

Insights on innovation: Charting trends in digital education through a novel hybrid AI-human coding methodology

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Abstract

Digital innovation in education is rapidly evolving. The purpose of this paper is to explore the insights and relevant themes highlighted by a group of educational researchers and practitioners from a digital innovation educational conference. The inaugural conference, hosted in April 2025 by the Centre for Digital Innovation in Education, invited submissions to share and discuss current topics in education innovation. Presenters submitted proposals in line with our four conference themes: 1) Pedagogical Innovation, 2) Structural Innovation, 3) Digital Innovation, and 4) Teaching for Innovation. As a site for networked learning, the hybrid online and in-person format supported connections and a shared sense of challenge among presenters and attendees. The session formats (i.e., keynote speakers, paper presentations, workshops, round tables, posters, social networking event, and graduate student luncheon) fostered conversations around contemporary themes in innovative educational practices in both formal and informal capacities. As a social practice, the conference enabled educators, researchers and students to formulate digital and social connections that contributed to broadening their professional communities within the professional development ecology. For the purpose of this content analysis, conference submissions refer to topic summaries from invited guest speakers (n=5) and confirmed proposals (n=46). We conducted a content analysis of the conference submissions (n=51) by coding the data through three different processes: ATLAS.ti and Open AI, Data Analysis by ChatGPT, and human-centred coding. This process leveraged AI to assist with refining and confirming coding. Our three-stage, iterative approach explores qualitative coding through a purpose-built application, an open-source platform, and a human-centred process to improve reliability when using emerging technology. Analysis of the 51 conference submissions revealed the following themes: integration of technology in learning; culturally relevant pedagogy; leveraging digital technologies to foster social and emotional learning (SEL) competencies; digital pedagogy and innovative instructional design; challenges of accessibility and inclusivity; AI and ethical considerations; innovative assessment practices; and faculty development and institutional readiness for digital innovation integration. Our paper offers two significant contributions to educational research: 1) it highlights the current topics and issues that educators and researchers perceive as innovative, relevant and transformative in the area of digital education; and 2) it describes an innovative methodological approach, along with its challenges, of using AI for qualitatively coding conference proposals.

Keywords

Education innovation, conference abstracts, AI coding, ATLAS, ChatGPT, education trends, education technology, qualitative coding.

Introduction

Digital technologies are rapidly presenting educators with a vast array of pedagogical, technological, and structural innovations. Innovation in education is the process of introducing new tools or processes intended to effect change, “raise productivity and efficiency of learning and/or improve learning quality” (Serdyukov, 2017, p. 8). In-person and virtual conferences, as social sites of networked learning, offer opportunities to share these innovations, inspire others and foster an environment where academics, practitioners and researchers mobilize knowledge gained through their recent projects (Jones, 2008; Verbeke, 2015). In this peer-to-peer environment, one can experience the recent and emerging trends in their field and can engage in professional development

through formal and informal sessions at both the individual and the collective learning level (i.e., workshop, presentation, roundtable, graduate student luncheon, coffee breaks, social networking events etc.) (Gourlay et al., 2021; Merianos et al., 2022; Verbeke, 2015).

This paper examines the proposal submissions (250-400 words) (n=51) from a digital innovation educational conference (April 2025) presented by the *Centre for Digital Innovation in Education* in Oshawa, Ontario, Canada. The purpose of this content analysis is two-fold: 1) to highlight the current topics and issues that educators and researchers perceive as innovative, relevant and transformative in digital education; and 2) to describe an innovative methodological approach, along with its challenges, of using AI for qualitatively coding conference proposals. For the purpose of this analysis, conference submissions refer to topic summaries from invited guest speakers (n=5) and accepted proposals and summaries from confirmed peer-reviewed presentations (n=46).

Two research questions guide this content analysis: 1) What do the submissions by educational researchers and practitioners to the *Digital Innovation and Education Conference* reveal about their perceptions of relevant topics in educational innovation?; and 2) How do AI-assisted technologies compare to a human-centred qualitative coding process when used in either an ad hoc or purpose-built platform capacity?

Literature Review

We conducted a literature review to address both research questions; the first was supported by a search to identify trends or highlights in innovative education practices, and consulting the most recently published literature exploring methodologies for AI-supported coding for qualitative texts informed the second research question.

Emerging Trends in Innovative Education Practices

Various sources characterised this era of educational digitalisation and innovation as a disruption (Koon et al., 2025; OECD, 2023); an irruption (Duart, 2024); an evolution (Zou et al., 2025); a transformation (Hamzah et al., 2024; Koon et al., 2025); and fraught with urgency and questionable sustainability (Gutierrez-Aguilar, 2025). Conceptually, infusing innovations into teaching and learning across educational sectors presents multi-layered and complex considerations that are more nuanced and often underestimated when reduced to the simple replacement or addition of digital tools into teaching and learning processes (Gutierrez-Aguilar, 2025; OECD, 2023).

The Organization for Economic Co-operation and Development (OECD) (2023) published a report illustrating how a global organisation contextualizes digital innovation and situates the potential for educational change. In this report, they convey that while a digital transformation of education may impact teaching and learning by increasing personalisation and creating inclusive and equitable learning environments, it is essential to mitigate the challenges and pressures associated with this inundation of technological advances (i.e., ethical Artificial Intelligence (AI) use in education and policy management) (OECD, 2023). Teachers and students continue to be impacted by the accelerated uptake of digital technologies initiated during the COVID-19 pandemic, to the degree that adapting technology to replace current systems is more common than adopting digital tools for innovative pedagogical approaches (OECD, 2023). Professional development, idea sharing, knowledge mobilisation and capacity building in this nascent time of digital and technological innovation are integral to a sustained effort for transformational education (Gutierrez-Aguilar, 2025; OECD, 2023; Zou et al., 2025).

Using AI for Qualitative Coding

To conduct this part of the literature review, we entered the phrase “artificial intelligence” “qualitative data coding” into Google Scholar to find peer-reviewed papers from 2024 to present. Papers that specifically examined AI to conduct qualitative data analysis, accompanied by a protocol, met the inclusion criteria for review.

ChatGPT (OpenAI, 2025), although not specifically designed for qualitative data coding analysis, emerged in the literature as a tool educational researchers used to inductively and deductively code qualitative data for thematic or content analysis (Atkinson, 2024; Goyanes et al., 2025; Nguyen-Trung, 2025; Qiao et al., 2025). The key benefits of using an AI like ChatGPT are that it employs machine learning to assist in the processing of large ‘human-like’ data sets such as interview transcripts, into concept clusters, co-occurrences, themes, codes and is responsive to direction and feedback from the user (Nguyen-Trung, 2025). Qiao et al. (2025) used a human-centred approach (manual coding) and a machine-based metric approach (Bidirectional Encoder Representations from Transformers) to evaluate the accuracy of ChatGPT’s inductive coding and reported that GenAI (ChatGPT) had an 80% accuracy score for inductive coding while significantly reducing the time researchers spent on qualitative coding.

Drawbacks to AI qualitative thematic or content analysis include the inability to duplicate the “contextual insights and subtle metaphorical nuances” in which human researchers engage during the qualitative analysis process (Goyanes et al., 2025, p. 1). Nguyen-Trung’s (2025) evaluation of ChatGPT for thematic analysis found that ChatGPT had the capacity to support human researchers to inductively generate codes and themes, arrange hierarchies and provide a solid initial analysis phase, but only after the researcher tested, refined, restructured and recalibrated this phase through an iterative process. Furthermore, ChatGPT’s repertoire of inductive coding was quite limited (Nguyen-Trung, 2025; Qiao et al., 2025). Unless the researcher prompts ChatGPT to employ coding strategies such as in vivo or process coding, it defaults to topic-based nouns (Nguyen-Trung, 2025). The literature identified inaccurate codes, hallucinations and repetitive results as common issues when employing ChatGPT for qualitative coding analysis (Nguyen-Trung, 2025; Qiao et al., 2025).

Methodology

This study analyses conference proposals (n=51) presented at Ontario Tech University’s inaugural *Digital Innovation in Education Conference* in April 2025 to determine research themes of significance to educators. The research team consisted of those involved with organising the *Digital Innovation in Education Conference*, including two doctoral students, the director of the Centre for Digital Innovation in Education, and an Ontario Tech University faculty member. Following the conference, we conducted a content analysis of the submitted proposals to understand and infer the information they convey and identify emerging trends (Krippendorff, 2019). Aligning with the Centre for Digital Innovation in Education’s focus on innovation, we also leveraged AI qualitative data analysis tools as a comparative strategy while still including a fully human process to ensure reliability. Through this lens, we analysed the data by conducting a tri-coding method focusing first on human-centred coding strategies, followed by ATLAS.ti 25.033023 for Windows desktop version, ATLAS.ti a purpose-built qualitative coding software, and lastly adopting a published protocol using the open generative AI platform, OpenAI’s (2025) ChatGPT (GPT5) as an ad hoc research tool. Additional details regarding this process follow below.

Data collection

The *Digital Innovation in Education Conference* proposal call occurred between December 13, 2024, and February 23, 2025, and invited educators, students, administrators, and researchers to submit proposals (250-400 words) that aligned with one of the conference’s four themes: pedagogical innovation, structural innovation, digital innovation, and teaching for innovation. Submitted proposals (n=56) underwent a peer-review process, leading to confirmed presentations (n=44), with two presenters withdrawing days before the conference. The conference included invited speakers (n=5) and undergraduate poster presentations (n=4) whose inclusion did not undergo the proposal peer-review process. The proposals were published on a public university website, which also doubled as a conference itinerary.

The dataset comprised proposals for various presentation formats including paper presentations (n=25), round table discussions (n=13), posters (n=7), workshops (n=1), featured speakers (n=4) and keynote presentations (n=1) by 80 presenters from 21 institutions, including universities (n=41), colleges (n=5), organizations (n=4), and K-12 educational settings (n=1), spanning five countries (Canada, France, Germany, Ukraine and the United States of America). During the conference submission process, presenters identified their intended audience. While some presentations aligned with more than one category, *Digital Innovation in Education Conference* presenters hoped to engage audiences comprised of K-12 educators and administrators (n=39), higher education (n=15), general audience (n=32) and other (n=18). Our findings present educational themes from the *Digital Innovation in Education Conference* and insights from AI-assisted qualitative coding.

A noteworthy point is that the initial data collection occurred without the intention of conducting a content analysis. This had an impact on the consistency and structure of the dataset. Because this was the first conference for the Centre for Digital Innovation in Education, we created a call for proposals to gather information on presentation topics and structure; it is unclear whether presenters interpreted this as an abstract or description. Among the dataset, some proposals follow an abstract structure while others follow a conversational structure. We cleaned the data by elongating acronyms, removing introductions and conversational elements.

Data extraction and analysis

Initial dataset cleaning included converting acronyms to their original phrases to minimize misinterpretations and improve coding reliability during the AI-assisted phases of the process (Goyanes et al., 2025). Because our research team had not previously implemented AI coding strategies, we created a proof of concept based on a ChatGPT prompt protocol established by Goyanes et al. (2025), whereby we prompted ChatGPT to synthesize major themes from 10 conference abstracts. We applied a similar strategy to ATLAS.ti; which, after systematically comparing and reconciling the results between the two platforms, produced the following initial inductive codes: integration of technology in learning; culturally relevant pedagogy; leveraging digital technologies to foster social and emotional learning (SEL) competencies; digital pedagogy and innovative instructional design; challenges of accessibility and inclusivity; AI and ethical considerations; innovative assessment practices; and faculty development and institutional readiness. Following our own first reading of the proposals and preliminary coding, we added motivation and engagement to the code list.

Human-led Coding

Human-led coding consisted of discussion of the themes, collaboration on their applicability, definition, and scope, and decisions regarding the additional codes not identified by our AI partners and identified during our initial reading. This resulted in a final list of a priori themes (Miles et al., 2020). We conducted an independent trial coding of the first five proposals to establish and sustain inter-coder reliability using the a priori list of themes (Creswell & Poth, 2018; Miles et al., 2020). We shared the independent results and consolidated any discrepancies (Creswell & Poth, 2018).

Due to the broad topic range, we determined that the line-by-line coding strategy (Saldaña, 2016) was inefficient. Instead, we decided to use holistic coding (Saldaña, 2016) to code the proposals in two phases: the first phase assigned one or more of the nine codes to the entire proposal, isolating key supportive quotes, and the second phase required reviewing to ensure consensus. We then: 1) added our independently coded themes to a spreadsheet, organized by numbered proposals; 2) reviewed, compared, and discussed discrepancies; 3) derived a consensus; and 4) consolidated each proposal's theme(s).

We inductively coded themes of interest as “other”, such as the: study method, identified learning theories, intended audience for the presentation, and participant group for the study. However, given the varied nature of the proposals, topics coded as other, remained points of interest beyond the scope of this inquiry.

ATLAS.ti AI Coding

We first tested three of the four AI-generated coding functions in ATLAS.ti (AI Coding, Intentional Coding, and Conversational AI). The fourth tool, AI Summary, misaligned with the study's coding goals and objectives and was not employed. We uploaded the 51 proposals as individual .docx files named P1, P2, P3, etc., which ATLAS.ti renamed to D1 P1, D2 P2, respectively. After selecting the Intentional AI Coding function, and selecting all 51 files for coding, the program asked for an ‘Intention.’ Using the research question and the deductive codes established during the preliminary analyses and approved by the research team as a guide, we established the following prompt: “What do these conference proposals reveal about the following themes: motivation and engagement; integration of technology in learning; leveraging digital technologies to foster SEL competence; culturally relevant pedagogy; AI and ethical considerations; digital pedagogy and instructional design; faculty development and institutional readiness; and challenges of accessibility and inclusivity?” ATLAS.ti then created eight questions based on the stated ‘intention,’ which the user may choose to turn on, off, or add more. ATLAS.ti attributed a code category to each of the eight questions, which differed slightly from the code names established during the human-led coding; however, the meaning and integrity of each code remained intact. For example, we named the code faculty development and institutional readiness, which ATLAS.ti renamed faculty development. We then prompted ATLAS.ti to apply those code categories, and despite providing ATLAS.ti with the nine predetermined code categories, the ATLAS.ti output included 534 new codes (subcodes) and 93 coded quotations. ATLAS.ti also provided Top Applied Codes (n=16), Top Co-Occurring Codes (n=7) and Top Coded Documents (n=7). In the Top Applied Codes summary, Digital Pedagogy: Instructional Design was listed first, with the assigned number of 41, but the summary failed to describe the meaning of this number.

ATLAS.ti unexpectedly generated a new tenth code, discrimination in higher education, when analysing a proposal that did not align clearly with the existing codebook or conference themes. Since it was the only instance of this code, we collapsed it into challenges of accessibility and inclusivity to preserve alignment with the research question while maintaining transparency in the AI coding process.

As an analysis, we explored the AI Coding function by once again uploading the 51 proposals as individual .docx files. The AI Coding function performs an inductive coding process, without the opportunity to guide the analysis process. ATLAS.ti reported that completing the analysis would take five minutes; however, after 32 seconds, ATLAS.ti generated 397 codes in 234 categories with 92 quotations to code. At this stage, the interface provided us with a promising, yet faulty slider intended to allow us to toggle between the lowest (n=1) and maximum (n=211) number of identified categories. Despite this feature, whenever we attempted to move the toggle, ATLAS.ti reverted to the maximum number of categories (n=211). Although ATLAS.ti generated 397 very granular and nuanced codes, a helpful feature enabled us to turn a code on or off. Similarly, additional functions permitted merging codes to suit the research goal (i.e., merging the codes community impact, community involvement and community support into community involvement). Once we asked ATLAS.ti to “Apply” that coding scheme, a similar summary screen showing the Top Applied Codes, Top Co-Occurring Codes and Top Coded Documents appeared, but, unfortunately, became unretrievable once the window was closed.

ChatGPT Coding

We adopted an iterative approach to coding with ChatGPT version 4, which does not include access to the potentially more targeted data analysis features provided with ChatGPT paid access. However, this permitted a comparison between the technological affordances, functionality, and reliability of a paid, purpose-built platform, like ATLAS.ti, with a no-cost, ad-hoc alternative that might provide accessible learning tools and strategies for student researchers.

Beginning with the proof of concept, we adapted the prompt sequence Goyanes et al. (2025) developed for coding their 30 segments of interview data to the *Digital Innovation in Education Conference*'s 51 proposals. Goyanes et al. (2025) recommended an incremental upload strategy for coding with ChatGPT. This protocol prompted ChatGPT to expect a specific number of data segments before receiving coding instructions. While the proof of concept we conducted with ten proposals closely aligned with the human coding and the data within each proposal, when we uploaded all 51 proposals sequentially before providing a coding instruction prompt, ChatGPT appeared to triangulate the data and attribute evidence from one proposal to another, such as listing “GPS-enabled learning (Proposal 19)” within the results for Proposal 1 on AI aided educational resources. Based on this result, we reversed the prompt sequence to provide ChatGPT with a prompt outlining the complete instructions, followed by requesting coded results before proceeding to the next proposal. We hypothesized that ChatGPT might perform better if they adopted human-centred research strategies, specifically, providing ChatGPT with all the coding instructions before expecting it to analyse the data. Although this incremental sequential strategy required significantly more time, this method permitted us to monitor each result and engage with ChatGPT to correct instances when the results drifted from the prompted instructions. The final prompt we used with Chat GPT was the following:

Please code the following abstract based on how it aligns with these codes: culturally relevant pedagogy; leveraging digital technologies to foster social and emotional learning (SEL) competencies; digital pedagogy and innovative instructional design; integration of technology in learning; challenges of accessibility and inclusivity; AI and ethical considerations; innovative assessment practices; faculty development and institutional readiness; motivation and engagement. The abstract does not need to align with all or any of these themes. Please choose no more than 3 and provide evidence for this choice. Here is the abstract:

We first noticed errors with Proposal 29's coding results when ChatGPT created inductive codes instead of using the provided deductive codes. Through discussions with the interface, ChatGPT recoded Proposal 29 and offered to recode Proposals 21 to 29, through which process ChatGPT assigned different codes for Proposals 25 to 29. While the recoding of Proposal 25 did not align with any themes we assigned, Proposal 29 was one of the few where all ChatGPT's codes aligned with the human researchers. Proposals 26 to 28, while coded differently on the second attempt, aligned similarly with the human researchers both times. Between Proposals 30 and 51, ChatGPT produced errors that prompted us to reinput the instructions on three additional occasions.

We compared ChatGPT's coding to the human researchers' results, using the same process of reviewing, comparing, and discussing discrepancies with ChatGPT to form a consensus. During this process, we requested that ChatGPT provide a coding rationale for Proposals 6, 8, 15, and 19, which all failed to align with the human-centred coding. We prompted ChatGPT to explain the discrepancy between its original and recoded findings for

each proposal; however, on Proposal 15 ChatGPT noted the discrepancies may have resulted from challenges with parsing the subtly overlapping, yet distinct themes. ChatGPT coded Proposal 19 differently than both human coders, when prompted to provide a rationale, this defence ultimately altered the proposal’s final coding.

Findings

Theme distribution

We reviewed the frequency of each theme's occurrence across the data set presented in Table 1, which illustrates the number of times each theme was attributed as a primary or first theme, with the corresponding frequency as a co-occurring theme in brackets (as a secondary or tertiary coded theme).

We observed some alignment across methods when examining the most frequently coded primary theme. The human-coding method identified AI and ethical considerations (n=17 or 33%), digital pedagogy and innovative instructional design (n=12 or 24%) and integration of technology in learning (n=7 or 14%) as the top three occurring primary themes. Similarly, ATLAS.ti reported digital pedagogy and innovative instructional design (n=16 or 31%), AI and ethical considerations (n=15 or 29%) and integration of technology in learning (n=6 or 12%) as the top three occurring primary themes. In contrast, ChatGPT listed AI and ethical considerations (n=12 or 24%), motivation and engagement (n=9 or 18%) and culturally relevant pedagogy (n=8 or 16%) as the top three occurring primary themes within the dataset.

There is very little alignment when examining the least occurring primary themes across the three methods. The human-led method coded culturally relevant pedagogy (n=1 or 2%) and motivation and engagement (n=1 or 2%) the least. ATLAS.ti coded innovative assessment practices (n=1 or 2%) and motivation and engagement (n=1 or 2%) the least, and ChatGPT coded leveraging digital technologies to foster SEL (n=2 or 4%), innovative assessment practices (n=2 or 4%) and faculty development and institutional readiness (n=2 or 4%) the least.

The top three co-occurring themes from the human-led coding method are integration of technology in learning (n=13 or 25%), motivation and engagement (n=6 or 12%) and digital pedagogy and innovative instructional design (n=5 or 9%). Similarly, but with one difference, the top three co-occurring themes from ATLAS.ti are motivation and engagement (n=6 or 12%), integration of technology in learning (n=5 or 9%) and challenges of accessibility and inclusivity (n=1 or 2%). Unexpectedly, given ChatGPT’s misalignment with either human-led or ATLAS.ti primary theme coding, ChatGPT synchronized with the other two methods, allocating motivation and engagement (n=32 or 63%), digital pedagogy and innovative instructional design (n=28 or 55%) and integration of technology in learning (n=24 or 47%) more frequently as secondary or tertiary themes.

When averaged across the three methods and presented as a percentage, the highest occurring frequencies are digital pedagogy and innovative instructional design (22% of proposals), AI and ethical considerations (22% of proposals), integration of technology in learning (20% of proposals) and motivation and engagement (18% of proposals). The above four themes account for 82% of all coding instances. The theme coded in the fewest proposals (averaged across methods and calculated as a percentage) is innovative assessment practices (4% of proposals).

Table 1: Distribution of theme frequency in proposals by coding strategy. Frequency of proposals’ first theme (frequency of proposals’ co-occurring theme).

Theme	Frequency			
	Human	ATLAS.ti	ChatGPT	Averaged Occurrences (%)
Culturally relevant pedagogy	1 (1)	3	8 (9)	7%
Leveraging digital technologies to foster SEL	2 (2)	5	2 (8)	6%
Digital pedagogy and innovative instructional design	12 (5)	16	7 (28)	22%
Integration of technology in learning	7 (13)	6 (5)	6 (24)	20%
Challenges of accessibility and inclusivity	5 (2)	4 (1)	3 (8)	8%
AI and ethical considerations	17 (2)	15	12 (20)	22%
Innovative assessment practices	2	1	2 (6)	4%

ATLAS.ti frequency counts, the platform appeared to produce reasonably accurate results; however, the volume and lack of immediate transparency in how they were achieved made verification challenging.

Both ATLAS.ti and ChatGPT had instances where they provided coding insights that altered how the human-coders interpreted the data; however, despite the valuable addition of these interactions, both platforms also require significant user input to provide reliable or relevant results. Where dissension arose, we prompted ChatGPT to explain its decision, which often highlighted insights the human-coders hadn't considered. While ATLAS.ti tended to provide highly granular coding, ChatGPT struggled to maintain consistent coding when the dataset extended beyond twenty segments, requiring frequent reminders and corrections for any data segment past the first 29.

Through the process, we came to view the AI platforms as additional researchers with the potential for "human error," but lacking the ability to reflect and self-correct, therefore possibly requiring greater oversight to maintain consistency. When we confronted ChatGPT regarding Proposal 6's discrepancy between its first and second coding attempts, ChatGPT identified that its first coding was not defensible, reinforcing that researchers must remain critical of their AI collaborator's results. Assumptions that the AI coding process might be "easy" were quickly replaced with an acknowledgement that, like any tool or researcher, working with AI is a partnership, aligning with Nguyen-Trung's (2025) findings.

Discussion

The study has two goals: 1) to highlight the topics and issues that educators and researchers perceive as innovative, relevant and transformative in the area of digital education; and 2) to describe an innovative methodological approach, outlining the challenges and potential benefits for using either a purpose-built or open platform AI for qualitatively coding conference proposals.

Alignment of innovation in education themes and trends with others

The findings reveal three prominent themes in the data set: 1) digital pedagogy and innovative instructional design; 2) AI and ethical considerations; and 3) integration of technology in learning. The first and third themes resemble Koon et al.'s (2025) description of Tech-Pedagogy Advancement, described as the "innovative teaching methods, technology and continuous professional development to enhance learning" (p. 7). The conference setting, intended for knowledge mobilization and professional development through peer-to-peer learning (Verbeke, 2015), supports the capacity building and educator training (Koon et al., 2025) that the OECD (2023) highlights as an important step in cultivating digital competencies. The Tech-Pedagogy concept brings awareness to integrating technology in learning and adopting digital pedagogies symbiotically. Many of the proposals (42%) discussed educational technologies or digital pedagogy, with some proposals tandemly discussing both. Our findings prominently align with those of Koon et al. (2025) suggesting an important acknowledgment of the relationship between digital pedagogy and technology integration and opportunities that conference settings facilitate. Conferences offer the capacity to enhance the teaching quality for all educators and practitioners at all career stages by promoting engagement in critical discussions around digital pedagogies and competencies (Verbeke, 2015), an integral co-learning process that the OECD (2023) recommends for effectively integrating innovative practices in education.

Curiously absent among the proposal topics was the exploration of innovative assessment practices. Only 4% of proposals (n=2) discussed the potential for innovative technologies to personalise assessment, a process that, when carefully considered, could encourage the adaptability and flexibility of assessment opportunities (Zou et al., 2025). The limited inclusion of innovative assessment practices might suggest that parsing the ethical use of generative AI for innovative assessment practices, such as adaptive assessments, is not yet accepted or valued (OECD, 2023). The finding may indicate that the *Digital Innovation in Education Conference* presenters view the ethical use of innovative technologies for teaching and learning as more socially acceptable or pressing than leveraging AI for assessment and evaluation.

AI and its ethical considerations featured as either a primary, secondary or tertiary theme in 22% of proposals. With the heightened enthusiasm for adapting AI into all aspects of life, we assumed the conference would focus on AI in education. All five featured speakers discussed AI and its ethical considerations without being specifically invited to do so, and the term AI featured in 51% of the proposals. However, situating innovation in educational contexts thematically as structural, pedagogical, digital and for learning might have reminded participants that

innovation's multi-faceted nature is independent from the surrender of agency that tends to pervade AI-assisted processes (OECD, 2023), and that critical thinking and creativity are still autonomously alive and well. The third theme, integration of technology in learning, is cited as a necessary enhancement of educational experiences (Hamzah et al., 2024) but must be incorporated with an increased effort towards teacher professional development, policy outlining responsible and ethical implementation of new technologies, and an awareness that efficiency does not equal effectiveness (Hamzah et al., 2024; Zou et al., 2025). To summarize, integrating new technologies, innovative instructional design, and AI-assisted platforms into any aspect of teaching and learning must intentionally and responsibly align with promising practices in digital and critical pedagogies. The presence of the root word *inclus-* and *equit-* in approximately 33% of proposals may suggest presenter awareness of the "socially conscious" responsibility of education to promote accessible, equitable and inclusive practices (Gutierrez-Aguilar, 2025, p. 1). While the innovation and digitisation of educational processes imply the personalisation of education (Duart, 2024; OECD, 2023), it must be accompanied by an intentional process for delivery, accessibility, funding support, infrastructure availability, and policy to be adequately operationalized (Gutierrez-Aguilar, 2025; OECD, 2023).

ChatGPT versus ATLAS.ti coding methodology

We conducted our in-depth individual human-centred coding process before using ATLAS.ti or ChatGPT to prevent inadvertent influence. The deductive dual-coder method guided by a codebook is a reliable method for qualitative data analysis (Miles et al., 2020); therefore, we consulted the AI-assisted methods as a third researcher who twice aided us in reaching a consensus. We observed close alignment between human-centred coding and ATLAS.ti; however, ChatGPT's findings misaligned with those from either the human-centred or ATLAS.ti method.

Limitations

In light of the new and experimental uses of generative AI and AI-assisted qualitative data analysis, there is far more to convey, critique and consider. We recognize our contribution to the rapidly growing body of literature in this area and acknowledge the exploratory tone of this study. Our experimental method reveals flaws. Similarly, the study's progress continues to evolve, limiting a comprehensive comparison and analysis at our current stage.

Co-occurrence of AI within other themes

When viewing the co-occurring themes, AI and ethical considerations appeared high in all coding methods. AI's high representation within the results may indicate either a significant research focus dedicated to the topic within the Digital Innovation in Education presentations or that, as an emerging technology, AI is impacting other technologies, pedagogies, and innovations. Conducting a more purposeful inductive coding of the proposals coded as AI might be necessary to gain a more granular understanding of how presenters discussed AI.

Alignment between data collection and intended research usage

Because the initial data collection occurred without the intention of conducting a content analysis, we believe there was an impact on the consistency and structure of the dataset. It is unclear whether presenters interpreted the call for proposals as an abstract or description, which might have skewed the data we collected. Presenters may have included different information if instructed to create an abstract. More explicit directions might have resulted in more consistently structured data for our analysis.

Future Research

Introducing a second purpose-built qualitative software that uses generative AI for data interpretation might add a different perspective to the results. ATLAS.ti's use of generative AI in the inductive and deductive coding phase features in the initial stages of the data analysis process and can influence the organization of the codes, clusters and themes prior to the interpretation process (Morgan, 2023). Other software, such as MAXQDA, employs generative AI towards the end of the data analysis stage and conducts interpretive analyses on an already human-coded data set (Morgan, 2023). The possibility of experimenting with AI-assisted software to summarize findings against human-interpreted codes and themes presents an intriguing inquiry.

Importance of this Work and Conclusion

As Goyanes et al. (2025) refer to the need for more empirically tested methods for using GenAI in qualitative data analysis, this paper contributes to and extends, this conversation by presenting a comparative tri-coding methodology of human- and GenAI-led coding analysis, in addition to identifying contemporary trends in digital education innovations in the Canadian context. The themes and trends identified from the *Digital Innovation in Education Conference* proposals aligned with some of those identified by the OECD's (2023) report. Presenters offered proposals focused on digital pedagogy and innovative instructional design; the integration of technology in learning; and AI and its ethical considerations. While challenges with inclusivity and accessibility featured less among the proposals' primary theme, they were present a third of the time. This substantial proportion suggests some presenters prominently considered inclusivity and accessibility.

Additionally, although the study offers a novel use of AI for qualitative coding, our findings reinforce that at this stage, qualitative coding requires human-centred approaches to AI collaboration. While purpose-built applications such as ATLAS.ti outperform ad hoc uses of ChatGPT, qualitative coding may continue to require human input to navigate the nuanced meaning of language-based datasets.

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