# Effects of an Online Faculty Educational Module on Instructor Knowledge and Confidence in Using Artificial Intelligence

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*Original Research Papers** are papers that report on original empirical research with a focus on teaching and learning. Papers may be qualitative or quantitative and include an Abstract, Introduction, Method, Results, Discussion, and Reference section, as well as any tables and/or figures.

**Abstract**
This study examined whether a generative artificial intelligence (genAI) training module improved instructor knowledge and confidence in integrating genAI into teaching among higher education instructors in a large Canadian polytechnic institution. Using a quantitative design, two surveys measured changes pre- and post-module among instructors ($n = 55$; follow-up $n = 20$). Independent samples t-tests revealed significant gaps in nine knowledge items and six confidence items, with five paired items showing concurrent improvement. Notably, enhancements were strongest in areas such as citation practices, prompt engineering, and assignment design. While knowledge generally increased, confidence gains were less consistent, particularly for complex ethical topics. Findings suggest targeted training might advance higher education instructors' AI literacy and readiness for responsible AI integration. However, further research is needed to explore confidence gaps and sustain instructor engagement with AI.

## Introduction

Generative artificial intelligence (genAI) applications, such as ChatGPT, introduced in November 2022, have intensified discourse and activity across various sectors, including higher education (HE). Although artificial intelligence (AI) itself is not new, the emergence of genAI, a subfield of AI, has further catalyzed interest and debate. With an estimated 100 million+ users just 2 months after ChatGPT's launch, there is no doubt that such applications are here to stay and are sure to affect teaching and learning (Currie, 2023). As a result, the education landscape is undergoing a transformative shift as we reengineer both pedagogy and learning experiences.

## Generative Artificial Intelligence

GenAI is a subset of artificial intelligence (AI) that uses algorithms to produce content in response to prompts, leverages large language models, and offers opportunities to improve educational services (Shah, 2023). The algorithms process data to identify patterns, make predictions, and generate responses that have proven invaluable in personalizing learning, augmenting teaching strategies, and streamlining educational processes. This technology works rapidly and adapts to many educational forums. It

is heralded for its effectiveness and its potential to improve overall accessibility to learning for many (Baidoo-Anu & Owusu Ansah, 2023; Chan & Hu, 2023; Shah, 2023).

## Generative Artificial Intelligence and Academic Integrity

While genAI presents numerous beneficial opportunities, it simultaneously introduces significant challenges, particularly concerning academic integrity. These challenges reinforce the necessity for AI literacy and the ethical implications of genAI use. Incorporating genAI into educational practices then requires a comprehensive re-evaluation of existing curriculum frameworks, pedagogical methodologies, and assessment standards. Instructors are now tasked with integrating genAI to enhance student learning and adequately prepare them for future careers that may demand proficiency in navigating various evolving applications. In fact, those working in the educational sector have been criticized for falling behind in their readiness to implement AI effectively (Celik et al., 2022).

## Background

Instructors play a crucial role in enhancing student learning (Shah, 2023) and fostering AI literacy development, underscoring the necessity for adept integration of AI in educational practices (Ritchie, 2016; Southworth et al., 2023). Knowledge and confidence in the use of genAI applications are two pivotal factors that will enable instructors to realize and optimize their roles. These factors can be contextualized through the concept of self-efficacy as described by Bandura's Theory of Motivation (1977). Bandura's Theory of Motivation outlines the concept of self-efficacy as an individual's belief in their ability to perform behaviours focused on a desired or specific outcome. Bandura proposes that such beliefs, which are influenced by knowledge, positively influence confidence. Self-efficacy influences whether individuals initiate coping behaviours, how much effort they invest, and how long they persist in the face of challenges. Self-efficacy is not about the actual skill but rather the belief in one's capacity to perform a task successfully.

Promoting the adoption of these technologies among instructors is a multifaceted challenge, potentially influenced by targeted educational initiatives and continuous technological support. The United Nations Educational, Scientific, and Cultural Organization's (UNESCO, 2024) AI competency frameworks emphasize a human-centred mindset advocating that educators teach responsible and safe use of

AI applications within teaching-learning experiences. AI must be leveraged to bridge, not widen, the digital divide to ensure equitable access to knowledge, research and diverse cultural expressions (UNESCO, 2024). Educators must remain central not only as facilitators of learning but as ethical stewards guiding students through the complexities of AI use. AI can enhance efficiency and personalization, but it cannot replicate the human capacity for empathy, mentorship, and moral reasoning. A balanced, informed approach that embraces technological innovation while safeguarding irreplaceable human elements of learning is essential.

Despite reputable frameworks that outline core competencies for the use of AI in education, there remains little comprehensive regulatory control over AI in education at the federal level of government. The Artificial Intelligence and Data Act (AIDA) is Canada's first proposed legislation that identifies education as a high-impact sector, yet does not include specific provisions tailored to the unique risks AI poses in both K-12 and HE settings. This gap is concerning given the rapid integration of AI into classrooms and the inconsistent development of provincial policies. British Columbia, Québec, and Ontario have taken some initial steps to guide ethical AI use and consider student data privacy, algorithmic bias, and the erosion of learner agency within educational settings (Canadian Teachers Federation, 2023). In fact, Québec has just released two reference documents that will direct the integration of AI within HE (Québec Government, 2025a, 2025b). At the federal level, the Canadian government recently announced its intent to launch an AI task force that will include public engagement and work to establish an AI strategy across a number of sectors, including education (Innovation, Science and Economic Development Canada, 2025).

Institution leaders are responsible for effectively managing and integrating technological support by ensuring improved, readily available access to relevant applications and expertise (Mah & Grob, 2024), while the enhancement of instructors' knowledge and confidence in using these technologies requires thorough examination and strategic prioritization. Investigating instructors' genAI-related knowledge and their confidence in using this technology can provide valuable insights into how best to support their effective engagement with these tools. Understanding the determinants of instructors' knowledge and confidence is essential, given their significant impact on student learning

and preparation for a future in which genAI literacy and use are as fundamental as traditional academic skills (Shah, 2023). The relationships between knowledge and confidence are important to examine as they are believed to influence actions that could determine instructors' interests and abilities to successfully use genAI applications in their teaching practices (Stringer Lucero & Chen, 2020).

An introductory online instructor module focused on the use of genAI in teaching was developed at a Canadian urban polytechnic institution through specialized funding. A research project associated with the module aimed to investigate instructors' reported confidence and knowledge related to genAI before and after completing the module. The belief that these two factors would positively influence instructors' intentions to adopt genAI was the compelling driver for this work. This article discusses the research findings from this initiative. The term *instructor* is used throughout this article to describe individuals who undertake teaching responsibilities in higher education (HE) and may hold titles such as instructor, educator, professor, faculty, or teacher.

## Literature Review

This research is situated within the body of work that seeks to understand the role of genAI in academia, particularly in activities associated with teaching and learning. Much has been written about how genAI can assist instructors by reducing workloads related to assessment, planning, and curriculum development (Chan & Zary, 2019; Swiecki et al., 2022). To date, research has predominantly focused on the impact of genAI on students in HE, with comparatively less attention given to its effects on instructors (Johnston et al., 2024; Teng et al., 2022; Almaraz-Lopez et al., 2023; Weidener & Fischer, 2023). This study aims to address this gap by examining the impact of an online educational module on the knowledge and confidence of instructors within the Canadian polytechnic system. An asynchronous online module for instructors was chosen for development due to its increasing recognition as an effective method for reaching time-constrained instructors (Rizzuto, 2017).

Previous research has investigated the factors influencing individuals' acceptance and integration of technology into their practices and daily lives, employing frameworks such as the Technology Acceptance Model (TAM; Davis, 1986) and its subsequent iterations (Venkatesh & Bala, 2008). The TAM model provides a foundational framework for understanding how users come to accept and use new technologies. The TAM has been pivotal in identifying self-efficacy as a critical factor affecting technological acceptance (Venkatesh & Bala, 2008). Along with self-efficacy, the TAM model proposes that perceived usefulness and perceived ease of use will determine a user's attitude toward technology and ultimately their behavioural intention and actual usage (Davis, 1989). Self-efficacy, initially described by Bandura through the Theory of Motivation in 1977, refers to individuals' beliefs in their ability to control their behaviours and specific outcomes (Bandura, 2012). These beliefs relate to their self-efficacy in completing tasks, such as integrating genAI into their teaching practices. It is believed that self-efficacy directly influences behavioural actions and confidence in accomplishing desired tasks, and that it is influenced by an individual's knowledge (Bandura, 2012). Confidence is a socio-cognitive process that requires a social environment where learners benefit from positive social feedback, as well as engaging with the opinions and beliefs of other learners (Nair et al., 2021). Research focused on developing teachers' confidence has shown that self-efficacy is a key variable in the adoption of new technologies in teaching (Ertmer & Ottenbreit-Leftwich, 2010). Ertmer and Ottenbreit-Leftwich (2010) argue that allowing time to play with new technology, focusing new technology uses to teachers' needs, starting with small successful experiences, working with knowledgeable peers, accessing suitable technological models, participating in learning communities, accessing professional development programs, and providing time to make adequate changes to practice are essential in establishing instructors' confidence.

Barriers to the adoption of genAI technology may be linked to instructors' negative self-efficacy, which can be impacted by a lack of specific AI education (AI illiteracy), insufficient support in adopting the technology, and misconceptions about genAI (Ahmed et al., 2022; Mays et al., 2021; Velander et al., 2023). Recognizing knowledge and confidence as important factors related to the development of self-efficacy, a survey instrument was developed and deployed within the module. Instructors were asked to complete the survey before starting the module and again several weeks after its completion to re-measure their knowledge and confidence.

The successful integration of AI into teaching practices hinges on the interconnected development of knowledge, confidence, and self-efficacy among instructors. Foundational AI knowledge, encompassing technical, pedagogical, and

ethical dimensions, is essential for building competence and reducing apprehension toward technology (Chiu et al., 2024). As instructors acquire this knowledge, their confidence in navigating AI tools increases, which positively influences their self-efficacy or belief in their ability to implement AI (Liu, 2025). Filiz et al. (2025) found that gaps in knowledge and confidence can hinder instructors' readiness to adopt AI in the HE sector. Collectively, these findings affirm the need for professional development that addresses all three dimensions of knowledge, confidence, and self-efficacy to empower instructors in using AI confidently and effectively.

## Artificial Intelligence in Canadian Higher Education

Higher Education (HE) is increasingly recognized as a pivotal setting for supporting student education and development during a time of tremendous change (Ancion et al., 2024). Integrating technologies like genAI has the potential to level the playing field in HE through the reduction of existing educational barriers. In one Canadian study ($n$ = 500), students shared their beliefs that their ability to understand new information improved because of genAI (Ancion et al., 2024). Canadian scholars have explored AI utilization and considered various aspects of its use in HE. Research exploring how to navigate and detect its use, as well as strategies to modernize pedagogical approaches to incorporate and optimize AI's benefits, have been topics of focus (Dahal & Sharma, 2023; Kumar, 2024; Veletsianos, 2023; Sarkar & Kumar, 2024; McConvey & Guha, 2024). These contributions to the field are important and underscore the significance of incorporating Canadian perspectives into this global discussion.

## The Online Module

The online instructor module was one of nine funded proposals that met the criteria for institutional projects focused on empowering instructors' ways of teaching and learning at Humber Polytechnic. The development of the online module, *Introduction to Generative Artificial Intelligence (genAI) for Instructors*, was the result of collaborative efforts from a diverse group of instructors, staff, and leaders across multiple academic and support units. Contributors included representatives from Humber Polytechnic. The content was designed by an interdisciplinary team encompassing librarians, associate deans, instructional media designers, instructors, and a tutor. This collective expertise facilitated the development of a comprehensive and multifaceted

approach to genAI education, specifically tailored to the needs of individuals who self-identified as beginners in genAI use. The module covered the following topics:

- An overview of the history of artificial intelligence (AI)
- Background on genAI's role in writing
- An introduction to prompt creation and usage
- Effective communication with students regarding genAI
- Academic integrity and ethical considerations in genAI usage
- Instructor insights and additional resources.

The self-paced module was initially made accessible to all instructors via a link shared through an institutional newsletter, as well as an invitational email sent to senior deans for further distribution among instructors. Ranieri et al. (2018) suggest such approaches to educational modules are successful because they allow learners to progress at their own pace. Since the module was intended for instructors who considered themselves at a beginner level in working with AI, it was created considering Knowles' andragogy (Knowles et al., 2014). Knowles posited that adult learners are self-directed, bring personal experience to their learning, bring a readiness to their learning with an orientation for application and problem-solving, and are motivated intrinsically by the relevance and applicability of content to real-world problems—in this case, the need to increase their knowledge and experience with AI in their educational practices (Knowles et al., 2014). The module was designed to prioritize learner motivation with relevant, current material about the opportunities and limitations of AI use and recognized the need for an iterative approach to content that could be foreign and intimidating to instructors. Efforts were made throughout the module to scaffold concepts and provide guided exploration of content so that the learner's emotional and cognitive needs were addressed and, in turn, leveraged their engagement and skill acquisition in a positive manner. The module was designed in a learner-centred way that allowed users to review and renew their knowledge. There were no tests involved, but rather knowledge check-ins that permitted learners to consider the content they were working with and its application to their teaching practices. This positive, non-threatening approach was a deliberate effort by the creators, as we considered the recent challenges instructors faced during the pandemic and the need for a dramatic pivot to online teaching. The continued and deep impressions and feelings left from those challenges continue to linger and intensified

instructor reactions to working with AI and the reality that this too was a change that was imminent and inevitable.

## Method

A quantitative research design was used to explore the two research questions.

### Research Questions

1. Does the completion of a generative AI training module positively impact instructors' knowledge of generative artificial intelligence?
2. Does the completion of a generative AI training module positively impact instructors' confidence to work with generative artificial intelligence in their teaching practices?

### Surveys

Two surveys were conducted via Qualtrics. The initial 32-item survey encompassed demographics (6), personal experience and usage of generative AI (4), knowledge (11), and confidence (11) items. The follow-up survey repeated the questions exploring genAI experience, knowledge, and confidence. Instructors completed the first survey prior to starting the module and the second survey at least two weeks postmodule completion. Respondents were asked to rate their knowledge and confidence using a 5-point Likert scale. Respondents were given the choice of rating their knowledge and confidence from 1 (*strongly disagree*) to 5 (*strongly agree*).

The project received approval from Humber Polytechnic's Research Ethics Board . Instructors were briefed on the research at the module's outset, and their participation was both voluntary and confidential. The survey was kept open for six months, from January 2024 to June 2024, to accommodate instructor schedules and encourage their participation. Instructors who opted out of the study were still permitted to complete the module. Data analysis used SPSS version 29.0.2.0, employing frequencies, descriptive, and inferential statistics.

### Module Completion

The module was intentionally designed without a prescribed time parameter for completion. This flexible approach reflects principles of self-directed learning, allowing participants to navigate the content at their own pace and prioritize topics of greatest personal relevance within the module menu. Such autonomy supports learner engagement and accommodates diverse learning needs, as participants can decide how much to time spend on the content that they believe will be most beneficial to their learning. This design aligns with adult learning theory, which emphasizes learner control and individualized pacing as critical components for meaningful knowledge acquisition (Knowles et al., 2015).

### Sample

A convenience sample of instructors proficient in reading, speaking, and writing English was obtained. Fifty-five instructors completed the initial survey, while 20 completed the follow-up survey. Instructors were informed about the study at the beginning of the module and received a reminder email to complete the second survey two weeks later. Despite the anonymity of participation and reminder emails, the response rate for the second survey was disappointingly low. This low response rate could be attributed to several factors, including instructor fatigue with the topic. Nevertheless, the findings remain valuable, as the analysis revealed interesting data that could inform future research and practice.

## Results

Instructors from six different faculties participated in the pre-survey (*N* = 55), with the highest numbers reporting from the faculties of Business (18.2%), Liberal Arts & Science (16.4%), Media & Creative Arts (16.4%), and Health Sciences (14.5%). Most respondents reported working full-time (40%), followed by part-time (32.7%) and sessional (9.1%). The majority had worked at the institution for over six years (54.5%), while almost 31% had been there between one and five years, and only 9.1% for under one year. Over 50% reported working predominantly in the classroom with hybrid (12.7%), online (7.3%), and work-integrated learning (7.3%) accounting for other teaching locations. The majority of respondents were women (49.1%) compared to men (43.6%). Most were over 51 years of age (67.3%), with just over 16% between the ages of 41-50 years, and 9% between the ages of 31-40 years. Less than half of the respondents (40%) reported using genAI in the classroom on the first survey with 65.5% reporting that they would be likely or very likely to use it in the future. Independent samples t-tests were conducted to evaluate the effectiveness of the intervention (educational module) across all knowledge (11 items) and confidence (11 items) (see Table 1). Each item on the knowledge scale was matched so that it was comparable to a corresponding item on the confidence scale. The matches between the two scales, therefore, permitted analysis of whether knowledge corresponded with confidence on each

specific item. This offered valuable insights into the interplay between knowledge and confidence. The results of the t-tests identify the specific components of the intervention that had the capacity to simultaneously increase participants' reported knowledge and confidence.

Nine knowledge items showed significant change in the positive direction, indicating that participants reported higher knowledge levels after completing the module. Similarly, six of the confidence items also increased, indicating that participants felt more confident about specific items after completing the intervention. It is important to note that five items on the knowledge scale that demonstrated significant results corresponded to their partner items on the confidence scale. This indicates that while the educational module effectively enhanced knowledge on some items, it did not always translate to increased instructor reports on confidence on others (Table 2).

Instructors reported that knowledge and confidence improved with their efforts to teach how to use genAI as a research tool; citation responsibilities when using genAI in academic work; effective prompt engineering techniques; potential copyright issues when using genAI; and effective ways to create clear critical paths and assignment statements to guide acceptable use of genAI in student work. It is interesting to note that the item measuring respondents' knowledge of genAI and its functionality did not report significance. However, the increase in the mean score for reported knowledge on this item pre-module versus post-module did increase, suggesting that participants did feel their knowledge improved. Additionally, the standard deviations between the pre- and post-module on the same item decreased, suggesting that knowledge levels were more uniform with less variability in respondents' responses.

Other discrepancies between knowledge and confidence were noted in the items that measured how to talk with students

**Table 1a. Survey results on "Knowledge. I have an acceptable level of knowledge about the following:"**

| Survey Item | Pre-Module (Mean, Standard Deviations) | Post Module (Mean, Standard Deviations) | P value |
|---|---|---|---|
| GenAI functionality | M=3.17 SD=1.29 | M=3.55 SD=.99 | p=0.245 |
| Talk genAI use | M=3.09 SD=1.23 | M=4.00 SD=.73 | p<0.001* |
| Benefits/risks using genAI in teaching | M=3.26 SD=1.26 | M=3.95 SD=.826 | p<0.010* |
| Teach critical thinking with genAI use | M=3.13 SD=1.08 | M=3.55 SD=.88 | p>0.127 |
| Teach ethical writing practices using genAI | M=3.09 SD=1.20 | M=3.85 SD=.88 | p<0.005* |
| Teach research practices using genAI | M=2.70 SD=1.16 | M=3.80 SD=.62 | p<0.001* |
| Teach students genAI citation | M=2.72 SD=1.31 | M=3.65 SD=.99 | p<0.003* |
| Teach copyright and use of genAI | M=2.83 SD=1.24 | M=3.70 SD=.98 | p<.007* |
| Teach academic integrity/ethical use of genAI | M=3.13 SD=1.33 | M=3.85 SD=.93 | p<0.014* |
| Teach prompt engineering | M=2.51 SD=1.16 | M=3.50 SD=1.15 | p<0.002* |
| Create critical path/assignment statement genAI use | M=2.72 SD=1.26 | M=3.35 SD=.99 | p<0.05* |

*indicates statistical significance of >.05

**Table 1b. Survey results on "Confidence. I am confident in applying my skills to the following:"**

| Survey Item | Pre-Module (Mean, Standard Deviations) | Post Module (Mean, Standard Deviations) | P value |
|---|---|---|---|
| GenAI functionality | M=2.89 SD=1.27 | M=3.60 SD=0.94 | p=0.015* |
| Talk genAI use | M=2.96 SD=1.25 | M=3.50 SD=0.95 | p=0.086 |
| Benefits/risks using genAI in teaching | M=2.80 SD=1.28 | M=3.40 SD=0.99 | p=0.068 |
| Teach critical thinking with genAI use | M=2.93 SD=1.24 | M=3.50 SD=.95 | p=0.073 |
| Teach ethical writing practices using genAI | M=2.93 SD=1.24 | M=3.50 SD=1.00 | p=0.076 |
| Teach research practices using genAI | M=2.76 SD=1.27 | M=3.45 SD=.95 | p=0.033* |
| Teach students genAI citation | M=2.70 SD=1.38 | M=3.40 SD=1.05 | p=0.046* |
| Teach copyright and use of genAI | M=2.72 SD=1.28 | M=3.45 SD=1.15 | p=0.031* |
| Teach academic integrity/ethical use of genAI | M=3.11 SD=1.42 | M=3.60 SD=.94 | p=0.103 |
| Teach prompt engineering | M=2.46 SD=1.1 | M=3.60 SD=.94 | p<0.001* |
| Create critical path/assignment statement genAI use | M=2.67 SD=1.19 | M=3.50 SD=1.00 | p=0.009* |

*indicates statistical significance of >.05

**Table 2 Corresponding Statistically Significant Findings Knowledge | Confidence Pre & Post Module**

| Survey Item | Knowledge P value | Confidence P value |
|---|---|---|
| How to teach research practices when using genAI | p<0.001 | p=0.033 |
| How to teach students the correct way to cite genAI | p<0.003 | p=0.046 |
| How to teach copyright with the use of genAI | p<.007 | p=0.046 |
| How to teach prompt engineering | p<0.002 | p<0.001 |
| How to create a critical path/ assignment statement about the use of genAI | p<0.053 | p=0.009 |

about the use of genAI, benefits and risks to using genAI, how to teach ethical writing practices when using genAI, and how to teach academic integrity as it relates to genAI. Instructors' knowledge reported higher, positive, and significant changes, but no statistical results were noted with the related confidence items.

## Limitations

This study has several limitations that should be considered when interpreting the findings. A notable limitation of this study is the reduction in sample size from the initial survey ($N = 55$) to the follow-up ($n = 20$). This attrition constrains the statistical power of the analyses, increasing the likelihood of Type II errors, reducing the confidence in detecting true

effects (Cao et al., 2024). Small sample sizes also limit the precision of estimates and compromise the generalizability of findings to the broader population (Andrade, 2020). Second, the potential for non-response bias must be acknowledged, as individuals who completed the follow-up may differ systematically from those who did not, possibly being more engaged or having more favourable perceptions, introducing bias into the results (Moore & Durrant, 2025). The data collection also relied on a self-reported survey, which can be subject to response bias and may not fully capture participants' experiences or behaviours. Third, participation was limited to individuals who could read, write, and speak English. Fourth, while flexibility was provided through the self-directed approach to content consumption to enhance and support a personalized approach to learning, this does introduce variability in exposure to content, which should be considered when interpreting outcomes. As well, participants were required to complete the module on their own time, and the module itself demanded a commitment of time, cognitive effort, and interaction, which may have influenced full engagement and completion rates.

## Discussion

Knowledge and confidence are the two factors explored in this study. Existing research on professional learning shows that knowledge acquisition and confidence are related but distinct constructs (Gesel et al., 2021; Oakes et al., 2020). While educators may report increased knowledge of concepts after training, confidence requires more than cognitive familiarity as it depends on perceived ability to apply that knowledge effectively in different contexts (Bandura, 1977). Knowing what to do does not guarantee feeling capable of doing it. The observed discrepancy between knowledge and confidence items in the analysis can be understood through the lens of self-efficacy. Findings from other studies demonstrate that individuals with high self-efficacy are more likely to engage in challenging tasks, persist in the face of adversity, and achieve higher performance levels of desired tasks and outcomes (Lopez-Garrido, 2025). Again, the interpretation of findings should be approached with caution, as the low response may limit representativeness and increase the risk of bias.

### Survey Items with no Significance between Knowledge and Confidence

In the current study, four items showed a positive and significant increase in instructors' knowledge without a corresponding rise in their confidence (how to discuss the use of genAI with students; the benefits and risks associated with using genAI; teaching ethical writing practices when using genAI; teaching academic integrity in relation to genAI). These findings align with other studies that have explored undergraduate experiences, indicating that formative feedback and instructor-student interactions play a more crucial role in enhancing confidence compared to knowledge (Goodson et al., 2015). Similarly, high school teachers reported high levels of knowledge regarding media literacy but did not necessarily exhibit high confidence in integrating it into their teaching practices (McNelly & Harvey, 2021). It is therefore important to consider knowledge, confidence, and the other components Bandura highlighted when considering how to support instructors' adoption of genAI into teaching practices. The current study affirmed that cultivating instructor knowledge positively affected their confidence with some aspects of genAI, so it is important to include education as a feature in supporting instructors forward.

Several contextual and pedagogical factors may have contributed to the lack of alignment between increased reported knowledge and confidence across these items. The complexity, novelty, and ubiquity of genAI are reflected in the items that did not show increases with knowledge and confidence. The reality that AI continues to evolve rapidly and remains largely unregulated may affect educator confidence. Educators may understand theoretical principles but still feel uncertain about implementation because institutional policies, detection tools, and best practices remain unsettled and vague (Deep et al., 2025; Miron & Facciolo, 2025; UNESCO, 2024).

Teaching about AI ethics and academic integrity carries reputational and compliance risks. Educators may hesitate to act confidently because missteps could lead to student misconduct or instructional scrutiny. This perceived risk may amplify the gap between knowledge and confidence (UNESCO, 2024). Ethical frameworks for AI in education are still emerging and are subject to much debate (Liu & Bates, 2025; Peters, 2025). Ambiguity lingers around what constitutes responsible use or ethical writing, which creates cognitive dissonance. Educators may know guidelines at their institutions but lack certainty about their durability or enforcement, which, in turn, affects their confidence (Nguyen, 2025). In essence, the newness of the technology and the uncertainty of the path ahead may contribute to educators not expressing confidence on some of the items in the study.

Professional development, vis-à-vis this faculty module, often emphasizes conceptual knowledge but provides limited opportunities for applied practice. While reflection pauses were incorporated throughout the module, the opportunity for educators to engage differently with discipline specific scenarios, role-play, or guided application should be considered over passive learning (Oakes et al., 2018). These safe spaces and opportunities for practice could support instructors in their teaching and AI-focused interventions and efforts.

## Survey Items with Statistical Significance Knowledge and Confidence

The present study demonstrated that the online module effectively enhanced instructors' knowledge regarding specific aspects of genAI. Notably, three of the five items (teaching citation, prompt engineering, and creating critical path/assignment statements) showed significant correlations and improvements in both knowledge and confidence and could be attributed to the content that provided examples from practice for instructors. Interestingly, the content addressing more complex issues, such as the ethical use of genAI and copyright, also appeared to meet instructors' needs, resulting in significant positive changes in both knowledge and confidence (see Tables 1 and 2).

Self-efficacy may play a crucial role in how instructors approach the adoption of genAI in their teaching practices. Knowledge and confidence affect self-efficacy. Bandura (1977) also outlines several different components that affect self-efficacy, including mastery experiences, vicarious experiences, verbal persuasion, and physiological and emotional states. Mastery describes hands-on practice or real-world application, for example, the opportunity to use genAI in learning settings Additionally, vicarious experiences include instructors seeing others being successful and receiving positive feedback for their work. Learning more about other instructors' positive experiences with genAI use in their teaching practices is one example of vicarious feedback. Physiological and emotional components, such as anxiety or stress, may also affect the adoption of genAI to teaching practices. This consideration is particularly compelling given that genAI has been described as a disruptive technology. Its sudden introduction and rapidly evolving capabilities have created significant upheaval in the educational landscape following a period of sudden change post-pandemic.

It is possible that the positive changes observed in the more complex issues in the survey were influenced by a stronger sense of self-efficacy in some of the educators. Other studies continue to support the notion about the positive influences these components have on self-efficacy. Lopez-Garrido (2025) emphasizes that mastery experiences are the most influential source of efficacy information, as they provide authentic evidence of a person's capabilities. Moore et al. (2024) note that vicarious experiences, such as observing others succeed, can significantly and positively influence self-efficacy. These effects have been verified and demonstrated across a variety of other populations, as evidenced by Buchanan et al. (2022). Ritchie (2016) noted that confidence is a socio-cognitive process that requires a social environment where learners benefit from positive social feedback and engage with the opinions and beliefs of other learners. Creating social environments within educational institutions that are focused on the implementation and use of AI in education and remain current and active is, therefore, a worthy endeavour. Such environments will provide instructors with opportunities to continue to build their knowledge and mastery of genAI applications that are sure to continue to evolve at a rapid rate.

## Recommendations

Educational efforts that offer important and concrete information to increase knowledge with instructors are core to increasing instructors' confidence in working with genAI. How these educational offerings are implemented could support the creation of a community of learning for instructors. For example, discipline-specific educational modules would provide content that is transferable for instructors. Educational modules that culminate in certification, like micro-credentialling, could also provide a vicarious experience to instructors. Bandura (2012) noted that verbal persuasion and positive feedback improve self-efficacy, so initiatives like regular meetings through communities of practice, blog postings specific to artificial intelligence use by instructors, newsletters with updates and links to resources from demonstrated practices, and other forms of media like podcasts that focus on genAI content spotlighting practices from colleagues, could feature such feedback and persuasion. Future initiatives should provide instructors with opportunities for mentorship by genAI experts, easy access to just-in-time genAI expert advice, and chances to practice and receive feedback on their efforts when working with genAI applications. These opportunities would strengthen

the social-cognitive process associated with instructor self-efficacy (Nair et al., 2021). Additionally, they would build the social learning environment that will connect knowledge with confidence, such that students benefit from the use of new technologies such as generative artificial intelligence.

## Conclusion

The study sought to answer two primary research questions: (1) Does the completion of a genAI training module positively impact instructors' knowledge of genAI? And (2) Does the completion of a genAI training module positively impact instructors' confidence to work with genAI in their teaching practices? It was believed that participation in the training module would lead to measurable improvements in both knowledge and confidence.

The findings support, in part, the notion that both knowledge and confidence would improve with instructors after they completed the module. Results from independent samples t-tests revealed significant positive changes in nine knowledge items and six confidence items following the educational intervention. Importantly, five knowledge items corresponded with their paired confidence items, suggesting that increased knowledge in certain areas translated into greater confidence. Instructors reported notable improvements in understanding how to use genAI as a research tool, apply effective prompt engineering techniques, address citation responsibilities, navigate copyright issues, and create clear assignment guidelines for acceptable use. However, some discrepancies emerged: while knowledge improved significantly on topics such as ethical writing practices and academic integrity, confidence did not show corresponding gains. This indicates that knowledge acquisition does not always equate to confidence in application.

The study contributes to the growing research and literature on instructor development and genAI integration in HE by demonstrating that targeted training can enhance both knowledge and confidence, albeit unevenly across different competencies. These findings underscore the importance of designing interventions that not only inform but also build practical confidence for implementation.

Several limitations should be acknowledged. The sample size was small and drawn from a single institution, which may limit generalizability. Self-reported measures of knowledge and confidence could introduce response bias. Additionally,

the short-term nature of the study does not capture whether improvements persist over time or translate into actual classroom practices.

Future research should explore longitudinal impacts of genAI training, examine strategies to bridge the gap between knowledge and confidence, and investigate how instructors apply these skills in real teaching contexts. Comparative studies across institutions and disciplines could provide deeper insights into preferred practices for instructor development in the era of AI-enhanced education.

## Conflict of Interest

The authors of this article have no conflicts of interest to declare.

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