Secondary School Teachers' Perceptions and Use of Generative AI in Bangladesh

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Declaration of AI

During this study, I have used DeepSeek and ChatGPT to obtain suggestions regarding the organizational aspects of my thesis, to improve the flow of the structure, and to enhance the readability of the text. DeepSeek was used for suggestions related to the methodology, literature organization, and refining the clarity of my writing. I have thoroughly reviewed, verified, and checked the entire paper afterward to ensure accuracy. AI tools were not used to generate original research findings, data analysis, or interpretations, all work and conclusions presented in this study are my own.

Abstract

Currently, the use of generative artificial intelligence (GenAI) by Bangladeshi secondary school teachers remains undocumented, informal, and uneven. This study researched the secondary school teacher's perceptions and use of GenAI in Bangladesh, which adopted an explanatory sequential mixed-method design. Quantitatively, it surveyed 207 secondary school teachers, which informed semi-structured interviews with 20 purposively sampled educators. Quantitative data were analyzed using descriptive statistics, Spearman correlation, ordinal logistic regression, and mediation analysis, and thematic analysis was utilized for the qualitative data. The study was guided by two theoretical frameworks: the Technology Acceptance Model (TAM) and the Technological Pedagogical Content Knowledge (TPACK) framework. The quantitative findings revealed that teachers viewed GenAI as useful and easy to use, but these perceptions did not significantly predict their actual use of GenAI. Instead, teacher's attitude towards using GenAI were the strongest predictor, influencing whether they use it. School type significantly predicted GenAI usage, with teachers in non-government, private, and semi-government schools using GenAI more than those in public schools. The qualitative findings also disclosed six main themes: balancing efficiency and dependency, changes in student's learning, lack of institutional and policy support, teacher's resilience, the importance of teacher's roles, and ethical concerns due to the absence of clear policies. The study contributes to refining the Technology Acceptance Model and provides practical recommendations for policymakers and educational leaders to support equitable, ethical, and effective use of GenAI in Bangladeshi secondary education.

Keywords: GenAI, Secondary School Teachers, Teacher Perceptions Technology Acceptance Model, Technological Pedagogical Content Knowledge

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1. Introduction

1.1 Background of the Study

The Bangladeshi education system has been struggling with constant structural and pedagogical challenges, such as, low literacy rates, high dropout rates, and a heavy emphasis on rote memorization. These issues lead to huge learning gaps among students, causing them to lose interest in actual learning outcomes. There is also shortage of skilled teachers, and the exam-centric culture along with minimal emphasis on modern, practical, and student-centric pedagogies further weakens the quality of education in Bangladesh (Ezekwe, 2025; Khan, 2014). Education should aim on the foundational cognitive and academic skill development of students, rather than merely focusing on theoretical concepts. Consequently, students fail to understand core concepts in class and increasingly rely on private tutoring to compensate for ineffective instructional methods. These challenges place considerable pressure on school teachers, who regularly manage heavy workloads, receive low salaries, and lack of adequate pedagogical and technological training (Ezekwe, 2025). Teacher preparation programs prioritize less on integration of technology which limits teacher's ability to adopt innovative and student-centered strategies (Khan, 2014).

The secondary education system in Bangladesh plays a critical role in students' academic journeys. During these formative years (Grade 6 to 10), students develop their foundational knowledge and skills that determine their future educational and career trajectories. However, the system faces substantial challenges that weaken its effectiveness. The curriculum is heavily content- driven, with an overwhelming emphasis on memorization and examination performance. Teachers are required to cover this extensive syllabus within a limited timeframe, leaving little room for interactive, student-centered, or conceptual learning (Rahman, Khan, & Howlader, 2018). Against this backdrop, students often complete their secondary education without developing essential critical thinking, analytical, or problem-solving skills.

1.2 Current Status of Generative AI in Bangladesh's Secondary Education

At present, the use of GenAI in Bangladeshi secondary schools remains undocumented, informal, and uneven. There is no national policy that specifically governs the integration of GenAI in classrooms. Teachers do not have formal training on pedagogical usage of GenAI in education. A small but growing number of teachers have started experimenting AI tools, for instance, ChatGPT, Gemini, and DeepSeek, independently, mostly outside institutional framework (Munni & Rafique, 2025; Shirin, 2022). While GenAI holds meaningful potential, its adoption by Bangladeshi secondary school teachers is driven more by individual initiative than by systematic support.

At present, there is limited, uneven, and largely informal use of GenAI in Bangladeshi secondary education, with most teachers lacking systematic training, institutional guidance, and policy support. However, the emergence of GenAI has provided opportunities to support teachers by reducing their workload, improving lesson preparation, and enabling more effective instructional designs (Elahee & Rafique, 2023; Dixon, 2024). Therefore, its successful implementation depends on teachers' perceptions, institutional conditions, and access to teacher training, all of which remain uneven nationwide (Shirin, 2022).

The digital divide in Bangladesh is a significant barrier to equitable GenAI adoption. Urban schools often have access to computers, internet connectivity, and other digital resources, whereas rural schools lag far behind. According to Amiri (2025), less than 20% of rural schools in Bangladesh have access to reliable internet, and only 22% of rural teachers possess basic digital literacy skills compared to 58% of urban teachers. This imbalance means that even when teachers have positive attitudes towards GenAI, their ability to adopt it is fundamentally limited by available infrastructure. Furthermore, teachers training has historically focused primarily on ICT proficiency rather than the pedagogical integration of technology, leaving teachers unprepared to adopt GenAI tools that require technical skills, critical evaluation and ethical judgement (Khan, 2014; Shirin, 2022).

1.3 Focus of the Research

For this study, secondary school teachers in Bangladesh are the primary focus. The study examines their perceptions of GenAI and their actual use of it in professional practice. It is necessary to understand how this key group perceives and uses GenAI in real classroom contexts to address the systematic pressures within Bangladeshi education system. Secondary school teachers play a vital role in shaping students' academic foundations and promoting the development of an educated and skilled population. Therefore, this study investigates how GenAI may enhance pedagogical practices, reduce teachers' workload, and improve student learning outcomes.

1.4 Novelty of the Research

The novelty of this research lies in its explanatory sequential mixed-methods design, which combines survey data and interviews to capture not only what teachers think and do, but also why they think and act that way. A mixed-method approach is essential because quantitative data can only identify broad trends in teachers' attitudes, usage patterns, and perceived barriers, whereas qualitative data can disclose deeper contextual factors, nuanced pedagogical concerns, and the lived realities of technology integration. Integrating both forms of evidence will provide a more holistic and robust understanding of GenAI adoption in schools, informing policy recommendations for teachers training and educational reform.

The study integrates two theoretical frameworks: the Technology Acceptance Model (Davis, 1989) and the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006) to provide comprehensive lens for understanding GenAI adoption. TAM conceptualizes teachers' motivational and perceptual readiness, while TPACK explains their knowledge-based readiness to adopt GenAI. The study investigates both individual perceptions and underlying knowledge structures by combining these frameworks.

Ultimately, by understanding the lived experiences of teachers, this study generated evidence to informs the policymakers and educational leaders about how AI-enhanced teacher training and

institutional support can be designed. Strengthening teachers' GenAI competencies can improve lesson quality, reduce workload, modernize instructional practices, and enhance student learning outcomes. These improvements are expected to support Bangladesh's long-term national goals of creating a more equitable and digitally enabled education system.

1.5 Objectives of the Research

The objectives of this study are:

1. To measure secondary school teachers' levels of perceived usefulness, perceived ease of use, and attitudes toward GenAI, and to investigate how these perceptions relate to their actual usage of GenAI tools.
2. To recognize the current usage patterns of GenAI among secondary school teachers, including the frequency and nature of their AI-related activities across lesson planning, assessment, administrative work, and instructional support.
3. To examine how teacher characteristics, including age, experience, and digital literacy, relate to their adoption of GenAI tools, and to evauate the extent to which access to infrastructure, training, and institutional support shapes actual usage.
4. To explore teachers' lived experiences, beliefs, and concerns surrounding GenAI, including how they deal with ethical dilemmas, workload pressures, and shifts in pedagogical identity.
5. To understand the contextual and institutional conditions that encourage or limit teachers' engagement with AI, as well as the processes teachers follow when attempting to integrate GenAI into their daily responsibilities.
6. To integrate both quantitative and qualitative evidence to explain why certain quantitative trends emerge, to reinterpret statistical findings through teachers' narratives, and to generate a holistic, evidence-driven understanding of GenAI adoption that informs actionable recommendations for teacher training, policy development, and institutional capacity-building.

1.6 Research Questions

This study is guided by the following research questions:

1.6.1 Quantitative Research Questions

a) How do teachers perceive the usefulness, ease of use, and pedagogical potential of generative AI?

b) In what ways are generative AI tools currently used for lesson planning, grading, and administrative tasks?

c) What institutional or technical barriers and enablers influence teachers' adoption of GenAI?

d) How do teachers perceive GenAI's impact on student learning, creativity, and engagement?

e) What forms of policy and professional development support do teachers believe are necessary for responsible AI integration?

1.6.2 Qualitative Research Questions

a) How do secondary school teachers in Bangladesh emotionally and practically experience the use of generative AI in their classroom and professional work, including its influence on their teaching practices, student engagement, and sense of pedagogical autonomy?

b) What contextual, institutional, and ethical factors shape teachers' enthusiasm, hesitation, or resistance toward adopting generative AI, and how do these conditions influence their evolving professional identities and teaching philosophies?

1.6.3 Integration Research Question

a) How do qualitative insights into teachers' lived experiences, contextual conditions, and professional identities help explain, deepen, or reinterpret the quantitative patterns in their perceived usefulness, ease of use, barriers, and actual adoption of generative AI, thereby producing an integrated understanding that can inform coherent policy, teacher training, and institutional strategies for responsible GenAI integration in Bangladeshi secondary schools?

1.7 Hypotheses

Based on the theoretical frameworks guiding this study, the following hypotheses are tested:

H1: Teachers with higher Perceived Usefulness (PU) and Perceived Ease of Use (PEoU) will report greater frequency of generative AI use (Use_Freq).

H2: Attitude Toward Use (ATU) will mediate the relationship between Perceived Usefulness (PU) and AI Use Frequency.

H3: School type will significantly predict AI Use Frequency, with teachers in Non-Government, Private, and Semi-Government schools reporting greater frequency of GenAI use compared to teachers in public schools.

Note: H3 was revised to show what was actually tested in the regression model. School type serves as a proxy for institutional conditions, including access to infrastructure, training opportunities, and administrative support.

1.8 Significance of the Study

This study contributes to academic knowledge by providing one of the first mixed-methods examinations of secondary school teachers' experiences with and perceptions of GenAI in Bangladesh. It advances understanding of how perception constructs, such as, perceived usefulness, perceived barriers, and attitudes, interact with deeper lived experiences, including changes in professional identity, ethical concerns, and institutional constraints. The findings can guide policymakers, school leaders, and teacher-training institutions in designing targeted, context-sensitive professional development and AI literacy programs that reduce teachers' workload and improve teaching quality. Additionally, the mixed-methods design strengthens the study by combining measurable trends with narrative insights, thereby providing a more comprehensive and actionable evidence base for policy and practice.

2. Literature Review

2.1 Introduction

This chapter delivers a critical synthesis of existing research on teachers 'perceptions and use of GenAI in educational contexts, with specific focus on the Bangladeshi secondary education system. The chapter commences by outlining the historical evolution of AI in education to position GenAI within broader technological developments. It then defines the two key constructs and presents the two theoretical frameworks, including Technology Acceptance Model (TAM) and Technological Pedagogical Content Knowledge (TPACK). Subsequently, the chapter synthesizes empirical studies on teachers 'perceptions and use of GenAI across multiple national contexts, recognizes contradictions and debates in the literature, and specifically discusses the context of Bangladeshi digital readiness. The chapter ends by identifying the research gap that this study highlights and presenting the rationale for the current investigation.

2.2 Historical Evolution of Artificial Intelligence in Education

The use of GenAI in education is not fully new, as researches have examined how machines might support human learning, commencing with early computer-assisted instruction systems and rule-based tutoring programs, since 1950s (Holmes et al., 2019). Intelligent tutoring systems appeared in the 1980s and 1990s that offered personalized feedback and adaptive learning pathways, though their complexity limited the widespread implementation. The rise of machine learning and learning analytics rose in the 2010s that enabled educational platforms to predict student performance and suggest interventions.

However, there was a transformative shift in the early 2020s when GenAI tools such as ChatGPT, Gemini, and other large language models. GenAI can produce new content, for instance, lesson planning, quizzes, explanations and creative materials in response to natural prompts (Dixon, 2024). GenAI offers numerous benefits for education, particularly by reducing teachers' workload and enhancing instructional design. AI has become more common in education, but teachers have not received adequate preparation to use it effectively. Bangladesh, faces the challenge of advancing directly

into the GenAI era without passing through the intermediate stages of systematic educational technology (EdTech) adoption that developed education systems have experienced.

2.3 Defining Generative Artificial Intelligence and Key Constructs

GenAI is a type of artificial intelligence that can generate new content, for example, text, images, and code, by learning patterns from large amounts of data. In the context of education, Gen AI tools like ChatGPT, Gemini, perplexity, and DeepSeek allow users to input natural language prompts and obtain human-like responses which makes it accessible even to users who has limited technical background (Munni & Rafique, 2025). These tools can develop lesson plans, summarize complex topics, create assessment questions, and provide feedback on student writing, and even enhances classroom discussions. GenAI adapts to each user's input that offers dynamic and context-sensitive assistance, unlike earlier educational software that offered fixed pre-programmed responses.

To understand teachers' adoption of GenAI, three theoretical constructs are notably essential. Perceived Usefulness (PU) mentions the degree to which a teacher believes that GenAI usage would enhance their job performance, for instance, GenAI can help to save time, improve lesson quality of students or to increase students' engagement. Perceived Ease of Use (PEoU) refers to the extent to which teachers believe that GenAI is easy to use, requires little effort, and is not difficult to learn (Davis, 1989). Attitude toward Use (ATU) specifies to the teacher's overall favorable or unfavorable evaluation of using GenAI, which may be shaped by both usefulness and easy usage, along with the broader beliefs about technology and teaching. These frameworks from the Technology Acceptance Model represents the main factors that this study investigates in relation to actual GenAI usage.

2.4 Theoretical Framework 1: Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Fred Davis in 1989, is one of the most widely used and empirically validated frameworks for predicting user acceptance of information technology. TAM was particularly designed to explain why users accept or reject a particular technology and has been considerably applied in educational research to examine teachers' adoption of various

digital tools, from learning management systems to user-friendly whiteboards and, more lately, artificial intelligence applications.

2.4.1 Core Constructs of TAM

TAM postulates that there are two primary beliefs that construct the determination of an individual's behavioral intension to use a technology such as Perceived Usefullness (PU) and Perceived Ease of Use (PEoU). Perceived Usefulness (PU) indicates to the user's subjective assessment of whether using a particular technology would improve their job performance or productivity. In the context of this study, PU captures whether secondary school teachers in Bangladesh believe that GenAI tools help them perform their teaching practices more efficiently, for instance, by saving time on lesson planning, improving the quality of instructional materials, or by enabling more personalized feedbacks for students. According to TAM, when users perceive a technology as useful, they are more likely to form positive intentions toward using it (Davis, 1989).

According to Davis (1989), Perceived Ease of Use mainly refers to the belief of the user that using a particular technology would be free of substantial effort or difficulty. In this study, PEoU apprehends whether teachers require excessive time, technical expertise, or cognitive load to use GenAI. TAM recommends that even if technology is perceived as useful, the users may reject it if they perceive it as too difficult to use. On the other hand, a technology that is easy to use may be adopted even if its usefulness is not instantly apparent.

Attitude toward Use (ATU) refers to the user's overall favorable or unfavorable evaluation of using the technology, which is shaped collectively by PU and PEoU. The teachers develop a positive attitude, when they perceive GenAI as both useful and easy to use, which then increases their behavioral intention to use the tool (Davis, 1989).

TAM also proposes that positive attitudes leads to stronger behavioral purposes, which eventually translate into actual system use. However, later revisions of TAM, including TAM2 (Venkatesh & Davis, 2000) and the Unified Theory of Acceptance and Use of Technology (Venkatesh et

al., 2003) have suggested that the relationship between intention and actual use may be moderated by facilitating conditions such as access to infrastructure, training, and institutional support.

2.4.2 Application of TAM to GenAI in Education

TAM specifically is well-suited for this study for several reasons. First, GenAI tools such as ChatGPT, Gemini, etc., symbolize a new class of technology that most Bangladeshi secondary school teachers have not encountered in formal training settings. As such, their primary perceptions of usefulness and ease of use are likely to be the strongest indicator of whether they choose to experiment with these tools or ignore them completely. Second, TAM's significance on subjective perceptions rather than objective features corresponds with the mixed-methods approach of this study, which pursues to understand both what teachers do with GenAI and also why they think and feel the way they do. Third, TAM has been effectively applied in numerous studies of technology adoption in developing country contexts, including Bangladesh, illustrating its cross-cultural credibility and relevance to low-resource educational settings (Howlader et al., 2025).

Research grounded in TAM establishes that teachers perceptions of usefulness and ease of use strongly influence their openness to adopting new technologies, and their attitudes often intervene these relationships (Camilleri et al., 2025; Davis, 1989). Recent studies found that perceived usefulness is a stronger predictor of adoption than perceived ease of use. Teachers are willing to learn new GenAI tools if they believe the payoff in terms of workload reduction or instructional improvement is substantial (Choi et al., 2024).

2.4.3 Hypothesis Derived from TAM for this Study

Based on TAM, this study tests the following hypotheses:

H1: Teachers with higher Perceived Usefulness (PU) and Perceived Ease of Use (PEoU) will report greater frequency of generative AI use (Use_Freq).

H2: Attitude Toward Use (ATU) will mediate the relationship between Perceived Usefulness (PU) and AI Use Frequency.

2.5 Theoretical Framework 2: Technological Pedagogical Content Knowledge (TPACK)

The Technological Pedagogical Content Knowledge (TPACK) framework, established by Mishra and Koehler (2006), expands upon Shulman's (1986) notion of pedagogical content knowledge (PCK) by incorporating technology as an additional fundamental knowledge domain. TPACK delivers an extensive framework for understanding the complex knowledge base that teachers need to effectively merge technology into their teaching practice. TPACK focuses on the knowledge and competencies that is required for meaningful integration, unlike TAM.

2.5.1 The Seven Knowledge Domains of TPACK

There are seven interrelated knowledge domains that teachers draw upon when integrating technology into their classrooms (Koh et al., 2015):

1. **Content Knowledge (CK)**: This refers to the teacher's deep understanding of the subject matter that they teach, including key concepts, theories, evidence, and disciplinary practices (Shulman, 1986; Mishra & Koehler, 2006). For a secondary school teacher in Bangladesh, CK includes knowledge of the national curriculum, textbook content, and examination requirements for subjects including mathematics, science, Bengali, English, and social studies.
2. **Pedagogical Knowledge (PK)**: This refers to the understanding of teaching methods, instructional strategies, classroom management, lesson planning, and assessment practices of a teacher (Shulman, 1986; Mishra & Koehler, 2006). PK includes knowledge of how students learn, how to design lessons, adapt to different learners, and assess student progress.
3. **Pedagogical Content Knowledge (PCK)**: This is the intersection of CK and PK, and it possesses specialized knowledge of how to teach specific content to specific learners. PCK involves knowing which analogies, examples, and explanations work best for particular concepts, anticipating common student misconceptions, and designing instructional approaches that make complex content accessible (Shulman, 1986).
4. **Technological Knowledge (TK)**: This highlights the understanding of how teachers use various technologies, including digital tools, software applications, and online platforms (Mishra &

Koehler, 2006). According to the context of the study, TK indicates whether teachers are able to use GenAI tools (such as ChatGPT, Gemini, DeepSeek etc), as well as basic digital literacy skills such as navigating the internet, using email, and operating classroom devices.

5. **Technological Content Knowledge (TCK)**: This denotes to the knowledge of how technology and content influence each other (Mishra & Koehler, 2006). For example, a teacher with strong TCK would understand how GenAI can represent mathematical concepts differently than a textbook, or how AI- generated explanations might transform students' understanding of historical events.
6. **Technological Pedagogical Knowledge (TPK)**: TPK refers to understanding how teaching and learning processes change when specific technologies are used (Mishra & Koehler, 2006). A teacher with strong TPK knows how GenAI can support collaborative learning, how to design AI- assisted activities that promote critical thinking, and how to assess students learning when AI tools are involved.
7. **Technological Pedagogical Content Knowledge (TPACK)**: This is the central, holistic construct, the deep understanding that emerges from the intersection of all three core knowledge domains. TPACK is the knowledge that is required to select, use, and merge technology in ways that are pedagogically sound and content- appropriate. A teacher with strong TPACK does not simply add technology to existing lessons but transforms their teaching by harnessing technology to address content-specific learning goals in ways that would be impossible without the technology (Mishra & Koehler, n.d.)

Mishra and Koehler (2006) originally formulated TPACK as consisting of seven knowledge domains. However, Mishra, Warr, and Islam (2023) have recently argued that in the context of Generative AI, the TPACK framework needs an expanded view of Contextual Knowledge (XK). They contend that context must go beyond the immediate classroom setting to include broader considerations of how GenAI will change individuals, society, and, through that, the wider educational context (Mishra et al., 2023). This expanded view is essential because GenAI technologies do not merely exist within classrooms but they

transform the very nature of knowledge, learning, and teaching in ways that extend beyond traditional boundaries. For Bangladeshi secondary school teachers, effective GenAI integration requires an understanding of local context, such as the digital divide, cultural attitudes toward technology, and institutional policies that shape the possibilities and constraints of AI use in their specific contexts.

2.5.2 Application of TPACK to GenAI in Education

TPACK is important for understanding GenAI adoption in Bangladeshi secondary schools because it requires more than basic technical skills. A teacher cannot simply open an AI tool and produce a good lesson plan, instead they must know what content to ask for, how to design activities, how to use the technology, how to adapt pedagogy for the technology, and how to blend it all together. A teacher must have subject knowledge to draft appropriate prompts, evaluate GenAI content for accuracy, and identify when the AI produces incorrect or misleading information. They must also understand how to integrate AI-generated materials into lesson sequences that promote active engagement and design assessments that measure authentic understanding.

Studies using TPACK present that the ability to combine pedagogical, technological, and content knowledge is necessary for designing meaningful lessons, and that teachers with stronger TPACK competencies tend to perceive AI as more pedagogically valuable (Zhai, 2024; Schubatzky et al., 2025).

2.5.3 TPACK and Teacher Readiness for GenAI in Bangladesh

In the Bangladeshi context, TPACK is relevant because teacher preparation programs have historically highlighted content knowledge (CK) and basic pedagogical knowledge (PK) but have provided minimal attention to technological knowledge (TK) or integrated TPACK competencies (Khan, 2014). As a result, even when teachers who have positive attitudes toward GenAI may lack the fundamental knowledge structures to use it competently. A teacher might believe that AI tools are useful but still struggle to incorporate them into their teaching due to lack of skills in writing productive prompts (low TK), assessing AI-generated content for curriculum alignment (low TCK), or designing assessment tasks that prevent AI-assisted cheating (low TPACK).

This study therefore merges TAM and TPACK to provide a complete understanding of GenAI adoption. Altogether, these frameworks suggest that teacher adoption of GenAI is shaped by individual perceptions, underlying knowledge structures, access to training, and contextual constraints within schools (Jahan & Akter, 2024; Afrin, 2025).

2.5.4 Hypothesis Derived from TPACK for This Study

Based on TPACK, this study tests the following hypothesis:

H3: School type will significantly predict AI Use Frequency, with teachers in Non-Government, Private, and Semi-Government schools reporting greater frequency of GenAI use compared to teachers in public schools.

Note: H3 was revised to indicate what was actually tested in the regression model. School type serves as a proxy for institutional conditions, including access to infrastructure, training opportunities, and administrative support.

2.6 Digital Readiness and Infrastructure in Bangladeshi Secondary Schools

It is important to understand the existing digital landscape of Bangladeshi secondary schools before examining how teachers perceive GenAI. The government has made substantial investments in digitization of secondary schools through various initiatives such as the National ICT Policy and the introduction of multimedia classrooms. (Khan, 2014). However, research shows that the quality and consistency of digital infrastructure differentiate dramatically between urban and rural schools, between public and private institutions, and between different regions of the country. Many schools lack reliable internet, sufficient devices, or technical support, leaving them unready for meaningful AI integration (Shirin, 2022).

Additionally, teachers' digital literacy remains uneven (CLEAR Global, 2024; Farhana et al., 2024). While younger, urban-based teachers often report basic familiarity with computers and smartphones, many older teachers and those in rural areas describe their digital skills as minimal (CLEAR Global, 2024). Teacher training programs have historically focused on basic ICT proficiency rather than on pedagogical integration of technology, leaving teachers unprepared to adopt tools like

GenAI that require not only technical skill but also critical evaluation and ethical judgement (Khan, 2014; Biswas, 2025). This uneven readiness indicates that even when teachers uphold a positive attitude towards GenAI, their actual ability to adopt the technology may be limited by factors that are entirely outside their control, including infrastructure gaps and lack of institutional support.

2.7 The Persistent Pedagogical and Structural Challenges in Bangladesh's Secondary Education

While the integration of GenAI in educational systems is accelerating globally, its use in a developing country like Bangladesh remains insufficiently examined. Research focusing on teacher experiences presents that high workloads, traditional lecture-based instruction, and limited access to professional development hold back effective teaching and meaningful learning (Amiri, 2025; Khan, 2014). Secondary school teachers often juggle administrative responsibilities alongside exam-oriented pedagogies while students rely heavily on private tutoring, illustrating a systemic disconnection between classroom instruction and actual learning needs (Amiri, 2025). These challenges highlight an urgent need to explore pedagogical innovations that can support teachers while addressing long-standing gaps in instructional quality.

2.8 The Promise of Generative AI for Teacher Support and Pedagogical Innovation

International research on teacher practice illustrates how GenAI technologies can ease workload pressures, enhance lesson preparation, and support differentiated instruction. Studies on teachers' regular work presents that GenAI assists with generating content, improving feedback systems, and stimulating creative instructional design (Dixon, 2024). Work conducted in Bangladesh presents similar insights; for example, a study examining English teachers' experiences discloses that AI is commonly viewed as an "auxiliary tool" that helps with content creation and language support (Elahée & Rafique, 2023). However, research also shows persistent challenges. Studies on teacher preparedness report that many educators describe their AI knowledge as minimal or basic to integrate it meaningfully into instruction (Shirin, 2022). This gap between willingness and capability is shaped by broader structural constraints, including inadequate training quality, limited digital access, and institutional support.

2.9 Empirical Studies on Teachers' Perceptions and Use of GenAI: A Cross-National Synthesis

In many countries, teachers hold positive attitudes towards GenAI's potential, but few actually use it regularly in their classrooms. However, the relationship between perception, use, and specific barriers teachers face, varies significantly by context.

In well-resourced Asian countries, studies reveal that teachers are high interested as well as anxious about GenAI. Studies in South Korea show that while most teachers express strong interest in AI, they reported that their pre-service training did not cover AI at all (Lee, Davis, & Ryu, 2024). Similarly, in Thailand, student teachers find GenAI useful for creating content but expressed ethical concerns about plagiarism, over-reliance, and weaker critical thinking skills (Thararattanasuwan & Prachagool, 2024). These studies depict that even in well-resourced Asian education systems, teacher training has not kept pace with technological advances.

In Europe, research focuses more on teachers' knowledge and confidence. Schubatzky et al. (2025) found that teachers who feel confident integrating teaching skills, subject knowledge, and technology (TPACK) are more likely to adopt GenAI in professional practices. This finding is substantial because training programs cannot simply focus on changing teachers' attitudes, they must also build the actual skills and confidence teachers need to use AI effectively.

In low-resource African settings, the situation is different. In a study of 122 schools in Sierra Leone, Choi et al. (2024) introduced an AI chatbot designed to help 193 teachers. The authors found that teachers regularly used the bot for lesson planning, classroom management, and subject matter content, with some using it heavily throughout the school year. Critically, the chatbot was delivered via WhatsApp with minimal data requirements, the study proves that GenAI can work even in areas with poor tech infrastructure, showing that smart design is key to AI adoption.

While this finding fits the international pattern, but it fails to explain the gap between how teachers feel about AI and how they actually use it. Similarly, Rahman, Khan, and Howlader (2018) documented that secondary education in Bangladesh face major challenges, such as heavy workloads,

poor training, and focus on memorization. These conditions could make GenAI particularly valuable or even difficult to integrate.

A limitation that is common to this literature is that most studies have been either purely quantitative or qualitative. Furthermore, almost no studies have previously explored how school-level conditions, such as infrastructure, administrative expectations, and institutional culture, interact with individual teacher characteristics to shape GenAI adoption. What remains unclear is whether this gap between positive attitudes and low usage is driven by individual, institutional, or infrastructure challenges and how these factors affect one another (Shirin, 2022).

2.10 Debates and Contradictions in the Literature

Researchers still disagree on several key questions about GenAI in education. One main debate concern whether GenAI primarily supports or undermines teachers' professional autonomy. On one hand, researchers argue that GenAI is a neutral tool that teachers can adapt to their own pedagogical goals, enhancing rather than replacing teacher expertise (Dixon, 2024), whereas, scholars contend that GenAI, carries inherent biases and may deskill teachers by encouraging reliance on automated content generation rather than professional judgement (Zhai, 2024). The relationship between these two perspectives has been examined from competing positions, with no consensus yet emerging.

Another debate revolves around the ethics of GenAI usage in classrooms. While some scholars highlight the necessity of teaching students to use AI responsibly as a complement to their own thinking (Pak, 2024; Sikka, 2025), on the other hand, others worry that the ease of generating content will lead to widespread plagiarism and superficial learning (Cotton et al., 2024; Mwakalinga & Mabilika, 2025). There is another debate that is concerned about the scalability of GenAI integration. According to the optimist point of view, the low cost and accessibility of tools could democratize access to high-quality instructional resources (ITU, 2025; FCT, 2025). Whereas, the skeptics note that effective use of GenAI still requires digital infrastructure, teacher training, and ongoing support and resources that are unevenly distributed both between and within countries (Brookings Institution, 2025; Eke Ogbu Ek Ek, 2025).

In Bangladesh's context, these debates need to be addressed because the education system already endeavors with low learning outcomes and high levels of rote memorization. GenAI needs proper support and training to work well for teachers or else AI could make existing problems worse, while, well-designed integration could help address them. What remains unclear from the existing literature is that which of these competing perspectives better predicts the actual outcomes in low-resource, exam-driven educational systems.

2.11 Gaps in the Existing Literature

Despite these findings, several research gaps remain. Most studies focus on higher education or technologically advanced countries, leaving limited understanding of how secondary school teachers in low-resource systems experience and adopt GenAI. Research in Bangladesh often looks at teachers' attitudes or digital literacy but rarely address how school-level conditions, such as infrastructure, expectations, and institutional culture, shape adoption. Conversely, studies rarely connect teachers' personal experiences with measurable data such as frequency of GenAI use, digital readiness, or perceived barriers. These gaps disclose the need for research that combines both measurable adoption patterns and the lived realities underlying them, especially in contexts were systemic limitations shape teachers' regular decision-making.

2.12 Rationale for the Present Study

This study addresses these gaps by using an explanatory sequential mixed-method design to explore GenAI adoption among secondary schools' teachers in Bangladesh. By integrating TAM and TPACK, the study examines trends in teachers' GenAI alongside the pedagogical knowledge, institutional conditions, and contextual barriers influencing implementation. Ultimately, this study presents how GenAI can support secondary education in Bangladesh while offering practical guidance for policy, teacher training, and responsible AI use.

3. Methodology

3.1 Research Design and Mixed-Methods Rationale

This study adopts an Explanatory Sequential Mixed-Methods Design, a structure widely recommended by Creswell and Plano Clark (2018), and Johnson and Onwuegbuzie (2004), for research that seeks to first measure trends quantitatively and then explains those patterns qualitatively.

3.2 Participants and Sampling

Participants included secondary school teachers (Grades 6–10) from Bangladeshi public, private, and NGO-run schools. The quantitative strand employed snowball sampling to recruit teachers with varying levels of digital or AI exposure. Participants were drawn from Dhaka, Madaripur, and Dinajpur, with representation from an NGO-run school (to ensure diversity and broader representation), as well as from public and private schools in Chittagong. The quantitative phase comprised 207 teachers.

Snowball sampling was employed for the quantitative phase because no comprehensive, publicly available sampling frame of all secondary school teachers in Bangladesh exists. Recruitment began through the researcher's personal networks, including family members, relatives, friends, and professional contacts currently teaching in secondary schools, who were asked to identify and refer other eligible teachers meeting the inclusion criteria, such as, currently teaching Grades 6–10 in a Bangladeshi secondary school, having some exposure to digital or AI tools, and willingness to participate.

3.3 Data Collection

During the first four weeks of data collection, a finalized Google Forms survey was distributed through email and WhatsApp to participating secondary school teachers. The survey link was also shared via the school's official communication channels. The survey instrument is a structured questionnaire designed to measure teachers' perceptions, attitudes, usage patterns, barriers, and enablers related to GenAI. Online distribution reached approximately 350 teachers through various networks, yielding 123 online responses (estimated 35.1% response rate). To address the low online response rate, the survey was also administered in paper-based format, where, 84 printed copies were distributed to

four schools that agreed to participate, all of which were completed and returned with 100% response rate. The final sample consisted of 207 completed surveys. The overall response rate is estimated as 207/434 = 47.7%.

The qualitative phase followed immediately after the survey period. Based on the survey responses, a purposive sample of approximately 20 to 25 teachers was invited to participate in semi-structured interviews. Selection was guided by key survey patterns, such as, high perceived usefulness but low usage, low perceived usefulness but high usage, and high perceived barriers. Interviews were conducted in Bengali or English, depending on participant preference. Semi-structured interviews allowed consistency of questioning while maintaining flexibility for probing and elaboration. Interviews were conducted either in person or via online platforms such as Zoom or Google Meet, depending on the participant's preference. Each interview lasted approximately 40 to 45 minutes The final qualitative sample included approximately 20 teachers from public, private, and NGO-run schools, representing diverse subject areas, years of experience, and geographical locations.

3.3.1 Mapping Theoretical Frameworks to Instruments

To ensure alignment between the theoretical frameworks guiding this study and the data collection instruments, the core constructs of the Technology Acceptance Model (TAM; Davis, 1989) and the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006) were systematically mapped to both survey items and interview topics. Table 3.6 in Appendix A presents this mapping.

3.4 Variables and Operationalization

The independent variables in this study are teacher characteristics and contextual factors that are hypothesized to influence teachers' perceptions and use of GenAI. Table 3.1 in the Appendix A, displays the independent variables, their operationalization, and measurement. The mediating variables are obtained from the Technology Acceptance Model (Davis, 1989) and are hypothesized to mediate the relationship between teacher characteristics and actual GenAI usage (see Table 3.2, in the Appendix A).

The dependent variables are the actual use of GenAI tools by teachers in their professional practice (refer to Table 3.3 in the Appendix A). The outcome variable captures teachers' perceptions of how GenAI affects student learning outcomes. Table 3.4 in the Appendix A, presents the outcome variable, its operationalization, and measurement. Control variables are factors that are not the primary focus of the study but may influence the relationships between the independent, mediating, and dependent variables (refer to Table 3.5 in the Appendix).

3.5 Data Analysis

Quantitative data were analyzed using R studio. Descriptive Statistics (means, standard deviations, frequencies, and percentages) summarized teacher's demographic characteristics, perceptions, usage patterns, barriers, and perceived impacts, with responses from online and paper-based surveys merged into a single dataset. Reliability analysis using Cronbach's alpha assessed internal consistency for multi-item scales (PU, PEoU, ATU, Enablers, Impact on Students, Future Outlook) with $\alpha \geq .70$ considered acceptable (Nunnally & Bernstein, 1994) and the Barriers scale was excluded due to poor internal consistency ($\alpha = .460$). Spearman's rank correlation examined relationships among the key constructs followed by ordinal logistic regression to test whether perceived usefulness, perceived ease of use, and teacher characteristics predicted GenAI use frequency. Mediation Analysis using the mediation package in R with 5,000 bootstrapped resamples tested whether Attitude Toward Use mediated the relationship between Perceived Usefulness and actual behavior. Model fit was assessed using Nagelkerke pseudo-R^2 and collinearity diagnostics ensured no multicollinearity among predictors.

Qualitative interview data were analyzed following Braun and Clarke's (2006) six-phase thematic analysis: Familiarization with the Data, Generating Initial Codes, Searching for Themes, Reviewing Themes, Defining and Naming Themes, and Producing the Report.

Coding was both deductive (based on TAM and TPACK constructs) and inductive (emerging from the data itself). In vivo coding was used wherever a participant's own phrase captured the idea more precisely than a researcher-generated label. Memo writing and iterative coding cycles were employed throughout the analysis. Twenty-two initial codes reached saturation after approximately 14-

16 interviews, which were subsequently grouped into categories and synthesized into six overarching themes. A sample codebook is presented in Table 3.7 in Appendix A.

Integration occurred through multiple strategies. The quantitative results guided the selection of interview participants to explain notable statistical patterns. Joint display tables were developed to merge data from both strands, allowing direct comparison of numerical trends and thematic narratives. The integrated analysis focused on identifying convergence, divergence, and complementarity between datasets, enabling the study to explain not only what teachers reported about GenAI but also why certain patterns emerged in relation to contextual, professional, and institutional factors.

3.6 Ethical Considerations

This study followed strict ethical protocols to ensure participant safety, dignity, and privacy. Informed consent was acquired from all participating teachers before data collection, and participants were informed of the study's purpose, procedures, and their right to withdraw at any time without penalty. Confidentiality was maintained by assigning pseudonyms and removing all identifying information from transcripts and datasets with all digital data stored on encrypted, password-protected devices accessible only to the researcher. To minimize harm, interview questions avoided sensitive personal or evaluative judgments and institutional permissions were sought from the researcher's university and participating schools as required by ethical research standards. Each participant received standardized instructions outlining the study’s purpose, voluntary participation, and data confidentiality, and respondents completed the instrument independently, without researcher influence. For the NGO-run school, the researcher contacted the school’s supervisor, explained the study's purpose, and sought permission to approach teachers. At the beginning of each interview, the researcher reviewed the consent statement, and participants were asked to provide verbal or written consent for audio recording. All audio files and transcripts were stored in password-protected folders. It is acknowledged that because snowball links could be forwarded, the true number of people who saw the online invitation may be unknown, making a precise online response rate impossible to determine with certainty. Therefore, 35.1% figure is an estimate based on the known distribution points. For the paper surveys,

school administrators distributed forms to teachers based on availability (e.g., during recess or free periods), and teachers were informed about voluntary participation.

4. Results

This chapter displays the findings from both the strands of the explanatory sequential mixed-methods study.

4.1 Quantitative Findings

4.1.1 Descriptive Statistics and Participant Demographics

Table 4.1 presents the demographic characteristics of the participants.

Table 4.1

Demographic Characteristics of Participants (N = 207)

Characteristic	Category	*n*	%
Gender	Female	145	70.0
	Male	62	30.0
School Type	Private	85	41.1
	Public	39	18.8
	NGO-run	31	15.0
	Non-Government	30	14.5
	Semi-Government	22	10.6
Location	Urban	186	89.9
	Semi-Urban	11	5.3
	Rural	10	4.8
Age Group	25-34	68	32.9
	45-54	63	30.4
	35-44	61	29.5
	55+	8	3.9
	Under 25	7	3.4
Teaching Experience	5-10 years	49	23.7

	Under 5 years	48	23.2
	20+ years	41	19.8
	11-15 years	36	17.4
	16-20 years	33	15.9

Note. Percentages may not sum to 100 due to rounding.

4.1.2 Descriptive Statistics of Key Variables

Table 4.2 demonstrates the descriptive statistics for the key variables measured in the survey such as Perceived Usefulness (PU), Perceived Ease of Use (PEoU), Attitude Toward Use (ATU), Barriers and Enablers (B&E), Impact on Students (PIS), Future Outlook (FO), and AI Use Frequency.

Table 4.2

Descriptive Statistics of key Variable (N = 207)

Variable	***M***	***SD***	**Min**	**Max**	**Skewness**	**Kurtosis**
Perceived Usefulness (PU)	3.86	0.93	1.00	5.00	-0.42	-0.12
Perceived Ease of Use (PEoU)	3.84	0.84	1.00	5.00	-0.35	-0.08
Attitude Toward Use (ATU)	3.94	0.85	1.00	5.00	-0.48	0.05
Barriers & Enablers (B&E)	3.24	0.78	1.00	5.00	0.15	0.22

Impact on Students (PIS)	3.75	0.84	1.00	5.00	-0.31	-0.15
Future Outlook (FO)	4.18	0.91	1.00	5.00	-0.62	0.18
AI Use Frequency	3.02	1.15	1.00	5.00	-0.05	-0.65

Note. All variables were measured on a 5-point Likert Scale. M = Mean; SD = Standard Deviation.

Table 4.3

Frequency Distribution of AI Use Frequency (N = 207)

Category	**Frequency (n)**	**Percentage (%)**
Never	1	0.5
Rarely	20	9.7
Monthly	13	6.3
Weekly	38	18.4
Daily	135	65.2
Total	207	100

Note. Scale was ordered as Daily, Weekly, Monthly, Rarely, Never in the instrument but presented in ascending order for clarity. "Never" and "Rarely" were combined for ordinal regression analysis due to small "Never" responses (n = 1).

Figure 1

Distribution of Perceived Usefulness Scores

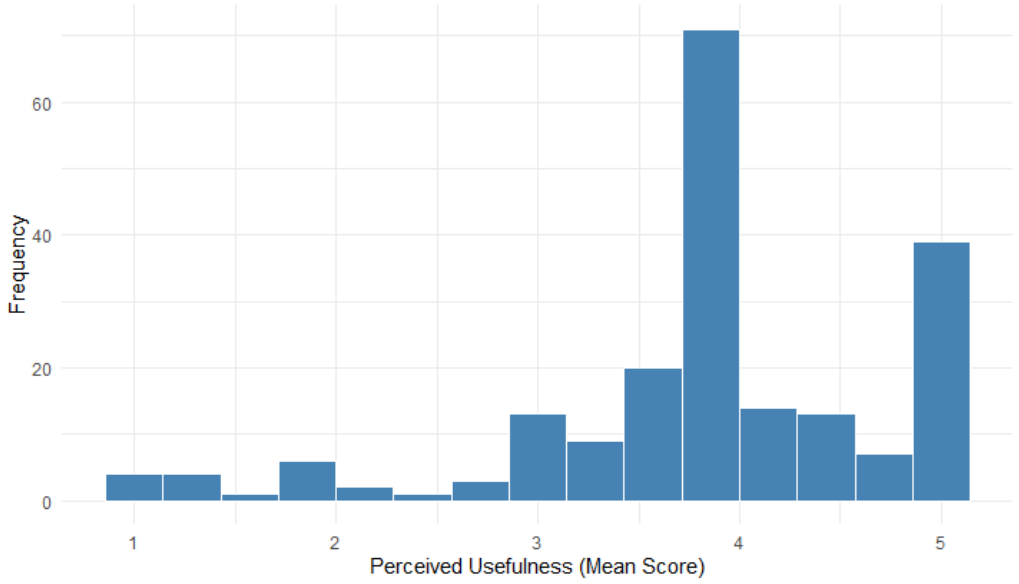

Figure 1 shows the histogram shows the frequency distribution of teachers' perceived usefulness scores on a 5-point Likert scale.

4.1.3 Reliability Analysis

Cronbach's alpha coefficients were calculated for each multi-item scale to assess internal consistency. Table 4.3 presents the reliability results.

Table 4.4

Reliability Analysis of Key Scales (N = 207)

Scale	Number of Items	Cronbach's α
Perceived Usefulness (PU)	4	.932
Perceived Ease of Use (PEoU)	3	.886
Attitude Toward Use (ATU)	3	.901
Enablers	3	.692
Impact on Students (PIS)	4	.717
Future Outlook (FO)	3	.900

Note. Cronbach's alpha values of .70 or higher indicate acceptable internal consistency (Nunnally & Bernstein, 1994). The Enablers scale (α = .692) was slightly below the conventional threshold but

considered acceptable for exploratory research. The Barriers scale (α = .460) showed poor internal consistency and was therefore excluded from further analysis.

4.1.4 Correlational Analysis

Table 4.5 presents the correlation matrix examining relationships among the key constructs.

Table 4.5

Correlation Matrix of key Variables (N = 207)

Variable	1	2	3	4	5	6	7
1. Perceived Usefulness (PU)	—						
2. Perceived Ease of Use (PEoU)	.700** [.62, .77]	—					
3. Attitude Toward Use (ATU)	.713** [.64, .78]	.629** [.54, .71]	—				
5. Impact on Students (PIS)	.469** [.35, .58]	.398** [.27, .52]	.478** [.36, .58]	.380** [.25, .50]	—		
6. Future Outlook (FO)	.386** [.26, .50]	.332** [.20, .45]	.470** [.35, .57]	.294** [.16, .42]	.497** [.38, .60]	—	

Note. Values in brackets indicate 95% confidence intervals. All variables were measured on a 5-point Likert scale. Correlation coefficients are Spearman's rho. *p* < .05. **p* < .01.

Figure 3

Correlation Heatmap of Study Variables

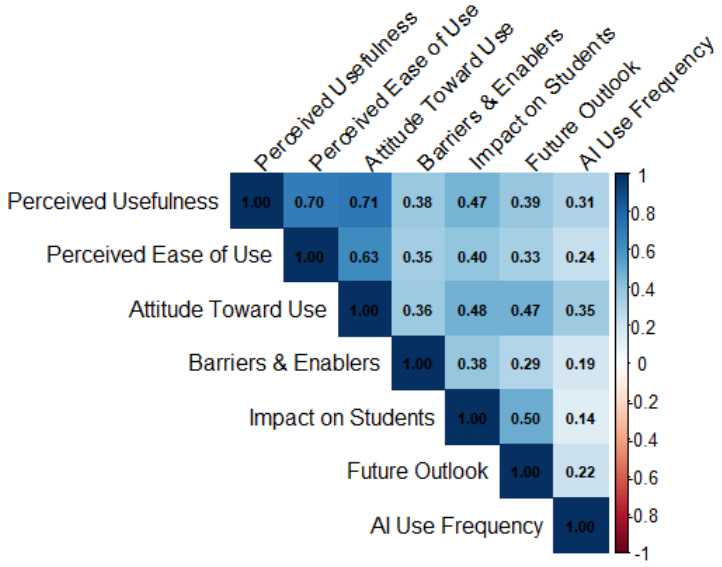

Figure 2 displays the Correlation Heatmap of Study Variables to present the strength and direction of correlations among all key variables. Darker shades indicate stronger correlations.

4.1.5 Relationship Between Perceived Usefulness and AI Usage

Figure 5

Relationship between Perceived Usefulness and AI Usage Frequency

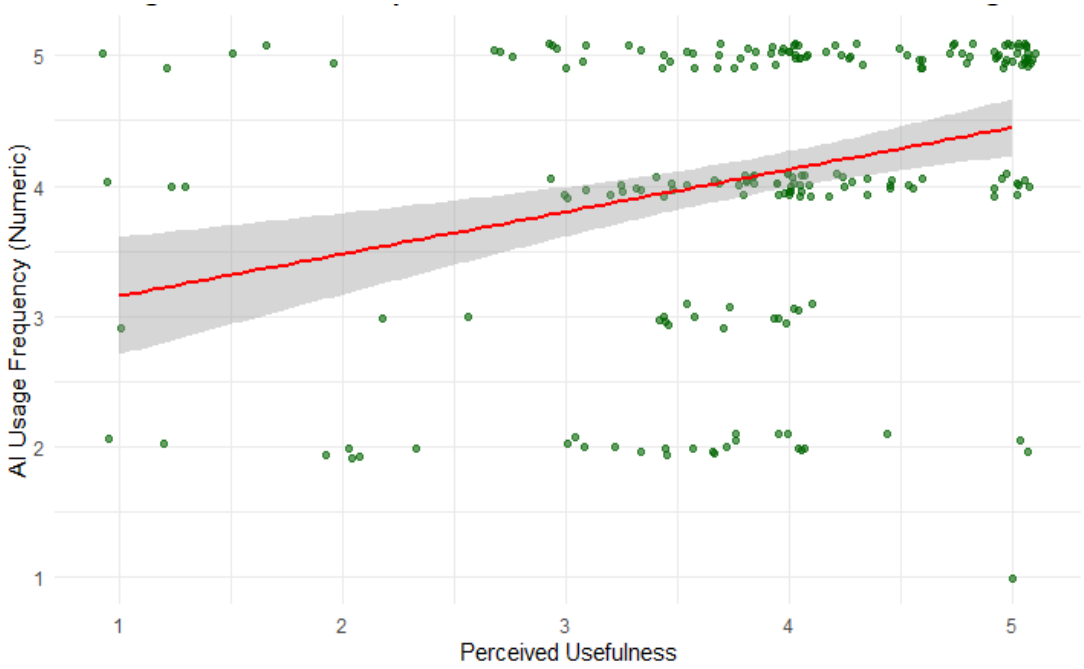

Figure 3 presents display the relationship between Perceived Usefulness and AI Usage. The scatter plot displays individual data points (green dots) with a red trend line indicating the positive relationship

between perceived usefulness and AI usage frequency. The shaded area represents the 95% confidence interval around the trend line.

Figure 7

Perceived Usefulness by AI Usage Frequency

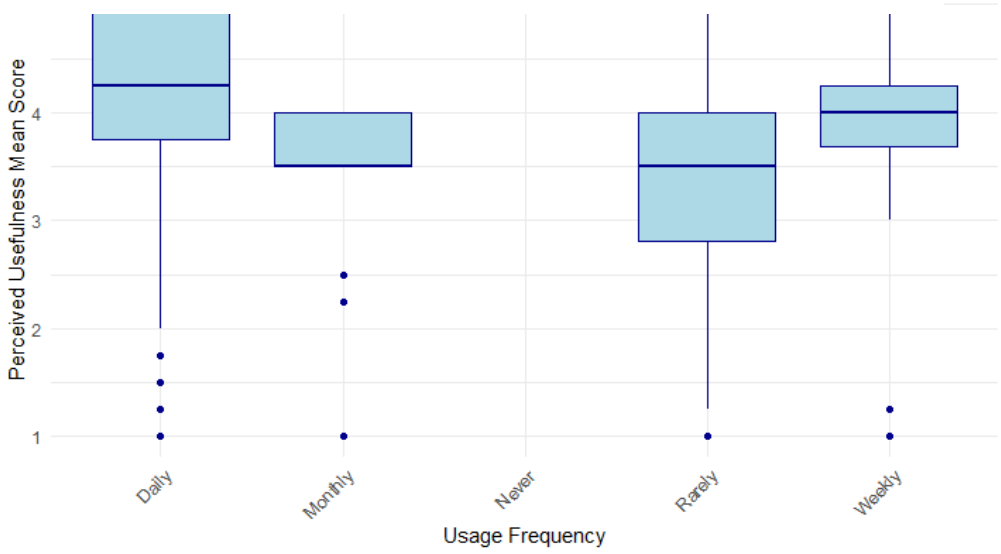

Figure 4 presents Perceived Usefulness scores across AI usage categories. The box plot displays the distribution of perceived usefulness scores across different AI usage frequency categories (Never, Rarely, Monthly, Weekly, Daily).

Figure 9

Key Variables by AI Usage Frequency

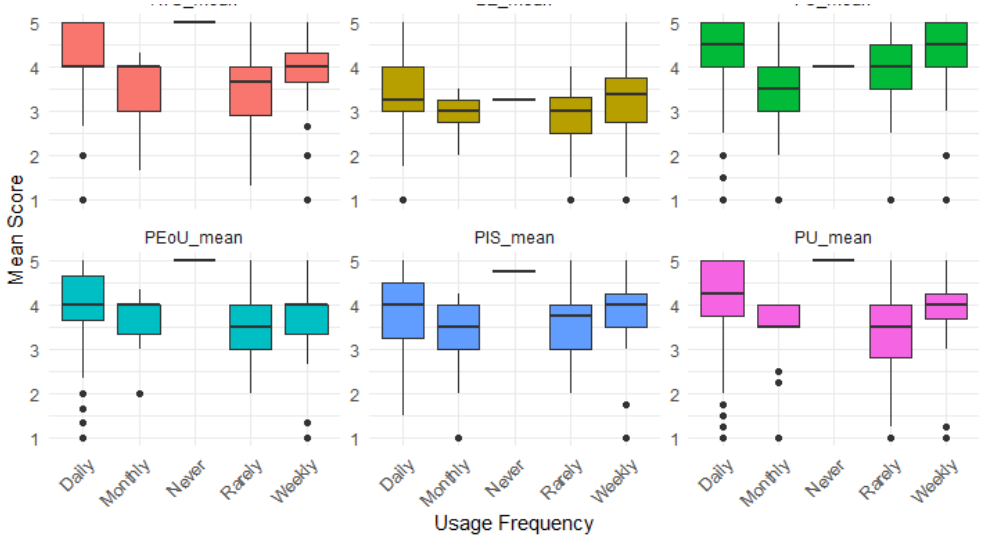

Figure 5 displays mean scores of all key variables (PU, PEoU, ATU, B&E, PIS, FO) across different AI usage frequency categories (Never, Rarely, Monthly, Weekly, Daily).

4.1.6 Ordinal Logistic Regression

To test the extent to which perceived usefulness, perceived ease of use, teacher characteristics, and school type predicted frequency of GenAI use, an ordinal logistic regression was conducted. Table 4.6 presents the results

Table 4.6

Ordinal Logistic Regression Results Predicting AI Use Frequency (N = 207)

Predictor	**Coefficient**	***SE***	***t*-value**	***p***
TAM Constructs				
Perceived Usefulness (PU)	0.372	0.281	1.323	.186
Perceived Ease of Use (PEoU)	-0.249	0.275	-0.904	.366
Attitude Toward Use (ATU)	**0.911**	0.280	**3.250**	**.001**
Gender (Reference: Female)				
Male	-0.291	0.315	-0.925	.355
Age (Reference: 25-34)				
Under 25	-0.026	0.973	-0.027	.978
35-44	-0.003	0.545	-0.005	.996
45-54	0.130	0.770	0.168	.866
55+	0.150	1.059	0.141	.888

Predictor	Coefficient	*SE*	*t*-value	*p*
Teaching Experience (Reference: 0-5 years)				
5-10 years	-0.220	0.494	-0.446	.656
11-15 years	-0.791	0.671	-1.180	.238
16-20 years	-1.246	0.734	-1.698	.090
20+ years	-1.606	0.833	-1.927	.054
School Type (Reference: Public)				
NGO-run	-0.066	0.845	-0.078	.938
Non-Government	**1.356**	0.539	**2.517**	**.012**
Private	**0.960**	0.473	**2.028**	**.043**
Semi-Government	**1.539**	0.591	**2.604**	**.009**
Location (Reference: Urban)				
Semi-Urban	-0.610	1.156	-0.528	.598
Thresholds				
Never/Rarely | Monthly	-2.740	—	—	—
Monthly | Weekly	1.418	—	—	—
Weekly | Daily	3.091	—	—	—

Note. Bolded values indicate statistically significant predictors (*p* < .05). SE = Standard Error. Model Fit: Nagelkerke R^2 = .238, $\chi^2(19) = 44.98$, *p* < .001. Rural location was excluded from the regression model due to the small number of cases (n = 10). "Never" and "Rarely" combined due to small "Never" responses (n = 1).

4.1.7 Mediation Analysis Results

To test H2 (Attitude Toward Use mediates the relationship between teachers' perceptions and their actual AI usage), a mediation analysis was conducted with Perceived Usefulness as the independent variable, Attitude Toward Use as the mediator, and AI Use Frequency as the dependent variable. Table 4.7 presents the mediation results.

Table 4.7

Mediation Analysis Results

Effect	Estimate	95% CI Lower	95% CI Upper	*p*
ACME (Indirect Effect)	**0.198**	**0.026**	**0.362**	**.012**
ADE (Direct Effect)	0.126	-0.078	0.370	.200
Total Effect	**0.324**	**0.142**	**0.510**	**.000**
Proportion Mediated	**0.610**	**0.089**	**1.475**	**.012**

*Note. ACME = Average Causal Mediation Effect (Indirect Effect); ADE = Average Direct Effect. CI = Confidence Interval. Bootstrapping with 5,000 resamples was used to calculate the confidence intervals. *p* < .05.*

The mediation analysis disclosed that Attitude Toward Use significantly mediated the relationship between Perceived Usefulness and AI Use Frequency (ACME = 0.198, 95% CI [0.026, 0.362], p = .012), with approximately 61.0% of the total effect transmitted through ATU.

The direct effect was not statistically substantial (ADE = 0.126, p = .200) and suggest full mediation.

AI Use Frequency was coded as a continuous variable (1 = Never, 2 = Rarely, 3 = Monthly, 4 = Weekly, 5 = Daily), for the mediation analysis mainly to allow calculation of indirect effects using the mediation package in R. While this strategy is common in mediation analysis, I acknowledge that treating ordinal data as continuous take on equal intervals between categories, which may not be fully justified. This limitation should be addressed when interpreting the mediation results.

4.2 Qualitative Findings

Semi-structured interviews were carried out with 20 secondary school teachers selected through purposeful criterion sampling from the quantitative survey respondents. Table 4.8 displays the demographic characteristics of the qualitative sample.

Table 4.8

Demographic Characteristics of Interview Participants (n = 20)

Characteristics	**Category**	***n***
Gender	Female	12
	Male	8
School Type	NGO-run	7
	Private (Cambridge/International	5
	Private (Bangladesh Curriculum)	8
Subject Area	Science	4
	Commerce	5

	Bangla	3
	BGS	3
	English	3
	Math	1
	Humanities	1
Teaching Experience	Under 5 years	9
	5-10 years	4
	11-15 years	3
	16-20 years	2
	20+ years	2
Location	Chittagong	13
	Dhaka	4
	Madaripur	3

Note. BGS = Bangladesh and Global Studies

Table 4.9

Purposeful Sampling Categories and Teacher Selection (n = 20)

Selection Category	Exact Rationale from Proposal	Teachers Selected	Count
High PU + Low Use	"High perceived usefulness but low actual usage (to explore barriers to adoption despite positive perceptions)"	Teacher 7	1

Low PU + High Use	"Low perceived usefulness but high actual usage (to understand what drives usage despite skepticism)"	Teacher 2	1
High PU + High Use	"High perceived usefulness and high actual usage (to identify enablers and successful integration strategies)"	Teachers 18, 17, 4, 5, 15	5
High PU + Moderate Use	Captures "variation across perceived usefulness, usage frequency"	Teachers 19, 3, 13, 14	4
Moderate PU + Moderate Use	Ensures "representation of the range of patterns observed in survey data"	Teachers 9, 11, 10, 8	4
Low PU + Low Use	Captures comprehensive barrier profiles	Teachers 1, 6, 16, 20, 12	5

Note. PU = Perceived Usefulness. Teachers are identified by their assigned pseudonym numbers.

Thematic analysis yielded 22 initial codes that reached saturation, grouped into seven categories and synthesized into six overarching themes. Table 4.9 presents the themes and their descriptions.

Table 4.10

Overview of Qualitative Themes

Theme	Description
Theme 1: The Efficiency-Dependency Paradox	AI dramatically reduces teachers' workload and saves time, but this efficiency comes with a perceived risk of dependency that erodes creativity, critical thinking, and professional effort.
Theme 2: Student Vulnerability and the Transformation of Learning	Students, especially younger ones, are perceived as vulnerable to AI's harmful effects, experiencing reduced reading, diminished effort, surface-level engagement, and declining creativity.
Theme 3: Institutional and Policy Neglect	Teachers operate without formal training, clear policies, adequate infrastructure, or systematic support, forcing them to make individual, inconsistent decisions about AI use.
Theme 4: Teacher Resilience and Survival Strategies	In response to institutional neglect, teachers develop survival strategies through self-learning, peer sharing, detection strategies, and AI-resistant assessment design.

Theme 5: Professional Identity and the Assertion of Irreplaceable Value	Teachers navigate an identity crisis as AI does more "work," asserting their irreplaceable value through the human element, emotional understanding, relationship-building, and moral guidance.
Theme 6: Ethical Confusion in a Policy Void	Teachers navigate ethical gray zones, using AI for grading, failing to verify answers, sharing information without privacy protections, due to workload pressure and lack of institutional guidance.

4.2.1 Theme 1: The Efficiency-Dependency Paradox

The Efficiency-Dependency Paradox reflects the fundamental tension at the heart of teachers' relationship with generative AI. While, AI dramatically reduces teachers' workload by saving hours of preparation time, teachers also fear that this very efficiency creates dependency, gradually eroding their creativity, critical thinking capacity, and depth of professional engagement.

Almost all participant described GenAI's entry into professional life as practical and instrumental, reducing hours of lesson planning, question-setting, and slide designs.

Teacher 17 (High PU + High Use) described the efficiency gain:

"The thing that would have taken me maybe half an hour or a bit more to do manually, I am getting it ready within 10-15 minutes."

Teacher 16 (Low PU + Low Use), despite her low usage, offered a dramatic comparison:

"Within just half an hour, I was able to finish a task that would normally take me six days."

Teacher 4 (High PU + High Use) highlighted the relief from repetitive tasks:

"Now I don't have to spend hours thinking about how to frame a question or design a worksheet. It's just there."

Teacher 18 (High PU + High Use) described using AI for pedagogical reinvention:

"A topic taught 5 days ago gets actively recalled in just 5 minutes through retrieval practice quizzes... I can make interactive slides now that I never had time for before."

Teacher 3 (High PU + Moderate Use) described AI's ability to generate visual content:

" If I need an image that is not in the book... I can make it."

However, celebration of efficiency was immediately qualified by anxiety about what is lost:

Teacher 14 (High PU + Moderate Use) expressed:

"The big disadvantage is that... there is a brainstorming part... which we are now doing less than before... creativity reduces."

Teacher 1 (Low PU + Low Use) articulated the fear of dependency:

"If I become entirely dependent on AI while using it, my own ability to initiate or create something independently will decline. Additionally, if I don't continuously review the output, a point may come after a few months where I won't be able to think critically or retain the capability and analytical power I once had."

Teacher 18 (High PU + High Use) acknowledged the risk:

"When I'm taking the critical thing question from the AI that means I am not using my own brain."

Note. Not all teachers experienced AI as creativity-destroying. Teacher 16 described:

"AI has actually simplified our workplace... made my work much easier and made me significantly more creative... I can combine my thoughts with the assistance of AI to create much better... slides."

Teacher 19 (High PU + Moderate Use) added:

"I got something creative, which cannot be found in conventional guidebooks.

This variation suggests that AI's impact on creativity is shaped by how teachers use it, as a starting point for their own creativity (enhancement) versus as a replacement for their own thinking (diminishment).

4.2.2 Theme 2: Student Vulnerability and the Transformation of Learning

Student Vulnerability and the Transformation of Learning highlights teacher's deep concern about AI's impact on students, particularly younger students in grades 6-8. Teachers describe a crisis of learning: students no longer read, think independently, or engage deeply with content. The "copy-paste culture" portrays a fundamental change where students outsource thinking to AI.

Almost all participants, voluntarily, shifted from describing personal benefit to perceived decline in students' willingness to read, brainstorm, or attempt problems independently.

Teacher 5 (High PU + High Use) provided a vivid example:

"In fact, I have received answers from students where perhaps they put a question into ChatGPT... and the student copy-pasted that exact thing!"

Teacher 5 elaborated:

"They aren't doing anything to develop their own skills... just getting an answer from ChatGPT."

Teacher 9 (Moderate PU + Moderate Use) quantified the perceived balance:

"If I had to put it in numbers, 40-60. 40% positive, 60% negative."

Teacher 1 (Low PU + Low Use) expressed concern about cognitive development:

"If children start using AI... their own creativity will be ruined."

Teacher 18 (High PU + High Use) noted the decline in research habits:

"The change in learning is that the eagerness to know is less. They don't want to read."

Teacher 2 (Low PU + High Use) observed reduced effort:

"The more they use AI, the less they try to solve problems themselves."

A key pattern emerged around younger students' vulnerability. Teacher 5 distinguished:

"If it's a very senior student... who understands, who can understand and write on their own and is just taking help from there instead of copy-pasting, then it's okay. But if we talk about students in grade 6 or 7... they copy-paste from there. They are becoming too dependent on it."

The detection of AI-generated student work appeared as a substantial sub-theme. Teacher 5 described:

"I know how a grade 6 student writes and how a grade 7 student writes... AI's answers are very well-structured... when it's too structured, only then can I figure out that this isn't actually their own writing."

Teachers also raised concern regarding the decline in exam performance:

"When different questions appear in the exam, they can no longer answer properly... You actually need to learn how to answer it yourself."

4.2.3 Theme 3: Institutional and Policy Neglect

Institutional and Policy Neglect apprehends the systemic failure that shaped every dimension of teachers' AI experiences. Teachers work without formal training, clear policies, sufficient infrastructure, or systematic support, forcing individual, inconsistent decisions about AI use.

A stark difference ran through the sample between well-resourced and under-resourced schools.

a) Supportive Institutional Contexts:

Teacher 2 (Low PU + High Use) described proactive support:

"Our school management has been very helpful. They have even created ChatGPT accounts for us."

Teacher 10 (Moderate PU + Moderate Use) described institutional training:

"They brought in someone to train us on how to use AI effectively."

Teacher 18 (High PU + High Use) noted institutional policy support:

"We have guidelines on what is acceptable and what is not."

b) Under-Resourced Institutional Contexts:

Teacher 13 (High PU + Moderate Use) described resource limitations:

"Since our school is basically for underprivileged children, we can't always work with AI."

Teacher 20 (Low PU + Low Use) described explicit restriction:

"My school administration is not supportive because they have told us not to use mobile phones in class."

Teacher 3 (High PU + Moderate Use) described infrastructure challenges:

"If I don't have an internet connection, I can't work... the network there is usually very weak."

Teacher 14 (High PU + Moderate Use) described neglect:

"Nobody has told us anything about AI. We just figured it out ourselves."

Teacher 20 (Low PU + Low Use) elaborated on practical constraints:

"Only with this small mobile, can I manage the whole class? I won't be able to. 65 students to 1 teacher."

Teacher 17 (High PU + High Use) noted the equity gap:

"The students in well-resourced schools will benefit much more than our students."

Teacher 1 stated:

"No official training has been organized yet to teach us how it can be utilized."

Teacher 4 (High PU + High Use) added:

"I haven't received any training or peer support on AI. I have learned it by myself through practice."

4.2.4 Theme 4: Teacher Resilience and Survival Strategies

Teacher Resilience and Survival Strategies highlights teachers' proactive responses to institutional disregard. Teachers developed their own strategies through self-learning, informal peer sharing, detection strategies, and AI-resistant assessment design.

a) Self-Learning:

Teacher 4 (High PU + High Use) described:

"I haven't received any training or peer support on AI. I have learned it by myself through practice."

Teacher 8 (Moderate PU + Moderate Use), with over 20 years of experience:

"I have done courses on AI tools personally—paid courses. Like how to generate videos, how to generate this or that. I have done it on my own."

Teacher 18 (High PU + High Use) added:

"Whatever I learned, it's from my personal learning."

b) Peer Sharing:

Teacher 1 (Low PU + Low Use) described informal learning:

"Initially, we learned about it through social media or various sources... Our Educational Coordinator told us about it."

c) Detection Strategies:

Teachers developed informal systems for identifying AI-generated student work.

Teacher 7 (High PU + Low Use) described writing-style indicators:

"Its writing pattern is distinct... it clearly shows AI usage."

Teacher 8 (Moderate PU + Moderate Use) relied on knowledge of individual students:

"I know my students' writing. When a weak student suddenly writes like a professor, I know something is wrong."

d) AI-Resistant Assessment Design:

Teacher 8 (Moderate PU + Moderate Use) described:

"I will give them something that they cannot even solve with AI."

Teacher 16 (Low PU + Low Use) described the pedagogical shift:

"I design open-ended, contextual questions that require critical thinking, not just information retrieval."

4.2.5 Theme 5: Professional Identity and the Assertion of Irreplaceable Value

Professional Identity and the Assertion of Irreplaceable Value present the existential dimension of AI integration. Teachers drive an identity crisis, questioning whether AI can replicate their abilities and what their role is. The answer they thought is that AI cannot do what they can do, understand students emotionally, build relationships, inspire, and provide moral guidance.

a) Existential Anxiety:

Teacher 14 (High PU + Moderate Use) expressed the most despairing point of view:

"There is no role of the teachers. Already, I do feel... I have become the puppet."

Teacher 1 (Low PU + Low Use) echoed this fear:

"Sometimes I wonder, if AI can do everything, what will be left for us?"

b) Confident Redefinition:

Teacher 18 (High PU + High Use) articulated a confident redefinition:

"AI cannot solve the behavior problems... teacher can more work on the emotional intelligence. Like, the AI cannot give that."

Teacher 8 (Moderate PU + Moderate Use) described the teacher's unique role:

"AI can give information, but it cannot build relationships. It cannot motivate students. That's our job."

Teacher 16 (Low PU + Low Use) described a fundamental shift in mindset:

"It's like the 'Jug and Mug Theory'... this mindset among educators needs to change. We are not the only source of knowledge anymore."

c) Managing Public Image:

Teacher 12 (Low PU + Low Use) described concealing AI use:

"I will not use it much in front of the students because students have a concept that teachers know everything."

Teacher 20 (Low PU + Low Use) shared the same concern:

"If students see me using AI, they will think I don't know the subject. I have to maintain my authority."

Teachers also explained the shift from "teacher" to "facilitator":

Teacher 8 (Moderate PU + Moderate Use) stated:

"We are facilitators. We focus more on child-centric classes, we use the UDL method."

Teacher 2 (Low PU + High Use) described the generational divide from a younger teacher's perspective:

"Those who are senior to us can neither relate to it nor reach that advanced level."

4.2.6 Theme 6: Ethical Confusion in a Policy Void

Ethical Confusion in a Policy Void presents the moral complexity of teachers' AI practices. Teachers steer ethical gray zones, using AI for grading, failing to verify answers, sharing information with AI tools, and generating images despite religious concerns, all due to workload pressure and absence of clear policies.

a) The Grading Compromise:

Teacher 17 (High PU + High Use) honestly described:

"What we tend to do when time is short... we don't want to open a book and search for it... we just depend on AI, input the question, and it tells us whether it's correct or incorrect, and based on that, we

finish the task... our brain utilization is decreasing, and we are not very keen on verifying what is right and what is wrong."

Teacher 17 elaborated on the unfairness:

"I am grading a child's paper... and it will count toward their final grade... isn't the marking unfair?"

b) The Verification Gap:

Teacher 1 (Low PU + Low Use) articulated the ideal:

"We need to check it, verify it thoroughly, and only then use it... it shouldn't be a case of 'received it and used it immediately.'"

Teacher 15 (High PU + High Use) acknowledged the need for verification:

"We need to evaluate things with our own judgment... I often find that I get incorrect information."

c) Privacy Concerns:

Teacher 4 (High PU + High Use) expressed concern:

"AI takes a lot of information from my end... now, it's not like AI keeps that information private... the information it gets from me ends up being spread. I feel this is ethically incorrect."

Teacher 12 (Low PU + Low Use) called for policy:

"Policy makers should establish certain guidelines... concerning the person using it... from their personal data protection to securing information they wish to keep private."

d) Religious Tensions:

Teacher 16 (Low PU + Low Use) described the conflict:

"My religion, Islam, states that creating images and things of that nature is not good... I am still not completely sure; I need to study this further."

4.3 Integration of Quantitative and Qualitative Findings

The integration reveals both convergence and divergence between the two strands. Table 4.11 presents a joint display summarizing key combination insights.

Table 4.1

Joint Display: Integration of Quantitative and Qualitative Findings

Quantitative Finding	Qualitative Theme	Integration Insight
PU: M = 3.86 (high); *r* = .713** with ATU	Theme 1: The Efficiency-Dependency Paradox	**Convergence:** High PU is explained qualitatively by concrete time-saving experiences. Teachers consistently described AI as a tool that compresses hours of work into minutes.
PEoU: M = 3.84 (high); *r* = .700** with PU	Theme 1 (part)	**Convergence:** High PEoU is explained by ease of use narratives. Teachers described AI as accessible and intuitive.
ATU: M = 3.94 (high); strongest predictor of use (coefficient = 0.911, *p* = .001)	Theme 1, Theme 5	**Convergence:** Positive attitudes drive usage. Qualitatively, teachers who successfully adopted AI had confidently redefined their professional identity (Theme 5), while those who resisted expressed existential anxiety.
Barriers: M = 3.24 (moderate); weak correlation with use (*r* = .189*)	Theme 3: Institutional and Policy Neglect	**Divergence:** Quantitative: barriers appear moderate. Qualitative: barriers are severe

		and structural for teachers in under-resourced schools—infrastructure, training, administrative support, and class size.
Student Impact: Weak correlation with use (*r* = .138*)	Theme 2: Student Vulnerability and the Transformation of Learning	**Divergence:** Quantitative measure does not capture emotional weight. Qualitatively, student dependency concerns are near-universal and emotionally charged.
H1: PU and PEoU not significant predictors	Theme 1, Theme 5	**Explanation:** Usefulness is widely recognized, but attitudes, shaped by identity concerns and institutional conditions, determine whether usefulness translates into use.
H2: ATU fully mediates PU → Use (indirect effect = 0.198, 95% CI [0.026, 0.362])	Theme 1, Theme 5	**Explanation:** Perceived usefulness influences usage through attitudes. Teachers' professional identity and cautious embrace shape their attitudes.

H3: School type significant; individual characteristics not	Theme 3, Theme 4	**Explanation:** Institutional conditions (training, infrastructure, support) matter more than individual characteristics like age or gender.

Note. PU = Perceived Usefulness; PEoU = Perceived Ease of Use; ATU = Attitude Toward Use. *p* < .01. *p* < .05.

5. Discussion

This chapter interprets the finding of the study in relation to the research questions and theoretical frameworks.

5.1 Teachers' Perceptions of Generative AI: Usefulness, Ease of Use, and Pedagogical Potential

The quantitative findings revealed that teachers reported relatively high mean scores for Perceived Usefulness (*M* = 3.86, *SD* = 0.93), Perceived Ease of Use (*M* = 3.84, *SD* = 0.84), and Attitude Toward Use (*M* = 3.94, *SD* = 0.85). Perceived Usefulness presented strong positive correlations with Attitude Toward Use (*r* = .713, 95% CI [.64, .78]) and Perceived Ease of Use (*r* = .700, 95% CI [.62, .77]).

The qualitative findings (Theme 1: “The Efficiency-Dependency Paradox ") delivered rich explanations for these positive perceptions. Teachers constantly explained GenAI as a practical tool that reduced hours of lesson planning, question-setting, and slide design into minutes. Teacher 17's statement, *"The thing that would have taken me maybe half an hour or a bit more to do manually, I am getting it ready within 10-15 minutes"*, depicts the specific, daily relief that upholds the high quantitative scores. This finding recommend that time-saving is the primary perceived benefit of GenAI among Bangladeshi teachers.

However, the qualitative data also stated that teacher’s use GenAI with self-imposed boundaries. Teacher 1 said, "I prefer using it specifically for scenarios like managing heavy workloads... I try not to rely on it for an entire task." This cautious perspective indicates that while teachers recognize AI's potential, they are also protective towards professional autonomy and pedagogical judgment.

5.2 Current Usage Patterns of Generative AI Tools

The quantitative findings presented moderate AI Use Frequency (M = 3.02, SD = 1.15), with teachers reporting use for lesson planning, grading, administrative tasks, and instructional support. The qualitative findings (Theme 1) delivered specific examples: lesson planning (Teacher 17), pedagogical transformation through recovery-practice quizzes and interactive slides (Teacher 18), and visual content generation (Teacher 3: "If I need an image that is not in the book... I can make it").

Notably, the qualitative data exposed usage patterns beyond simple content generation. Teacher 15 described using AI for cross-checking: "I try to cross-check them with AI to verify if I am on the right track." Teacher 18 described using AI for recapture-practice quizzes and interactive slides. These examples highlights that some teachers are moving beyond basic content generation toward more sophisticated pedagogical applications.

5.3 Institutional and Technical Barriers and Enablers Influencing Adoption

The quantitative findings demonstrated that Barriers and Enablers had a moderate mean score ($M = 3.24$, $SD = 0.78$) and a weak correlation with AI Use Frequency (*r* = .189, 95% CI [.05, .32], *p* < .05). However, the qualitative findings (Theme 3: "Institutional and Policy Neglect") revealed that institutional barriers are severe and structural for teachers in under-resourced schools.

This divergence between moderate quantitative scores and severe qualitative realities recommends that the quantitative measure may not fully capture the depth of institutional constraints. Teachers in under-resourced schools described the lack of institutional support (Teacher 20: "My school administration is not supportive because they have told us not to use mobile phones in class"), infrastructure challenges (Teacher 3: "If I don't have an internet connection, I can't work... the network there is usually very weak"), and neglect (Teacher 14: "Nobody has told us anything about AI. We just figured it out ourselves"). The qualitative data provide rich, contextual evidence that these infrastructure gaps are lived realities that fundamentally restrict teachers' ability to GenAI adoption.

Enabling factors detected qualitatively included: proactive administrative support (Teacher 2: "Our school management has been very helpful. They have even created ChatGPT accounts for us"), institutional training (Teacher 10: "They brought in someone to train us on how to use AI effectively"), and transparent policy guidelines (Teacher 18: "We have guidelines on what is acceptable and what is not"). These findings suggest that teachers need significant training that moves beyond basic computer skills to include pedagogical application.

5.4 Perceived Impact on Student Learning, Creativity, and Engagement

The quantitative findings stated a weak but meaningful positive correlation between Impact on Students (PIS) and AI Use Frequency (*r* = .138, 95% CI [.00, .27], *p* < .05). Nervertheless, the qualitative findings (Theme 2: "Student Vulnerability and the Transformation of Learning") uncovered that concerns about students' cognitive development are near-universal and emotionally charged.

Teachers depicted a perceived decrease in students' willingness to read, brainstorm, or endeavor problems independently. Teacher 5 delivered a vivid example: "In fact, I have received answers from students where perhaps they put a question into ChatGPT... and the student copy-pasted that exact thing!". Teacher 9 quantified the perceived balance: "If I had to put it in numbers, 40-60. 40% positive, 60% negative." Teacher 1 expressed issue about cognitive development: "If children start using AI... their own creativity will be ruined."

These matters found that teachers worried about students' potential misuse and over-reliance on AI.

The qualitative data also exposed that teachers are constructing their own informal systems for managing AI use (Theme 4: "Teacher Resilience and Survival Strategies"). In the absence of institutional policies, teachers have designed detection strategies, for example, writing-style indicators, vocabulary usage, knowledge of individual students, and graduated response strategies, such as, verbal warnings, reduced marks, and quiet reporting). This finding implies that teachers are navigating notable ethical challenges without institutional support, therefore, emphasizing an urgent need for policy and training.

5.5 Policy and Professional Development Support Teachers Believe Are Necessary

The qualitative findings (Theme 6: "Ethical Confusion in a Policy Void") showed that participants merged with unusual consistency on two policy requests: structured, mandatory training and some form of monitoring or accountability framework.

Teacher 5 articulated the near-universal requirement: "It can be included in the policy that the AI training... can be made mandatory." Teacher 2 highlighted the need for systematic training: "We need

proper training, not just 'go and explore.' Someone needs to guide us." Teacher 13 explained the equity argument: "If some teachers get training and others don't, the gap will widen." Teacher 19 expressed the ideal format: "Step-by-step, subject-by-subject integration frameworks. How do I use AI in English differently than in Mathematics?" These findings advise that teachers need relevant professional development training for using AI tools more creatively.

The call for monitoring and accountability was also noteworthy. Teacher 1 called for supervision: "Monitoring is also necessary... if it is becoming excessive, or how much we are doing with proper understanding." Teacher 16 portrayed the need for accountability: "If any teacher uses AI just to reduce their workload, shirk their duties... they must be held accountable under disciplinary rules." This suggest that teachers ackknowledge the need for both support and regulation to ensure responsible AI use.

5.6 Testing of Hypotheses

5.6.1 Hypothesis 1 (H1): PU and PEoU positively predict AI Use Frequency

Partially Supported. The correlation analysis disclosed that Perceived Usefulness (*r* = .308, *p* < .01) and Perceived Ease of Use (*r* = .237, *p* < .01) both had statistically notable positive relationships with AI Use Frequency. However, when other variables were controlled in the ordinal logistic regression model, Perceived Usefulness (*p* = .186) and Perceived Ease of Use (*p* = .366) were not statistically substantial predictors, hence, recommending their effects are largely mediated by Attitude Toward Use.

The qualitative findings (Themes 1 and 5) explain that while usefulness and ease are widely authorized, professional identity concerns, fear of obsolescence, maintaining pedagogical authority, shape whether these perceptions translate into actual use.

5.6.2 Hypothesis 2 (H2): ATU mediates the relationship between PU and AI Use Frequency

Partially Supported. The mediation analysis uncovered that Attitude Toward Use significantly mediated the relationship between Perceived Usefulness and AI Use Frequency. The indirect effect (ACME) was 0.198 (95% CI [0.026, 0.362], *p* = .012), showing that approximately 61.0% of the total

effect of Perceived Usefulness on AI Use Frequency was conveyed through Attitude Toward Use. The direct effect was not statistically significant (ADE = 0.126, *p* = .200), therefore, suggesting full mediation.

The qualitative findings (Theme 5: "Professional Identity and the Assertion of Irreplaceable Value") offer rich explanatory evidence. Teachers who had successfully adopted GenAI described a confident reformulation of their professional identity. Teacher 18 expressed this: "AI cannot solve the behavior problems... teacher can more work on the emotional intelligence. Like, the AI cannot provide that." Instead, teachers who expressed existential anxiety (Teacher 14: "There is no role of the teachers. Already, I do feel... I have become the puppet") were more likely to report low usage despite realizing AI's potential benefits.

This finding suggests that successful GenAI adoption demands not just positive perceptions but also a positive attitude toward the technology, shaped by teachers' professional identity. Training programs should hence address not only technical skills but also the professional identity concerns that shape teachers' attitudes.

Note. H2 initially stated that Attitude Toward Use would mediate the relationships between both Perceived Usefulness and Perceived Ease of Use and AI Use Frequency. However, the mediation analysis was conducted only with Perceived Usefulness as the independent variable, as Perceived Ease of Use presented a weaker correlation with AI Use Frequency in the beginning of analysis.

5.6.3 Hypothesis 3 (H3): School type significantly predicts AI Use Frequency

Partially Supported. School type was a meaningful predictor of AI Use Frequency. Teachers in non-government schools (coefficient = 1.356, *p* = .012), Private schools (coefficient = 0.960, *p* = .043), and Semi-Government schools (coefficient = 1.539, *p* = .009) were significantly more likely to use GenAI frequently compared to teachers in public schools. Teaching experience displayed a negative trend, with more experienced teachers (20+ years) being less likely to use GenAI frequently, though this was only marginally significant (*p* = .054). Gender, age, and location were not significant predictors.

The qualitative findings (Theme 3: "Institutional and Policy Neglect") offer a compelling explanation. The stark distinction between well-resourced and under-resourced schools, in terms of administrative support, training availability, infrastructure, and class size, explains why school type appeared as a significant predictor. The same fundamental attitude (broad willingness to use AI) produced very different behavior based on institutional context. Hence the data provide rich evidence that these statistics reflect real, structural constraints that essentially limit adoption. However, the marginal implication suggests that experience alone is not the primary determinant of adoption. Institutional conditions do play a pivotal role.

Note: H3 originally stated that teachers with higher digital literacy and greater access to technological infrastructure would illustrate stronger adoption. However, digital literacy and access to technology were not directly calculated in the final regression model due to limited variation in the sample. School type was used as a proxy for institutional infrastructure and support. Therefore, H3 has been rephrased to consider what was actually tested: School type will significantly predict AI Use Frequency, with teachers in Non-Government, Private, and Semi-Government schools reporting greater frequency of GenAI use compared to teachers in public schools. Moreover, Rural location was excluded from the regression model due to the small number of cases (n = 10, 4.8% of the sample).

5.7 Theoretical Implications

The findings of this study led to the improvement of TAM in the context of GenAI adoption. The finding that Attitude Toward Use fully mediates the relationship between Perceived Usefulness and actual usage imply that attitudes, not just perceptions, are central to adoption. This emphasize the necessity of understanding the factors that shape teachers' attitudes, such as, professional identity, ethical concerns, and institutional support.

The finding that school type significantly predicted usage while individual characteristics like age and gender did not suggests that contextual factors are more important than individual differences in determining adoption. This recommend that TAM may need to be prolonged to more explicitly

incorporate institutional and contextual factors, steady with the Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh et al., 2003).

The qualitative findings (Themes 3 and 4) reveal that teachers are developing new pedagogical-technological knowledge informally, proposing that TPACK development can occur through experience and informal learning, not only formal training. This has suggestions for teacher education: providing opportunities for teachers to experiment with AI in supportive environments may be as meaningful as formal training.

The finding that teachers are designing AI-resistant tasks (Teacher 8: "I will give them something that they cannot even solve with AI") and developing detection strategies (Teacher 7: "Its writing pattern is distinct... it clearly shows AI usage") recommend that TPACK in the GenAI era requires not just knowledge of how to use AI but also knowledge of how to manage its pedagogical challenges. This promote that the TPACK framework may need to be expanded to include new dimensions related to AI-specific pedagogical knowledge.

The integration of quantitative and qualitative findings disclosed both convergence and divergence between the two strands. The joint display (Table 4.10) presented how qualitative data can explain and reinterpret quantitative patterns, providing a more complete understanding of GenAI adoption than either method alone. This maintains the value of explanatory sequential mixed-methods designs in educational research (Creswell & Plano Clark, 2018; Johnson & Onwuegbuzie, 2004).

5.9 Practical Implications

The finding that teachers called for mandatory, structured training (Theme 6) put forward an urgent need for professional development programs. Training should address not just technical skills but also pedagogical integration and professional identity.

Training programs should be subject-specific, as Teacher 19 expressed: *"Step-by-step, subject-by-subject integration frameworks. How do I use AI in English differently than in Mathematics?"* This demonstrates that one-size-fits-all training may be insufficient.

The finding that teachers who received training reported more positive perceptions and higher usage (Theme 4) and this suggests that training can be efficient in promoting adoption. On the other hand, the finding that teachers in under-resourced schools lacked access to training (Theme 4) and indicate that training should be approachable to all teachers, regardless of school type or location.

The finding that teachers called for monitoring and accountability (Theme 6) approve a need for clear policy guidelines on acceptable AI use. Teachers must know what is allowed, what is not, and how to acknowledge the misuse of AI.

The finding that institutional conditions explain more shift in behavior than individual characteristics (H3) indicates that policy should address systemic barriers, such as, infrastructure, training, and support, rather than focusing solely on individual teacher characteristics.

The finding that administrative support is a key enabler (Theme 3) highlight that school leaders should proactively support GenAI adoption by providing resources, training, and clear guidelines. Teacher 2's experience ("Our school management has been very helpful. They have even created ChatGPT accounts for us") advise that practical support can be highly impactful in promoting adoption.

School leaders should also focus on teachers' professional identity concerns (Theme 5) by recognizing and valuing the unique role of teachers in an AI-saturated world. Teacher 18's depiction of the teacher's role as providing emotional intelligence and relationship-building indicate that professional development should help teachers reshape their role.

6. Conclusion

The study employed an explanatory sequential mixed-methods design and explored teachers' perceived usefulness and ease of use of GenAI, their actual usage patterns, the barriers and enablers influencing adoption, the perceived impact on students, and the policy and professional development support teachers believe are essential.

The quantitative findings illustrated that teachers hold positive perceptions of GenAI's usefulness (M = 3.86), ease of use (M = 3.84), and overall attitude toward use (M = 3.94). However, contradictory to the Technology Acceptance Model's original proposition, perceived usefulness and ease of use were not significant predictors of actual usage when other variables were controlled. Instead, attitude toward use appeared as the strongest predictor (coefficient = 0.911, *p* = .001), fully mediating the relationship between perceived usefulness and usage. School type was a substantial predictor of usage, with teachers in non-government, private, and semi-government schools utilizing GenAI more frequently than those in public schools.

The qualitative findings determined six overarching themes. First, the Efficiency-Dependency Paradox apprehends the fundamental tension teacher’s experience, for instance, AI saves significant time but reduces creativity, critical thinking, and professional effort. Second, Student Vulnerability and the Transformation of Learning uncover teachers' deep concern about students, specifically younger ones, who are perceived as becoming dependent on AI, losing reading habits, and experiencing declining creativity. Third, Institutional and Policy Neglect revealed the systemic failure that leaves teachers without training, policies, infrastructure, or systematic support. Fourth, Teacher Resilience and Survival Strategies prove how teachers cope through self-learning, peer sharing, and developing their own detection strategies and AI-resistant assessments. Fifth, Professional Identity and Irreplaceable Value emphasize teachers' navigation of an identity crisis as they affirm their irreplaceable value through the human element. Sixth, Ethical Confusion in a Policy Void discloses how teachers make ethical compromises due to workload pressure and lack of institutional direction.

The findings exhibit a complex and deeply uncertain relationship between teachers and GenAI. Teachers are caught in a paradox, such as, AI saves them significant time and makes their overwhelming workload manageable, yet this efficiency comes with a perceived cost, including the erosion of creativity, critical thinking, and professional identity. They cannot completely adopt AI without anxiety, nor can they avoid it.

This paradox is intensified by profound institutional neglect. Teachers acquire no formal training, no policy guidance, and often lack the infrastructure to use AI effectively. They are incorporating a powerful, complex technology into their practice entirely on their own. The change in institutional support creates inequities, for example, teachers in well-resourced schools can experiment and introduce, while those in under-resourced schools are excluded from AI's benefits entirely.

The outcomes of this situation heavily affect the students. Teachers see students becoming dependent, losing the capacity for independent thought, and abandoning reading and deep engagement. Younger students are particularly vulnerable. Teachers' experience with AI is driven by concern for their students, and many fear they are failing the next generation.

7. Limitations

Several methodological limitations influenced the findings of this study. First, the use of snowball sampling limited the generalizability of the findings. The sample was mainly urban (89.9%) and female (70.0%), which may not mirror the demographic composition of all secondary school teachers in Bangladesh, especially those in rural areas with limited digital access.

Second, the survey depended on self-reported data, which may have subjected to social desirability bias and recall bias. Teachers may have over-reported their use of AI or under-reported barriers to present themselves favorably. The response rate for the online component (approximately 30%) may have introduced non-response bias, as teachers who chose not to participate may have differed systematically from those who did.

Third, the quantitative data were cross-sectional, documenting teachers' perceptions and usage at a single point in time. This limited the ability to make causal inferences. Future research could use longitudinal designs to examine how perceptions and usage change over time.

Fourth, in the qualitative phase, researcher bias may have affected data collection and interpretation. To mitigate this, in vivo coding was used, and negative cases were deliberately preserved. In addition, portions of the interviews were conducted in Bengali and analyzed via English transcription, which may have affected the richness of the qualitative data.

Fifth, the study's geographical scope was restrained by the researcher's location in Chittagong, which resulted in an excessively large number of participants from Chittagong compared to other regions. Although efforts were made to include teachers from Dhaka, Madaripur, and Dinajpur through the NGO-run school network and online distribution, the response rates from these regions remained low. This geographical imbalance constraints the generalizability of findings to the broader population of secondary school teachers across Bangladesh, particularly those in remote or rural areas with different institutional and infrastructural contexts.

Sixth, teachers in this study were recruited from multiple schools and NGO networks. Teachers from the same school share similar infrastructure, policies, leadership, professional development

opportunities, and recruitment processes, which indicates that their responses are not completely independent. The number of participating schools and the number of teachers per school were not recorded systematically, and the ordinal logistic regression assumed independence of observations. This grouping effect may have created standard errors too small and p-values too optimistic. Future research should prefer multilevel modeling to account for school-level clustering effects. Furthermore, the small number of Rural teachers in the sample (n = 10, 4.8%) meant that Rural location could not be included as a separate category in the regression model. This limits the generalizability of findings based on rural school contexts.

Additionally, the Barriers scale ($\alpha = .460$) presented poor internal consistency and was therefore excluded from analysis. This may suggest that the concept of "barriers" was not consistently understood by participants or the items measured different types of barriers.

Despite these limitations, the study equipped valuable insights into teachers' perceptions and use of GenAI in Bangladeshi secondary education. The limitations do not invalidate the findings but provide direction for future research to consider when interpreting them.

8. Recommendations

This study offers an evidence-based recommendations based on the findings. The recommendations are organized into three sections: policy recommendations, practice recommendations, and recommendations for future research.

8.1 Recommendations for Policy

The Government of Bangladesh should develop a comprehensive approach to GenAI integration in secondary education. A comprehensive national policy should be designed that will provide clear guidelines for ethical use, training requirements, infrastructure standards, and accountability mechanisms, while instituting mandatory AI literacy training for all teachers. Government must establish minimum infrastructure standards for internet connectivity and devices, and ensuring equitable access across all school types. The government should also integrate AI literacy into the national curriculum at the secondary level by updating the ICT syllabus. To bridge the digital divide, policymakers should support under-resourced schools by upgrading teach infrastructure, offering free or low-cost AI tools for teachers, and creating offline solutions to cut data fees. Additionally, dedicated funding should be assigned for professional development, integrating AI into pre-service teacher preparation programs, providing ongoing in-service training, and creating subject-specific modules to build local capacity.

8.2 Recommendations for Practice

School leaders and teachers should collaborate and take actions to combine GenAI effectively into their institutional practices. School leaders should provide systematic training on AI integration, including foundational training, ongoing professional development, and subject-specific content, while addressing ethical considerations and providing practical resources for immediate classroom use. Schools should develop clear institutional policies addressing acceptable use, academic integrity, data privacy, and guidance and support. Infrastructure needs should be structured by ensuring reliable internet access, providing devices for teachers, offering technical support, and equipping classrooms with smartboards and projectors. Schools should also build collaborative communities where teachers

can share AI strategies, resources, and experiences through peer learning groups, professional learning communities, and online networks. Finally, teachers should design AI-resistant assessments using open-ended questions, integrated questions, contextual questions, performance-based assessments, and metacognitive reflection tasks to confirm authentic student learning.

8.3 Recommendations for Future Research

Future research should embrace longitudinal designs to investigate how teacher's perceptions usage of GenAI evolve over time, tracking teachers across multiple years and analyzing the impact of training and policy interventions. Intervention studies utilizing rigorous designs such as randomized controlled trials or quasi-experimental approaches are needed to test the effectiveness of different training methods. Comparative studies should examine how institutional contexts shape GenAI adoption, comparing patterns across school types to identify best practices. Student perspectives should also be investigated to understand how students perceive and use AI tools, how AI affects their learning outcomes, and what guidance they require. Finally, research must focus on equity and inclusion, examining how the digital divide influences adoption and how policies and practices can address these inequities, with particular attention to under-resourced schools and marginalized communities.

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Appendix A

Survey on Secondary School Teachers' Perceptions and Use of Generative AI in Bangladesh

Research Information:

This survey is part of a research study titled "Secondary School Teachers' Perceptions and Use of Generative Artificial Intelligence (GenAI) in Bangladesh."

Researcher: Sadia Binth Shahin, Graduate Student, MA in Education Program, Asian University for Women

Purpose: To understand how secondary school teachers perceive, experience, and use generative AI tools (such as ChatGPT, Gemini, DeepSeek, Perplexity, etc.) in their teaching and professional practice.

Confidentiality: All responses will remain confidential and anonymous. No personally identifiable information will be collected. Data will be used solely for academic purposes.

Section A: Demographics

Question	Response
Gender	☐ Male ☐ Female ☐ Non-binary ☐ Prefer not to say
Age	_____years
Teaching experience	_____years
Name of institution where you currently teach	_____
Which grade(s) do you currently teach?	☐ Grade 6 ☐ Grade 7 ☐ Grade 8 ☐ Grade 9 ☐ Grade 10
Subject area (Science/Humanities/Commerce/ICT/Other)	_____
School type	☐ Government ☐ Private ☐ Non-government ☐ Others: _____
Location	☐ Urban ☐ Suburban ☐ Rural
Level of digital literacy	☐ Beginner ☐ Intermediate ☐ Advanced ☐ Expert

Section B: Awareness and Use of Generative AI

1. Have you heard of generative AI tools (e.g., ChatGPT, Gemini, DeepSeek, Perplexity, etc)?

☐ Yes ☐ No

2. How frequently do you use any generative AI tools?

☐ Daily ☐ Weekly ☐ Monthly ☐ Rarely ☐ Never

3. Which of the following tools have you used? (select all that apply)

☐ ChatGPT ☐ Gemini (Google) ☐ DeepSeek ☐ Perplexity
☐ Other: _____

4. For what purposes do you use generative AI? (select all that apply)

☐ Lesson planning ☐ Grading and feedback ☐ Creating teaching materials
☐ Administrative tasks ☐ Student engagement activities☐ Personal learning
☐ Not using yet

Section C: Perceptions (TAM Constructs)

1. Perceived Usefulness (PU)
Please rate your agreement on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). ***Circle*** *your answer.*

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Generative AI helps me teach more efficiently	1	2	3	4	5
AI tools save me time in lesson preparation	1	2	3	4	5
Using AI enhances the quality of my teaching materials	1	2	3	4	5
AI improves student engagement and learning outcomes	1	2	3	4	5

2. Perceived Ease of Use (PEoU)

Please rate your agreement on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). Circle your answer.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Learning to use AI tools is easy for me	1	2	3	4	5
I find AI applications user-friendly	1	2	3	4	5
I can get AI to do what I want without difficulty	1	2	3	4	5

3. Attitude Toward Use (ATU)

Please rate your agreement on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). Circle your answer.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I enjoy using generative AI in my teaching	1	2	3	4	5
I believe AI can play a positive role in education	1	2	3	4	5
I am willing to continue using AI tools in the future	1	2	3	4	5

Section D: Barriers and Enablers

Please rate your agreement on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). Circle your answer.

Statement	Strongly Disagree	Disagree	Neutral	Agree	
My school provides sufficient ICT infrastructure for AI use	1	2	3	4	5
I have received adequate training on AI in education	1	2	3	4	5
Lack of institutional support limits my use of AI	1	2	3	4	5
I am concerned about ethical issues (e.g., plagiarism, privacy)	1	2	3	4	5
Peer support encourages me to explore AI tools	1	2	3	4	5
Internet connectivity limits my ability to use AI tools	1	2	3	4	5

Section E: Perceived Impact on Students

Please rate your agreement on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). Circle your answer.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
AI helps students become more creative	1	2	3	4	5
AI can make students overly dependent on technology	1	2	3	4	5
AI promotes critical thinking and individualized learning	1	2	3	4	5
Students need guidance to use AI responsibly	1	2	3	4	5

Section F: Future Outlook

Please rate your agreement on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). Circle your answer.

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
More AI training for teachers should be mandatory	1	2	3	4	5
School policies should promote ethical AI use	1	2	3	4	5

I believe AI will become essential in future education	1	2	3	4	5

Qualitative Phase: Semi-Structured Interview Questions

(For 15–20 teachers, based on survey themes)

1. Perceptions and Attitudes

a) How do you personally perceive the role of generative AI in teaching?

আপনি ব্যক্তিগতভাবে শিক্ষাদানে জেনারেটিভ AI-এর ভূমিকা কীভাবে উপলব্ধি করেন?

b) In your opinion, what are the main benefits and risks of using AI in the classroom?

আপনার মতে, শ্রেণিকক্ষে AI ব্যবহারের প্রধান সুবিধা ও ঝুঁকিগুলো কী?

c) How comfortable do you feel integrating AI tools into your daily teaching?

আপনার দৈনন্দিন শিক্ষাদানে AI টুল অন্তর্ভুক্ত করতে আপনি কতটা স্বাচ্ছন্দ্যবোধ করেন?

2. Current Use and Practices

a) Can you describe how you have used generative AI tools in your work (lesson planning, grading, or admin tasks)?

আপনি কীভাবে আপনার কাজে (পাঠ পরিকল্পনা, মূল্যায়ন বা প্রশাসনিক কাজ) জেনারেটিভ AI টুল ব্যবহার করেছেন তা কি বর্ণনা করতে পারেন?

b) Which AI applications have been most useful, and why?

কোন কোন AI অ্যাপ্লিকেশন আপনার কাছে সবচেয়ে উপকারী মনে হয়েছে, এবং কেন?

c) Can you share a specific example of how AI helped (or failed) in your teaching?

AI কীভাবে আপনার শিক্ষাদানে সহায়তা করেছে (বা ব্যর্থ হয়েছে) – এমন একটি নির্দিষ্ট উদাহরণ কি শেয়ার করতে পারেন?

3. Barriers and Enablers

a) What challenges have you faced in using AI (technical, institutional, or ethical)?

AI ব্যবহারে আপনি কী ধরনের চ্যালেঞ্জের মুখোমুখি হয়েছেন (প্রযুক্তিগত, প্রাতিষ্ঠানিক বা নৈতিক)?

b) How supportive is your school administration regarding AI adoption?

AI গ্রহণের ক্ষেত্রে আপনার বিদ্যালয়ের প্রশাসন কতটা সহায়ক?

c) Have you received any training or peer support related to AI? If yes, how effective was it?

AI সম্পর্কিত কোনো প্রশিক্ষণ বা সহকর্মীদের সহায়তা কি পেয়েছেন? পেয়ে থাকলে, তা কতটা কার্যকর ছিল?

4. Perceived Impact on Students

a) How do you think AI influences your students' engagement or creativity?

আপনার মতে, AI আপনার শিক্ষার্থীদের অংশগ্রহণ বা সৃজনশীলতায় কীভাবে প্রভাব ফেলে?

b) Have you noticed any changes in students' learning behavior since using AI?

AI ব্যবহারের পর থেকে শিক্ষার্থীদের শেখার আচরণে কোনো পরিবর্তন কি লক্ষ্য করেছেন?

c) How do you manage concerns about plagiarism or over-reliance on AI by students?

শিক্ষার্থীদের দ্বারা নকল (plagiarism) বা AI-এর উপর অতিরিক্ত নির্ভরতার বিষয়ে আপনি কীভাবে মোকাবিলা করেন?

5. Future Outlook and Policy

a) What kind of institutional or policy support would help teachers integrate AI effectively?

শিক্ষকদের কার্যকরভাবে AI অন্তর্ভুক্ত করতে কী ধরনের প্রাতিষ্ঠানিক বা নীতিগত সহায়তা প্রয়োজন বলে আপনি মনে করেন?

b) How do you envision the role of teachers evolving with AI in the next five years?

আগামী পাঁচ বছরে AI-এর সাথে শিক্ষকদের ভূমিকা কীভাবে পরিবর্তিত হবে বলে আপনি কল্পনা করেন?

c) What advice would you give to policymakers introducing AI in secondary education?

মাধ্যমিক শিক্ষায় AI প্রবর্তনের ক্ষেত্রে নীতিনির্ধারকদের আপনি কী পরামর্শ দেবেন?

Table 3.1

Independent Variables: Operationalization and Measurement

Variable	Operationalization	Measurement
Age	Self-reported age in years	Continuous (years)
Gender	Self-identified gender	Categorical (Male, Female, Other)
Teaching Experience	Number of years spent teaching	Continuous (years)
School Type	Type of school where teacher is employed	Categorical (Public, Private, NGO-run)
Subject Area	Primary subject taught	Categorical (Science, Mathematics, English, Bengali, Social Studies, Other)
Digital Literacy	Self-rated competence in using digital tools	5-point Likert scale (1 = Very Low, 5 = Very High)
Access to Technology	Availability of internet and devices at school	5-point Likert scale (1 = Very Limited, 5 = Very High)

Table 3.2

Mediating Variables: Operationalization and Measurement

Variable	Operationalization	Measurement

Perceived Usefulness (PU)	The degree to which a teacher believes that using GenAI would enhance their job performance	5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree)
Perceived Ease of Use (PEoU)	The degree to which a teacher believes that using GenAI would be free of effort	5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree)
Attitude Toward Use (ATU)	The teacher's overall favorable or unfavorable evaluation of using GenAI	5-point Likert scale (1 = Strongly Negative, 5 = Strongly Positive)

Table 3.3

Dependent Variable: Operationalization and Measurement

Variable	**Operationalization**	**Measurement**
Frequency of GenAI Use	How often teachers use GenAI tools for professional tasks	5-point Likert scale (1 = Never, 2 = Rarely, 3 = Monthly, 4 = Weekly, 5 = Daily)
Types of GenAI Use	Specific professional tasks for which teachers use GenAI	Multiple-response checklist (Lesson Planning, Grading, Administrative Tasks, Instructional Support, Other)

Note. The AI Use Frequency scale was ordered as Daily, Weekly, Monthly, Rarely, Never in both the Google Form and the printed survey sheets. For the ordinal regression analysis, "Never" and "Rarely" were combined due to the very small number of "Never" responses (n = 1).

Table 3.4

Outcome Variable: Operationalization and Measurement

Variable	Operationalization	Measurement
Perceived Impact on Student Engagement	Teachers' perception of GenAI's effect on student engagement	5-point Likert scale (1 = Very Negative, 5 = Very Positive)
Perceived Impact on Student Creativity	Teachers' perception of GenAI's effect on student creativity	5-point Likert scale (1 = Very Negative, 5 = Very Positive)
Perceived Impact on Student Integrity	Teachers' concerns about academic integrity and plagiarism	5-point Likert scale (1 = No Concern, 5 = Very Concerned)

Table 3.5

Control Variables: Operationalization and Measurement

Variable	Operationalization	Measurement
Digital Literacy	Self-rated competence in using digital tools	5-point Likert scale (1 = Very Low, 5 = Very High)

Access to Technology	Availability of internet and devices at school	5-point Likert scale (1 = Very Limited, 5 = Very High)
Enablers	Factors that facilitate GenAI adoption	5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree)
Prior Training in AI/Ed Tech	Whether the teacher has received formal training in AI or educational technology	Categorical (Yes/No)

Note: Barriers were measured but excluded from analysis due to poor internal consistency (α = .460).

Table 3.6

Mapping Theoretical Frameworks to Survey Items and Interview Topics

Theoretical Framework	**Construct**	**Survey Items (Sample)**	**Interview Questions (Sample)**
TAM (Davis, 1989)	**Perceived Usefulness (PU)**	"Using GenAI improves my lesson planning efficiency."	"How has using GenAI changed the way you plan your lessons?"

Theoretical Framework	Construct	Survey Items (Sample)	Interview Questions (Sample)
	Perceived Ease of Use (PEoU)	"I find GenAI tools easy to use."	"What challenges have you faced in learning to use GenAI tools?"
	Attitude Toward Use (ATU)	"I have a positive attitude toward using GenAI in my teaching."	"How do you feel about using GenAI in your classroom?"
	Behavioral Intention (BI)	"I intend to continue using GenAI in my teaching."	"Do you plan to continue using GenAI in the future? Why or why not?"
TPACK (Mishra & Koehler, 2006)	**Technological Knowledge (TK)**	"I am confident in using digital tools in my teaching."	"How would you describe your digital skills?"
	Technological Pedagogical Knowledge (TPK)	"I know how to integrate technology	"How do you decide when and how to use

Theoretical Framework	Construct	Survey Items (Sample)	Interview Questions (Sample)
		effectively in my lessons."	GenAI in your teaching?"
	Technological Content Knowledge (TCK)	"I can use GenAI to create content that aligns with the curriculum."	"Have you used GenAI to create teaching materials? What was that experience like?"
	TPACK (Integrated)	"I can effectively integrate GenAI into my subject-specific teaching."	"How do you ensure that GenAI supports your students' learning of specific content?"

Note: This table illustrates how the core constructs of the Technology Acceptance Model (TAM) and Technological Pedagogical Content Knowledge (TPACK) were operationalized through survey items and explored through corresponding interview topics.

Sample Codebook with Definitions and Illustrative Quotations

Code	**Definition**	**Illustrative Quotation**
Time-saving in lesson/material preparation	Using GenAI to compress the time spent drafting lesson plans, slides, worksheets, and questions	"There was a time I spent hours and hours making lesson plans... now it saves a lot of time."
Student creativity/independent-thinking decline	Perceiving that students no longer attempt problems themselves before turning to AI	"If children start using AI... their own creativity will be ruined."
Fear of professional obsolescence	Explicit anxiety that AI could reduce or eliminate the teacher's role	"There is no role of the teachers, already... I have become the puppet."
Detecting AI-generated student work	Identifying AI use through writing style, structure, vocabulary, or formatting cues	"Its writing pattern is distinct... it clearly shows AI usage."
Call for mandatory/structured training	Recommending compulsory, systematic AI training as the top policy priority	"It can be included in the policy that AI training... can be made mandatory."