Examining the Increase of AI Tool Usage Among Pre-service Teachers: A Comparative Analysis of Spring 2024 and Spring 2025 Results

By

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ABSTRACT

AI tool usage has increased significantly in the past few years, but very few researchers have used cross-sectional surveys to measure the increase. This study sought to evaluate the extent to which the frequency of AI tool usage has increased among first-year pre-service teachers at a rural public university in Ontario, Canada. Data were collected in the spring of 2024 and the spring of 2025 through a self-report survey. A concurrent embedded mixed-methods design was used with a sample size of 158 participants. Findings indicate that there was a 57% increase year-over-year in AI tool use, going from 54% in 2024 to 85% in 2025. Further statistical analysis indicated a correlation between gender and AI tool use, with a greater percentage of females adopting these tools. The qualitative findings revealed various themes, including using AI tools for idea generation and editing, as well as the negative stigma associated with its use. These findings underscore the importance of policymakers adopting new strategies to address AI tool use in teacher education programs, with the hope of sufficiently preparing pre-service teachers to teach in this new digital era.

Keywords: AI tool use, mixed-methods research, pre-service teachers (PSTs), gender differences, frequency of use,

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CHAPTER ONE: INTRODUCTION

Artificial intelligence has brought us into an era of innovation and has revolutionized many industries, including education (Rahim et al., 2023). Students are using AI tools, like ChatGPT, for various tasks such as writing assistance and brainstorming (Almumen & Jouhar, 2025). AI tools can be used throughout the entire writing process to help with proofreading, editing, reflection, and the initial preparation stage (Aksakallı & Daşer, 2025). Pre-service teachers are able to use AI tools to create lesson plans, but they run the risk of receiving inaccurate information (Kalenda, 2025).

AI tool usage is widespread in higher education, with a growing number of students relying on AI tools for academic tasks. For example, in a large-scale study by Von Garrel and Mayer (2023), nearly two-thirds of the 6,300 university students surveyed reported using generative AI tools such as DeepL, DALL-E, and BingAI, with ChatGPT being the most used at 48.9%. Additionally, research indicates a rise in both adoption and frequency of AI use. In one study, among students who reported using AI tools, 51% indicated they did so often, while 22% reported very frequent use (Fošner, 2024).

Problem Statement

The increased use of AI tools has raised concerns regarding their impact on pre-service teachers' lesson planning because of their insufficient depth and grade-level appropriateness (Yilmaz Can & Durmus, 2024). Despite these concerns, AI tools such as ChatGPT are beneficial with regard to creating a complete lesson plan for pre-service teachers. (Kalenda et al., 2024). Additionally, AI tools can enhance lesson creativity and diversity, producing more imaginative plans than those created from scratch (Yilmaz Can & Durmus, 2024). Finally, AI tools can offer

teacher candidates personalized tutoring, providing them with immediate feedback to support them in their learning (Baidoo-Anu & Ansah, 2023).

Although there are numerous studies that investigate AI tool use among pre-service teachers, there is limited research on the year-over-year increase in their use. Understanding this growth and the perceptions of preservice teachers with regard to AI tools is imperative as they prepare to educate future generations. This study aimed to address this gap by looking into the increase of AI tool usage among pre-service teachers and their views of these technologies. By doing so, it provides the awareness needed to inform policymakers in teacher education programs, allowing them to develop evidence-based approaches to balance the affordances and challenges of AI integration. Ultimately, this research contributes to ensuring that pre-service teachers receive high-quality education while considering their perspectives on AI tools.

To examine the frequency of AI tool use and the perceptions of pre-service teachers' own experiences, two theoretical perspectives were employed. The Technology Acceptance Model (TAM) helps in clarifying how the perceived usefulness, perceived ease of use, and social influences play a role in shaping PSTs' willingness to use AI tools. Additionally, constructivism emphasizes active learning, engagement, and ethical construction, which helps support the examination of how PSTs incorporate AI into their learning. Collectively, these two frameworks help inform the design of the research questions and provide a well-structured basis for the interpretation of the findings in relation to PST's attitudes and experiences with AI tools.

Research Questions

This study had two research questions, with the quantitative question being: (1) To what extent has the frequency of AI tool usage for completing assignments increased among pre-

service teachers from Spring 2024 to Spring 2025, and how do demographic variables relate to any change? The qualitative question was as follows: (2) What are the experiences and perceptions of pre-service teachers regarding their AI tool usage for completing assignments, and how does that relate to their attitude, trust, and inclination to recommend AI tools to their classmates?

Definition of Key Terms

Artificial intelligence.

Artificial intelligence (AI) refers to applications that allow computers and machines to replicate human perception and decision-making when completing a task (Kwid et al., 2024). Another definition of AI in its broadest sense is an association with algorithms (Sheikh et al., 2023).

Constructivism.

Constructivism is a learning theory that attempts to explain how learning occurs (Cobern, 1993). Constructivism places an emphasis on the engagement of students within the learning process as active learners (Gambo, 2023; Wu, 2022, as cited in McGuire et al., 2024). Social constructivism is another form which focuses on how interactions with others help shape an individual's learning process (Creswell & Poth, 2016).

Grammarly.

Grammarly is a writing assistant that can help individuals edit their work. It utilizes artificial intelligence to correct spelling mistakes, punctuation, capitalization, and other areas, allowing for more polished writing (Fitria, 2021).

Mixed-methods research.

Mixed-methods research combines both quantitative and qualitative approaches in the data collection, analysis and research design (Creswell, 2009). There are four major types of mixed-methods research, including triangulation, embedded, explanatory, and exploratory designs (Doyle et al., 2009).

Pre-service teachers.

Individuals currently enrolled in a teacher education program, completing coursework and practicums, who are not yet certified teachers (Darling-Hammond et al., 2017).

Technology Acceptance Model.

The Technology Acceptance Model focuses on why people adopt certain technologies, with perceived usefulness and perceived ease of use being two key factors (Davis et al., 1989). Perceived usefulness refers to how much an individual believes that the system will improve their performance, whereas perceived ease of use is the degree to which that system will be free from effort (Davis et al, 1989).

CHAPTER TWO: LITERATURE REVIEW

This literature review is separated into three sections. The first section discusses AI tool usage, including key terms and definitions. The second section provides insights into the literature concerning the frequency of AI tool usage as well as what methods researchers have used to measure usage. The last section touches on the unique situation that pre-service teachers find themselves in with regard to using this new technology.

AI Tool Usage

Defining artificial intelligence (AI) is not an easy task, as there is no clear definition of what it truly means (Sheikh et al., 2023). In one definition, it refers to applications that allow

computers and machines to replicate human perception and decision-making when completing a task (Kwid et al., 2024). In another definition, it stands for how computers imitate human intelligence (Sheikh et al., 2023). In the broadest sense, AI is equated with algorithms (Sheikh et al., 2023). The lack of a specific definition of artificial intelligence highlights the innate complexity of this technology. Understanding that AI is a system with the capability of supporting human-like tasks may be the best description, and it explains why pre-service teachers perceive AI tools as useful for completing their assignments.

AI can be placed into three different groups, which include artificial narrow intelligence, artificial general intelligence, and artificial super intelligence (Kwid et al., 2024). Artificial narrow intelligence (ANI) is programmed to complete single tasks, which can include weather tracking and playing games like chess (Kwid et al., 2024). Some examples of ANI include Google Assistant, Google Translate, Siri, and ChatGPT. ANI is particularly relevant to this study because many of the tools PSTs use, such as ChatGPT, fall under this category. Artificial narrow intelligence can help generate ideas and edit text, which aligns with the Technology Acceptance Model's perceived usefulness.

Artificial general intelligence (AGI) extends the capabilities of ANI to go beyond the limits of tasks for which they are trained (Firt, 2020, as cited in McLean et al., 2021; McLean et al., 2021). AGI is a proposed virtual machine that could understand, learn, and apply a vast array of knowledge to different cognitive tasks just like a human can (Kwid et al., 2024). AGI will be able to go beyond what narrow intelligence can do, but artificial superintelligence (ASI) would take yet another step forward. The differences between AGI and ANI are relevant to this study as current AI tools used by pre-service teachers fall under the scope of ANI. Artificial narrow

intelligence is the category of AI that most tools, such as ChatGPT and Grammarly, fit under and are most widely used by PSTs.

Artificial superintelligence is defined as a machine having greater intelligence than human beings in every single way, including scientific creativity (Narain et al., 2019, as cited in Kwid et al., 2024). Even though AGI and ASI do not currently exist, experts expect that these forms of AI will build on existing AI systems and may arrive sometime in this century (Müller & Bostrom, 2016, as cited in McLean et al., 2021).

Generative artificial intelligence (GenAI) is a set of computational techniques that can generate images, text or audio (Feuerriegel et al., 2023). It can also create other multimodal content that includes video and more advanced three-dimensional models (Nah et al., 2023). GenAI models can increase productivity through the automation of the creation process (Nah et al., 2023). It is able to automate various tasks, including writing, news stories, creating thumbnail images, translating audio, and summarizing web pages (Feuerriegel et al., 2023).

One of the most popular GenAI tools is ChatGPT, which is an AI tool that has the ability to generate text, translate languages, and analyze data (Ray, 2023). Just after a week of ChatGPT's release in November 2022, it received over a million subscribers (Baidoo-Anu et al., 2023). ChatGPT is pre-trained on a massive amount of data in the form of text that includes books, articles, and websites using a language modelling task (Abdullah et al., as cited in Ray, 2023). These capabilities are important to consider in this study as they highlight some of the factors as to why ChatGPT and other tools are increasingly being adopted by PSTs.

This pre-training affords ChatGPT the ability to model the relationship between words in natural language, which makes it invaluable in creating realistic responses (Ray, 2023). The immediate success of this GenAI tool was due to some of the unique affordances that it provides.

ChatGPT has a lot of benefits for users. It can be used as a personalized tutor, automated grader, language translator, formative feedback provider, and for adapted learning based on users' individual learning needs (Baidoo-Anu et al., 2023).

Another AI tool that is beneficial for students is Grammarly, which is an automatic grammar checker that was released in 2009 (Pratama, 2021, as cited in Faisal & Carabella, 2023). It has features that use artificial intelligence and algorithms to improve writing proficiencies and produce high-quality texts (Fahmi & Cahyono, 2021; Khoshnevisan, 2019, as cited in Faisal & Carabella, 2023). The main purpose of Grammarly is that of an automatic grammar checker. It analyzes potential grammatical errors and corrects them automatically, in addition to providing suggestions regarding improving one's writing style (Fahmi & Cahyono, 2021). Some of Grammarly's features highlight aspects that may support the notion that perceived usefulness under the Technology Acceptance Model is a factor in PSTs' adoption of this tool.

The key affordance that Grammarly provides is enhancing one's writing. In a study looking at the impact of Grammarly on students' grammar, 60% of participants strongly agreed that Grammarly made them feel more confident about their writing (Alotaibi, 2023). Fahmi and Cahyono (2021) found that all of their participants agreed that Grammarly enhanced their writing as well as gave them more confidence in the quality of their work prior to submitting it for feedback.

Students are incorporating AI tools into their learning, with the usage focusing on improving their writing, and that is where Grammarly comes in as a leading writing assistant. These studies are relevant to the study at hand because they showcase how other students are

using a common AI tool. Understanding how PSTs use Grammarly can help connect their usage and experiences with other patterns of AI adoption in teacher education.

In the current digital era, the integration and use of AI tools have become an important aspect of educational practice. Both educators and students are increasingly using GenAI for a variety of purposes, as previously discussed. Additional examples of AI tool usage include search engines, recommendation systems embedded in platforms such as YouTube, and digital voice assistants like Siri (Ottenbreit-Leftwich et al., 2023).

Understanding the motivations behind AI tool adoption is important. One study noted that a teacher's self-efficacy, which is essentially someone's own confidence in succeeding, significantly influenced their perceived ease of use, which then shaped their overall attitude toward the adoption of that tool (Wang & Tu, 2021). The Technology Acceptance Model (TAM) is a valuable framework for comprehending the various factors driving AI tool usage, particularly as education continues to develop within the current landscape of AI technologies. The TAM Model is presented in detail later in this chapter.

The patterns of these findings illustrate the importance of AI in educational contexts as well as the various tasks PSTs use it for, which supports the rationale for this study. The literature highlights PSTs' use of AI tools, such as Grammarly, for editing, with a majority of them believing that it is useful in this task. This aspect of perceived usefulness justifies the adoption of the Technology Acceptance Model in exploring the research questions in this study. Additionally, the use of AI is not passive in nature, and thus constructivism fits within the scope of this research, as demonstrated by the literature.

Frequency of Use

AI tool usage is becoming a common occurrence in higher education. In a large-scale study by Von Garrel and Mayer (2023), almost two-thirds of the 6300 university students surveyed used AI tools to some degree. The highest usage per faculty was in engineering, with 75.3% indicating that they use it (Garrel & Mayer, 2023). In Garrel and Mayers (2019) study, they found that the most used tool among students was ChatGPT, with a total of 48.9%. In another study, 71.1% of students responded yes to using ChatGPT (Aksakallı & Daşer, 2025). The number of students in these studies that incorporate AI tools into their studies showcases how commonly these tools are used by students.

Students' use of AI tools is increasing. In one study, out of the students who responded yes to using AI tools, 51% of them indicated that they did so often and 22% very often (Fošner, 2024). Aksakallı and Daşer (2025) found that 29% of students used ChatGPT moderately and 25.7% used it frequently. In another study, they concluded that 56.3% of students who used ChatGPT did so less than once or twice per month (S. Zhang et al., 2024). The discrepancies between these studies indicate that the slight wording differences might have contributed to the variation.

Self-report surveys are often used to assess the frequency of AI tool usage in higher education. In a study by Von Garrel and Mayer, a quantitative survey method was used to examine AI tool usage among university students. De Winter et al. (2024) used questionnaires to look at the frequency of ChatGPT usage. In another study, they also employed a self-report survey method through questionnaires (Fakhri et al., 2024). Jo (2023) adopted a quantitative questionnaire to look at AI tool usage. It seems like the vast majority of research on the frequency of AI usage is collected via surveys.

Mixed-method self-report surveys are used to measure the frequency of AI tool usage. In one study that was conducted by Rahim et al. (2023), they did not select a quantitative approach and decided to use mixed methods. This research used a case study design to look at the frequency of GenAI use. They took the mixed methods approach because they wanted to capture both quantitative and qualitative insights of their participants (Rahim et al., 2023). Even though some researchers used a mixed methods approach when looking at AI tool usage, most of them tended to focus on quantitative methods.

Data logs are another way to monitor the frequency of AI tool usage. Delavari and Talebi (2024) used a digital AI tracking system that monitored the frequency and duration of AI tool usage by students. This method was employed because they wanted to see if there was a correlation between AI tool usage and the language proficiency scores students received (Delavari & Talebi, 2024). In order to validate this study, data logs were the best way to accurately understand the correlation between the frequency of AI tool usage and language proficiency scores. Even though this method of monitoring AI tool usage is probably the most accurate, not a lot of studies have used it. This could be due to cost constraints, ethics, and possible privacy concerns regarding tracking students' usage.

Together, these patterns reveal an increase in the frequency of AI tool use in higher education, which justifies investigating the increase in usage in this study. Furthermore, this section highlights that the majority of studies measuring AI tool use employ either quantitative or mixed-methods research designs, which validates the chosen methodology for the study at hand. Additionally, the Technology Acceptance Model is used in prior research to explore how perceived usefulness, perceived ease of use, and various social factors affect PST’s AI tool use.

Pre-Service Teachers

Pre-service teachers (PSTs) are using AI tools in their education programs, and understanding their perspectives regarding their use is vital to informing teacher-training programs. In one study, pre-service teachers found that AI-generated lesson plans did not allow for proper scaffolding for students to learn through various learning styles (Kalenda et al., 2025). In that same study, PSTs also felt that AI-generated lessons did worse than they expected at presenting a finished lesson, as they did not provide enough detail for a supply teacher to use (Kalenda et al., 2025). Another study echoes similar results, as they found that AI lesson plans did not provide enough depth (Yilmaz Can & Durmus, 2024). In addition to the lack of depth, ChatGPT's automated lesson plans were not grade-appropriate (Yilmaz Can & Durmus, 2024).

Despite the concerns that pre-service teachers have about AI tools being used in their lesson planning, they did find many affordances. The key benefit that is indicated in the literature is the ability to save time (Yilmaz Can & Durmus, 2024). In addition to saving the students' time, ChatGPT creates highly original content and can provide accessible materials faster (Yilmaz Can & Durmus, 2024).

Generative artificial intelligence (GenAI) has the potential to support PSTs in the process of designing lesson plans that take into account the diverse backgrounds of their students. One study evaluated the lesson planning processes of PSTs who used AI tools against those who did not. Findings indicated that individuals who integrated AI tools showed greater improvement in including inclusive strategies within their plans (Zagami, 2024).

Additionally, Zhang and Zhang (2024) found similar findings and noted that GenAI tools aided in the creation of more inclusive learning environments. Moreover, Zagami (2024) concluded that the group supported by AI showcased a higher degree of diversity awareness.

This study also indicated that AI chatbots facilitated a more relaxed and non-judgmental environment for PSTs to engage in self-reflection (Zagami, 2024).

An important element of teacher education includes the creation of unit plans. Wen and Wen (2024) looked at the use of ChatGPT in the context of unit plan development and identified four key stages through which PSTs progressed. This included inquiry and prompt formulation, examination and evaluation, modification and tinkering, and synthesis and organization. These participants developed unit plans by critically assessing ChatGPT's responses to their own prior knowledge, personal preferences, and input from instructors (Wen, 2024).

In addition to lesson and unit planning, AI tools are also being used in the development of responsive teaching skills, particularly in mathematics education. For example, Lee et al. (2025) compared two groups of PSTs within a math lesson: an experimental group that interacted with a virtual chatbot and a control group that did not receive responses from the chatbot. They found that pre-service teachers who interacted with a chatbot named Jiwoo showed increased noticing abilities, a skill that is crucial in programs that emphasize responsive teaching practices.

Moreover, AI chatbots like ChatGPT can provide unique opportunities for reflective practice, an important aspect of teacher education programs. Ledger et al. (2019, as cited in Son et al., (2024) emphasized the important role that simulations play in initiating reflection. In this study, PSTs' responsive teaching skills in a mathematics course were tested by comparing their responses pre- and post-interaction with an AI chatbot. Results indicated an improvement in PSTs' responsiveness after reflecting on the feedback they received from the AI virtual mentor. Additionally, Lee et al. (2025) also suggested that virtual student chatbots can improve the overall quality of teacher education programs.

Furthermore, it is essential that teacher education programs take into account PSTs' digital literacy skills, self-efficacy, and their own perceptions of AI integration within early childhood education contexts. Lim (2023) found a positive correlation between PSTs' self-efficacy and digital literacy skills and their attitudes toward using AI in early learning environments. An analysis of the survey results in this study found that higher levels of digital literacy and self-efficacy were positive predictors of PSTs' own perception of AI tool use. Their perception of AI tools was a key factor in whether they would adopt its usage.

Additionally, Su (2024) identified three key components critical to the success of integrating AI literacy into classrooms, including school support, government policy, and broader societal needs. The readiness of pre-service teachers to use AI tools in the classroom is linked to their familiarity with these technologies. Bautista (2024) found that PSTs' willingness to adopt AI tools was significantly influenced by their technological knowledge (TK) within the TPACK framework. Individuals who had experience using similar tools were more likely to adopt the use of AI.

Furthermore, pre-service teachers can use AI tools to help provide personalized learning support to their students. Farrokhnia et al. (2024, as cited in Estaiteyeh & McQuirter, 2024) found that AI tools can help in adjusting individual learning experiences to the needs of each student. Additionally, a systematic literature review by Gligorea et al. (2023) found that real-time analytics provided by AI can help identify learning gaps, allowing students to find the support they need. This study analyzed 63 peer-reviewed articles and highlighted not only the fact that AI can help recognize learning gaps but also provide personalized learning paths, in addition to improving student engagement.

Duran (2024) also found that AI applications can enhance educational quality by monitoring student progress and offering individual learning experiences based on the students' needs. Duran (2024) highlights the importance of a balanced approach in the utilization of artificial intelligence. Moreover, Holman et al. (2024) noted that incorporating personalized learning tools into special education teacher programs can offer personalized learning experiences and adaptive feedback. This article introduces key components for successfully incorporating AI tools while maintaining accessibility and inclusivity. Some of these components include utilizing AI tools that are designed with accessibility features and proper training of PSTs through professional development.

In addition to personalized learning support, AI feedback has shown incredible potential. Bauer et al. (2025) study compared simulated learning that included adaptive AI feedback to that with static expert feedback. 332 pre-service teachers across five German universities took part in this study. The results indicated that adaptive AI feedback significantly improved PSTs' overall diagnostic reasoning. This ability is key for effective teaching, and GenAI was a valuable tool in its cultivation.

Collectively, this section highlights that PSTs' digital literacy skills and self-efficacy play a significant role in their use of AI tools, with the literature showcasing a positive correlation between PSTs' digital literacy and self-efficacy and their attitudes toward using AI (Lim, 2023). Additionally, there was an association between AI tool usage and PSTs' prior experiences with similar technology, which highlights TAMs' perceived ease of use as a possible factor to be explored later in this study. Furthermore, the literature draws attention to the importance of institutional policies in the implementation of AI in the classroom, which is essentially a key component of the research problem at hand.

Theoretical Framework

Technology Acceptance Model (TAM).

The technology acceptance model (TAM) is the theory that best aligns with the research aims and objectives of this study. This model was first introduced by Davis in 1986 as an adaptation of the theory of reasoned action (Davis et al., 1989). The TAM model looks at the behaviour and attitude of the user towards a particular technology as the main determinant of whether they will use or reject that technology (Marangunic & Granic, 2014). The technology acceptance model has developed over time from TAM to TAM 2. This development included additional factors as well as key variables that were suggested by other authors.

The main goal of TAM is to explain some of the determinants of individuals using technology (Davis et al., 1989). Two key concepts in the technology acceptance model are perceived usefulness and perceived ease of use (Chau, 1996). Perceived usefulness refers to an individual's own subjective probability that if they use a specific application system, then their job performance will increase (Davis et al., 1989). Perceived ease of use is the degree to which the potential user perceives that using that system will be mostly easy to use (Davis et al., 1989).

The technology acceptance model fits within the scope of this study because the underlying assumption is that students believe that AI tools are useful. If they did not think that these tools were useful, then they would likely not use them. Another reason why this model was selected is that most of the literature on AI usage that includes a theoretical framework uses the technology acceptance model. In a study that looked specifically at the TAM model, they found that the perceived ease of use had a major impact on students' intention to use ChatGPT (Zou & Huang, 2023).

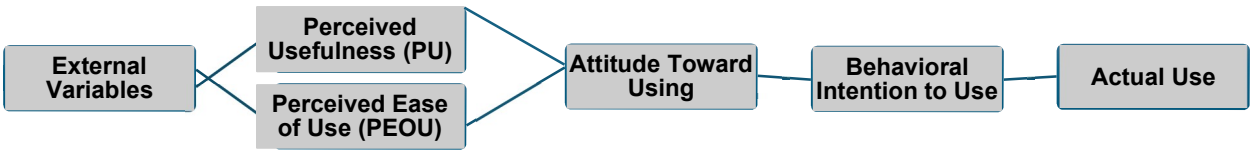
ChatGPT, in addition to other AI tools, is quite easy to use, and thus, the technology acceptance model fits within the scope of this study. One question in this study includes how likely the student is to recommend the use of AI tools to their peers. This recommendation can serve as a key external variable of how social influence affects the user in terms of perceived usefulness and perceived ease of use.

The Technology Acceptance Model helped guide the development of the research questions and aligned with the survey questions. When measuring the frequency and increase in AI tool usage as it relates to RQ1, perceived usefulness was a factor that was captured. It is conceivable that increased AI tool usage could be linked to pre-service teachers finding AI tools useful for completing their assignments.

Additionally, perceived ease of use and external variables in TAM were considered in the development of RQ2. One survey question sought to determine how likely individuals are to disclose their use, acknowledging that external variables such as social influence could affect PSTs' disclosure.

Figure 1 explains the key aspects of the Technology Acceptance Model and the stages an individual goes through before adopting a technology.

Figure 1: Technology Acceptance Model



Constructivism.

Constructivism is a theory that is dominant in various fields, including education (Sjøberg, 2010). Even though the central ideas of constructivism were formed by earlier theorists, Jean Piaget is seen as the founder of this learning theory (Sjøberg, 2010). One of the main concepts in constructivism is that knowledge is not passively taken in but rather actively constructed by the learner (Sjøberg, 2010). Constructivists emphasize the engagement of students within the learning process as active learners (Gambo, 2023; Wu, 2022, as cited in McGuire et al., 2024). When individuals look for and use AI tools, they are not passive participants as they would be in a traditional lecture. They are engaging in their learning by actively searching for these tools and prompts that are useful.

Social constructivism focuses on how interactions with others help shape an individual's learning process (Creswell & Poth, 2016). Both constructivism and social constructivism fit within the scope of this study. For example, previous studies have found a close connection between constructivism and artificial intelligence (Hof, 2021, as cited in McGuire et al., 2024).

AI-generated tools have the potential to allow pre-service teachers to co-construct knowledge with AI (McGuire et al., 2024). They can use tools like ChatGPT to get instant feedback and interact with GenAI in a social constructivist approach to learning. Constructivism and the technology acceptance model are two theories that will help guide me throughout the research process.

Constructivism was a key factor in developing the qualitative research question in this study. It takes the experiences of individuals as well as their interaction with AI tools as an active process. RQ2 sought to understand the experiences of PSTs regarding AI tool use with constructivism, helping inform that usage. Furthermore, PST's recommendation of its usage

could potentially be a part of socially constructed knowledge where their own experiences and interaction with peers influence their suggestion to use AI.

CHAPTER THREE: METHODOLOGY

This study addressed the following questions. For the quantitative component of this study the question was: "To what extent has the frequency of AI tool usage for completing assignments increased among pre-service teachers from Spring 2024 to Spring 2025, and how do demographic variables relate to any change?" The qualitative question was as follows: "What are the experiences and perceptions of pre-service teachers regarding their AI tool usage for completing assignments, and how does that relate to their attitude, trust, and inclination to recommend AI tools to their classmates" This investigation was conducted through a comparative analysis of survey data collected over two years. A mixed-methods research design was selected as it provided a comprehensive approach to effectively examine the research questions.

Research Design

Mixed Methods Approach.

This study employed a mixed-methods research design to collect and analyze data. This methodology combines both qualitative and quantitative approaches and can be traced back to its inception in psychology (Creswell, 2009). By incorporating both methods, the researcher ensures a comprehensive examination of the research problem, applying qualitative and quantitative techniques throughout data collection, analysis, and interpretation (Tashakkori & Creswell, 2007).

There is a difference of opinion among researchers on what constitutes a mixed-methods research design (Sandelowski, 2001; Bryman, 2007; Tashakkori & Creswell, 2007). Some

researchers argue that mixed methods are evolving and that the discussion regarding what they actually mean should remain open (Creswell & Plano, 2007; Tashakkori & Creswell, 2007). One definition of mixed-methods research is where the investigator collects and analyzes both quantitative and qualitative data in order to draw inferences between them (Tashakkori and Creswell, 2007). Greene (2006) defines it as an approach that investigates the social world with more than one methodological tradition. A more comprehensive definition of mixed-methods research is where the researcher collects, analyzes, and integrates both qualitative and quantitative data within a single study (Creswell & Clark, 2011).

There are two key concepts in mixed-methods research, which are weighting and timing. Weighting refers to the priority given to either the quantitative or qualitative component, while timing pertains to whether data collection occurs concurrently or sequentially (Creswell, 2009). Weighing is determined by the interest of the researcher, the audience, and what is being emphasized in the study (Creswell, 2009). Timing can come in phases where quantitative or qualitative data is collected first or sequentially (Creswell, 2009). Another key component in mixed-methods research is mixing, which refers to when the quantitative and qualitative data are connected (Creswell, 2009).

Overall, there are many benefits of utilizing a mixed-methods research design. This includes allowing for greater evidence of validity, having a more complete picture, offsetting weaknesses of each method, and answering different research questions (Doyle et al., 2009). Additionally, this type of methodology has some inherent limitations. Methodological purists perceive the main limitation is that quantitative and qualitative have drastically different epistemological and ontological origins and thus cannot be mixed (Doyle et al., 2009). Another

criticism is that mixed methods research is seen as more difficult to conduct and takes longer to undertake (Johnson & Onwuegbuzie, 2004).

There are four major types of mixed-methods designs, which include triangulation, embedded, explanatory, and exploratory (Doyle et al., 2009). A concurrent embedded design was chosen, which in this case prioritizes the quantitative data while using qualitative methods for further interpretation. The embedded concurrent design, or "concurrent embedded mixed-methods design," has a primary method that guides the research, which could be either quantitative or qualitative in nature (Creswell, 2009). The quantitative and qualitative data are collected concurrently (Creswell, 2009). Following the data collection stage, an analysis of the quantitative data was conducted. After the quantitative analysis, the qualitative comments were coded, and various themes emerged. The quantitative and qualitative components involved a secondary data analysis of a pre-existing dataset.

The concurrent embedded design was selected because it aligned closely with the research aims and objectives. Both quantitative and qualitative data were already collected, and thus, this methodology was the best option to utilize in this study. Additionally, the qualitative data in this study were secondary, as they were derived from a subset of survey questions that allowed for qualitative comments. The embedded approach has a main method that guides the research, and the secondary method is given less importance (Creswell, 2009). The qualitative comments were secondary because this study's focus was on the quantitative aspect. Furthermore, with this design, the secondary method addresses a different research question (Creswell, 2009). In this case, the research questions differed significantly, and the qualitative research question was not determined by the quantitative data.

Given that this study examined the frequency of AI tool usage, a quantitative approach was necessary to measure and quantify usage. In this case, the weighing gave precedence to the quantitative data as the main research objectives were to quantify the increase in AI tool usage. The adoption of this approach ensured an analysis of both quantitative and qualitative insights to truly comprehend the issue surrounding the frequency of AI tool use.

Quantitative Phase

Demographic Characteristics.

This section describes the demographic variables in this study, including age and gender, as well as other key demographics. The demographic data serves as a foundational element for the subsequent analysis that proceeds later in this thesis. There was a total of 158 participants across both years. The spring 2024 survey had 61 participants, whereas the spring 2025 survey had 97. The demographic information here only includes first-year pre-service teachers and does not consider the total respondents across first-year and second-year PSTs.

The analysis of participants' age across both cohorts revealed that a majority of PSTs were between the ages of 21 and 24, accounting for 90 (57.0%). Participants who were least represented in this study were under the age of 20, accounting for only 1 (0.6%) of the sample size.

The gender distribution showed that females were significantly more represented in this study than males. Females accounted for 80.4% of the sample size, whereas males represented 16.5%. Non-binary individuals and those who preferred to self-describe accounted for 3.1% of participants in this study. The gender analysis in the results chapter included only individuals who self-identified as male or female, as those who identified as non-binary or preferred to self-describe were too few for that analysis. Tables 1 and 2 below provide more detail on the

demographic variables in this study. Additionally, the survey used the term 'gender' to ask individuals to self-identify their gender, not 'sex'.

Table 1

Participant Demographics: Cohort 1 2024

Survey Item	**Response Option**		
		n	%
What is your age?	Under 20	1	1.6
	21-24	33	54.1
	25-29	18	29.5
	30-34	2	3.3
	35 and above	7	11.5
	Total	61	100.0
What is your gender?	Non-binary & prefer to self-describe	1	1.6
	Male	10	16.4
	Female	50	82.0
	Total	61	100.0
What is your current program of study in the Teacher Education program?	Other (please specify)	1	1.6
	Bachelor of Education, Primary/Junior (2 Years)	33	54.1
	Bachelor of Education, Intermediate/Senior (2 Years)	26	42.6
	The Honours Bachelor of Education (Indigenous Teacher Education)	0	0.0
	The Bachelor of Arts/Bachelor of Education (Indigenous Learning Major)	1	1.6

	Indigenous Language Teacher Diploma (ILTD)	0	0.0
	Total	61	100.0
Which campus are you primarily affiliated with for your Teacher Education program?	Other (please specify)	0	0.0
	Thunder Bay	36	60.0
	Orillia	24	40.0
	Total	60	100.0
Are you a first-generation university student (that is, your parents did not attend university)?	Yes	36	59.0
	No	24	39.3
	Unsure	1	1.6
	Total	61	100.0
Are you an International Student?	Yes	1	1.6
	No	60	98.4
	Total	61	100.0
Language Spoken at Home:	English	58	95.1
	Another language	3	4.9
	Total	61	100.0
On average, how many hours per week do you work at a job?	None	18	30.0
	1-10 hours	15	25.0
	11-20 hours	20	33.3
	21-30 hours	6	10.0
	31 or more hours	1	1.7
	Total	60	100.0
Do you have any learning needs that require accommodations or modification for some (or all) of your course work?	Yes	7	11.7
	No	51	85.0
	Unsure	2	3.3
	Total	60	100.0

I am an...	Introvert - An introvert is someone who tends to be more inward-focused, finding fulfillment and energy in solitary activities	10	16.7
	Extrovert - An extrovert is characterized by an outward orientation, gaining energy and satisfaction from social interactions	7	11.7
	Ambivert - An ambivert falls in the middle of the introvert-extrovert spectrum, displaying a mix of introverted and extraverted	43	71.7
	Unsure	0	0.0
	Total	60	100.0
When it comes to trying new technology, which of the following statements describes you best?	I'm an innovator. I love exploring new technologies and am not afraid to take risks. I'm always on the lookout for fresh	6	10.0
	I'm an early adopter. I tend to adopt innovations after innovators but before the majority. People often look to me for	11	18.3
	I'm part of the early majority. I observe experiences of innovators and early adopters	22	36.7

	before deciding to adopt a new technology		
	I'm in the late majority. I adopt innovations after the majority, usually with a more cautious approach. I am skeptical.	17	28.3
	I'm a laggard. I'm resistant to change and only adopt new technologies when it becomes absolutely necessary. I am a traditional.	4	6.7
	Total	60	100.0%

Note. N = 61 unless otherwise indicated. Percentages are based on valid responses per item (missing cases are excluded).

Table 2

Participant Demographics: Cohort 2 2025

Survey Item	**Response Option**		
		n	%
What is your age?	Under 20	0	0.0
	21-24	57	58.8
	25-29	27	27.8
	30-34	5	5.2
	35 and above	8	8.2
	Total	97	100.0
What is your gender?	Non-binary & prefer to self-describe	4	4.1
	Male	16	16.5

	Female	77	79.4
	Total	97	100.0
What is your current program of study in the Teacher Education program?	Other (please specify)	0	0.0
	Bachelor of Education, Primary/Junior (2 Years)	59	60.8
	Bachelor of Education, Intermediate/Senior (2 Years)	38	39.2
	The Honours Bachelor of Education (Indigenous Teacher Education)	0	0.0
	The Bachelor of Arts/Bachelor of Education (Indigenous Learning Major)	0	0.0
	Indigenous Language Teacher Diploma (ILTD)	0	0.0
	Total	97	100.0
Which campus are you primarily affiliated with for your Teacher Education program?	Other (please specify)	0	0.0
	Thunder Bay	31	32.0
	Orillia	66	68.0
	Total	97	100.0
Are you a first-generation university student (that is, your parents did not attend university)?	Yes	48	49.5
	No	49	50.5
	Unsure	0	0.0
	Total	97	100.0
Are you an International Student?	Yes	0	0.0
	No	97	100.0
	Total	97	100.0
Language Spoken at Home:	English	89	91.8
	Another language	8	8.2
	Total	97	100.0

On average, how many hours per week do you work at a job?	None	35	36.1
	1-10 hours	32	33.0
	11-20 hours	18	18.6
	21-30 hours	11	11.3
	31 or more hours	1	1.0
	Total	97	100.0
Do you have any learning needs that require accommodations or modification for some (or all) of your course work?	Yes	20	20.6
	No	71	73.2
	Unsure	6	6.2
	Total	97	100.0
I am an...	Introvert - An introvert is someone who tends to be more inward-focused, finding fulfillment and energy in solitary activities	19	19.6
	Extrovert - An extrovert is characterized by an outward orientation, gaining energy and satisfaction from social interactions	14	14.4
	Ambivert - An ambivert falls in the middle of the introvert-extrovert spectrum, displaying a mix of introverted and extraverted	64	66.0
	Unsure	0	0.0
	Total	97	100.0

When it comes to trying new technology, which of the following statements describes you best?	I'm an innovator. I love exploring new technologies and am not afraid to take risks. I'm always on the lookout for fresh	6	6.2
	I'm an early adopter. I tend to adopt innovations after innovators but before the majority. People often look to me for	19	19.6
	I'm part of the early majority. I observe experiences of innovators and early adopters before deciding to adopt a new technology	47	48.5
	I'm in the late majority. I adopt innovations after the majority, usually with a more cautious approach. I am skeptical.	23	23.7
	I'm a laggard. I'm resistant to change and only adopt new technologies when it becomes absolutely necessary. I am a traditional.	2	2.1
	Total	97	100.0%

Note. N = 97 unless otherwise indicated. Percentages are based on valid responses per item (missing cases are excluded).

Secondary Data Analysis.

A secondary data analysis was used in this study, which involves data collected by other individuals for different purposes (Boslaugh & Boslaugh, 2007). The data were obtained from a survey that was developed for the research titled "Artificial Intelligence-Powered Student Learning Assessment in Teacher Education" (van Barneveld, 2024). This survey has five sections: (1) Demographic information, including age, gender, and program of study. (2) Students' use of AI tools for completing their assignments, with one question seeking out what type of tools are most helpful.

(3) The next section looks at the impacts of AI on the participants' learning. (4) Following that, the opinions of students regarding their instructors using AI tools to assess their work are addressed. (5) The last part of the survey is about the ethical considerations of AI use. There was a slight alteration to question 15 from the 2024 to the 2025 survey. The alteration was the addition of examples of AI tools, e.g., Grammarly and ChatGPT, which are considered AI tools. The questions that were posed were quantitative in nature, but some questions allowed for the input of students' comments. The written comments by students are the qualitative data that were analyzed for this research.

Spring 2024 & Spring 2025 Survey.

The data in this study were collected from two distinct cross-sectional samples of first-year PSTs. Spring 2024 and spring 2025 participants represented different groups rather than the same individuals completing the survey each year. Consequently, the comparisons are between two separate cohorts rather than longitudinal shifts within the same participant group.

The quantitative data collection stage was a secondary data analysis of a survey that was conducted over two separate years. Data was collected in the Spring of 2024 and then again in

the Spring of 2025 through an anonymous online survey developed by van Barneveld (2024). The original survey included students enrolled in the 2-year Bachelor of Education program from all divisions and teachable subjects; however, my study focused on data from first-year students. First-year students were the focus because I wanted to describe student perspectives on AI tool usage based on their initial experience in the two-year program, to ensure consistency in the stage of education for the cohort for longitudinal data analysis, and because the result of this research would inform early intervention strategies for PSTs' future professional development.

Students in the Bachelor of Education program Year 1 received invitations via their official Lakehead University email in both the Spring of 2024 and 2025 about participating in the survey. Three reminder emails were sent out a few weeks apart to notify potential participants. In addition to emailing, posters were put up in the education buildings of both campuses. Furthermore, my supervisor and I had a meeting with a representative from the "Student Teachers Association" at Lakehead to brainstorm about other possible ways of contacting potential participants. Lastly, for participating in the survey, they were given the option to take part in a raffle for the chance to win one of three $25 Tim Hortons gift cards.

Data Analysis.

The data was analyzed using a cross-sectional analysis drawing on survey responses from two cohorts of pre-service teachers. Cross-sectional surveys attempt to collect and establish opinions of a specific group of people at the time they were conducted (Gunter, 2013). The survey included 41 questions, but only 7 key questions were analyzed because they aligned with the research questions in this study. These questions are located within the second section of the survey titled "Students' use of AI for completing assignments".

Descriptive statistics were generated for each survey question of interest. Specifically, tables and charts were created to describe the frequency and percentage of PSTs' responses to seven survey questions of interest. To answer research question 1, a chi-squared test of independence was conducted on Question 15 to determine if there has been a statistically significant change in the distribution of responses to Question 15 from 2024 to 2025.

To answer research question one, the chi-squared test of independence was used to examine whether there has been a shift from years 2024-2025, in the other survey questions of interest, including which AI tools respondents found to be most useful, how much trust they place in AI tools, as well as how likely they are to recommend AI tools to colleagues. Lastly, an analysis of the overall perception of pre-service teachers regarding the impact of AI tools on their learning, as well as how comfortable they are with disclosing their AI tool usage. The SPSS Statistics Software application was used to analyze the quantitative data. Table 1 below shows the specific survey questions that were used in the analysis.

Table 3

Summary of Survey Questions

Survey Item	**Response Option**
Question 15. Have you ever used AI tools to assist in completing your course assignments?	Yes No Prefer not to say

Question 16. Which types of AI tools have you found most helpful for completing course assignments?	Writing assistants Research tools Language translation Coding Problem-solving Presentations Argumentation Art Digital media Professional writing and design Studying Perspective taking Self-assessment Summary tools Other
Question 17. How frequently do you use AI tools to assist you in the competition of your course assignments?	Always (95-100% of my time) Regularly (70-95% of my time) Occasionally (30-70% of my time) Seldom (Less than 30% of my time) Never
Question 18. How comfortable are you with disclosing the use of AI tools when	Very comfortable Comfortable

submitting your course assignments for grading?	Neutral Uncomfortable Very uncomfortable
Question 19. How much trust do you place in the accuracy of AI tools when completing your course assignments	Complete trust Moderate trust Neutral Limited trust No trust at all
Question 21. How likely are you to recommend the use of AI tools for completing course assignments to your peers?	Very likely Likely Neutral Unlikely Very unlikely It depends on
Question 26. Considering both positive and negative aspects, how would you currently describe your overall perception of AI's impact on your learning?	Positive Neutral Negative It's too early to tell Not sure

Note. AI = Artificial Intelligence

Qualitative Phase

Qualitative Survey Comments.

The qualitative component of this study involved analyzing the survey comments to gain a deeper understanding of the quantitative results. A total of seven questions were used in this secondary data analysis, and three of those included options for participants to comment. Not every question provided the opportunity for participants to share their opinion, but the following table includes the three questions that allowed for comments.

Table 4

Qualitative Survey Comments

Survey Item	Response Option
Question 17. How frequently do you use AI tools to assist you in the completion of your course assignments?	Always (95-100% of my time) Regularly (70-95% of my time) Occasionally (30-70% of my time) Seldom (Less than 30% of my time) Never
Question 18. How comfortable are you with disclosing the use of AI tools when submitting your course assignments for grading?	Very comfortable Comfortable Neutral Uncomfortable Very uncomfortable
Question 21. How likely are you to recommend the use of AI tools for completing course assignments to your peers?	Very likely Likely Neutral

	Unlikely
	Very unlikely
	It depends on

Data Analysis.

A thematic analysis was employed to guide the qualitative data analysis process. The primary aim of a qualitative analysis is to derive meaning and understanding from the collected data (Merriam & Tisdell, 2015). The analysis was initiated by reading the comments of each survey participant. During this initial phase, it is essential to engage in the process of coding, which involves identifying and annotating segments of data that appear significant or noteworthy (Merriam & Tisdell, 2015). This coding process was conducted manually across all participant comments, and as patterns emerged, key themes were extracted and refined.

The final stage of analysis involved interpreting the data to construct meaning and draw conclusions (Creswell, 2009). This included developing my own interpretation of the findings and identifying recurring themes that provide insight into the research questions. To ensure credibility, an iterative reading of the data was conducted, with ongoing comparison of themes to ensure alignment with participants' responses. Additionally, dependability was maintained by tracking coding processes and the development of key themes.

Integration of Quantitative and Qualitative Findings

My study employed a mixed-methods embedded concurrent design, which necessitates the integration of both quantitative and qualitative data. In this design, quantitative data is collected alongside the qualitative data (Creswell, 2009). The purpose of the qualitative phase is to further explore and elaborate on the findings generated during the quantitative phase, offering

a deeper understanding of the results (Creswell, 2009). The primary emphasis of the study is on the quantitative data; consequently, the integration of qualitative data occurs at the end, serving primarily to contextualize and deepen the interpretation of the quantitative findings.

Positionality

This section provides information on my background, beliefs, and experiences that may have impacted the research that is presented in this study. This was done to adhere to reflexivity, which involves being conscious and self-aware of one's own role as a researcher (Findlay, 2002). Findlay highlights that being self-aware can help increase the trustworthiness of a study. Reflexivity is a process that critically examines how the researcher's own subjectivity affects the research process (Palaganas, 2017). To maintain reflexivity, one must constantly engage in an internal dialogue with oneself to prevent possible biases from affecting the research aims and objectives.

I first started my post-secondary education in college, where I earned a diploma in office administration and a certificate in adult education. That certificate in adult education is what sparked my interest in education and ultimately led me down the path of completing my bachelor's degree in educational studies. After completing my undergraduate degree, I still had a passion to learn and push myself to be the best person I could be. This brought me to a crossroads, where I had to decide which graduate degree to pursue. After careful deliberation, I decided to pursue a master's degree in education and contribute meaningfully to this field of knowledge.

I completed most of my education entirely online, which meant prior to conducting this research, I already had a high level of digital literacy skills. Given the fact that there might be an association between high levels of digital literacy skills and AI tool usage, I had to be aware of

my own background and how that plays a role in this research. Even though I haven't used AI tools much in the past, my experiences completing most of my studies online meant I understood both the affordances and constraints of other digital tools. Not conducting interviews or observations in this study was beneficial in terms of reducing some of the possible biases that I may have due to my lived experiences. These biases might have been more profound if I were interviewing pre-service teachers, and potentially have affected the validity of the study.

Ethical Considerations

The data for my research comes from a secondary data analysis that uses survey data that was previously collected by Dr. Christina van Barneveld, and thus, the ethical approval was already given by Lakehead University Research Ethics Board. I was added to the research team, and I submitted my TCPS2 certificate with signed documentation that I understood the research and ethics implications.

Limitations and Delimitations

My study aimed to offer valuable insights into pre-service teachers' perceptions of AI tools, but there are a few limitations that should be acknowledged. First, my study relied on a secondary data analysis rather than primary data. As the original survey was designed to address different research questions, there may be limitations in how well the available data align with the specific aims and objectives of this research. In addition to that, extracting qualitative data from the comments of a survey does not provide the richness and depth that is required in a true qualitative study.

Another limitation is the lack of control over participant selection, which limits the diversity of my sample selection. Since the participants in my study were not specifically recruited, there is a possible risk of an overrepresentation of certain views while not including

the views of underrepresented groups, such as racialized or Indigenous people. This could potentially lead to a narrower range of views that may affect the generalizability of the findings. This research would have benefited if it had more diverse participants, including greater representation of male and racialized individuals, to ensure a more in-depth understanding of pre-service teachers' perspectives on AI tool usage.

A primary delimitation of this study was that all participants were drawn exclusively from the Bachelor of Education program at Lakehead University. Since I narrowly defined my participant group, the findings may not be generalizable to a broader population. This specific focus was necessary because of the available data, and the survey under analysis had already excluded individuals outside the BEd program. The limited timeframe of this project did not permit the collection of new data followed by a year-later comparison. Despite these constraints, the chosen methodology is the most appropriate for addressing my study's research aims and objectives.

CHAPTER FOUR: RESULTS

This chapter presents the results of a study examining the increase in AI tool usage among PSTs, employing a concurrent embedded mixed-methods research design. The first section of this chapter presents the quantitative data, including the analysis of the quantitative findings, which includes (RQ1) and the chi-square test analysis using the demographic variables in this study. The second section was the qualitative results of (RQ2), which was conducted through an inductive thematic coding process. The final section integrated both the quantitative and qualitative results.

Research questions:

RQ1: To what extent has the frequency of AI tool usage for completing assignments

increased among pre-service teachers from Spring 2024 to Spring 2025, and how do demographic variables relate to any change?

RQ2: What are the experiences and perceptions of pre-service teachers regarding their AI tool usage for completing assignments, and how does that relate to their attitude, trust, and inclination to recommend AI tools to their classmates?

Quantitative Results

This section was an examination of the quantitative results of this study regarding the increase in AI tool usage among pre-service teachers. Adhering to the concurrent embedded research design, quantitative and qualitative data were collected concurrently (Creswell, 2009). The quantitative data extracted from the survey were analyzed using statistical tests, including chi-square tests across all categorical variables in this study. The findings highlighted correlations between two key categorical variables in this study. RQ1: To what extent has the frequency of AI tool usage for completing assignments increased among pre-service teachers from Spring 2024 to Spring 2025, and how do demographic variables relate to any change?

Research Question 1 Results

This section was an analysis of RQ1, which examined the increase in AI tool usage among PSTs from spring 2024 to spring 2025. The quantitative analysis utilized survey question fifteen, which asked, “Have you ever used AI tools to assist in completing your course assignments? Participants’ responses were compared across both years to determine the increase in AI tool use, and the results were calculated using valid percentages. Subsequently, a chi-square test of independence was conducted against all demographic variables in this study.

As shown in Table 5, there was a significant increase in AI tool usage, which answered RQ1: To what extent has the frequency of AI tool usage for completing assignments increased

among pre-service teachers from Spring 2024 to Spring 2025, and how do demographic variables relate to any change? A chi-square test of independence was conducted with results revealing a significant association between year and AI tool usage $\chi^2(1, N = 158) = 17.51$, $p < .001$, Cramér's V = .33. The effect size was medium which indicates a significance.

Table 5

AI Tool Usage

Spring 2024	Spring 2025	Increase
54%	85%	57%

Gender Differences.

This analysis also examined the role of gender and the use of AI tools. In 2024, there were 10 male participants, of whom 40% used AI tools. In 2025, there were 16 male participants with a 68% AI tool usage rate. This represents a 28-percentage point increase in usage year-over-year. However, these results should be viewed with caution because of the low number of male respondents, and thus, it is difficult to draw a meaningful conclusion. In 2024, there were 50 female participants with a 59% AI tool usage rate. In 2025, there were 77 female participants and a 92% usage rate. This represents a 33-percentage point increase in AI tool use among female PSTs. The implications suggest that not only are female PSTs using these tools more frequently than males, but also that their usage is increasing over time. This steeper increase among females suggests that gender played a role in their usage. However, the cause of this association was not determined in this study, and thus, these findings should be interpreted with caution.

Chi-Square Test Analysis.

Subsequently, a chi-square test of independence was conducted to examine the relationship between all demographic variables and AI tool use. There was an association between two key demographics, which were gender and AI tool use, as well as adoption of new technology and AI tool use. Other variables such as age, campus location, and teaching divisions did not yield any significant results.

Gender and AI Tool Use.

A chi-square test of independence revealed a statistically significant association between gender and AI tool use, $\chi^2(1, N = 151) = 5.38$, $p = < .02$), with a Cramér's V of .19, indicating a small approaching medium effect. A higher proportion of female PSTs used AI tools to complete their course assignments, as seen in Table 6. This was statistically significant, which indicates that other factors might also contribute, but the effect size was small. This association highlights the role that gender plays in AI tool use and provides a baseline to investigate the cause of this association. This is addressed further in the preceding discussion chapter.

Adoption of New Technology and AI Tool Use.

The use of AI tools and the adoption of new technology were also noted as significant in this study. The test was statistically significant, $\chi^2(2, N = 155) = 6.28$, $p = .043$, Cramér's V = .20, indicating a small association between the two variables. Individuals who self-identified as innovators and early adopters were more likely to use AI to complete their assignments, as shown in Table 7. The early majority were also more likely to utilize these tools, but not to the same extent as innovators and early adopters. The possible links between AI tool use and adoption of innovation are addressed in the discussion chapter.

Table 6

Gender by use of AI tools for Course Assignments (N = 151)

			Yes	No	
Gender	Male	Count	15	11	26
		Expected Count	19.6	6.4	26.0
	Female	Count	99	26	125
		Expected Count	94.4	30.6	125.0
Total		Count	114	37	151
		Expected Count	114.0	37.0	151.0

Table 7

Adoption of new technology by use of AI tools

			Yes	No	
When it comes to trying new technology, which of the following statements describes you best?	innovator and early adopter	Count	35	7	42
		Expected Count	31.4	10.6	42.0
	early majority	Count	54	15	69
		Expected Count	51.6	17.4	69.0
	late majority and laggard	Count	27	17	44
		Expected Count	32.9	11.1	44.0
Total		Count	116	39	155
		Expected Count	116.0	39.0	155.0

Summary

To summarize the quantitative results from RQ1, there was a significant increase in the use of AI tools among pre-service teachers from the spring of 2024 to the spring of 2025. These results reveal a 57% increase year-over-year, going from 54% to 85%. Subsequently, the chi-square test of independence conducted against the demographic variables in this study demonstrated a significance with gender and AI tool use, as well as adoption of new technology and AI tool use. Females and early adopters of technology were more likely to use AI tools to complete their assignments. Both associations were noted to be small, but they do suggest that gender and adoption of innovation do play a role in how likely PSTs are to use AI in their course assignments.

Qualitative Results

Adhering to the concurrent embedded mixed methods design, this section transitions from the quantitative analysis to the qualitative findings of this study. This approach enabled an in-depth understanding of the phenomena under investigation by complementing the quantitative findings with qualitative data (Creswell & Plano-Clark, 2011). This section presents the second research question in this study, which sought to understand the experiences and perceptions of pre-service teachers concerning their AI tool use. There were 3 open-ended survey questions that provided qualitative data with a total of 37 comments.

Those comments were analyzed through an inductive thematic coding process. This involves producing codes that accurately reflect the content of the data, rather than introducing preconceived concepts (Byrne, 2022). To ensure consistency throughout, the coding was conducted manually by identifying emerging codes from the data. This was accomplished by

reading the qualitative comments directly without the use of code-analyzing software. After the initial coding, the dataset was reviewed to ensure consistency and refine codes. A self-audit was conducted by reviewing and recoding the dataset at weekly intervals. Minor adjustments were made in order to ensure accurate alignment with codes and themes.

Qualitative Comments.

This section presents the qualitative comments of survey question seventeen as seen in Table 8. A total of 37 comments were extracted from the survey, which consisted of 3 questions. Only survey question 17 is presented in the table below, primarily because it was the question that incorporated both the quantitative and qualitative elements of this study.

Table 8

Qualitative Comments

Survey Item	**Respondent Comment**
Question 17. How frequently do you use AI tools to assist you in the completion of your course assignments?	*If you count Word spelling corrections and Grammar, then 100%* *Used to generate ideas when stuck* *I normally have Grammerly open on my documents as I type. I tend to make grammar mistakes that I won't always catch during my first draft without it. Plus, you can take notes and pop them into Quizlet to help start you off with making a study guide for a test, which is a result useful tool to start studying.*

	Only grammarly
	100% of the time for grammar purposes. Occasionally to help me generate ideas.
	This is including Grammarly, a word processor, not an LLM such as ChatGPT.
	Many of my instructors encourage the use of AI and even give us assignments that REQUIRE the use of AI.
	Even less than 30%, more like 10%
	I used it once to get an idea for a lesson on Soviet Art for a history unit outline
	It depends on the task, if it requires 'meaningful work' then yes for example write 2000 words on so and so. But if I only have a 300–500-word essay I am much more likely to not use AI assistance.

	I only use it to create rubrics for lessons when given the okay from my instructors
	I frequently use grammar and editing technology to proofread my work. I utilize AI tools for idea generation much less frequently.
	I mostly use AI to give me a good synopsis on a subject matter I don't know; I also use it to enhance how I might phrase a question (elevate how I ask a question from layman terms to "teacher" speak), and I use AI to generate a start for rubrics which I then edit

Research Question 2 Results

This section presents the findings of research question 2 in the study. RQ2: What are the experiences and perceptions of pre-service teachers regarding their AI tool usage for completing assignments, and how does that relate to their attitude, trust, and inclination to recommend AI tools to their classmates? This research question was addressed through the qualitative data collected in this study. This data was based on the comments participants made on the survey questions 17, 18, and 21. The qualitative data were coded through an inductive thematic process.

The results of RQ2 identified six key themes, which were (1) grammar and editing support, (2) idea generation, (3) negative stigma, (4) no need to disclose, (5) depends on use, and (6) course instructor policies.

Survey Question 17: How frequently do you use AI tools to assist you in the completion of your course assignments?

There were two major themes that emerged regarding survey question seventeen, which were grammar and editing, and idea generation.

Grammar and editing.

The overwhelming sentiment described by the participants in this study was the use of AI tools like Grammarly to improve the accuracy and clarity of their writing. Many of them indicated that these tools were a necessary component in their academic work. One participant stated, *"100 percent of the time for grammar purposes".* Additionally, another respondent explained, *"I normally have Grammarly open on my documents as I type. I tend to make grammar mistakes that I won't always catch during my first draft without it".*

These responses suggest that pre-service teachers primarily utilize AI tools as language aids rather than content generators. This indicates that their frequency of use is tied to desiring more polished and well-written assignments, while still maintaining the authorship of their assignments. PSTs seem to still value completing their own assignment, but also value writing assistants to help them during that process.

Idea generation.

Another noticeable theme reported by participants was using AI tools to stimulate idea development and reduce writer's block. One participant mentioned, *"I use it occasionally to help generate ideas."* Continuing with this theme, another participant noted, *"I used it once to get an*

idea for a lesson". Overall, this theme showcases the role that AI has in PST's idea generation, even though it remains secondary to participants using AI for editing purposes. These results showcase that PSTs are active participants in their learning.

Survey question 18: How comfortable are you with disclosing the use of AI tools when submitting your course assignments for grading?

Negative stigma and the perceived lack of need for disclosing AI tool use were two contrasting themes that emerged from the comments on survey question 18.

Negative stigma.

Negative stigma was a key theme, with several participants expressing how they were uncomfortable with reliving their AI tool use. This revealed concerns regarding the ethical perceptions of PSTs, reinforcing the struggle PSTs faced when deciding to adopt AI tools. This negative stigma stemmed from concerns regarding the reactions that professors might have, as many of them might perceive its usage as unethical.

One participant stated, "*The stigma that using AI is 'cheating'. AI has helped me provide assignments that are more cohesive and strengthen my learning in the topic, but there is stigma that it's not your 'own' work".* Another participant noted, *"Unpredictable whether professors will react badly if you bring up AI at all".* These comments showcase how institutional policies and professors' perceptions influence pre-service teachers' willingness to use AI tools and suggest a tension between the advantages of its usage and fears of academic dishonesty.

No need to disclose usage.

In contrast to the theme noted above, many respondents were of the view that their AI tool use was acceptable and did not warrant disclosure. This suggests that some of them viewed AI as ethical, which could have been affected by how they interacted with these tools.

Additionally, the concept of active learning may be a factor, as respondents mentioned that they engaged with AI and did not rely solely on it. This highlights that PSTs were active participants in their learning, and AI was utilized solely to assist them in their assignments.

One participant explained their use of the AI tools, saying, *"As long as I'm using it to look for topics and not to do my work for me, it's fine."* Continuing with this theme, another participant said, "*Most of the things I use it for, I do not feel like I need to disclose it because I change so much of it/add to, and edit it enough".* These responses indicate that many participants viewed the use of AI as ethical for enhancing their work, rather than using it to replace their learning.

Survey question 21: How likely are you to recommend the use of AI tools for completing course assignments to your peers?

Two interconnected themes noted here were the conditional recommendation of AI tools based on their use and the influence of instructors' policies.

Depends on the use.

Many participants stated that their recommendation was dependent on how their classmates would use AI tools. This highlights ethical construction, showcasing PSTs' considerable attention to ethical usage. One participant mentioned, *"How they're using it. Is it doing your assignment for you, or is it just a tool?".* Another added *"very likely but only for editing and grammar purposes".* These comments highlight the ethical awareness of PSTs and how their recommendation is tied to how their peers would utilize these tools. PSTs would suggest the use of AI to their classmates conditionally, depending on how they would utilize these tools.

Course instructor policies.

The instructor's policy was a secondary theme, but it was still a significant factor in influencing pre-service teachers' recommendations of AI tool use to their peers. For example, one participant noted, *"What the assignment is, what the instructor's policies are on AI".* This theme highlights the role of university policies and professors' perceptions on AI tool usage and how that affects PSTs' attitudes to suggest its use to their classmates.

Summary

The qualitative findings centred around RQ2 and the qualitative comments on the survey. These results indicate that pre-service teachers primarily use AI tools to assist them with their writing, in addition to idea generation. Additionally, attitudes toward the disclosure of AI tool use were influenced by various factors, including perceived stigma and ethical considerations. These ethical motives were linked to ethical construction, where PSTs felt an ethical responsibility considering the impact it would have on their peers. These findings highlight the balanced approach that PSTs took when considering academic integrity and authorship, as well as the affordances that AI tools provide.

Integration of Quantitative and Qualitative Results

The integration of both quantitative and qualitative data provides a detailed interpretation of the findings at hand. Quantitative findings reveal a 57% increase in AI tool usage, going from 54% to 85%. Building on this, the qualitative responses indicate that the time-saving benefits of AI tools are a key factor in motivating PSTs to use AI. This was highlighted by the numerous responses indicating PST's AI tool use was tied to editing purposes and generating ideas.

Additionally, there was an association between innovators of new technology and early adopters of technology and AI tool usage. Integrating this with the quantitative rise in AI tool

use, we can see a link between individuals who were early adopters and innovators and their likelihood of utilizing these tools. A possible correlation could be that since these individuals are early adopters of other technologies, they are more likely to adopt AI tools. Furthermore, integrating the qualitative data, there may be a link between early adopters and innovators of technology and their comfort level with using AI, as well as their belief that it is useful for tasks such as editing and idea generation.

Gender differences regarding AI tool use saw significantly more females adopting these tools. The quantitative data highlighted that females were more inclined to use AI, with the qualitative data highlighting that this could have been due to the affordances they perceived, such as writing assistance and idea generation.

CHAPTER FIVE: DISCUSSION

This chapter interprets the findings of Chapter 4 in relation to previous research and the theoretical framework employed in this study. This study investigated the increase of AI tool use among pre-service teachers. It also explored the experiences and perceptions of PSTs regarding their AI tool usage for completing assignments, and how that influenced their attitude, trust, and inclination to recommend AI tools to their classmates. The data in this study were collected via a quantitative survey that allowed for qualitative comments. This cross-sectional survey was collected in the spring of 2024 and spring 2025. This afforded the opportunity to measure the increase in AI tool use and the possible changes in PSTs' perceptions, trust, and inclination to recommend its use over time.

There were two research questions in this study. The first one aimed to measure the increase in AI tool use from spring 2024 to spring 2025, in addition to ascertaining any relationship among key variables in the study. The second one sought to understand the

qualitative component, which was the perceptions pre-service teachers had, their trust, and their recommendation to recommend these tools.

Research Question 1

RQ1: To what extent has the frequency of AI tool usage for completing assignments increased among pre-service teachers from Spring 2024 to Spring 2025, and how do demographic variables relate to any change?

This was the quantitative research question in this mixed-methods research design. The purpose of this question was to see if there was an increase in AI tool use among pre-service teachers. Von Garrel and Mayer (2023) found that nearly two-thirds of the 6,300 university students surveyed reported using generative AI to some extent. Despite this study, in addition to others that measure AI tool usage, there was a lack of research on the increase over time. Additionally, there have not been many studies that utilize a mixed-methods research design through a cross-sectional survey design. Therefore, this study sought to understand the increase in AI tool usage among pre-service teachers while considering their own perceptions and experiences.

Discussion of RQ1 Results

The results indicate that AI tool usage among PSTs has increased significantly year over year. This study showcased that 54% of PSTs used AI tools in spring 2024, which echoes similar studies such as Fošner (2024), who indicated 51% of participants used AI tools. These findings slightly contrast with those of Aksakallı and Daşer (2025), who found that 71% of participants used these tools, compared to 85% in the study at hand from the same year. The increase in AI tool usage from 2024 to 2025, as observed across the literature, including this study, suggests that the construct of perceived usefulness (PU) in the Technology Acceptance Model (TAM)

could play a role. PSTs are increasingly recognizing the affordances that AI tools provide, such as idea generation for assignments and writing assistance, which in turn can potentially drive their usage based on PU in TAM.

The slight contrast in 2025 usage rates could also be due to institutional acceptance or peer usage of AI, as Aksakallı and Daşer's (2025) study was conducted in a different geographical location. It is plausible that the Turkish study would have lower AI usage rates compared to the current study conducted in Canada due to external variables. Although this study does not provide evidence of any differences in technology access across contexts, the variability in technology availability may help explain the differences in AI tool usage.

Within the Technology Acceptance Model, external variables are key in determining whether an individual perceives that the technology is useful or easy to use. This perception is ultimately what drives behavioural intention to use, and then the actual system use. Thus, the external variable in this case, institutional acceptance and peers' usage, could be a key determinant in the perceived usefulness for PSTs. External variables within TAM affect two key constructs, which are near-term usefulness and long-term usefulness (Chau, 1996). Social approval is the main determinant in long-term usefulness, which highlights the importance of peer usage and institutional acceptance in encouraging AI tool use.

Furthermore, intention towards behaviour within the TAM framework is linked to believing that this technology will increase job performance (Davis et al., 1989). PSTs' increase in AI tool use could be linked to them perceiving that it will improve their assignments and thus be useful to them. This was highlighted by the qualitative comments PSTs made regarding using AI to improve their writing and idea generation. Near-term usefulness with the construct of perceived usefulness in TAM seems likely to be the main factor affecting the increase in usage.

This is because it is plausible that PSTs are looking at the short-term benefit of AI tools rather than the long-term.

Additionally, through the lens of TAM, this increase could be attributed not only to perceived usefulness (PU) but also perceived ease of use (PEOU), which may be due to the improved user interfaces of AI technology. Given that AI tools are a relatively recent development, it is logical to see such a steep increase in usage due to a considerable improvement in the technology itself. ChatGPT came out in 2022 but was limited to text only, but now we can use it to generate images, voice and has transformed to a multimodal task platform (Baidoo-Anu et al., 2023). In this case, external variables such as an improved interface and the performance of AI tools appear to be driving factors in the increased PU and PEOU. Consequently, this has affected the attitude towards use, behavioural intention to use, and actual use, ultimately increasing AI tool use among the participants in this study.

AI and gender.

These results revealed a significant correlation between AI tool use and gender, as well as between AI tool use and the adoption of new technology. Through a chi-square test analysis, results indicated a significant correlation $\chi^2(1, N = 151) = 5.38, p = < .02)$ between AI tool use and gender. 92% of females used AI tools in the spring of 2025, as contrasted to 68% of males. This differs from Von Garrel and Mayer's (2023) study, where 68.9% of males used AI compared to 59.6% of females. This could be due to the study's setting, as Von Garrel and Mayer's (2023) study was conducted in Germany. Prior research has put forth that technology adoption and gender usage patterns are influenced by institutional norms and cultural attitudes regarding technology (Teo & Du, 2015). However, further cross-cultural research would be needed to determine if contextual factors, such as location, shape AI tool usage among genders.

In this study, the difference in usage among genders could potentially be attributed to TAM in terms of PU and PEOU. Female PSTs had a higher frequency of AI tool use than their male counterparts, which could suggest a higher degree of perceived ease of use among females, aligning with TAM (Davis et al., 1989). Although it should be noted that the ease-of-use differences between genders were not measured in this study, and thus, this is a mere possibility.

Furthermore, as mentioned above, external variables such as social influence may have had an impact on female PSTs' comfort level with using these tools. Perhaps seeing their peers using AI has reinforced the PU and PEOU, which has led to their own usage. Additionally, there are other variables that may have had an impact on the higher frequency of female AI tool users. These include teachable subjects, technology adoption patterns, and potentially other key factors. These contextual factors are not solely based on gender, but rather on internal and external variables that may have contributed to the significant difference in AI tool use among genders.

When applying TAM, we can see that social factors and the PU and PEOU AI may have played a role in the contrast in usage between genders. Other key demographic variables, such as age, campus location, and teaching division, did not indicate a significant relationship. These findings highlight a clear increase in AI tool adoption and integration among pre-service teachers.

AI and adoption of innovation.

In addition to gender, innovators and early adopters of technology were also more likely to utilize AI tools in this study. Through the use of a chi-square test, results indicated a statistical significance $\chi^2(2, N = 155) = 6.28$, $p = .043$, Cramér's $V = .20$, showcasing a small association between the two variables. Individuals who are innovators or early adopters of technology were more likely to use AI tools in this study.

Logically, this correlation makes sense as AI is a form of technology; therefore, those who are innovators and early adopters of technology would likely adopt AI into their studies. This significance also aligns with the Technology Acceptance Model, which stresses perceived usefulness and perceived ease of use as the main factors of adopting new technology (Davis et al., 1989). Participants in this study likely thought that AI is useful and easy to use, or they would not have utilized these tools.

Moreover, early adopters and innovators of technology could have been more comfortable using AI because of their prior experience with other digital technologies. Baustista's (2024) study found that PSTs' willingness to adopt AI tools was significantly influenced by their prior technological knowledge. In the study at hand, their prior experience with similar tools may have influenced their adoption of AI tools, as perceived ease of use relates to the Technology Acceptance Model. These early adopters and innovators could perceive AI tools as useful and easier to use because of their past experience, which aligns with TAM.

Although there was a considerable increase in usage, a minority of pre-service teachers remained hesitant to use them due to concerns such as over-reliance and university policies. The quantitative data highlights the overall acceptance of AI tools, whereas the qualitative data sheds light on ethical concerns and policy uncertainty. This integration showcases that AI tool use is not solely driven by value, but also based on the perceptions of PSTs regarding academic integrity.

Implications of RQ1.

Research question one highlights many important factors that teacher education programs need to take into consideration. Since AI tool use is increasing, universities need to have clear policies and guidelines in place. This, in turn, will help reduce some of the uncertainty that PSTs

experienced when considering whether to use these tools. The Technology Acceptance Model highlights external factors, which include social influence and institutional policies. If universities encourage AI tool use and provide an ethical framework regarding its usage, PSTs will likely be more inclined to utilize this beneficial tool. This is because the external variables will showcase the PU and PEOU of AI tools.

Additionally, since AI is being increasingly utilized among PSTs in this study, this calls into question how prepared they are to use these tools. Therefore, teacher education programs should focus on training PSTs on how to use AI ethically and improve their digital literacy skills, as these will be key skills teachers will need in this current digital age we live in. PSTs who were innovators or early adopters of technology were more likely to adopt AI, which connects to the Technology Acceptance model. It is quite possible that innovators and early adopters found that AI tools fit within the concept of PU and PEOU within the TAM model.

Lastly, the results found that gender played a significant role in their adoption of AI tools. Even though there were discrepancies with Von Garrel and Mayer's (2023) study, which found that males used AI tools more frequently than females did, this highlights the need to investigate the mitigating factors that lead to this. This could be due to the geographic location of that study. Nevertheless, this discrepancy showcases the importance of conducting further research regarding how gender plays a role in AI use adoption.

Research Question 2

RQ2: What are the experiences and perceptions of pre-service teachers regarding their AI tool usage for completing assignments, and how does that relate to their attitude, trust, and inclination to recommend AI tools to their classmates?

This was the qualitative research question in this study, which sought to provide richer meaning from the quantitative component. This question was answered through 3 open-ended survey questions where participants commented on their perceptions and experiences using these tools. In a world where artificial intelligence is so prevalent, understanding the motivations behind its adoption is just as important as the statistical increase. RQ2 aims to shed light on the underlying reasons why PSTs are using AI more often. The qualitative findings adhered to trustworthiness through precise coding and alignment of themes with participants' responses, as well as through a clear and systematic approach to the analysis.

Discussion of RQ2 Results

Writing assistance.

The results indicate that perceived usefulness, as per the Technology Acceptance Model, had an impact on PSTs using writing assistants. One significant finding was that pre-service teachers used AI tools primarily for grammar and editing purposes. Many of the participants in this study mentioned that they use AI tools like Grammarly for editing purposes, which echoes similar studies. For example, Fahmi and Cahyono (2021) found that all their participants agreed that Grammarly enhanced their writing and produced better-quality work. Additionally, Alotaibi's (2023) study noted that 60% of participants strongly agreed that Grammarly made them feel more confident about their writing.

Some participants in this study mentioned that they use Grammarly 100% of the time for grammar and editing purposes. These results align with those of other studies regarding students' use of AI tools for editing and writing support. This suggests that PST's perception of AI tools is user-friendly and useful, which aligns with the Technology Acceptance Model (Davis et al., 1989). This user-friendly and useful aspect aligns with TAM's perceived usefulness within the

concept of near-term usefulness. This near-term usefulness is linked to improving job performance, which in this case is short-term goals to do well on PST assignments (Chau, 1996).

Usefulness & practicality.

Another key reason why participants in this study used AI tools was due to practical considerations, including saving time and idea generation. This was mentioned by quite a few participants in this study. The frequency of their usage was tied to using AI for idea generation, which could potentially save time. Yilmaz Can and Durmus's (2024) study aligns with the notion that these tools allow individuals to save time. This could potentially be explained through the Technology Acceptance Model, where participants found that the perceived usefulness was advantageous. The perceived usefulness in this case would be saving time in order to focus on other tasks. AI tools enable individuals to save time, which can then be allocated to higher-order tasks, and thus, this concept aligns with the perceived usefulness in the TAM framework.

Additionally, PSTs are able to co-construct knowledge through the use of AI (McGuire et al., 2024). Even though idea generation might appear to be passive in nature, PSTs are still actively co-constructing meaning. Participants in this study used AI tools to generate new ideas, but that interaction is likely active where they needed to refine and evaluate the input of the tool. This suggests alignment with both the constructivist and social constructivist approaches to learning.

Negative stigma.

Negative stigma was also mentioned by participants in this study, which stemmed from ethical concerns surrounding professors and institutional policies. One participant mentioned the negative stigma that AI is cheating, but also said that it helped them in their learning, which underscores how external factors, such as professors' opinions of AI, affect PSTs' adoption of

these tools. Those individuals who were hesitant to use AI tools mentioned mitigating factors such as their professors' reactions and the stigma that it is unethical. This suggests that PSTs were engaging in ethical construction, which fits within the constructivist framework of this study.

Constructivism and artificial intelligence share a close connection, as mentioned by Hof (2021), as cited in McGuire et al. (2024). This ethical consideration of when to use AI translated to how comfortable they were recommending its usage. Participants in this study mentioned that their recommendation is tied to how their classmates would use these tools. They did not approve of AI tools if their classmates were going to use them to complete the assignment without understanding it. This indicates an ethical awareness and ties back to ethical construction within the constructivist framework.

Additionally, this links TAM because if they believe that it is ethical, their trust increases, which then feeds into them perceiving it as useful. In this case, PSTs did consider AI as ethical, but depending on what it is used for. This suggests that PST's own apprehension of using AI tools due to the negative stigma affects their recommendation of it. Perhaps their ethical considerations are a factor not only in their trust of these tools, but also in suggestions to their classmates. Even though it is difficult to determine whether the use of AI tools in some contexts is unethical, these external variables, such as professors' reactions, do play a role in their adoption. These external variables highlight how the Technology Acceptance Model connects with PST's use of AI tools.

Implications of RQ2.

Research question two highlights several important factors that educational policymakers should consider. Using AI tools for editing was a key finding, highlighting the need for

educational institutions to provide subscriptions for AI writing assistants. Providing these resources can help reduce costs for PSTs and demonstrate a change in policy regarding AI tool use. This new acceptance of AI in the classroom can potentially improve trust and alleviate the negative stigma that PSTs felt when considering its use.

Within the Technology Acceptance Model developed by Davis (1996) is the notion of perceived usefulness, which can potentially be influenced by whether an individual trusts the system they are using. Trust could be viewed as an external variable which affects the PU and PEOU among PSTs. Individuals had mixed feelings regarding their trust in AI tools, and that is represented in the findings of this study.

These findings provide greater insights into TAM by demonstrating that trust plays a key role in perceived usefulness and whether an individual would adopt the behavioural intention to use AI tools. Not only was trust a key external variable, but also social influence and institutional policies. Together, they were a driving force in the increase in AI tool use because of the perceived usefulness that PSTs felt through these external variables.

The constructivist theory was shown in this study through PSTs' own engagement with AI tools and their ethical construction. Teacher education programs should focus on providing classes that teach AI literacy to help their students use AI tools and critically analyze. This is important because AI is being used everywhere, and if PSTs are not competent in using it, then it will affect them negatively when entering into their teaching careers.

Summary

This chapter examined some of the motivational factors that contributed to the increase in AI tool use among pre-service teachers. Additionally, it was an analysis of PST's own experiences and perceptions, which influenced their usage and recommendations of these tools.

This mixed-methods research design included two research questions, one quantitative and the other qualitative.

Research question one aligns with the Technology Acceptance Model, suggesting that the increase in AI tool use is influenced by its perceived usefulness and external social factors. Furthermore, the findings of the first research question align with and contrast with those of prior studies, such as Von Garrel and Mayer (2023), who found that males used AI more frequently than females. In contrast, this study found the opposite to be true, with females representing the majority of AI tool users. In terms of alignment, previous studies that measured the frequency of AI tool usage mirrored this study's results.

Research question two echoes prior findings regarding students' use of AI tools like Grammarly for editing purposes (Fahmi & Cahyono, 2021; Alotaibi, 2023). There was also a link between trust and the inclination to use and recommend AI to their classmates. This study also found that PSTs were engaging in ethical construction within the constructivist framework.

This research underscores the need for educational institutions to adapt to the increasing number of students utilizing AI. This means developing classes on AI literacy and providing free subscriptions to writing assistant tools. If educational policymakers want to train the best pre-service teachers, they need to recognize the importance of these tools. With a change in policy, this means that PSTs will have the proper digital technology background that will help serve them in their future careers as teachers.

Limitations of the study

There are a few limitations of this study that are worth mentioning in order to help the reader interpret the results. One of the limitations was that all the participants were from the same university and were students in the Bachelor of Education program. Pre-service teachers

were specifically sought out for this study, but that still calls into question whether results would be different if the respondents were from a different program or university. Additionally, the PSTs in this study volunteered and therefore only represent the portion of PSTs who were comfortable participating in this study. Furthermore, an overwhelming majority of participants were white and identified as females. This means the experiences of males and marginalized populations were underrepresented in this research.

Another possible limitation was that all the participants were first-year PSTs and did not include second-year students. This could have potentially altered the results based on other factors, including second-year PSTs being more comfortable using AI due to their experience with it in their first year. Moreover, the data used in this study were collected through a secondary data analysis of a similar study. Thus, a possible limitation is that, although the data were original, they were not specifically collected for this study, which means that they may lack the depth and comprehensiveness of the results.

Lastly, the qualitative data were taken from survey comments, which do not represent the richness of a true qualitative study. This means that there was a lack of depth and probing in the qualitative component of this research, which could have been addressed by utilizing other qualitative methods, such as interviews. Future research should implement interviews, whether that be semi-structured or unstructured, to explore pre-service teachers' perceptions and experiences in greater detail. Additionally, observations can be used as a tool to understand PSTs' experiences with AI, as that could provide insights that would not be obtained via survey comments or interviews.

Suggestions for Future Research

While conducting this study, it became apparent that there was a lack of research utilizing cross-sectional surveys to measure the increase in AI tool use over time. It was also noted that there were not many studies that took on a mixed-methods approach, as most studies were quantitative in nature. Therefore, conducting this study again to investigate the increase of AI tool use in 2026 would be a noteworthy endeavour. Additionally, moving beyond pre-service teachers and examining the use of in-service teachers would be beneficial. The affordances of doing so would mean providing more practical results on how in-service teachers and their students interact with these tools.

This is important because ultimately, we are educating pre-service teachers to become in-service teachers, and thus, understanding in-service teachers' AI usage is important. Furthermore, this study relied on a self-report survey, and future research examining in-service teachers' use can provide valuable insights into this phenomenon. This can be done through classroom observations rather than relying on participants' responses. Through observations, a researcher can observe the phenomenon and minimize the risk of missing information that would be more likely in self-report data. I believe that the natural progression for future research in this topic would be to investigate the use of AI tools by in-service teachers.

Another suggestion for future research would be to explore the relationship between PSTs' digital literacy skills and self-efficacy, and their AI tool usage. Although this study did not investigate this relationship, there is literature that has found a correlation between high levels of digital literacy skills, self-efficacy, and the likelihood of using AI among PSTs. For example, Lim's (2023) study found a positive correlation between PSTs' self-efficacy and their attitudes

towards using AI. Therefore, conducting a study that explores this possible relation in more detail would be a worthwhile pursuit.

Conclusion

This study examined the increase in AI tool use among pre-service teachers from spring 2024 to spring 2025 through a cross-sectional survey. Additionally, it investigated PSTs' own experiences and perceptions using these tools and how that influences their trust and inclination for recommending them to their classmates.

Although studies have investigated the use of AI tools, there has been a lack of research measuring the increase in usage. This study sought to fill the gap by quantifying the increase in AI tool use among pre-service teachers. Two research questions guided this study. (1) To what extent has the frequency of AI tool usage for completing assignments increased among pre-service teachers from Spring 2024 to Spring 2025, and how do demographic variables relate to any change? (2) What are the experiences and perceptions of pre-service teachers regarding their AI tool usage for completing assignments, and how does that relate to their attitude, trust, and inclination to recommend AI tools to their classmates?

The results indicated a significant increase in AI tool use and a correlation between gender and its usage. Additionally, early adopters and innovators of technology were more likely to use AI, which pointed to the usefulness that these tools provide as a factor in this increase. This study highlights that AI is increasingly being utilized by PSTs, but also reveals that a negative stigma remains attached to its use. It serves as a basis to inform educational policymakers of the importance of adopting these tools in teacher education programs, given the growing demand for teachers to be competent in using digital technologies in the classroom.

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Appendices

Appendix A: Survey Instrument

Using AI for student assessment

Welcome to the survey!

Welcome to our anonymous survey on using Artificial Intelligence (AI). Your insights are invaluable in understanding the perspectives of students on this evolving educational practice. Note: Your responses will be anonymous and the data collected will be used solely for research purposes.

All the information about the research is provided below. If you decide to consent, please CLICK THE "NEXT" BUTTON at the bottom of the page.

Dear Potential Participant:

You are invited to participate in a research project entitled "**Artificial Intelligence-Powered Student Learning Assessment in Teacher Education**" because *your opinions on the use of artificial intelligence in student assessment has a direct impact on your (and future students') education as a teacher*. This research is being conducted by Dr. Christina van Barneveld, Associate Professor in the Faculty of Education at Lakehead University.

The research is funded by a Research in Teacher Education Grant, 2024, Lakehead University.

Taking part in this study is voluntary. Before you decide whether you would like to take part in this study, please read this letter carefully to understand what is involved. After you have read the letter, please ask any questions you may have.

PURPOSE
The purpose of this research is to describe your opinions of the role of Artificial Intelligence (AI) in assessing student progress within teacher education programs, aiming to improve the quality of training and produce more adept educators. Your opinions on how AI technologies can be integrated into teacher education programs to provide real-time, personalized feedback and foster continuous improvement will be explored with the goal of improving teacher education programs and better preparing aspiring teachers for their profession.

WHAT INFORMATION WILL BE COLLECTED?
This anonymous online questionnaire will be used to collect data from you on your opinions about AI and assessment of student learning. The questionnaire consists of questions on demographics, the use of AI for completing assignments, impact of AI on your learning, your opinions about professors using AI to assess their work, and ethics for using AI for student assessment.

WHAT IS REQUESTED OF ME AS A PARTICIPANT?
You are asked to complete an online questionnaire. The questionnaire will take about 20 minutes to complete point-and-click questions with some opportunities for you to comment, if you wish.

WHAT ARE MY RIGHTS AS A PARTICIPANT?
· You are under no obligation to participate, are free to withdraw at any time without prejudice to pre-existing entitlements.
· Your decision to participate will not affect your academic status/employment.
· You will be given, in a timely manner throughout the course of the research project, information that is relevant to your decision to continue or withdraw from participation.
· You have the right to request the withdrawal of your data from the study. The feasibility of data withdrawal after completion of the online questionnaire is limited, due to the anonymous nature of the online questionnaire.

WHAT ARE THE RISKS AND BENEFITS?

· There is no harm or risks for research participants.
· There is no deception as part of this research.
· There are no direct benefits of participation for those that volunteer. You may volunteer, however, to enter your email into a raffle to **win one of three $25 gift cards to Tim Hortons**. The three winners will be randomly selected. If you are randomly selected to win one of the cards, the researcher will email you with the good news and arrange for delivery of the gift card.
· There may be a benefit to faculties of education and future students, in that results of this research will inform dialogue and decisions about the ethical and pedagogical role of AI in preparing future teachers.

HOW WILL MY CONFIDENTIALITY BE MAINTAINED?

The online questionnaire is anonymous. Only the researcher and a research assistant will see the anonymous data. Results will be shared in aggregated form such that no individual participant can be identified directly or through deduction. Please note that the online survey tool used in the study, SurveyMonkey, is hosted by a server located in the USA. The US Patriot Act permits U.S. law enforcement officials, for the purpose of anti-terrorism investigation, to seek a court order that allows access to the personal records of any person without the person's knowledge. In view of this we cannot absolutely guarantee the full confidentiality and anonymity of your data. With your consent to participate in this study, you acknowledge this.

WHAT WILL MY DATA BE USED FOR?

Your data will be analyzed, and a report of aggregated results will be shared with the Faculty of Education administration. The results will fuel conversations about how to best use AI to improve learning experiences for preservice teachers. A report of results will also be prepared for scholarly publication. Results will be shared at an academic and/or professional conference. Only the researcher and the research assistant will have access to the data.

WHERE WILL MY DATA BE STORED?

Data will be stored for a minimum of 7 years following completion of the project in the principal researchers secured office on her desktop computer, in BL1022C. Survey data will be downloaded and deleted from SurveyMonkey, then stored securely at Lakehead University. The data files and computer each will be password-protected.

HOW CAN I RECEIVE A COPY OF THE RESEARCH RESULTS?

In research reports to the Faculty of Education, scholarly publications, and conference presentations, participants will be not identified directly or indirectly. You may obtain a copy of the research results by emailing the principal researcher, Dr. Christina van Barneveld at cvanbarn@lakeheadu.ca.

WHAT IF I WANT TO WITHDRAW FROM THE STUDY?
If you wish to withdraw from the research, please contact the principal researcher, Dr. Christina van Barneveld via email at cvanbarn@lakehead.ca. Please note that previously collected data on anonymous online questionnaires cannot be withdrawn.

RESEARCHER CONTACT INFORMATION
The principal researcher, Dr. Christina van Barneveld, may be contacted via email at cvanbarn@lakehead.ca NOTE: There is no possibility of commercialization of research findings, and there are no real, potential or perceived conflicts of interest on the part of the researchers, their institutions, or the research sponsor(s).

RESEARCH ETHICS BOARD REVIEW AND APPROVAL
This research study has been reviewed and approved by the Lakehead University Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team, please contact Sue Wright at the Research Ethics Board at 807-343-8010 ext. 8283 or research@lakeheadu.ca.

MY CONSENT:
I agree to the following:

- I have read and understand the information contained in the Information Letter
- I agree to participate
- I understand the risks and benefits to the study
- That I am a volunteer and can withdraw from the study at any time, except after I submit the anonymous online questionnaire, and may choose not to answer any question
- That the data will be securely stored at BL1022C the office of Dr. Christina van Barneveld, for a minimum period of 7 years following completion of the research project
- I understand that the research findings will be made available to me upon request
- I will remain anonymous
- All of my questions have been answered

By consenting to participate, I have not waived any rights to legal recourse in the event of research-related harm.

If you agree to the terms in the information letter above and consent to participate in this research, PLEASE CLICK "NEXT" (below) to move to the survey questions.

Using AI for student assessment

Demographic information

Before we dive into your thoughts on Artificial Intelligence (AI), we would like to gather some demographic information. Your responses will help us better understand the diverse perspectives within our student community. Please be assured that all information provided is anonymous, and the data will be used for research purposes only.

1. What is your age?

- ◯ Under 20
- ◯ 21-24
- ◯ 25-29
- ◯ 30-34
- ◯ 35 and above

2. What is your gender?

- ◯ Male
- ◯ Female
- ◯ Non-binary
- ◯ Prefer to self-describe

3. What is your current program of study in the Teacher Education program?

- ◯ Bachelor of Education, Primary/Junior (2 Years)
- ◯ Bachelor of Education, Intermediate/Senior (2 Years)
- ◯ The Honours Bachelor of Education (Indigenous Teacher Education)
- ◯ The Bachelor of Arts/Bachelor of Education (Indigenous Learning Major)
- ◯ Indigenous Language Teacher Diploma (ILTD)
- ◯ Other (please specify)

4. If you are in the I/S program, what are your teachable subjects?

5. In which year of your 2-year Professional Teacher Education program are you currently enrolled?

- ◯ First year
- ◯ Second year
- ◯ Other (please specify)

6. Which campus are you primarily affiliated with for your Teacher Education program?

- ◯ Thunder Bay
- ◯ Orillia
- ◯ Other (please specify)

7. Are you a first-generation university student (that is, your parents did not attend university)?

- ◯ Yes
- ◯ No
- ◯ Unsure

8. Are you an International Student?

- ◯ Yes
- ◯ No

9. Language Spoken at Home:

- ◯ English
- ◯ Another language

10. Do you self-identify as Indigenous?

- ◯ Yes
- ◯ No
- ◯ Prefer not to say
- ◯ Other (please specify)

11. On average, how many hours per week do you work at a job?

- ◯ None
- ◯ 1-10 hours
- ◯ 11-20 hours
- ◯ 21-30 hours
- ◯ 31-40 hours
- ◯ 41 or more hours

12. Do you have any learning needs that require accommodations or modification for some (or all) of your course work?

- ◯ Yes
- ◯ No
- ◯ Unsure

13. I am an...

- ◯ **Introvert** - An introvert is someone who tends to be more inward-focused, finding fulfillment and energy in solitary activities or in small, close-knit social settings. Introverts often need time alone to recharge after social interactions and may prefer deep one-on-one conversations over large group gatherings.
- ◯ **Extrovert** - An extrovert is characterized by an outward orientation, gaining energy and satisfaction from social interactions and engaging with others. Extroverts often thrive in group settings, enjoy meeting new people, and are generally more outgoing. Unlike introverts, they typically feel energized by socializing.
- ◯ **Ambivert** - An ambivert falls in the middle of the introvert-extrovert spectrum, displaying a mix of introverted and extroverted traits. Ambiverts can adapt their social behaviour depending on the context and may feel comfortable in both social and solitary settings.
- ◯ Unsure

14. When it comes to trying new technology, which of the following statements describes you best?

- ◯ **I'm an innovator.** I love exploring new technologies and am not afraid to take risks. I'm always on the lookout for fresh ideas and solutions. I am open-minded, comfortable with uncertainty, and enjoy experimenting.
- ◯ **I'm an early adopter.** I tend to adopt innovations after innovators but before the majority. People often look to me for opinions on new technologies. I am well-connected, willing to take calculated risks, and a role model for others.
- ◯ **I'm part of the early majority.** I observe experiences of innovators and early adopters before deciding to adopt a new technology. I am pragmatic, deliberate decision-maker who values evidence of success.
- ◯ **I'm in the late majority**. I adopt innovations after the majority, usually with a more cautious approach. I am skeptical, risk-averse, and may adopt technology due to external pressures.
- ◯ **I'm a laggard.** I'm resistant to change and only adopt new technologies when it becomes absolutely necessary. I am a traditionalist, skeptical of new ideas, and tied to established practices.

Using AI for student assessment

Use of AI for assignments

* 15. Have you ever used AI tools to assist in completing your course assignments?

Friendly reminder: This survey is anonymous.

- ◯ Yes
- ◯ No
- ◯ Prefer not to say

Using AI for student assessment

Student use of AI for completing assignments

In this section, we aim to gather insights into your experiences and perspectives regarding the use of Artificial Intelligence (AI) in completing assignments within the Faculty of Education. Your candid responses will contribute valuable information to our understanding of how students perceive and engage with AI tools in the academic context.

16. Which types of **AI tools** have you found **most helpful for completing course assignments**? (Select all that apply)

- [ ] Writing assistants (e.g., editing, grammar, outlines, clarity, exploration of topics)
- [ ] Research tools (e.g., upload and analyze data, identify variables, research design options)
- [ ] Language translation tools (e.g., translating from one language to another)
- [ ] Coding (e.g., using AI to generate or verify coding or prompts)
- [ ] Problem-solving (e.g., concrete or conceptual problem)
- [ ] Presentations (e.g., assist with brainstorming, creating outlines, suggesting information and organization for slide decks, developing speeches and pitches)
- [ ] Argumentation (e.g., generate supporting evidence, suggest counterarguments, assess reasoning flaws, and identify implicit assumptions)
- [ ] Art (e.g., using AI generated artwork for illustrating projects, sparking conversations about art or course topics)
- [ ] Digital media (e.g., create images, video, slideshows, podcasts and voice recording)
- [ ] Professional writing and design (e.g., building resumes or CVs, writing cover letters, practicing interviewing skills, and creating digital portfolios)
- [ ] Studying (e.g., create quizzes with a variety of question types that use to study for exams, create study guides)
- [ ] Perspective taking (e.g., generate information from different perspectives by adding a particular viewpoint or persona into the prompt)
- [ ] Self-assessment (e.g., using AI to generate feedback on your drafts, application of a rubric to your draft course work)
- [ ] Summary tools (e.g., upload text and get a summary)
- [ ] Other

17. How frequently do you use AI tools to assist your completion your course assignments?

- ◯ Always (E.g., 95-100% of my assessment tasks have AI-assistance)
- ◯ Regularly (E.g., 70%-95% of my assessment tasks have AI-assistance)
- ◯ Occasionally (E.g., 30%-70% of my assessment tasks have AI-assistance)
- ◯ Seldom (E.g., less than 30% of my assessment tasks have AI-assistance)
- ◯ Never

Comment

18. How comfortable are you with disclosing the use of AI tools when submitting your course assignments for grading?

- ◯ Very comfortable
- ◯ Comfortable
- ◯ Neutral
- ◯ Uncomfortable
- ◯ Very uncomfortable

Comment

19. How much trust do you place in the accuracy of AI tools when completing your course assignments?

- ◯ Complete trust
- ◯ Moderate trust
- ◯ Neutral
- ◯ Limited trust
- ◯ No trust at all

20. To what extent do you think using AI tools for course assignments is advantageous to you in terms of time management?

- ◯ Very advantageous
- ◯ Moderately advantageous
- ◯ Slightly advantageous
- ◯ Not advantageous at all

21. How likely are you to recommend the use of AI tools for completing course assignments to your peers?

- ◯ Very likely
- ◯ Likely
- ◯ Neutral
- ◯ Unlikely
- ◯ Very unlikely
- ◯ It depends on...

Using AI for student assessment

Impact of AI on your learning

Welcome to the section dedicated to understanding the impact of Artificial Intelligence (AI) on your learning experiences within the Faculty of Education. Please share your thoughts on the broader impact it may have on your overall learning experience.

22. What are **positive** impacts of AI on your learning experience? (check all that apply)

- [ ] Enhanced personalization of learning content
- [ ] Improved access to educational resources
- [ ] Increased efficiency in completing assignments (saves time)
- [ ] Easier access to feedback
- [ ] More timely access to feedback
- [ ] I can get quick answers to my questions (like a tutor on demand)
- [ ] Improved access to exemplars of good work
- [ ] Judgement-free exploration of ideas
- [ ] Helps me be more creative
- [ ] Learning is more fun.
- [ ] Other (please specify)

- [ ] None of the above

23. What are **negative** impacts of AI on your learning experience? (Check all that apply)

- [ ] Decreased human interaction in the learning environment
- [ ] Overreliance on technology for understanding concepts
- [ ] Inhibits ability to independently problem-solve.
- [ ] Concerns about job displacement due to automation
- [ ] Decreased understanding of the topic
- [ ] It hinders creativity
- [ ] Perpetuation of biases, racism, sexism, and other negative ideas
- [ ] Limits my imagination
- [ ] Other (please specify)

- [ ] None of the above

24. How do you perceive the emotional support provided by AI in the assignment process compared to the support you receive from human interaction?

- ◯ Equal emotional support
- ◯ AI provides better emotional support
- ◯ Human interaction provides better emotional support
- ◯ I don't know

Comment

25. Do you consider interaction with AI as social interaction?

- ◯ Yes
- ◯ No
- ◯ Other (please specify)

26. Considering both positive and negative aspects, how would you currently describe your overall perception of AI's impact on your learning?

- ◯ Positive
- ◯ Neutral
- ◯ Negative
- ◯ It's too early to tell
- ◯ Not sure

Using AI for student assessment

Your opinions about your instructors using AI to assess your work

In this section, we seek to understand your opinions regarding the use of Artificial Intelligence (AI) by instructors to assess your work within the Faculty of Education. Please share your insights on the potential benefits or concerns you may have.

27. To your knowledge, have you ever received feedback on your course assignments that were generated by AI rather than your instructor?

- ◯ Yes
- ◯ No

If yes, please give an example.

28. If yes, how would you rate the quality and effectiveness of AI-generated feedback compared to feedback provided by human instructors?

- ◯ Feedback from **AI is superior** to feedback from human instructors
- ◯ They are **comparable**
- ◯ Feedback from **AI is inferior** to feedback from human instructors
- ◯ Not applicable, I have not experienced both.

Comment

29. How comfortable are you with the idea of your instructors using AI to generate feedback on your course assignments?

- ◯ Very comfortable
- ◯ Comfortable
- ◯ Neutral
- ◯ Uncomfortable
- ◯ Very uncomfortable
- ◯ It depends (please comment below)

30. To what extent do you believe AI-generated feedback could contribute to your understanding of your strengths and areas for improvement?

- ◯ Significantly
- ◯ Moderately
- ◯ Slightly
- ◯ Not at all

31. Would you prefer receiving feedback on your course assignments from AI or from human instructors?

- ◯ AI
- ◯ Human instructors
- ◯ It depends.
- ◯ No preference

Please elaborate on your choice

32. If AI tools provided positive reinforcement for well-performed assignments (e.g., "Great assignment, keep up the good work"), how would you feel about this form of encouragement as a student?

- ◯ Motivated
- ◯ Indifferent (I don't care)
- ◯ Ambivalent (mixed feelings)
- ◯ Uncomfortable
- ◯ I'm unsure

33. As a student, would you rather...

- ◯ Have your assignments graded by AI with the potential for quicker feedback but with a chance of occasional errors, OR
- ◯ Stick to traditional human grading, ensuring a more personalized evaluation but with a longer turnaround time?

34. How important is it for you to know whether your feedback and grades are generated by AI or by human instructors?

- ◯ Very important
- ◯ Important
- ◯ Neutral
- ◯ Not important
- ◯ Not important at all

Why?

35. What is your opinion on the use of AI in grading assignments? Check all that apply

- [ ] It enhances fairness since everyone is treated the same.
- [ ] It decreases fairness since everyone is treated the same.
- [ ] It is more accurate than human grading of assignments
- [ ] It is less accurate than human grading of assignments
- [ ] I'm ok with it
- [ ] I'm not keen on it
- [ ] Other (please specify)

36. How much would you trust the accuracy of grades generated by AI for...?

	No trust at all	Limited trust	Neutral	Moderate trust	Complete trust
Grading multiple choice test items	○	○	○	○	○
Grading essays	○	○	○	○	○
Grading lesson plans, unit plans	○	○	○	○	○
Grading your reflections	○	○	○	○	○
Grading artwork	○	○	○	○	○
Grading your classroom management strategies	○	○	○	○	○
Grading your knowledge of the Ontario curriculum	○	○	○	○	○
Grading short answer test items	○	○	○	○	○

It depends on...

37. In your view, does the use of AI in assessing assignments enhance or hinder the relationship between professors and students?

- ○ Enhances
- ○ Has no significant impact
- ○ Hinders
- ○ I'm unsure

Comment

Using AI for student assessment

Ethics of using AI for student assessment

In this section, we ask about your perspectives on the ethical considerations surrounding the use of Artificial Intelligence (AI) for student assessment within the Faculty of Education. Your insights on the ethical implications are important. Please take a moment to consider the ethical aspects of using AI for student assessment and share your thoughts on the potential benefits, challenges, and considerations related to maintaining ethical standards in this context.

38. In your opinion, what ethical considerations should be prioritized when **instructors** use AI for student assessment? Rank every item on the list, give "1" for the highest priority, "2" is second highest, ... and "5" is the lowest priority. Be sure to rank all the items.

- ☐ Transparency in AI usage
- ☐ Fairness and equity in assessment
- ☐ Mitigation of biases in AI algorithms
- ☐ Ensuring student privacy
- ☐ Academic integrity (e.g., plagiarism, cheating)

39. In your opinion, what ethical considerations should be prioritized when **students** use AI-assistance for their assignments? Rank every item on the list giving "1" to the highest priority, "2" is second highest, etc.

- ☐ Transparency in AI usage
- ☐ Fairness and equity in assessment
- ☐ Mitigation of biases in AI algorithms
- ☐ Ensuring student privacy
- ☐ Academic integrity (e.g., plagiarism, cheating)

40. In your opinion, should educational institutions provide guidelines on the ethical use of AI tools for completing course assessments?

- ◯ Yes
- ◯ No
- ◯ Not sure

Comment

41. Do you have other thoughts of the ethics of using AI for student assessment?

Using AI for student assessment

Thank you

Two last questions....

Would you like to enter a raffle to win one of three $25 gift cards to Tim Hortons? If yes click HERE and enter your email. The three winners will be randomly selected. If you are randomly selected to win one of the cards, the researcher will email you with the good news and arrange for delivery of the gift card.

Would you like to participate in a 30 minute ZOOM interview on AI? If yes click HERE to get more information about the interview.

PLEASE NOTE THAT THE RAFFLE AND THE INTERVIEW ARE FOUND AT THE SAME LINK, SO YOU WON'T MISS OUT ON ONE OR THE OTHER. :)

Appendix B: AI Survey Poster