the greater their awareness of challenges to be faced when using AI and how to address these using effective prompts. A statistically significant difference existed by level of readiness to use AI as a teacher $F(4, 198) = 3.46$ $p = 0.009$ ($p<0.05$).

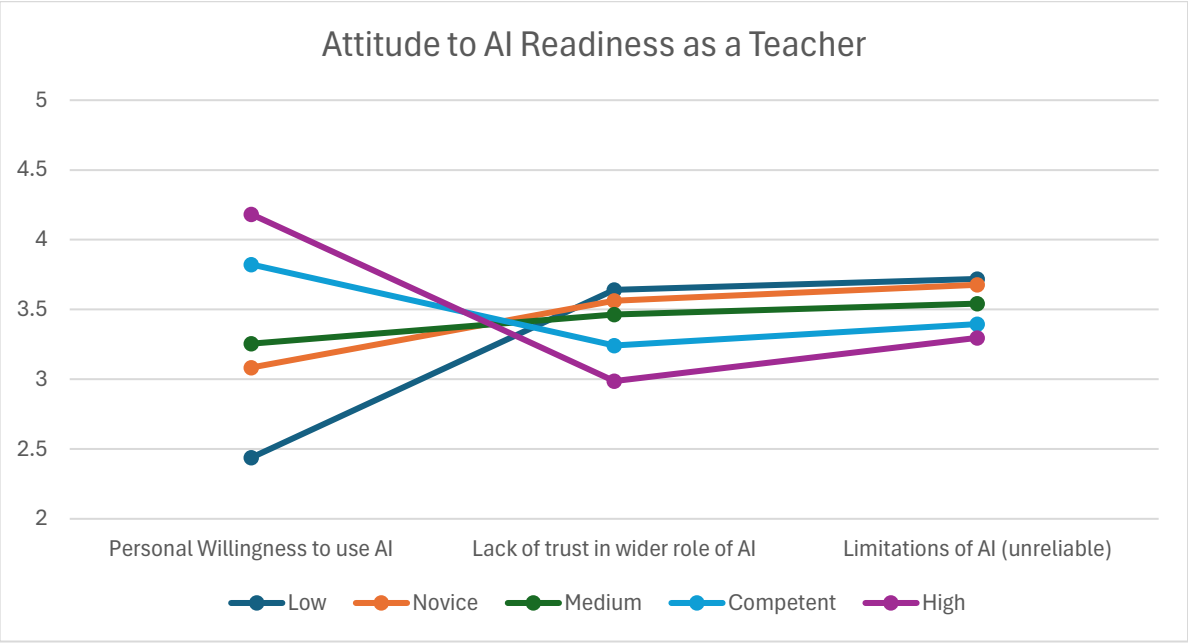


Figure 18

Summary of Student Teachers' Attitudes to AI readiness.

Overall, it can be concluded that gender, age and the location of the ITE programme (NI or Ireland and by implication the PGCE and PME courses) does not have a statistically significant impact on student teachers' attitudes towards AI readiness as defined by Shepman and Rodway (2020). From Figures 14 to 16, it can be seen that the scores across the three factors measuring the positive and negative aspects of personal willingness, lack of trust and limitations in terms of reliability of AI were congregating mainly around the mean score of 3 on the 5-point Likert attitudinal scale. A more distinguishable pattern in the profiles emerged when student teachers had to reflect upon their own perception of AI skills and knowledge as shown in Figures 17 and 18. In both cases, increased AI expertise resulted in increased willingness to use AI and an increasing trust in the students' own ability to generate reliable teaching materials/opportunities to use AI as a teacher. A plausible explanation for this result is the development of more effective prompt engineering as the student teachers' experience and familiarity with GenAI assists them in understanding how to engage well with the AI tools to achieve their goal.

The next section of the online questionnaire was based on the work of Wang & Wang (2022) and their AI Anxiety scale.

Student Teachers' AI Anxiety

Wang & Wang (2022) developed a 21-item survey to measure the relationship between AI anxiety and motivated learning behaviour in individuals using the four factors: learning, job replacement, sociotechnical blindness and AI configuration. Not all items were relevant to the teaching context so these were removed, and terms such as 'humanoid robots' were re-defined as 'ChatBots or equivalents' to reflect the current developments in AI. As a result, an 18-item AI Anxiety scale was included in the questionnaire with 6 items capturing anxiety related to Learning, to Job replacement (5 items), to Sociotechnical blindness (4 items) and anxiety resulting from AI Configuration (3 items). The existing 4 factor model was confirmed by the data from the student teachers on the PGCE and PME programmes.

Typical items for each factor include:

- **Learning** – *Being unable to keep up with the advances associated with AI makes me anxious; Learning to use the range of AI products makes me anxious*;
- **Job replacement** – *I am concerned that AI will make us lazy; I am concerned that AI products may replace humans*;
- **Sociotechnical blindness** – *I worry that AI products may be misused; I am concerned that an AI product may get out of control and malfunction; I am afraid that AI may lead to robot autonomy*; and
- **AI configuration** – *I find humanoid AI (like chatbots) intimidating; I have an irrational fear of humanoid AI products (e.g. robots).*

This 4 factor model accounted for 75.64% of variance and all factors had high reliability, measured by Cronbach's alpha, as shown below.

Factor	Reliability (Cronbach's alpha)
Learning	0.836
Job Replacement	0.723
Sociotechnical Blindness	0.764
AI Configuration	0.810

Table VI

As in the previous section, subgroups of the participating student teacher population were investigated to determine if AI anxiety was gender-related, location-based (and therefore ITE programme-related), age-related or impacted by self-assessed AI expertise and/or AI readiness for teaching.

Firstly gender-related anxiety was considered. The profiles of mean scores in each of the four anxiety measures for male and female respondents were compared using SPSS. As shown in the Tables and Figures below, there were no statistically significant differences by the student teachers' gender or location.

Factor	Man	Woman
Learning	2.829	2.863
Job replacement	3.366	3.267
Sociotechnical blindness	3.688	3.712
AI Configuration	2.957	3.226

No significant difference by gender: $F(1, 200) = 0.33$, $p=0.566$ ($p>0.05$)

Table VII

From Figure 19, the mean scores are almost identical for learning and sociotechnical blindness. However, males are very slightly more concerned about job replacement by AI than females but males are clearly less worried about AI misuse or AI getting out of control as denoted by the lower mean score for AI configuration.

Taking a mean score of 3 as representing Neither Agree nor Disagree, a score below 3 indicates disagreement while a score above 3 represents agreement. From Figure 19, both male and female

student teachers disagree that they are anxious about the use of AI in learning however both genders are concerned about the role of AI in job replacement, AI making them lazy or AI replacing parts of their job. Stronger levels of anxiety exist for sociotechnical blindness such as the misuse of AI or AI malfunctioning causing disruption while females are more anxious about ChatBots and robots than males as denoted by the difference in mean scores for AI Configuration.

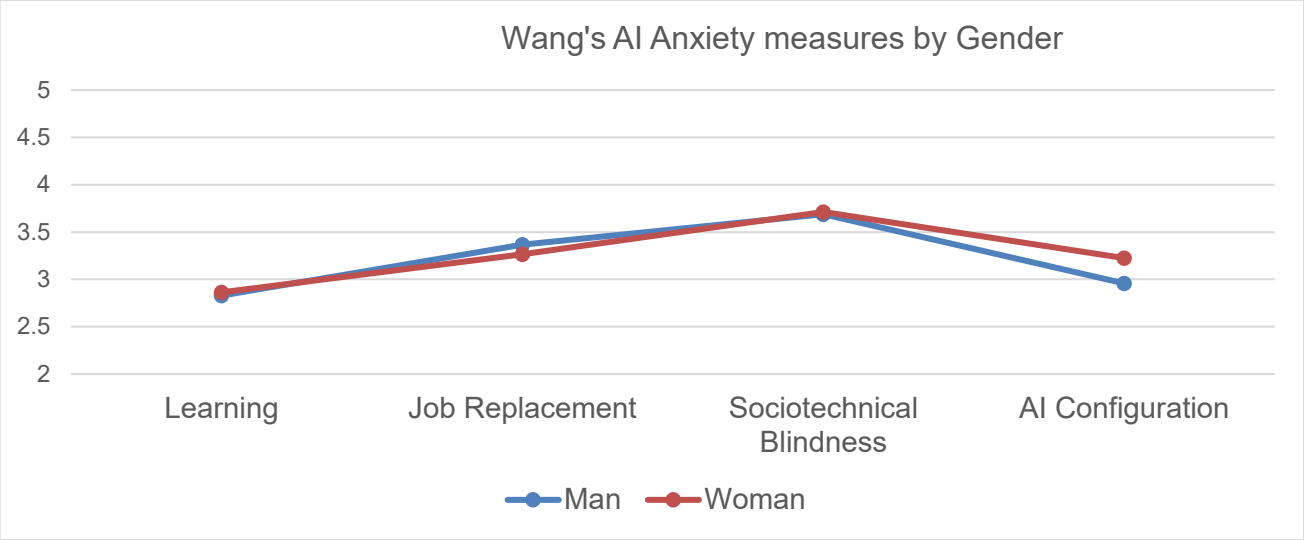


Figure 19

Comparisons were also completed for the student teachers from NI and Ireland since the two ITE programmes were independent. As before scores above 3 indicate agreement with the anxiety factors.

Factor	NI	Ireland
Learning	3.009	2.814
Job replacement	3.223	3.346
Sociotechnical blindness	3.702	3.711
AI Configuration	3.160	3.129

No significant difference by location (and therefore ITE programme) $F(1, 204) = 0.04$, $p=0.833$ ($p>0.05$)

Table VIII

The student teachers from Ireland are slightly less anxious about the role of AI on learning but a little more concerned about job displacement compared to their northern counterparts. For young people starting out on their career in teaching, it is understandable that these two areas are of most interest to them. The greatness anxieties however for both jurisdictions relate to sociotechnical blindness which may reflect their limited awareness of how to address the misuse of AI and retain control of AI-based systems, and AI configuration which includes the use of ChatBots and robots.

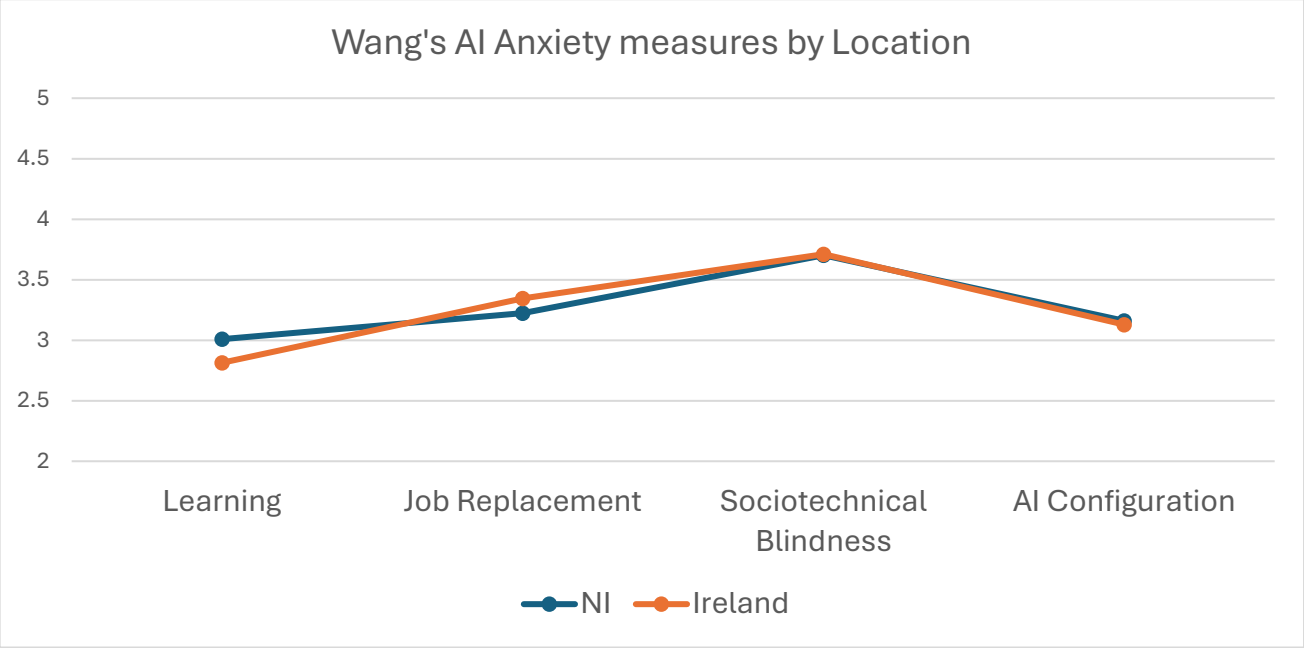


Figure 20

Age-related anxiety was also investigated as shown in Table IX. For all age groups, the mean scores on the Learning factor were below 3 indicating disagreement with the AI anxiety statements for this factor. As shown in Figure 21a & 21b, the small number of student teachers aged 31-35 years old had lower levels of anxiety compared to all other age groups however their overall profile outline mirrored that of the 26-30 year olds. All age groups demonstrated anxiety associated with sociotechnical blindness with mean scores greater than 3 while anxiety about AI configuration (the use of ChatBots or robots) existed for the 22-25 year olds and the small number of student teachers aged 36-40 years old as illustrated in Table IX.

Although there was no statistically significant difference in the profiles across the age groups, Figure 21a highlights the difference in the profile of anxiety responses from those student teachers aged 36-40 years old. Since the majority of the respondents were aged 22-25 years old it is important to note the higher levels of anxiety (mean scores of 3 or above) across the four factors under investigation.

Factor	22-25	26-30	31-35	36-40
Learning	2.919	2.707	2.343	2.750
Job replacement	3.385	3.205	2.821	3.313
Sociotechnical blindness	3.176	3.813	3.214	3.313
AI Configuration	3.202	2.848	2.429	3.063

No significant difference by Age group: $F(3, 176)=2.13$ $p=0.098$ ($p>0.05$)

Table IX

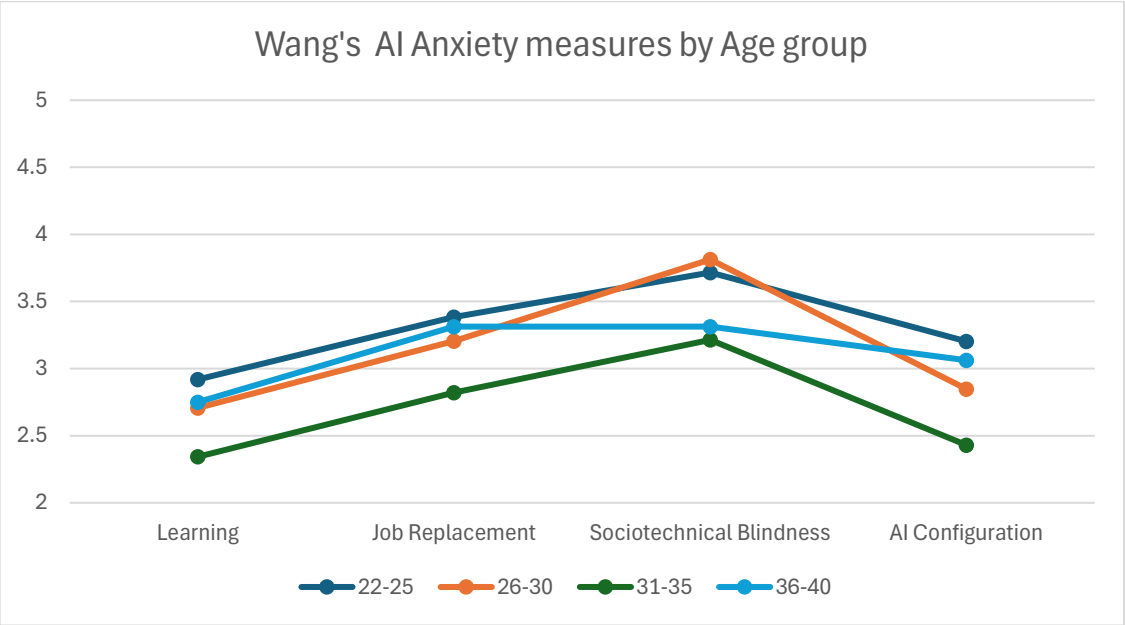


Figure 21a

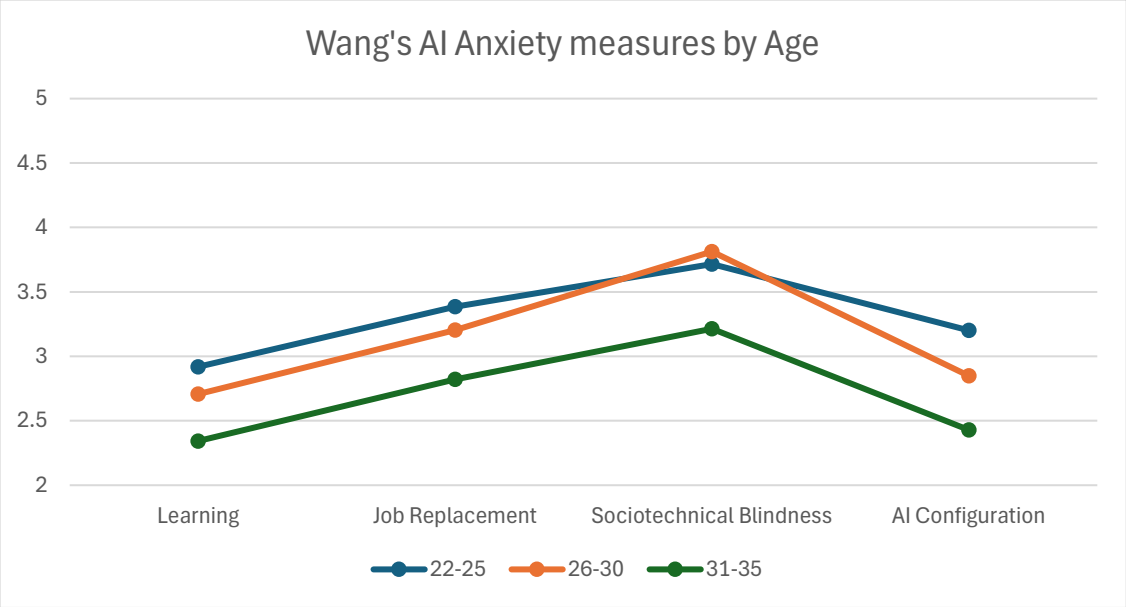


Figure 21b without the profile for the 36-40 year old age group

Self-rated AI skills

When considering the student teachers' self-rated AI skills, it was anticipated that AI anxiety would decrease with increasing familiarity with, and use of, AI tools. Like most new technologies, novices typically experience the challenges and feel concerned until their skills develop and therefore the AI anxiety profile of Beginners should be above that of the Expert users.

Figure 22 broadly aligns with these expectations apart from the Expert's anxiety in Sociotechnical blindness. As anticipated, an increase in the AI expertise category lowers the mean score in the Learning factor from 'anxious' (a score above 3) for Beginners and those who have Got Started, to around 2.5 (little anxiety) for the Average-Expert groups. In terms of Job replacement, the Experts were the only group not anxious about this prospect and the other groups clustered above a score of 3. All student teachers

regardless of AI skill level revealed higher levels of anxiety regarding sociotechnical blindness indicating strong concerns over AI misuse and how to manage control of AI. Experts' scores were notably out of synch with the rest of the profiles indicating more knowledge may also increase the awareness of the extent of the dangers being faced and the challenges of controlling AI misuse. Both the Experts and the students whose AI skills were above those of their friends reported low levels of anxiety in AI configuration so were less intimidated by ChatBots and humanoid robots or equivalent.

In this case, a statistically significant difference exists between the various AI skills groups as shown by the deviations in parallelism of the profiles in Figure 22.

Factor	Beginner	Got started	Average (like my friends)	Better than friends	Expert
Learning	3.460	3.040	2.662	2.546	2.500
Job replacement	3.500	3.373	3.290	3.202	2.938
Sociotechnical blindness	3.942	3.714	3.713	3.404	3.750
AI Configuration	3.508	3.145	3.135	2.769	2.875

Statistically significant difference by AI skill: $F(4, 201)=3.83$, $p=0.005$ $(p<0.05)$

Table X

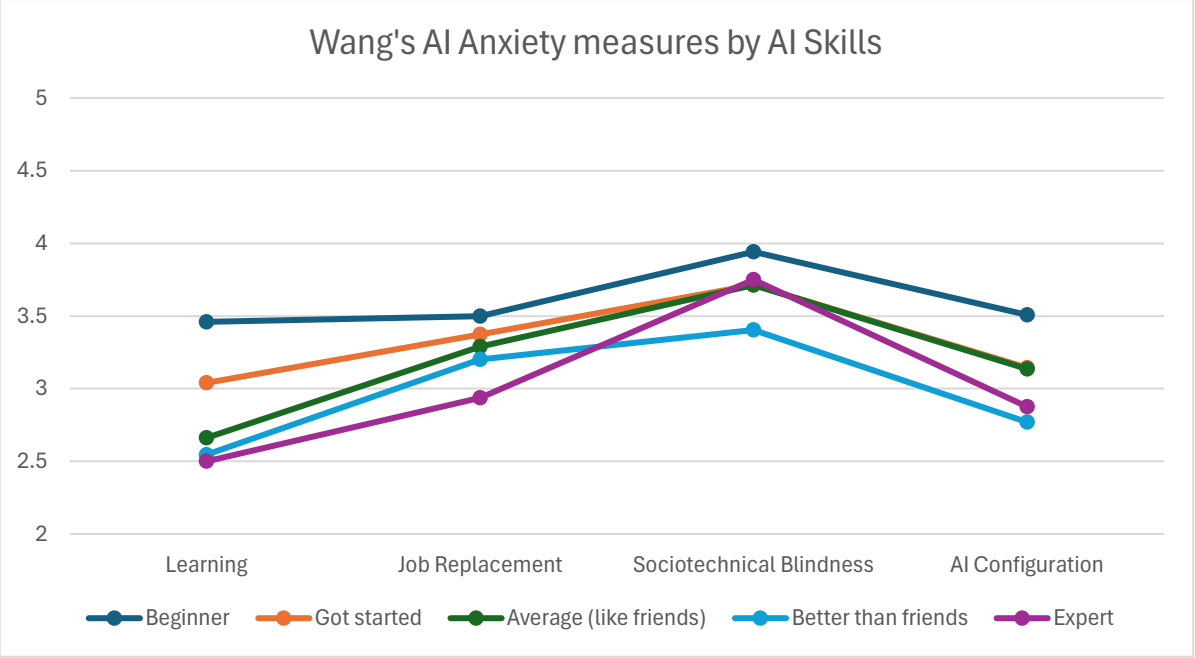


Figure 22

Readiness to Teaching using AI

Aligned with the above findings, a statistically significant difference existed between the categories of Readiness to Teach using AI as shown in Table XI and Figure 23 below. With approximately 80% of the respondents selecting the three categories from Low to Medium, it is clear that AI anxiety is generally close to or above a score of 3 across all four factors.

In keeping with the earlier patterns of responses, Anxiety levels consistently decrease as level of AI readiness increases especially for Learning and Job replacement. There is a clustering of anxiety for all student teachers around sociotechnical blindness and also around AI configuration (use of ChatBots and robots) for the Low-Medium subgroups. The former anxiety around sociotechnical blindness – the

misuse of AI or AI getting out of control - may be a reflection of the perceived importance of the teacher's role both for pedagogy and assessment/feedback. The Competent and High category student teachers appear not to be anxious about the role of AI in Learning, Job Replacement and the use of ChatBots and robots (AI configuration) as shown in Figure 23.

Factor	Low	Novice	Medium	Competent	High
Learning	3.469	3.015	2.892	2.610	2.208
Job replacement	3.750	3.532	3.400	2.994	2.770
Sociotechnical blindness	3.992	3.673	3.735	3.595	3.480
AI Configuration	3.344	3.224	3.242	3.036	2.790

Statistically significant difference by Readiness to teaching using AI: $F(4, 198) = 7.42$, $p=0.000$ $(p<0.05)$

Table XI

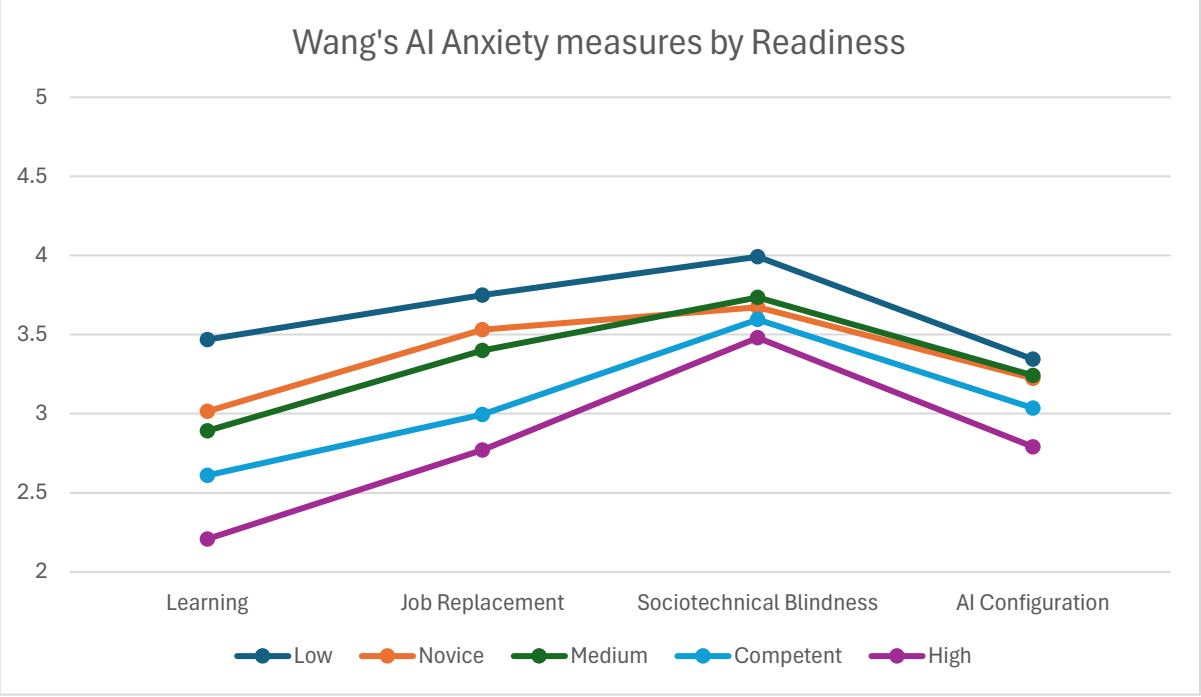


Figure 23

Summary of AI Anxiety

Generally student teachers appear less anxious about the AI Learning factor especially as their expertise in AI increases. A similar pattern emerges in terms of Job Replacement where more savvy AI users recognise the need for the 'human in the loop' and the importance of a balance in the control of AI usage. Following on from this, the 'control' of AI does emerge as an area of anxiety as indicated by the sociotechnical blindness scores being consistently high regardless of the level of AI expertise. This factor captured aspects such as misuse of AI, retaining and managing control over AI and associated products. This concern is also reflected, albeit to a lesser extent, in the AI configuration factor for the less AI expert students. The role of ChatBots and robots raises concerns for the Low-Medium subgroups whereby a lack of knowledge or the impact of negative media is leading to anxiety over expectations of the future role of AI-related products.

Factors impacting on Student Teachers' Behavioural Intention to use AI

Chai, Wang and Xu (2020) used an Extended Theory of Planned Behaviour model integrated with Davis' (1989) Technology Acceptance Model and the Technology Readiness Index (TRI) to construct a scale measuring Chinese secondary school students' intentions to learn AI. Their confirmatory factor analysis identified eight key factors influencing behavioural intention, including AI literacy, Subjective Norms, Perceived usefulness of AI, AI for Social Good, AI anxiety, AI learning confidence, optimism, and attitude towards using AI. Building on this theoretical foundation and Chai, Wang and Fan's (2021) validated 35-item Likert scale, the current study adapted these measures for Irish student teachers, revealing strong correlations (>0.4) between personal traits (AI confidence, optimism) and external influences (subjective norms, AI for social good) and Behavioural Intention to use AI as shown in Figure 24.

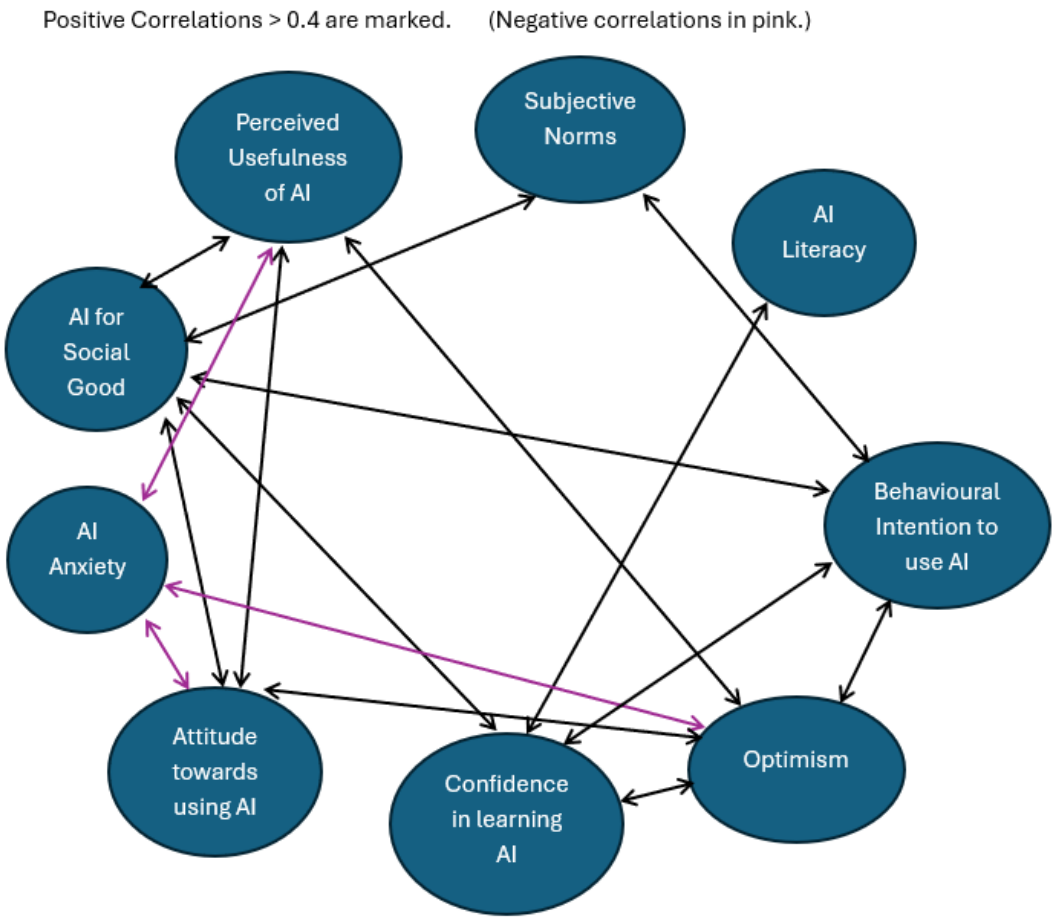


Figure 24 Correlations between Chai et al.'s factors for student teachers across Ireland.

Using the 35 items provided in Chai et al. (2021)'s model for Behavioural Intention to use AI, EFA revealed a 9 factor model accounting for 72.98% of variance. All factors were highly reliable with Cronbach's alpha greater than 0.7 (to 1 decimal place) as shown in Table XII.

Factor	Reliability (Cronbach's alpha)
AI literacy	0.759
Subjective Norms	0.763
Perceived Usefulness of AI	0.929
AI for Social Good	0.771
AI Anxiety	0.838
Behavioural Intention	0.909
Confidence in learning AI	0.831
Optimism	0.681
Attitude towards using AI	0.939

Table XII

As in the earlier analysis there was no statistically significant difference in the mean factor scores by gender, location (and therefore ITE programme) and age group.

Factor	Man	Woman
AI literacy	3.323	3.129
Subjective Norms	3.275	3.130
Perceived Usefulness of AI	3.136	3.325
AI for Social Good	3.457	3.340
AI Anxiety	3.343	3.224
Behavioural Intention	3.386	3.449
Confidence in learning AI	3.561	3.555
Optimism	3.267	3.341
Attitude towards using AI	3.133	3.273

No significant difference by gender $F(1, 201) = 0.03$, $p=0.855$ ($p>0.05$)

Table XIII

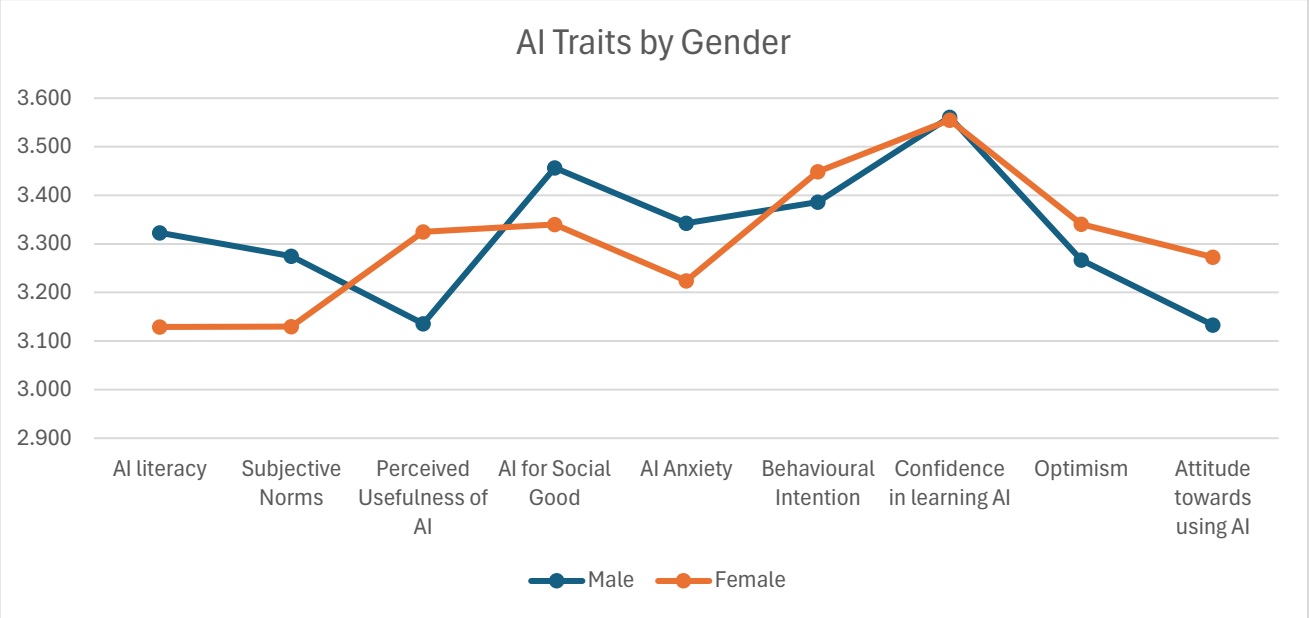


Figure 25

All scores for both genders are greater than 3 indicating a positive attitude towards the behavioural intention to adopt AI. When comparing the male and female profiles, the females rated the Perceived usefulness of AI, Behavioural Intention, Optimism and Attitude towards using AI more highly than their male counterparts reflecting a more personal decision to adopt AI. In contrast males scored more highly on AI Literacy, Subjective Norms and AI for Social Good all of which are influenced by or have impact upon others as well as self.

When the student teachers' location was considered and by implication their ITE programme (PGCE or PME), there was an agreed consensus regarding the intention to use AI.

Factor	NI	Ireland
AI literacy	3.162	3.209
Subjective Norms	3.085	3.197
Perceived Usefulness of AI	3.234	3.256
AI for Social Good	3.431	3.366
AI Anxiety	3.415	3.245
Behavioural Intention	3.553	3.377
Confidence in learning AI	3.612	3.520
Optimism	3.390	3.265
Attitude towards using AI	3.092	3.250

No significant different by location (ITE programme) $F(1, 205) = 0.16$, $p=0.690$ ($p>0.05$)

Table XIV

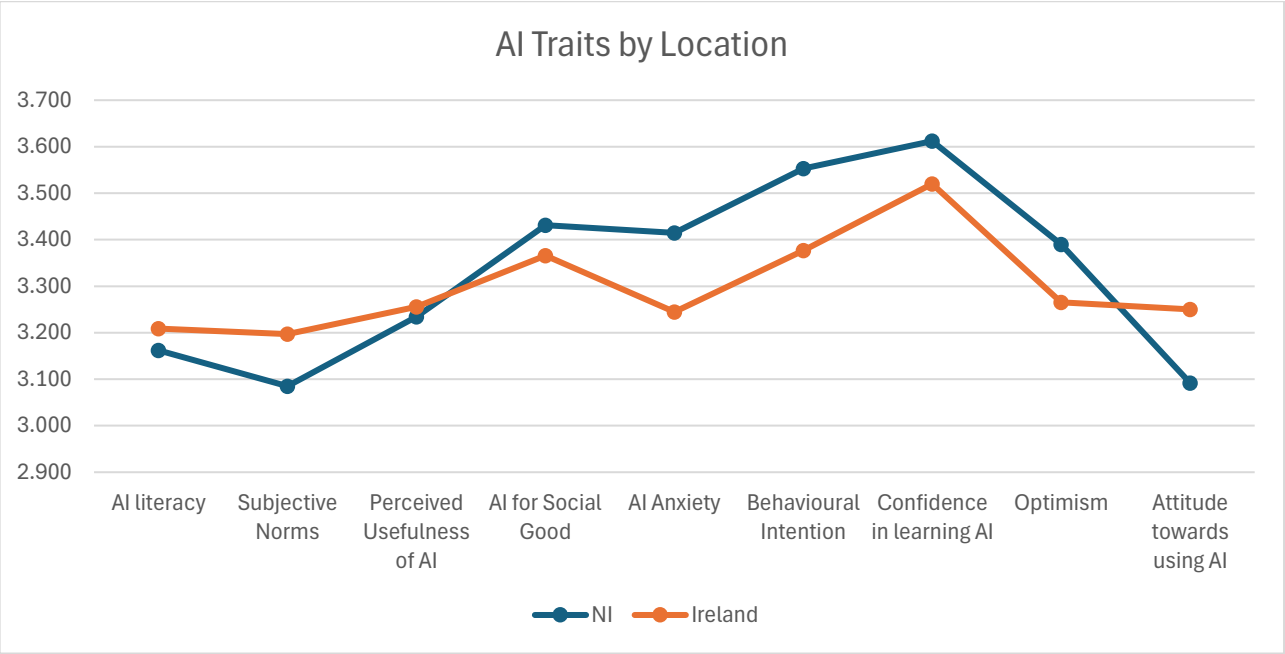


Figure 26

All student teachers were scoring above 3 in each category indicating a positive overall behavioural intention to use AI. Students from Ireland had slightly higher mean scores for AI Literacy, AI Attitude and Subjective Norm indicating clarity and confidence about using AI to meet the expectations of others, whereas student teachers from NI scored noticeably higher on AI anxiety (for future developments in AI). Nonetheless the mean scores of student teachers from NI were slightly higher on AI for Social Good, Behavioural Intention to use AI, Optimism and AI Confidence (to succeed with AI) indicating positive disposition and personal willingness towards using AI. There was no real difference in the mean scores for the Perceived Usefulness of AI between the two locations which is typically a deciding factor in adopting new technologies.

An age-related investigation of any differences in intention to utilise AI produced no significant difference at the 5% level however the 36-40 year olds scored 3 or below on AI literacy, Perceived Usefulness of AI, Social Good, and Attitudes towards AI indicating they were less positive than their peers. However, they had limited AI anxiety unlike their younger counterparts aged 22-25 and 26-30 years old. Student teachers aged 31-35 years old appeared to be most positively disposed to using AI and least anxious about its role in the future.

Factor	22-25	26-30	31-35	36-40
AI literacy	3.146	3.350	3.229	2.950
Subjective Norms	3.138	3.286	3.321	3.125
Perceived Usefulness of AI	3.266	2.973	3.357	3.000
AI for Social Good	3.349	3.411	3.643	3.000
AI Anxiety	3.277	3.455	2.679	2.938
Behavioural Intention	3.383	3.429	3.679	3.250
Confidence in learning AI	3.475	3.741	3.857	3.750
Optimism	3.253	3.155	3.667	3.417
Attitude towards using AI	3.217	3.012	3.238	2.667

No significant difference by Age category $F(3, 175) = 0.34$, $p=0.799$ ($p>0.05$)

Table XV

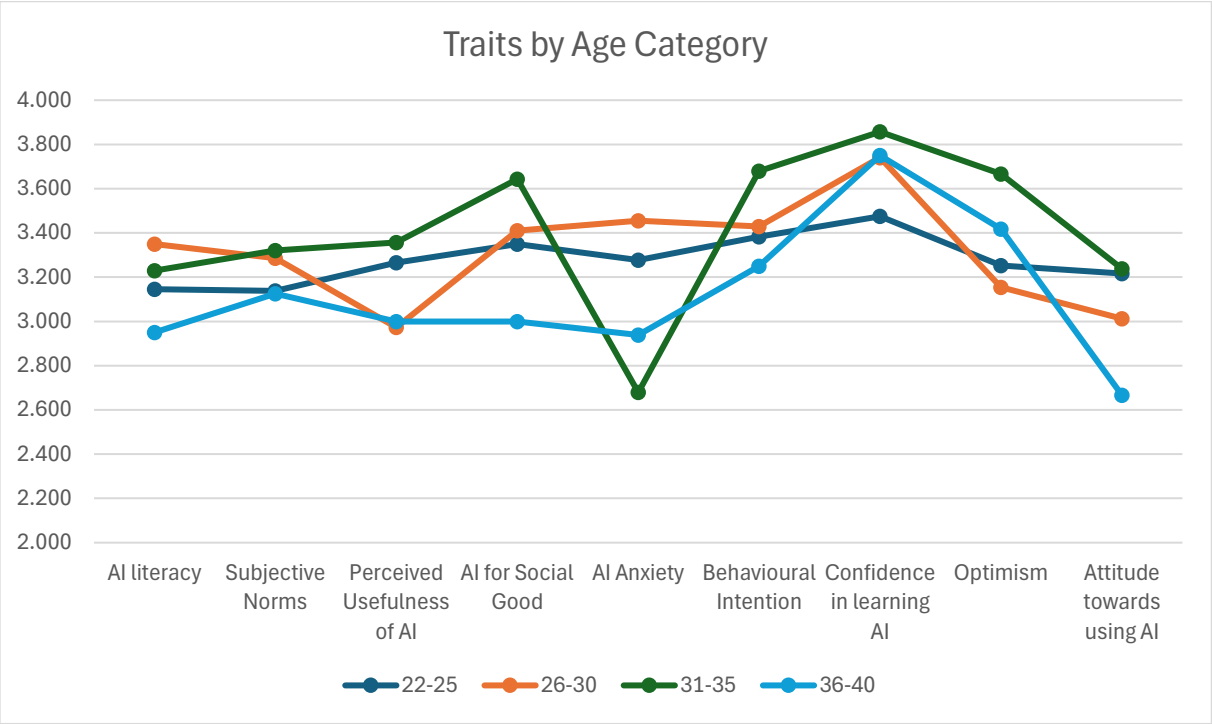


Figure 27

Self rated AI Skills

As anticipated, as student teachers progressed from Beginner to Expert in terms of their AI skills, their profiles became more positive apart from AI anxiety which decreased. From Figure 28, it is interesting to note that Perceived Usefulness of AI seems to be the element that changes most in the initial transition from Beginner to Novice, followed by AI for Social Good and a reduction in AI anxiety. AI literacy, Behavioural Intention and Confidence in learning AI appear to make a positive leap once the student moves from 'Average like my friends' to the next stage. The mean scores for Subjective Norm and Optimism remain clustered together even as the expertise increases. Apart from the Beginners, most student teachers are positively disposed to each of the traits indicating a positive intention to adopt AI once a sense of familiarity is in place.

Factor	Beginner	Got started	Like my Friends	Better than friends	Expert
AI literacy	2.940	3.069	3.182	3.585	3.925
Subjective Norms	3.033	3.105	3.198	3.269	3.531
Perceived Usefulness of AI	2.750	3.268	3.284	3.509	3.781
AI for Social Good	2.925	3.341	3.414	3.685	3.969
AI Anxiety	3.742	3.386	3.172	2.907	3.344
Behavioural Intention	3.050	3.318	3.428	3.796	4.063
Confidence in learning AI	3.192	3.441	3.549	3.972	4.000
Optimism	2.978	3.273	3.341	3.457	3.542
Attitude towards using AI	2.711	3.006	3.364	3.580	3.667

Statistically significant difference exists by self-rated AI skills: $F(4, 202) = 6.38$, $p=0.000$ ($p<0.05$)

Table XVI

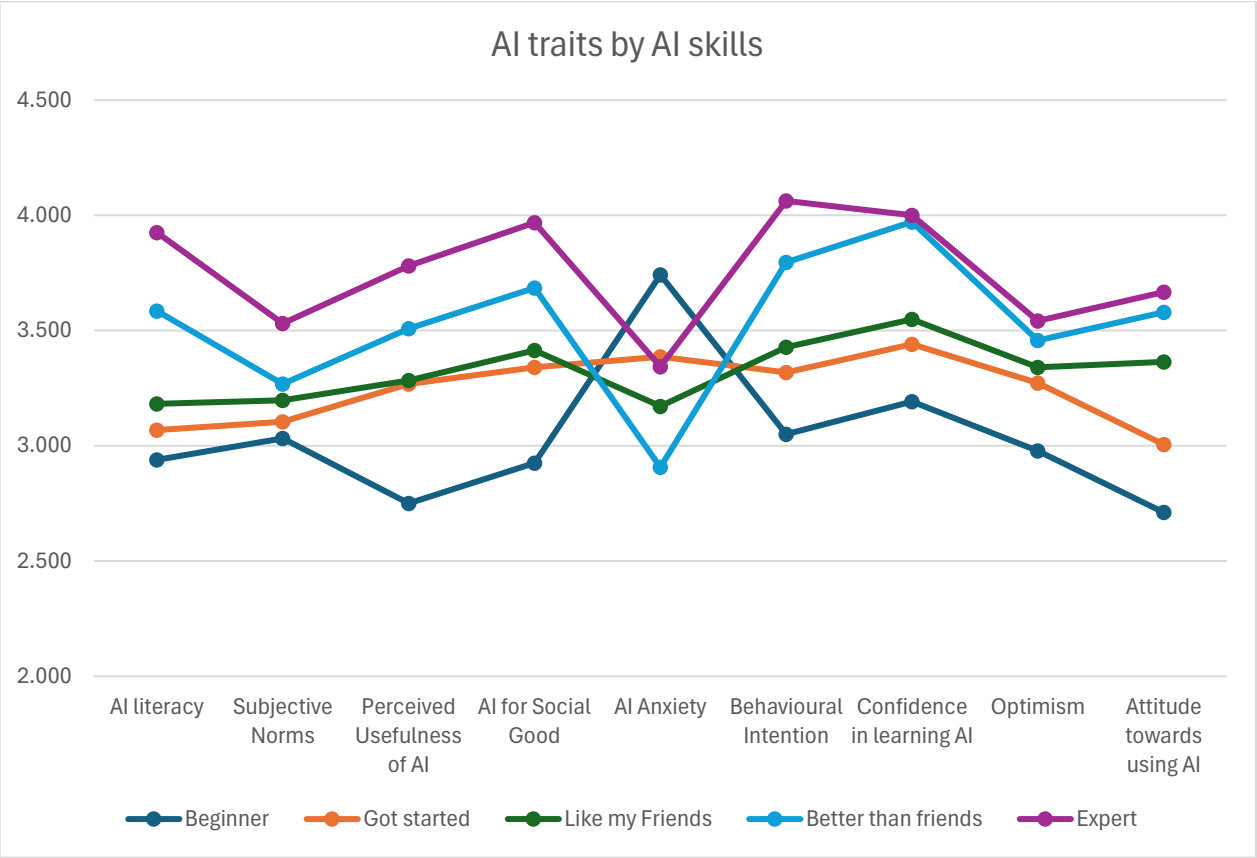


Figure 28

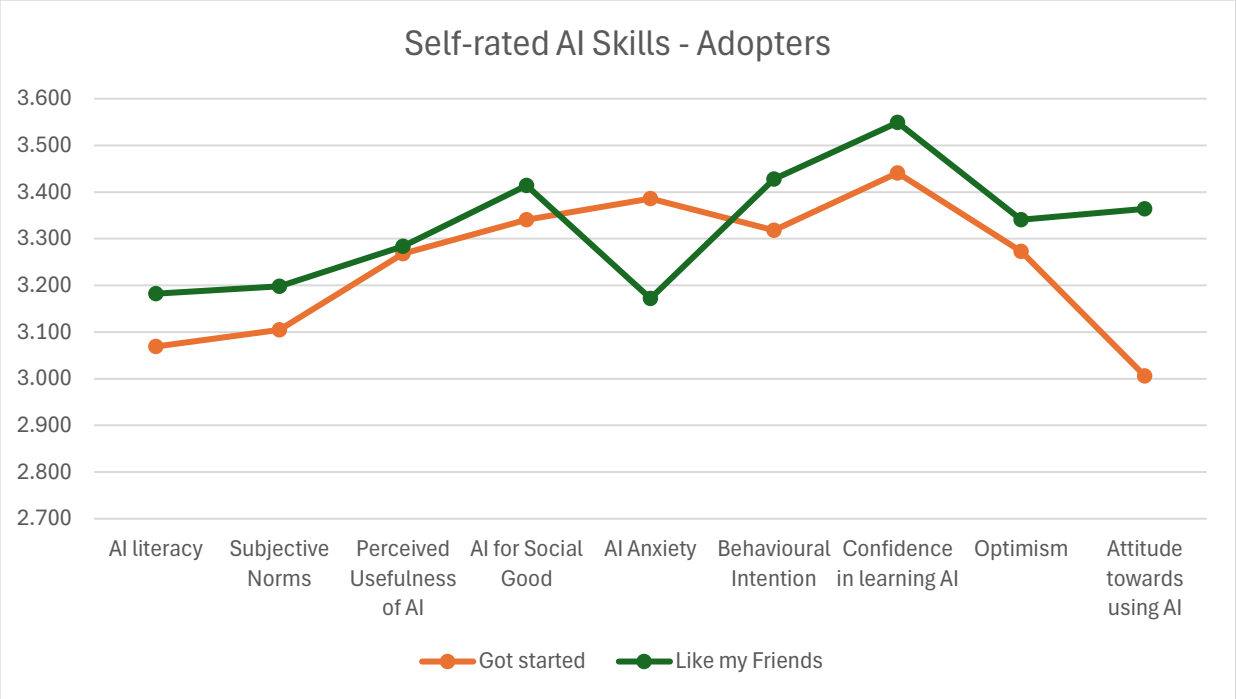


Figure 29a

In terms of the AI adopters, the Attitude towards using AI and a reduction in anxiety are the most positive benefit in terms of moving a 'Starter' to 'Average like my friends'.

In terms of the Innovators, Confidence in learning AI, Optimism and Attitude towards using AI change least in the transition to Expert. Perhaps the most interesting element of this chart is the higher level of anxiety being reported by Experts as shown in Figure 29b.

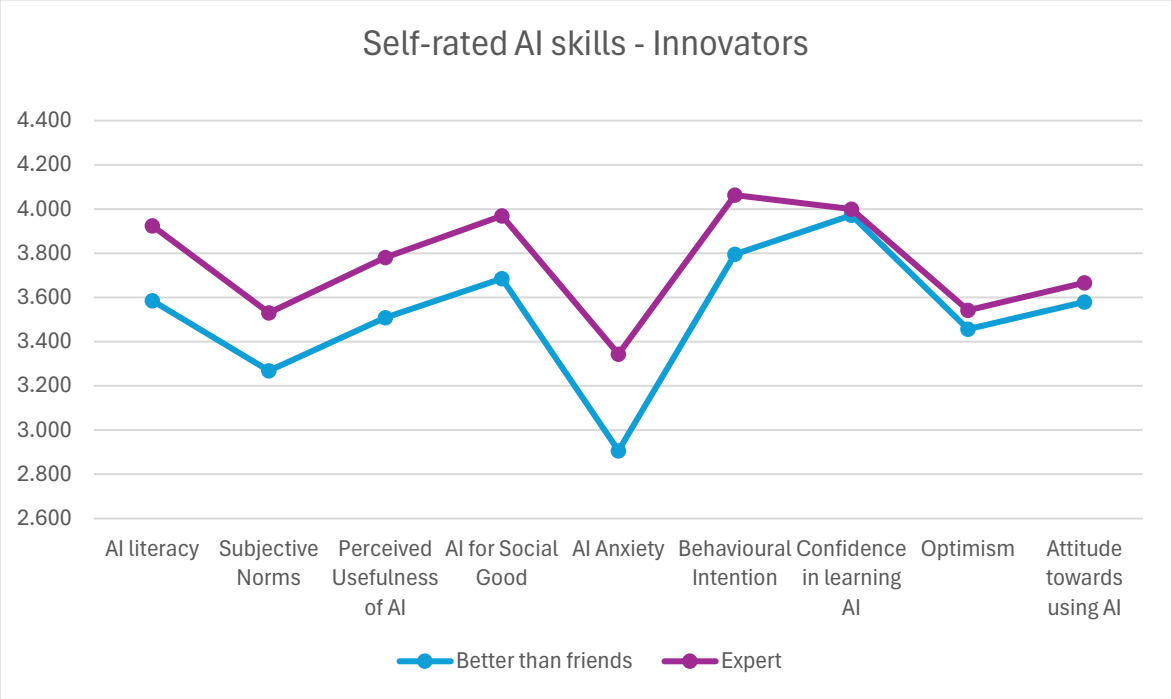


Figure 29b

AI readiness – Behavioural intention and the attitude towards using AI

Student teachers with low levels of AI Readiness to use AI in teaching seem to struggle most with the Perceived Usefulness of AI, their AI anxiety, optimism and attitude towards using AI resulting in a low behavioural intention to use AI. In contrast, those students with high levels of AI readiness are more aware of the Perceived usefulness of AI, Confidence in learning about AI, Attitudes towards AI and have a high behavioural intention to use AI, alongside low levels of AI anxiety.

Factor	Low	Novice	Medium	Competent	High
AI literacy	2.806	3.190	3.222	3.229	3.504
Subjective Norms	2.805	3.064	3.104	3.339	3.680
Perceived Usefulness of AI	2.227	2.763	3.227	3.839	4.520
AI for Social Good	2.789	3.224	3.292	3.720	3.990
AI Anxiety	3.883	3.519	3.369	2.857	2.600
Behavioural Intention	2.734	3.346	3.327	3.702	4.100
Confidence in learning AI	3.102	3.391	3.415	3.792	4.220
Optimism	2.552	3.026	3.297	3.754	3.987
Attitude towards using AI	2.156	2.949	3.138	3.794	4.173

Statistically significant difference by AI readiness: $F(4, 198) = 35.73$ $p=0.000$ ($p<0.05$)

Table XVII

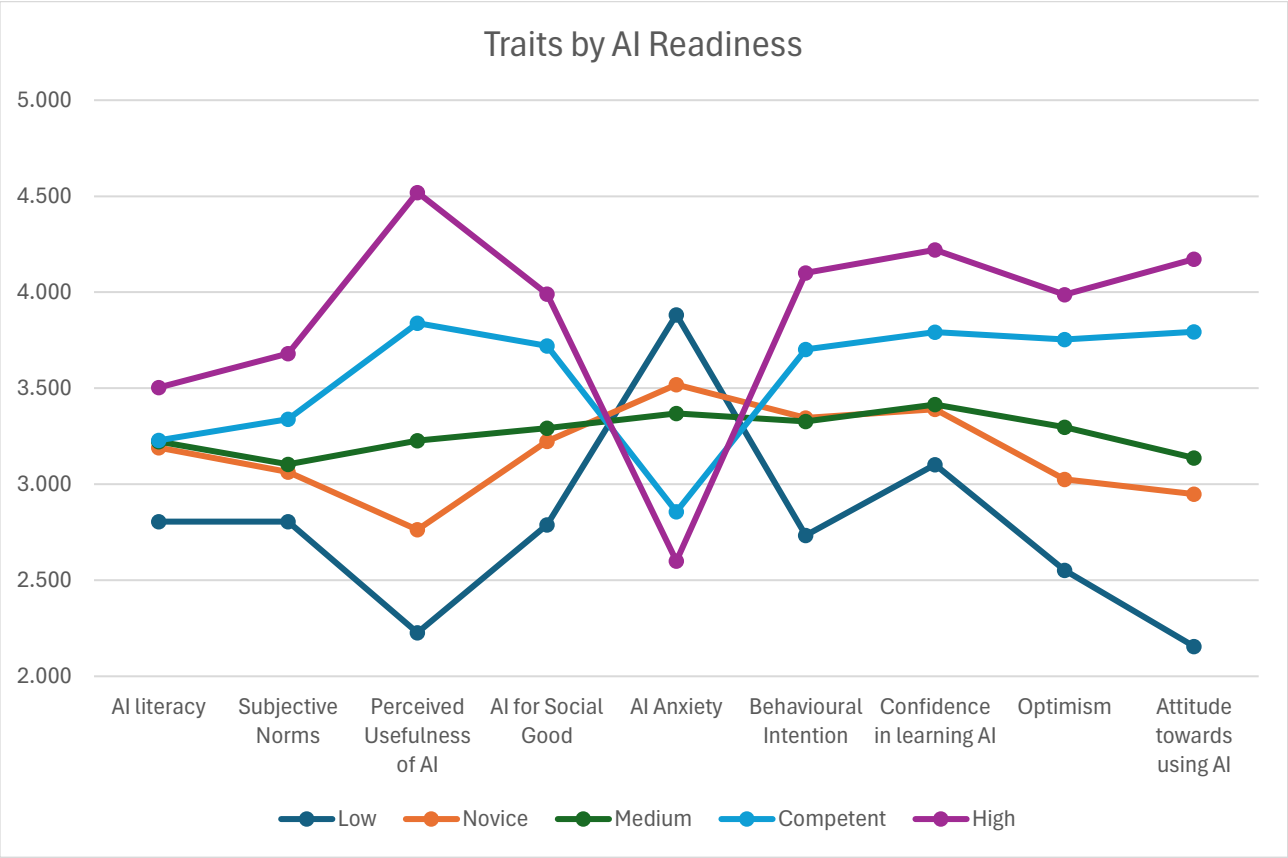


Figure 30

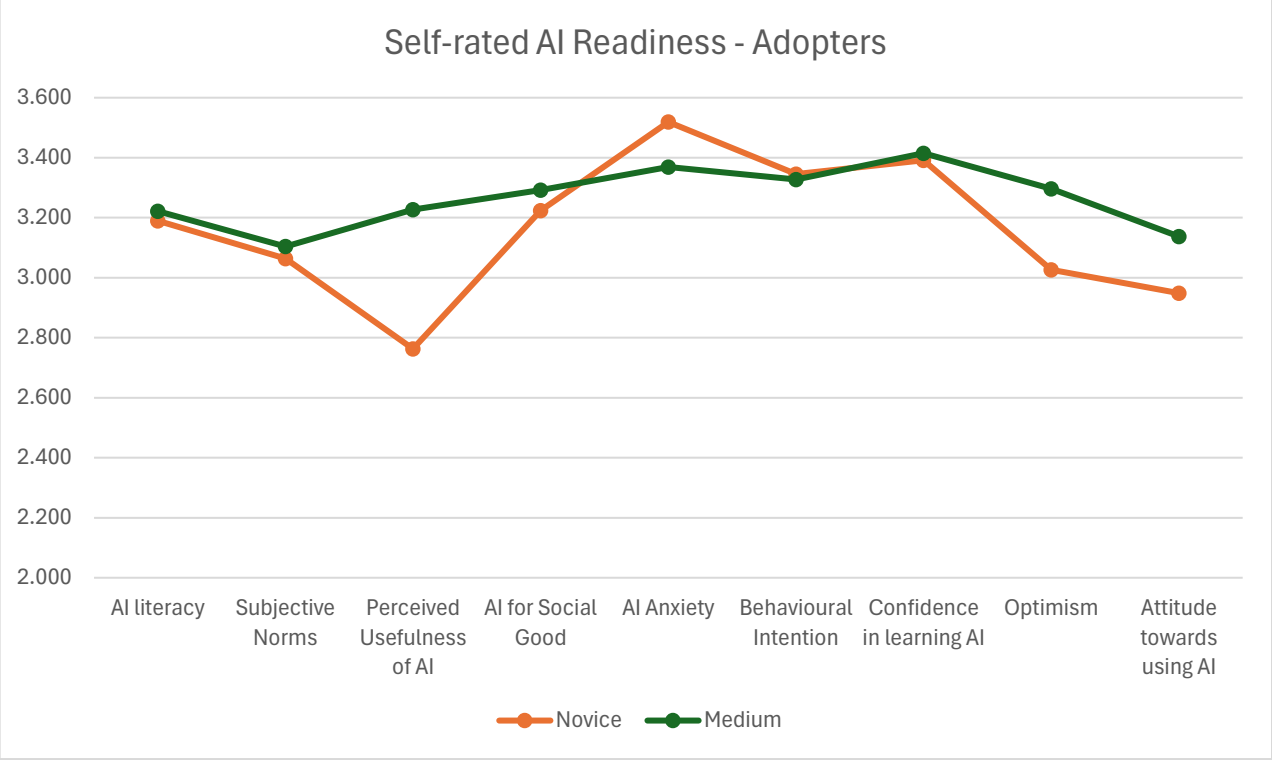


Figure 31a

Figure 31a highlights the dramatic change in perspective between Novice and Medium adopter of AI in terms of Perceived Usefulness primarily but also Optimism and Attitude to AI. Figure 31b also reveals quite a large change in Perceived Usefulness even with the Innovators. In this case, it is accompanied

by increases in behavioural intention to use AI, confidence in learning AI and a more positive attitude towards using AI.

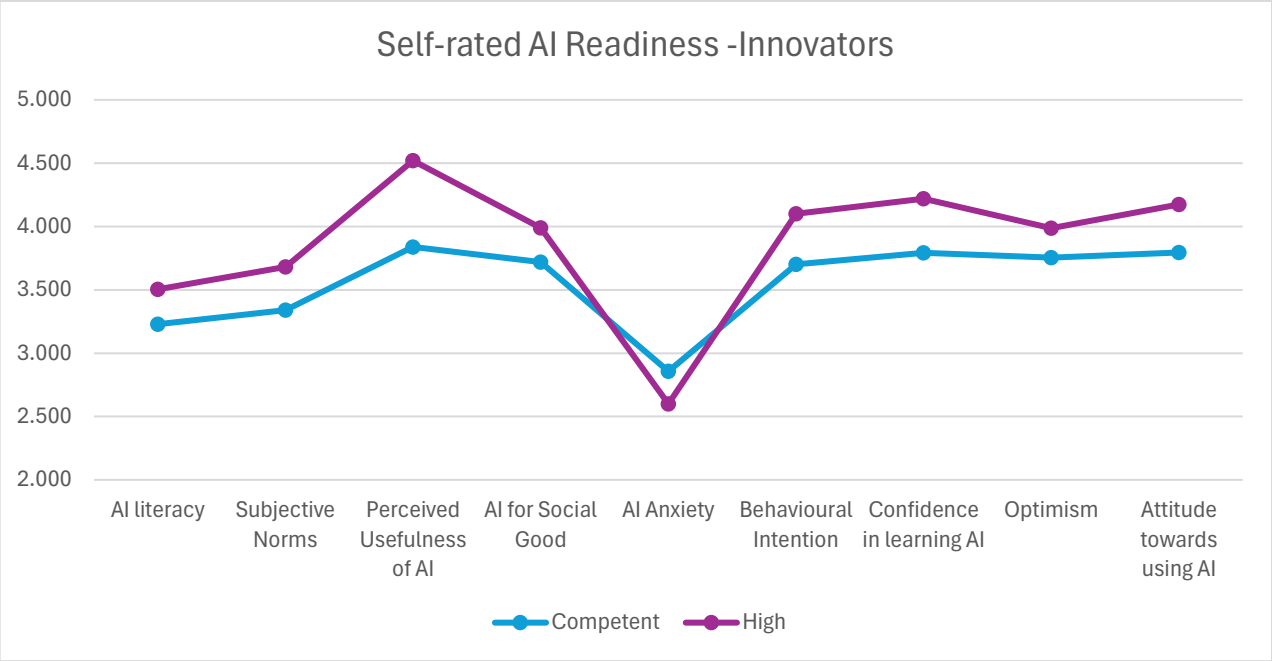


Figure 31b

In summary, the nine AI traits highlight the core capabilities associated with progression in AI use, whether framed as movement from Beginner to Expert or from Novice to Competent. Innovators appear to respond to subjective norms by meeting emerging expectations for AI use in teaching and learning and by actively developing their AI literacy. Student teachers who report high readiness to use AI for teaching score above 4 on several traits, including AI for Social Good, confidence in learning about AI, optimism, and broader attitudes towards AI. They are also more likely to recognise GenAI's potential as an intelligent tutoring system and as a means of personalising support through interactive conversations. Most notably, perceived usefulness distinguishes the groups most sharply: the High-readiness group reports substantially stronger perceptions of AI's usefulness than their Competent peers, suggesting that perceived pedagogical value may be a key driver of readiness and sustained uptake. Taken together, these patterns indicate that developing readiness is not simply a matter of technical skill, but also of confidence, value alignment, and the ability to translate AI literacy into pedagogically defensible classroom applications.

Parallels in AI Literacy

Considering Figure 32 reflecting on the four aspects of AI literacy, it could be argued that there is a mapping between Engaging with AI and a recognition of the Perceived Usefulness of AI; Creating with AI is the Behavioural Intention to use AI; Managing AI is the Optimism to use AI while Designing AI is the Confidence in Learning about AI. As a result, this definition of AI Literacy appears to be supporting the transition in AI Readiness and Skill development in AI for teachers.

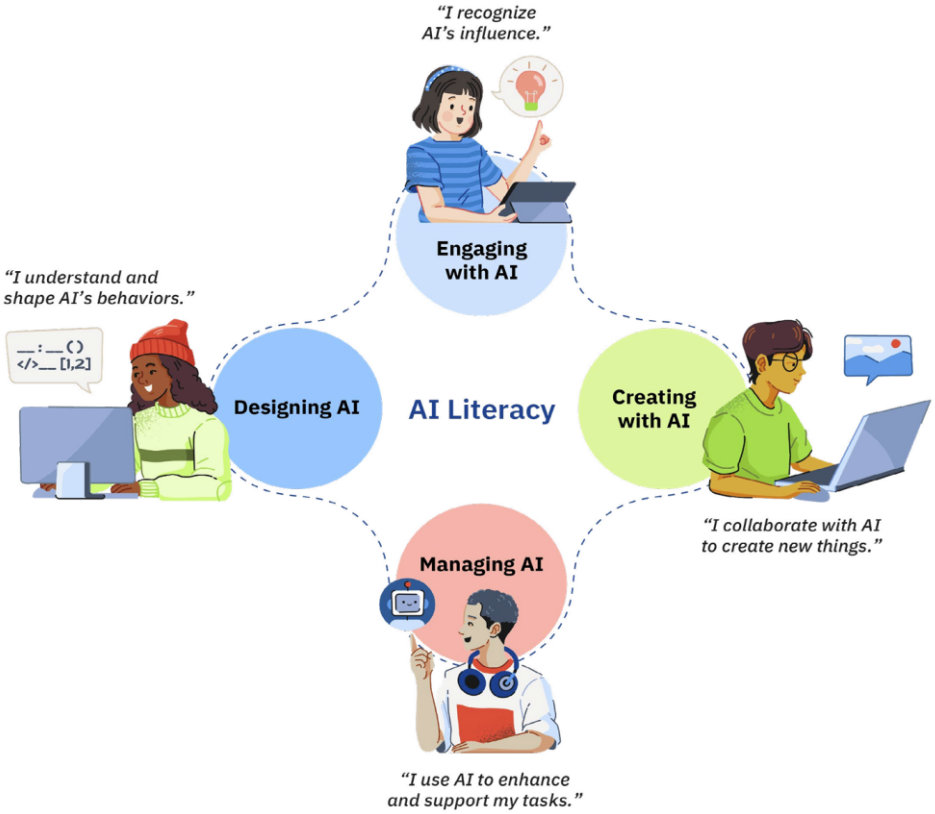


Figure 32: AI Literacy Framework for Primary and Secondary Education (OECD, 2025)

Student teachers' views on using AI in the classroom.

Xu (2020) proposes the importance of learning AI for educators saying that "teachers who know how to use AI may replace the teachers who do not know how, because AI can empower teachers and promote their role transformation which greatly improve the efficiency of management and the level of decision-making" (p.290). Moreover, the current research literature indicates that teachers should enable pupils to use AI-enhanced learning tools such as intelligent tutors and adaptive learning systems to facilitate personalised learning (e.g., self-diagnosing, providing automatic feedback and promoting online collaboration among learners) (Cavalcanti et al., 2021). The final section of the questionnaire aimed to uncover the extent to which student teachers accepted and were confident facilitating such goals in the classroom now or in classrooms of the future.

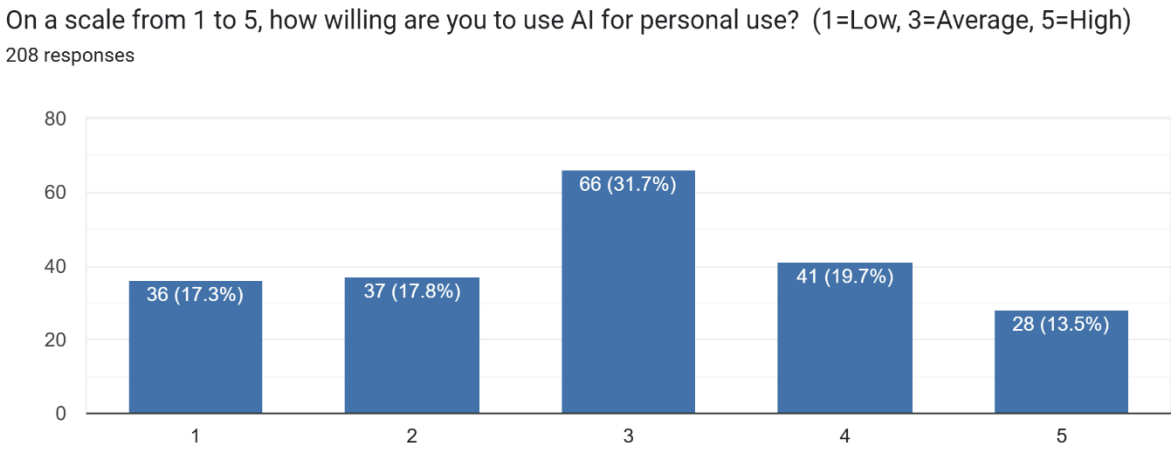


Figure 33

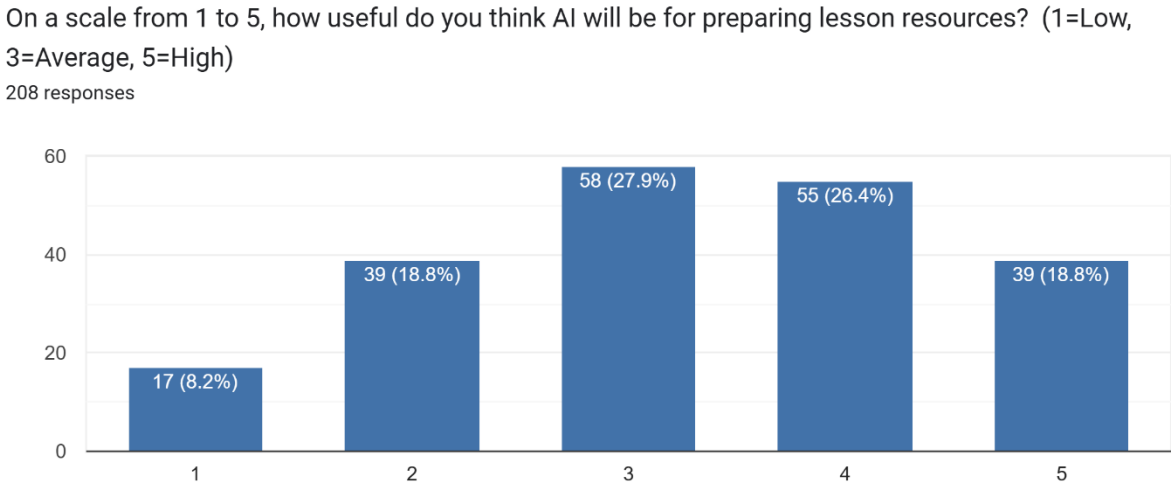


Figure 34

Just over one-quarter (27%) of respondents saw limited use of AI for preparing lesson resources while 45.2% of student teachers thought AI would be useful. However. when AI was considered for assessment purposes, only 29.8% of student teachers indicated above average usage, while 39.4% predicted below average benefits emerging from the use of Gen-AI as shown in Figure 35.

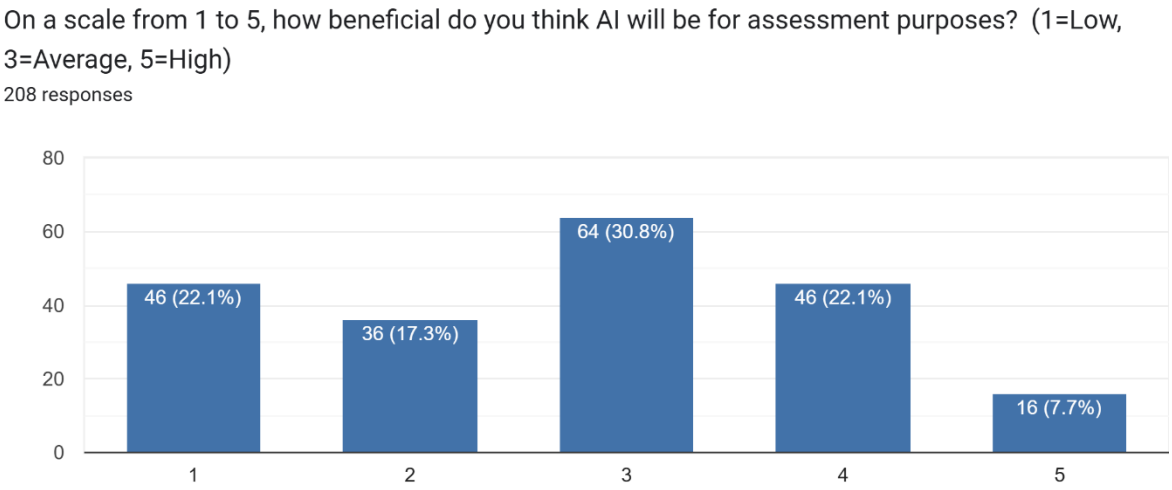


Figure 35

Although the use of Gen-AI as an intelligent tutor has been well-researched in the literature, only 13.9% of student teachers felt it would offer above average support to pupils who needed one-to-one help. Most notable were the 58.1% of student teachers who were unwilling to engage AI as an intelligent tutor for pupils needing help as illustrated in Figure 36.

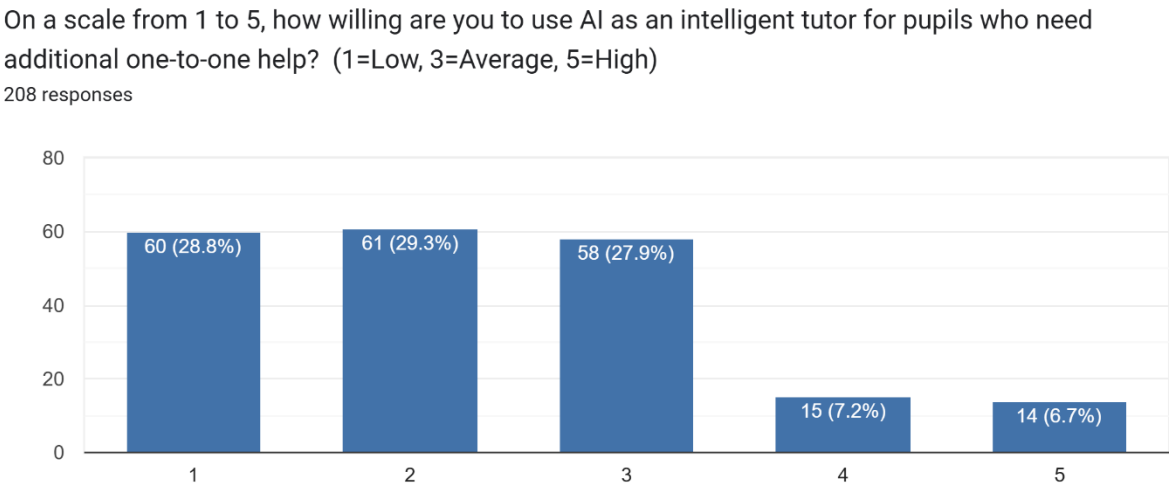


Figure 36

Despite this reluctance to utilise the non-judgemental nature of AI to support pupils needing one-to-one assistance, it was heartening to see an acceptance of AI by 41.8% of respondents for creating personalised learning pathways for pupils (Figure 37). Finally, respondents were asked to self-assess their own 'AI-readiness' as they entered teaching as a career. Figure 38 revealed that the respondents fell into almost three equal categories with 36.1% feeling 'below average' in terms of readiness, almost one-third (31.3%) of student teachers reported 'average' readiness to use AI to support their role as a teacher, and 32.6% reporting 'above average' readiness in their AI skillset (see Figure 38).

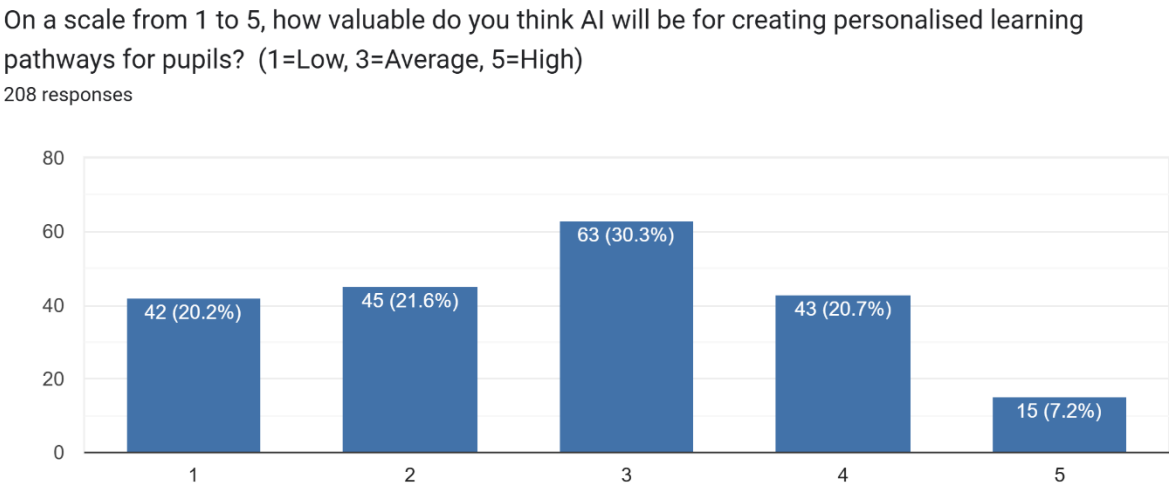


Figure 37

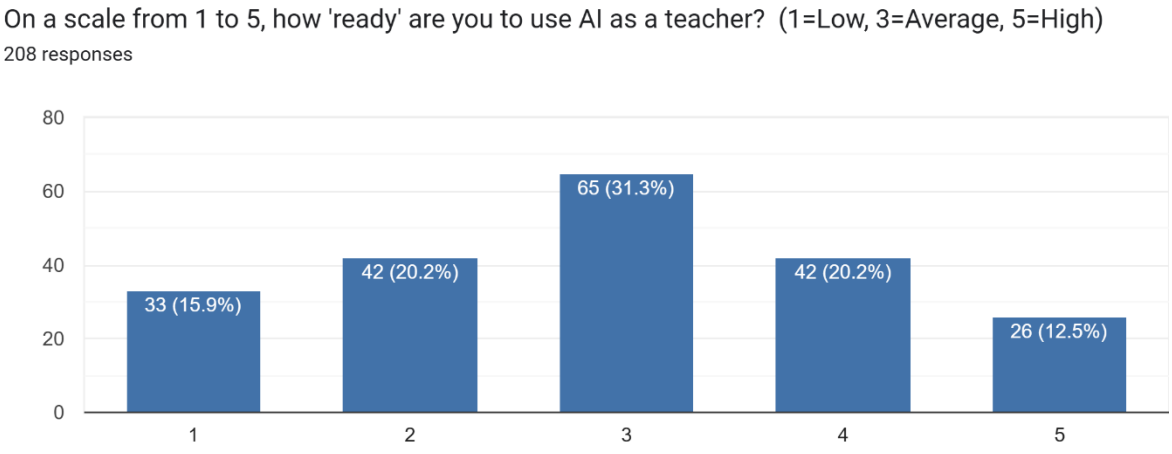


Figure 38

Qualitative findings: Descriptive thematic analysis of open-ended responses

Open-ended survey responses (n = 22 substantive responses to "Do you have other concerns…?" plus additional comments across related items) were analysed using a **qualitative descriptive approach** and **descriptive thematic analysis** (Sandelowski, 2000; Vaismoradi et al., 2013). focusing on participants' stated concerns, perceived risks, and perceived supports for GenAI in education. The analysis produced six themes, with a cross-cutting pattern of **"bounded optimism"**: student teachers recognised practical benefits of GenAI for planning and workload, while simultaneously expressing strong concerns about governance, trustworthiness, and the erosion of human-centred pedagogy.

Theme 1: Ethical and regulatory concerns

A prominent set of comments expressed anxiety about GenAI as a system that is expanding faster than governance, with particular concern about privacy, consent, and corporate accountability.

Data privacy and consent. Student teachers raised concerns about data exploitation and insufficient safeguards, linking these to wider distrust in technology governance: *"I'm generally concerned about the lack of policies to regulate the use of AI and technology, to the detriment of individuals."* Another respondent highlighted fears about extraction and repurposing of others' work: *"Stealing data from other people. Especially the likes of artists and creators for AI generated products."*

Regulatory vacuum. Several responses framed AI as under-regulated, with education positioned as a setting where unclear rules heighten risk: *"[AI is] very poorly regulated and is used for all of the wrong things."* The absence of clear, enforceable boundaries was described as enabling misuse and creating uncertainty about what constitutes defensible practice.

Profit motive and corporate influence. A small number of detailed responses argued that commercial incentives distort outputs and public information ecosystems. One participant linked profit motives to confirmation bias and misinformation: *"AI companies motivated by profit are incentivised to give people information which appeals to and comforts them rather than a source of reliable information."* The same respondent raised concerns about model collapse and declining output quality: *"Much like a photocopy of a photocopy, the quality of the output will likely inevitably get worse."*

Descriptive interpretation: Across this theme, student teachers were not simply asking for "rules," but for clearer boundaries that establish accountability, protect users' data, and reduce uncertainty, especially relevant to ITE settings where students must learn what responsible use looks like in planning, assessment, and placement contexts.

Theme 2: Human impact and dehumanisation of learning

Many comments expressed fear that GenAI could erode uniquely human aspects of education, creativity, critical thinking, judgement, and relationships, particularly if it becomes normalised as a "default" thinking tool.

Loss of creativity and critical thinking. Several respondents voiced concern that GenAI could undermine learning through over-reliance: *"Over reliance and lack of critical thinking and creativity."* Another was blunt: *"It will remove creativity."* One participant framed the issue as cognitive atrophy: *"The brain is a muscle and like all muscles you use it or lose it."* Others worried that GenAI use could become a "shortcut" that weakens professional growth: *"I am concerned that students looking for an easy*

answer will rely on AI and hinder their own critical thinking development rather than using it as a supplementary tool."

Dehumanisation of pedagogy. Some respondents worried GenAI could diminish the relational nature of teaching: *"AI cannot pastorally support a child… It inherently lacks the ability to relate to its subject."* Another expressed concern about the loss of emotional connection: *"I fear that the use of AI may remove the human element from the classroom."*

Descriptive interpretation: This theme positions "AI readiness" as more than competence: it includes boundary-setting around what should remain human-led (relationships, judgement, pastoral care, and the formation of critical thinking).

Theme 3: Social and emotional consequences

A related but distinct concern centred on social development and the risk of substitution of authentic relationships with "good-enough" artificial interaction.

Desocialisation and relationship displacement. Multiple respondents worried about reduced face-to-face engagement and the erosion of social skills: *"Effect interpersonal skills and connections… social skills and building community."* Another wrote: *"I think AI will desocialize the human race, completely replacing authentic human relationships with fake ones."* A detailed response highlighted the developmental stakes for younger people: *"Chatbots can be a 'perfect enough' representation of human interaction… [which] will prevent (especially young) people from putting themselves into unfamiliar or uncomfortable [situations]… necessary points in human development."*

Descriptive interpretation: Student teachers' concerns here are not primarily about classroom efficiency, but about broader educational aims such as socialisation, emotional growth, community, and identity formation.

Theme 4: Reliability, misinformation, and trustworthiness

Concerns about **hallucinations**, confident inaccuracy, and misplaced trust were persistent, and were often framed as core barriers to using GenAI for teaching and learning.

Hallucinations and misinformation. Participants described experiences of GenAI producing incorrect outputs: *"AI also hallucinates… Without a critical eye… the AI will confidently deliver information that is not based in fact."* Another gave a classroom-adjacent example: *"I've seen mistakes that AI can generate in a lesson (e.g., the word longship used in a Viking lesson and AI put up a picture of a modern day barge)."* This was linked to a need for strong subject knowledge and verification practices: *"Not enough people who use AI understand how it works, and so [put] an inordinate amount of trust in what it produces."*

Boundaries around pedagogical use. Several respondents framed GenAI as acceptable for limited tasks but not as an authority: *"It should only be supplementary."* Another used the metaphor of constrained support: *"[It] should be similar to that of a librarian… point you in the right direction but it should not replace actual research or planning."*

Descriptive interpretation: Trust is conditional and task-specific. Student teachers tended to accept GenAI for brainstorming and drafting supports, while resisting its use where accuracy, fairness, and accountability are central.

Theme 5: Equity, access, and the 'digital divide'

Equity concerns emerged in two connected ways: unequal access to paid tools, and unequal capacity to evaluate outputs.

Access and subscription barriers. Some respondents directly questioned who benefits: *"Who does and doesn't have access to advanced AI."* These concerns were linked to the risk that GenAI becomes another resource that advantages those with better access, better devices, or paid subscriptions.

Differential digital literacy. Participants also noted disparities in critical evaluation skills: *"The biggest challenge… is that students lack digital literacy skills."* This suggests that even where tools are available, the ability to use them safely and critically may be unevenly distributed.

Descriptive interpretation: For ITE, equity concerns span both infrastructure (who can access tools) and capability (who can evaluate and use them responsibly).

Theme 6: Employment, displacement, and opportunity costs

Economic displacement and societal impacts were present, often tied to corporate behaviour and policy choices.

Job replacement and labour impacts. Respondents worried about AI being used to cut costs: *"Large corporations will attempt to use AI to replace staff… [leading to] mass unemployment."* Others linked this to diminished service quality and broader social consequences.

Opportunity cost and dependence. A detailed comment raised concerns about wasted effort and reliance: *"There may also be a massive opportunity cost as people spend time becoming familiar with technology that will not exist or become unaffordable… [and] the danger of AI dependence."*

Descriptive interpretation: These anxieties situate GenAI within wider societal change, rather than treating it as a neutral classroom tool.

Cross-cutting pattern: 'bounded optimism' and practical usefulness

Despite strong concerns, many student teachers expressed pragmatic interest in GenAI for planning and routine tasks, provided it is bounded and critically managed. Typical comments included: *"AI is a useful tool in terms of planning, it gives resources and ideas…"* and *"It makes lesson planning a lot easier and quicker."* At the same time, even optimistic responses often included a boundary condition: *"Useful in moderation. Important to set boundaries,"* and *"Once it's not heavily relied on… it can… assist a teacher."*

Overall descriptive summary: Student teachers' qualitative responses depict GenAI as simultaneously useful and risky. The dominant stance is not simple acceptance or rejection, but a conditional orientation: GenAI is viewed as helpful for brainstorming, drafting, and time-saving supports, while raising persistent concerns about privacy, regulation, misinformation, equity, environmental impact, and the erosion of human-centred pedagogy. These patterns reinforce the need for ITE to provide explicit, scaffolded opportunities to develop prompt design and verification practices, clarify acceptable use across university and placement contexts, and foreground ethical judgement and professional agency as central components of GenAI readiness.

Discussion

AI generated image: Generative AI in Contemporary teaching

5 Discussion

The integration of Generative Artificial Intelligence (GenAI) in Initial Teacher Education (ITE) represents more than a technological shift; it is reshaping how student teachers learn, plan, reflect, and enact professional judgement. This study indicates that GenAI use in ITE is not simply a matter of 'digital competence' rather, it depends on how ITE programmes cultivate reflective, ethical, and innovative practice and on how tutors, mentors, and placement contexts frame what counts as legitimate, defensible, and educationally worthwhile use. In this sense, GenAI can act as a catalyst for educational transformation and professional agency, but only where it is accompanied by structured guidance, shared norms, and coherent governance. Qualitative comments underscore this conditional stance: many respondents valued GenAI's practical benefits but insisted it must remain 'supplementary' and 'bounded' ("*It should only be supplementary*") rather than becoming a default substitute for teacher thinking and judgement.

Reframing AI readiness as an ITE issue

Across the findings, AI readiness is best understood as multi-level. At the individual level, readiness involves student teachers' confidence and capability to evaluate GenAI outputs critically, to verify and adapt outputs using subject and pedagogical knowledge, and to make informed decisions about when and how tools can be integrated into planning, teaching, and assessment in ways that remain aligned with professional responsibility. Qualitative data reinforce that readiness is not simply confidence with tools, but confidence with *verification*: student teachers were alert to misplaced trust, noting that "*not enough people who use AI understand how it works, and so [put] an inordinate amount of trust in what it produces*."

At the ITE programme level, readiness depends on curriculum and assessment design, tutor modelling, and explicit opportunities for supported experimentation, conditions that help student teachers move from surface-level use (e.g., idea generation) toward disciplined use shaped by pedagogical intent and ethical judgement. At the institutional level, readiness includes infrastructural provision, licensing and cost decisions, and a coherent strategy for regulation, governance, and staff development, particularly as expectations evolve regarding data protection, academic integrity, and acceptable use in both university and school settings.

Placement is pivotal within this ecosystem. Even where student teachers have the expertise and intention to use GenAI, their opportunities to do so may be moderated by school-level access, departmental culture, mentor preferences, and local interpretations of acceptable professional practice. This highlights a central ITE challenge: ensuring that programme expectations for responsible GenAI use are credible and workable in the varied realities of placement contexts.

AI literacy as technical, practical and ethical competence

A key implication of the findings is that AI literacy should not be treated as uni-dimensional. It encompasses technical understanding (e.g., what GenAI can and cannot do; why errors and "hallucinations" occur; limitations linked to training data and probabilistic generation), practical competence (e.g., prompting and iterating, verification and triangulation, and adapting outputs for pedagogical fit and contextual relevance), and ethical and social understanding (e.g., bias and fairness, accountability, privacy/data protection, and broader societal and environmental implications). This aligns with competency-based and rights-based framings that emphasise 'keeping the human in the

loop' through professional judgement and critical evaluation of AI outputs (Jotterand & Bosco, 2020). A useful way to conceptualise progression in ITE is movement from responsible use (critical engagement with outputs) towards co-creation (designing learning experiences with AI while retaining authorship, accountability, and ethical oversight). This positions GenAI not as a substitute for teacher work, but as a context that intensifies the need for teacher judgement.

Qualitative data show that "ethical issues" were not framed as abstract. Student teachers raised concerns about consent and extraction ("*Stealing data... artists and creators*"), regulatory gaps ("*lack of policies to regulate... to the detriment of individuals*"), and corporate incentives that may privilege persuasion over accuracy ("*incentivised to give people information which appeals... rather than a source of reliable information*"). These comments indicate that ethical competence for GenAI in ITE includes governance-aware judgement: understanding data provenance, accountability, and safeguards, and being able to justify when and why GenAI use is professionally defensible.

What the data suggest: readiness as expertise, acceptance and anxiety

Survey patterns suggest that student teachers' readiness clustered around three interrelated components: AI expertise, AI acceptance, and AI anxiety as shown in Figure 39. AI expertise was associated with willingness to learn, confidence in tool use, awareness of limitations, and the ability to evaluate outputs using subject knowledge. AI acceptance reflected perceived usefulness, optimism, and behavioural intention to use GenAI, often connected to planning and workflow support, differentiation, and aspirations for "AI for social good". AI anxiety was expressed through concern about reliability, surveillance, and inappropriate delegation of complex decisions, including worries about sociotechnical dependence and configuration/competence demands. Anxiety was particularly salient around assessment and other high-stakes judgements where fairness, transparency, and accountability are paramount.

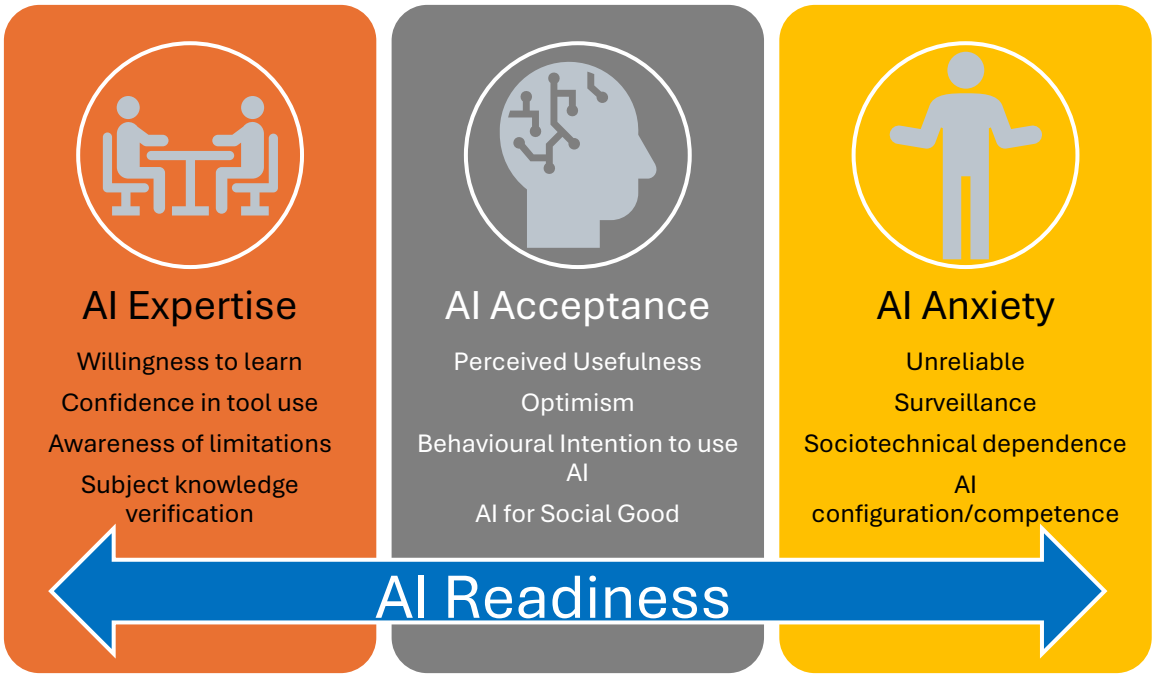


Figure 39

Crucially, these components varied even among students who described themselves as 'AI-ready'. AI-Readiness therefore appears less like a single state and more like a profile, in which different balances of competence, perceived value, and perceived risk shape what student teachers feel able, and willing,

to do with GenAI. The qualitative responses sharpen this profile by showing a recurring 'bounded optimism': GenAI was widely valued for planning efficiency ("*It makes lesson planning a lot easier and quicker*"), yet simultaneously treated as risky if relied upon as an authority ("*AI also hallucinates… [and] will confidently deliver information that is not based in fact*").

Elements of AI readiness among student teachers

Interpreting the readiness profile in more detail, the survey data suggest that student teachers' AI readiness relates to increasing levels of AI expertise and AI acceptance, and lower levels of AI anxiety (Figure 31b). AI expertise encompassed personal willingness to learn, confidence in developing competence, awareness of GenAI's limitations and the need for verification, and boundary-setting around where AI should and should not be used. It also included concerns about keeping pace with rapid advances, the implications of job replacement narratives, and the appropriateness of delegating complex pedagogical decisions to AI. AI acceptance reflected perceived usefulness and behavioural intention to use GenAI, often expressed through optimism about workload support, lesson preparation, and the potential for "AI for social good," including personalised pathways and inclusive design. AI anxiety clustered around reliability, surveillance and data concerns, sociotechnical dependence, and uncertainty about configuration and competence demands, with particularly strong caution around assessment and the use of AI as an instructional proxy (including in contexts involving pupils with additional learning needs – see Figure 36).

Taken together, these patterns reinforce that readiness in ITE requires not only tool familiarity, but practical skills such as prompt design, iteration, and verification, alongside ethical and critical reasoning. Student teachers' comments suggest that identifying errors and "hallucinations" depends heavily on strong subject knowledge and on explicit norms that position verification as an expected professional practice. The qualitative data also broaden what counts as the "human dimension" of AI literacy: beyond bias and privacy, respondents raised concerns about the erosion of creativity and thinking ("*Over reliance and lack of critical thinking and creativity*") and strong views about relational and pastoral limits ("*AI cannot pastorally support a child*"). Environmental impact was also salient for some participants, described as "*trading our planet for ease*" and framed as incompatible with sustainability commitments unless educational use is justified and proportionate (page 64).

Sitting alongside this readiness profile is teacher attitude and agency. These shape how student teachers interpret risk and value, influence perceived usefulness and behavioural intention, and mediate whether they adopt a more explicitly human-centred stance or a more technology-forward stance, positions that are not mutually exclusive and may coexist within the same individual. Even student teachers who viewed themselves as AI-ready to varying extents displayed marked variation in their balance of expertise, acceptance, and anxiety.

Cross-context interpretation: tutor modelling, programme design, and placement norms

Qualitative comments suggest that student teachers' perceptions of GenAI are shaped strongly by public narratives (e.g., disruption, hallucinations, cheating) and by the normative cues encountered within programmes and placements. Across both contexts, there was uneven evidence of deep technical understanding and uneven development of prompting and verification practices. This supports the argument that ITE needs to teach not only how to generate outputs, but how to verify, refine, and justify their use, especially when outputs inform lesson design, differentiation materials, or feedback drafting, where subtle inaccuracies can become pedagogically consequential. One respondent's account captured both usefulness and limitations: GenAI produced a "*bare-bones plan to edit*," but "*lacked*

criticality… and would not have been fit for purpose for teaching." Such comments underline that GenAI can accelerate drafting, but the educational value depends on teachers' judgement, subject expertise, and professional standards.

A particularly important theme is the role of visibility and modelling. Where GenAI use was explicitly discussed and demonstrated within university-based learning, matching tool to task, modelling prompt iteration, and emphasising verification grounded in strong subject knowledge, student teachers tended to describe clearer professional boundaries and greater confidence. This suggests that tutor modelling and programme design can help student teachers develop disciplined habits of use, including when to refrain from using GenAI. Equally, where guidance is implicit or inconsistent, student teachers may be left to form their own norms, which can intensify anxiety and widen variation within a cohort.

The study also highlights the complexity of subjective norms across ITE and placement. Student teachers operate under dual expectation systems: university guidance on integrity and acceptable use, and school/departmental cultures that vary in their receptiveness, access conditions, and policy clarity. Even where student teachers demonstrate high expertise and strong behavioural intention to use GenAI, placement policies, network access, mentor attitudes, and perceptions of GenAI use as "cheating" in planning can constrain or discourage use. This indicates that variability in programme provision is not the sole driver of differing engagement patterns; rather, placement context functions as a significant moderator of whether readiness can be enacted in practice.

The cross-context pattern in qualitative responses also suggests that the salience of the "human dimension" of AI literacy (e.g., environmental and sustainability concerns, or broader societal impacts) may differ across contexts; however, this study cannot determine whether such differences reflect programme emphasis, policy framing, or wider contextual influences. Nonetheless, the implication for ITE is straightforward: ethical and societal dimensions cannot be assumed to emerge organically through tool use and must be made explicit through curriculum, modelling, and guided reflection.

Implications for ITE: disciplined practice, not tool adoption

Taken together, the findings point to an ITE-specific challenge: supporting student teachers to become disciplined, ethical, and context-sensitive users of GenAI. This involves developing practical competence (prompting, verification, adaptation), alongside professional judgement about boundaries, particularly in assessment, relational pedagogy, and accountability. It also requires coherence across programme policy, tutor practice, and placement expectations. Without that coherence, student teachers can experience mixed messages and uneven opportunities to develop competence, undermining both readiness and confidence.

A pragmatic implementation lens is offered by Borgonovi et al.'s (2025) OECD roadmap, which foregrounds **intentionality** (which links GenAI use to clearly defined learning goals), **precaution** (preferring lower-risk approaches where they achieve the same goal; introducing higher-risk uses in stages), **teacher capacity** (investing in training alongside infrastructure), and **governance and equity** (acknowledgement of bias audits, data protection, transparent procurement, and support for schools). These principles resonate strongly with what this study suggests ITE needs:

- coherent guidance,
- staged and defensible uses, and
- capacity-building that supports professional judgement rather than mere uptake.

Next steps

For practice and policy, the results suggest several priorities:

Structured capability-building for student teachers: scaffolded tasks that develop prompting, verification, and ethical evaluation, linked to authentic planning and placement work.

Professional learning for tutors and mentors: shared language, exemplars of defensible use, and guidance on assessment and feedback design that recognises AI's presence without defaulting to prohibition.

Alignment across university and placement expectations: consistent guidance on acceptable use and transparency (including how to acknowledge AI support), reducing contradictory norms across settings.

Low-stakes experimentation spaces: "safe-to-try" opportunities that build calibrated trust and reduce anxiety, alongside explicit discussion of bias, privacy, and sustainability implications.

Key insights and transformational contributions

This research suggests that GenAI can reconfigure teacher education in productive ways when it is treated as a catalyst for professional judgement, not as a shortcut or automation layer. Three insights stand out.

Empowerment through AI literacy. Student teachers described developing confidence in using GenAI to innovate within curriculum frameworks and manage aspects of planning and workload, provided they had strategies for verification, adaptation, and pedagogical fit. Qualitative comments illustrate this conditional usefulness: GenAI was valued for efficiency ("*lesson planning… easier and quicker*"), but only when teachers retained responsibility for checking and improving outputs ("*bare-bones plan to edit*").

Ethical awareness and agency. Engagement with GenAI prompted sustained attention to bias, surveillance, accountability, consent, and inclusion. Rather than being peripheral concerns, these issues shaped student teachers' willingness to use GenAI for high-stakes pedagogical functions. Comments about data exploitation ("*Stealing data… artists and creators*") and regulatory uncertainty ("*lack of policies to regulate…*") show that agency is partly governance-oriented: student teachers want clearer boundaries that protect learners and maintain professional integrity.

Transformative learning under real constraints. For some student teachers, GenAI functioned as a reflective partner, supporting iterative planning, feedback refinement, and adaptive thinking during placement. At the same time, enactment depended heavily on contextual conditions: access, policy clarity, mentor norms, and local interpretations of acceptable practice. This highlights that transformation is possible, but not automatic, and that ITE must actively design for disciplined use within real-world constraints.

Together, these insights strengthen the case that readiness should be conceptualised as a profile (expertise, acceptance, anxiety) and as ecologically produced across university and placement settings, rather than treated as a stable individual attribute.

Proposed AIRED framework for GenAI integration in Initial Teacher Education

The proposed AIRED framework conceptualises GenAI integration in ITE as a **developmental, spiral process** rather than a one-off 'tool adoption' decision. Starting with **AI acceptance** and moving clockwise, the framework shows how student teachers' readiness is shaped by the interaction of attitudes, affective responses, professional roles, programme design, governance, and practical use-cases, culminating in the growth of AI expertise that, in turn, reshapes acceptance. Across the AIRED findings, **AI readiness** is best understood as a **profile comprising AI expertise, AI acceptance, and AI anxiety**, and it is **ecologically produced across university and placement settings**, rather than being a stable individual trait.

1) AI acceptance

AI acceptance functions as the entry point because it captures the initial "willingness to engage" with GenAI as potentially useful for teaching work. In AIRED, student teachers' acceptance is **pragmatic and conditional**: GenAI is viewed as helpful for brainstorming, drafting, and planning supports, but rarely embraced as a substitute for teacher judgement. This "bounded optimism" is visible in the way respondents position GenAI as useful *in moderation*, with clear boundaries and verification expectations.

The survey results similarly show mixed but notable perceived usefulness, confidence in learning about AI, having a positive attitude towards AI and an optimism for ideation in lesson-resource preparation, alongside more cautious views when pedagogical stakes rise.

2) AI anxiety

Moving clockwise, acceptance is moderated by **AI anxiety**, concerns about reliability, misplaced trust, privacy, surveillance, inequity, and the professional consequences of delegating judgement to automated systems. In AIRED, anxiety is not abstract: it is expressed as governance and responsibility concerns (e.g., policy gaps, consent and extraction, misinformation and bias) and intensifies around contexts where accountability and fairness matter most.

The report also confirms a structured, multidimensional anxiety profile (adapted from Wang & Wang's scale), capturing doubts about keeping up with change, fears of sociotechnical blindness, and qualms about configuration/competence demands, all issues of scepticism that can suppress experimentation even when perceived usefulness is high and societal expectations exist. High levels of anxiety are also associated with low levels of AI literacy however as AI expertise increases, AI literacy improves and AI anxiety lessens.

3) Role of the ITE tutor

The framework acknowledges the importance of context in AI readiness and therefore the **role of the ITE tutor** as a key leverage point for converting anxiety into disciplined capability. AIRED shows that where GenAI use is **made visible and modelled** in university-based learning, matching tool to task,

demonstrating prompt iteration, and foregrounding verification grounded in strong subject knowledge, student teachers report clearer professional boundaries and greater confidence.

Conversely, where guidance is implicit or inconsistent, students are left to construct norms alone which can intensify anxiety, lower positivity and optimism surrounding AI use and widen variation across the cohort.

In the framework, the tutor role is therefore not "promoting use" but **modelling defensible practice**, both pedagogically and ethically, including clarifying when *not* to use GenAI, having the confidence to spot and challenge hallucinations and to act appropriately.

4) ITE programme focus points

This is the heart of the framework: programme design is where acceptance and anxiety are translated into consistent learning opportunities that build professional judgement. Student teachers develop a wider understanding of AI for Social Good in a controlled environment, and the subjective norms around societal expectations for AI use can be compared with the teaching profession's expectations, leading to the nurturing of student teachers' agency and informed choice.

The **ITE programme focus points**—the curriculum and assessment design choices—determine whether student teachers can develop competence beyond surface-level use. AIRED suggests readiness at programme level depends on **explicit opportunities for supported experimentation**, and on designing tasks that teach student teachers not only to generate outputs, but to **verify, refine, and justify** them—especially where outputs inform lesson design, differentiation, adaptive teaching or feedback drafting and where subtle inaccuracies can become pedagogically consequential.

5) University regulations

Moving clockwise again, sustainable AI readiness depends on **university regulations and governance**—particularly clear norms around academic integrity, privacy/data protection, transparency, and acceptable use across university and placement contexts. AIRED emphasises that student teachers operate under **dual expectation systems**: university guidance and school/departmental cultures that vary in policy clarity, access, and mentor norms; this variability may constrain or discourage use even where expertise and intention are high.

The framework therefore treats regulation not as a constraint on innovation, but as the **protective architecture** that enables defensible, equitable practice providing value alignment.

6) AI as ITS

The next node, **AI as ITS (intelligent tutoring system)**, captures a high-stakes application where student teacher caution is especially pronounced. AIRED data shows limited endorsement for GenAI as a tutor, particularly in sensitive contexts, with concerns about bias, accountability, and over-reliance, and the report's survey results show reluctance to deploy AI as a one-to-one tutoring substitute for pupils. However, based on the high levels of use of ChatGPT reported by student teachers, the connection between their own personal development and the role of ChatGPT as an ITS may have been overlooked.

This position in the framework is important: it illustrates that acceptance is *task-dependent* and often *personalised*, consequently ITE must explicitly teach how to evaluate risk by context, learner vulnerability, and stakes.

7) AI expertise

Finally, the framework arrives at **AI expertise**, which AIRED links to increased willingness to use AI and increased trust in one's ability to generate reliable materials, partly explained by developing more effective prompt practices and an improved understanding of how to engage AI tools to achieve pedagogical goals.

Crucially, AIRED also argues that expertise in ITE must be **more than operational fluency**: it includes technical understanding, practical competence (prompting, iteration, verification), and ethical/social judgement.

As expertise strengthens, it feeds back into AI acceptance, reframing acceptance as *informed, bounded, professionally accountable* acceptance rather than enthusiasm for tools.

8) The outer arc: personal development of student teachers' AI literacy and the role of the university

Across the full cycle, the framework positions **personal development of AI literacy** as the cumulative outcome of repeated movement through these stages, supported (or undermined) by the **role of the university** in providing coherent governance, infrastructure, staff development, and alignment with placement realities. AIRED is explicit that readiness is multi-level: individual confidence and capability develop within programme design and tutor modelling but are enacted (or blocked) by institutional and placement conditions.

In sum, the proposed AIRED framework suggests that meaningful GenAI integration in ITE starts with acceptance but becomes sustainable only when anxiety is addressed through tutor modelling and programme design, anchored in coherent regulation, and tested against high-stakes use-cases such as intelligent tutoring—so that growing expertise ultimately returns student teachers to a more robust, professionally defensible form of acceptance.

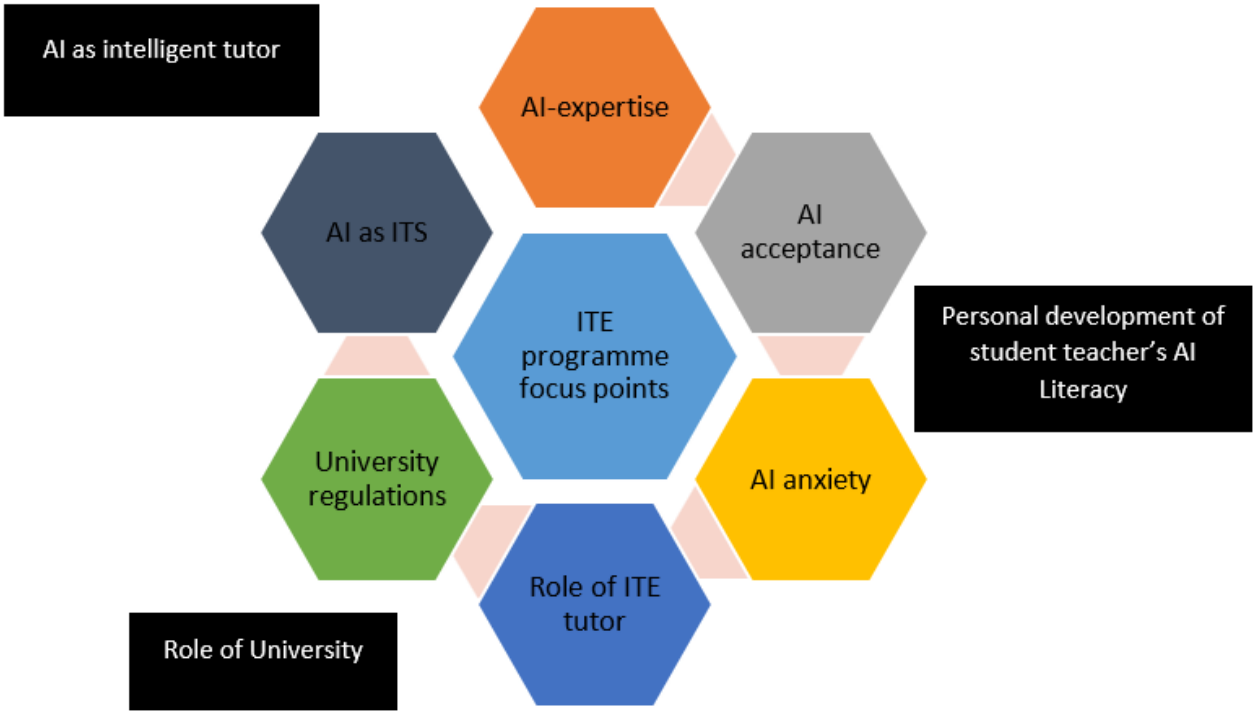
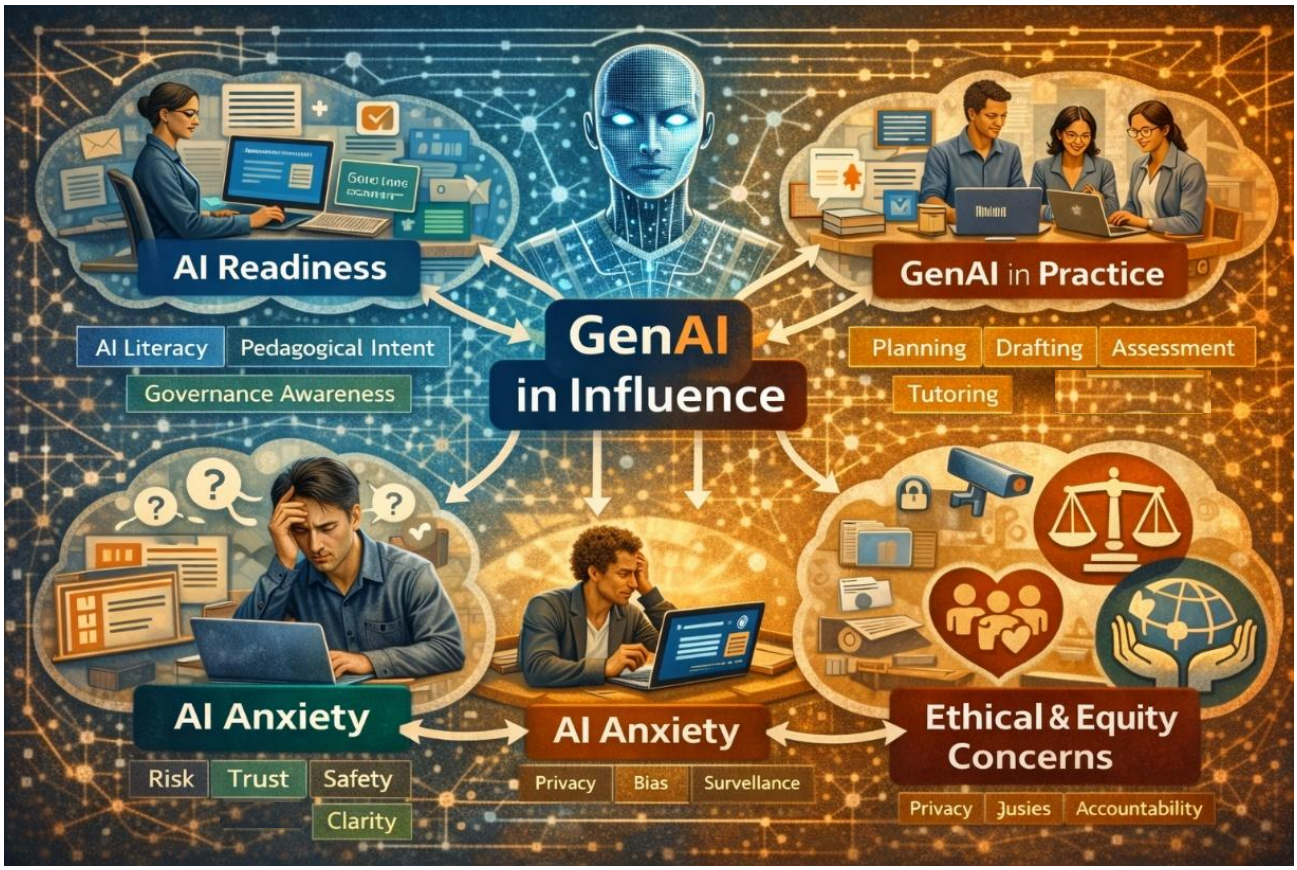


Figure 40: Proposed Framework for Promoting AI Readiness in ITE

Conclusions



AI generated image: Generative AI in Education

6 Conclusion

This study shows that generative AI in Initial Teacher Education (ITE) should not be approached primarily as a question of tool access, technical novelty, or generic digital competence. Rather, the findings indicate that student teachers' engagement with GenAI is shaped by the interplay of individual capability and confidence, affective responses (including anxiety and caution), tutor modelling, programme design, governance conditions, and the realities of school placement. In this context, AI readiness is most usefully understood not as a fixed trait or a simple adoption outcome, but as an ecologically produced profile comprising **AI expertise, AI acceptance, and AI anxiety**.

Across the AIRED data, student teachers do not emerge as either enthusiastic adopters or resistant non-users. Instead, they demonstrate a pattern of **bounded optimism**: GenAI is often viewed as useful for planning, drafting, idea generation, and aspects of workload management, but its use is repeatedly framed as conditional, supplementary, and dependent on verification, professional judgement, and clear boundaries. This is a significant finding for ITE because it suggests that caution is not simply a barrier to be overcome; in many cases, it is evidence of emerging professional discernment. Participants' concerns about reliability, bias, misinformation, privacy, accountability, equity, and the erosion of human-centred pedagogy point to a developing understanding that pedagogical decisions involving GenAI are also ethical and governance decisions.

A key contribution of the study is its demonstration that readiness is **contextually enacted**, not merely individually possessed. Student teachers may report GenAI confidence, willingness, and growing expertise in its uses, yet still be constrained by unclear policies, uneven tool access, network restrictions, mentor attitudes, or local norms that position GenAI use as suspect or inappropriate. School-based placements therefore operate as a critical moderating context in which readiness is either supported or inhibited. This reframes AI readiness in ITE as a **coherence challenge**: if expectations across university provision, assessment guidance, tutor practice, and school placement are misaligned, student teachers are left to navigate contradictory norms, often at the cost of personal and professional confidence and consistency.

The findings also underscore the central role of **ITE tutors and programme design** in shaping professionally defensible GenAI practice. Where GenAI use is made visible through explicit discussion, modelling, and guided evaluation, matching tool to task, demonstrating prompt refinement, and foregrounding verification grounded in subject and pedagogical knowledge, student teachers describe clearer boundaries and greater confidence in their role. By contrast, where guidance is implicit or inconsistent, responsibility for norm-setting becomes individualised, increasing uncertainty and widening variation within cohorts. The implication is clear: the role of ITE is not to promote GenAI uptake per se, but to support student teachers in developing the judgement needed to decide **whether, when, and how** such tools may be used, and a rationale for when they should not be used.

Taken together, the report supports a practical orientation to GenAI in ITE centred on **disciplined professional practice rather than tool adoption**. This includes structured opportunities to develop practical competence (e.g., prompting, iteration, verification, adaptation), alongside ethical reasoning and boundary-setting in higher-stakes areas such as assessment, feedback, and pupil-facing support. GenAI in ITE also requires governance arrangements that do not simply regulate risk after the fact, but actively enables responsible practice through clarity on academic integrity, privacy and data protection, transparency, acceptable use, and equity. In this sense, the AIRED framework offers value not as a prescriptive model of "implementation," but as a way of diagnosing readiness profiles and identifying where support is needed across programme and placement systems.

The study is also timely in relation to a rapidly evolving policy landscape in which AI literacy, human oversight, transparency, and institutional accountability are becoming increasingly explicit expectations. The AIRED findings provide an ITE-specific evidence base for why these priorities matter in practice: student teachers are already calibrating their engagement with GenAI in response to governance uncertainty, ethical concerns, and the perceived stakes of different pedagogical tasks. Their responses indicate a need not for simplistic encouragement to use AI, but for coherent norms, credible guidance, and pedagogically grounded opportunities to develop professionally defensible judgements.

As with any small-scale cross-sectional study, the conclusions should be interpreted with appropriate caution. The data provide a robust descriptive snapshot across two ITE contexts, but they cannot fully account for how AI readiness and AI anxiety change over time, how patterns vary by subject specialism, or how self-reported practices align with observed decision-making in authentic teaching, planning, and assessment situations. These limitations point towards a clear next agenda for research: longitudinal work on AI readiness trajectories across ITE programmes and school-based placements; task-level studies of how student teachers evaluate and justify GenAI outputs; and design-based studies testing scaffolded approaches to AI literacy, assessment transparency, and ethical decision-making in real ITE contexts.

Overall, this report strengthens the case that GenAI may contribute productively to teacher education **only where it is approached as a catalyst for professional judgement rather than a substitute for professional labour**. The evidence suggests that student teachers are not simply seeking permission to use AI, they are seeking the expertise, shared norms, and institutional guardrails required to engage with it in ways that remain human-centred, ethically grounded, and educationally defensible in the present realities, and emerging conditions, of university learning and school placement.

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