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Secondary school teachers' perspectives on GenAI proliferation: generating advanced insights

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Abstract

The proliferation of generative artificial intelligence (GenAI) technologies has significantly impacted the educational sector, prompting a re-evaluation of teaching, learning, and assessment practices. This study explores the perceptions of Ontario secondary school teachers regarding the challenges and opportunities presented by GenAI. Using a qualitative research method, 17 high school teachers were interviewed to understand their views on GenAI integration and its implications for academic integrity. The findings reveal three critical areas for integrating GenAI in education: *generating people* through professional development and ethical training for educators, *generating programs* by designing transparent and purpose-driven initiatives, and *generating policies* through the creation of clear, adaptable governance frameworks. Together, these pillars highlight the collaborative work needed to harness GenAI's potential while ensuring ethical and equitable practices in secondary education. These themes are a subset of invitational education and highlight the need for comprehensive training for teachers, the development of transparent guidelines and ethical practices, and the establishment of robust policies to support the integration of GenAI in education. The study emphasizes the importance of collaboration among educators, administrators, and other stakeholders to effectively navigate the evolving landscape of GenAI-driven educational environments effectively. By addressing these pillars, academic institutions can harness the transformative potential of GenAI while maintaining the integrity and quality of education. This research provides valuable insights into the evolving role of teachers and the necessity for strategic planning, professional development, and policy frameworks to optimize the benefits of GenAI in secondary education.

Keywords Academic integrity, Generative artificial intelligence (GenAI), Qualitative, Ontario, Secondary teachers, Invitational education, Support

Introduction

Generative artificial intelligence (GenAI) technologies have heralded a new era of digital innovation, sparking widespread public, media, and academic interest. GenAI has disrupted traditional practices by challenging norms of academic integrity, altering

approaches to assessment (Furze 2024), and prompting educators to rethink their pedagogical strategies (Perkins 2024). GenAI's potential impact is poised to rival the transformative influence of the internet (Makridakis 2017) and extend to teachers' pivotal role (Jeon and Lee 2023).

Educational institutions are called upon to prioritize "critical thinking, digital literacy, and GenAI literacy skills for both students and teachers" (Chan and Lee 2023, p.18). This call requires teachers to explore GenAI's role in education more deeply and acknowledge its complexities (Fahrman et al. 2020).

Secondary school teachers find themselves inventing strategies to cope with the influx of students using GenAI in their classrooms, necessitating different instructional and evaluation strategies. Existing, long-held practices, even in secondary schools, are being disrupted. Depending on one's perspective, these trigger events can be seen as catalysts for positive or negative changes in existing practices. Therefore, this disruption presents challenges and opportunities as educators navigate the complex terrain of GenAI-driven learning environments.

Despite the growing body of literature and recommendations for reform in the post-secondary education (PSE) sector (e.g. Eaton 2023; Volante et al. 2023), the impact of GenAI in secondary education has not received the same scale of scrutiny. This oversight has left a gap in the knowledge of the kind of assistance secondary school teachers themselves want. This research gap is particularly noticeable in the context of teachers, who find themselves at the forefront of navigating and mediating these technological disruptions. Concerns regarding the potential transformation of traditional teaching roles and responsibilities add urgency to this discourse.

A primary challenge lies in equipping teachers with the necessary skills and competencies to effectively leverage GenAI tools in their instructional practices. This may require additional training and professional development to ensure educators have the knowledge and expertise to integrate these technologies seamlessly into their curriculum and assessment strategies.

As educators struggle to integrate GenAI tools into their teaching methodologies, there is a pressing need for comprehensive training and ongoing professional development initiatives. Without this know-how, teachers are apt to struggle primarily with detecting and dealing with their students' unauthorized or improper use of GenAI. The discourse about GenAI in those cases would devolve into concerns about academic misconduct. It is imperative to address these issues proactively, fostering dialogue among educational stakeholders to establish robust guidelines and ethical practices. By doing so, academic integrity is more likely to be upheld whilst harnessing the educative potential of GenAI.

The purpose of this study was to qualitatively explore the myriad issues and challenges faced by secondary school teachers due to the proliferation of GenAI in education, including its implications for academic integrity. Specifically, the research sought to address the question: What are the significant challenges and opportunities that Ontario secondary school teachers perceive due to the proliferation of GenAI? By investigating teachers' perspectives, coping mechanisms, and insights into how this technological advancement is reshaping the educational landscape, the study aimed to provide valuable insights into the evolving educational landscape.

Exploring secondary teachers' questions, concerns, and challenges regarding the proliferation of GenAI in education is a prerequisite to devising strategies that permit the use of GenAI while preserving academic integrity. GenAI can revolutionize teaching and learning experiences; understanding teachers' viewpoints is crucial for addressing potential challenges and optimizing the benefits of GenAI-driven educational tools, fostering a robust educational system that nurtures ethical practices and prepares students for the demands of the modern world.

Theoretical framework

Invitational education (IE) (Purkey and Novak 1988, 1996) is a theory of practice and useful framework that emphasizes creating a welcoming and inclusive environment in educational settings. This approach fosters positive relationships and interactions among all stakeholders, including students, teachers, parents, and the community. The IE framework posits a holistic approach that demands *people* working in various *places* to ameliorate their *practices* in their *programs* within the restraints of *policies* that can enhance education. The people, places, programs, policies, and processes constitute the 5Ps that IE addresses. Studies have shown that invitational practices significantly impact the quality of learning and teaching (e.g. Haigh 2011; Venketsamy et al. 2020). These 5Ps can be utilized to be intentionally inviting, unintentionally inviting, unintentionally disinviting, and intentionally disinviting.

For example, *people* who are intentionally inviting might include educators who actively mentor and support students through positive reinforcement, whereas unintentionally disinviting individuals might unknowingly use dismissive language that alienates students. *Places* can also play a role, with intentionally inviting spaces being designed to be bright, accessible, and welcoming to all learners, in contrast to unintentionally disinviting poorly lit or cluttered spaces, creating an unwelcoming atmosphere despite positive intentions. Similarly, *intentionally inviting programs* might integrate student voices and provide diverse learning opportunities, while rigid, one-size-fits-all curricula can unintentionally disinvite participation by neglecting diverse needs.

Policies and processes further illustrate the 5Ps. Intentionally inviting *policies* might include flexible deadlines for varying student circumstances, whereas zero-tolerance attendance policies could be intentionally disinviting by excluding students facing legitimate challenges. Finally, *processes* can reflect invitational practices through collaborative decision-making that involves all stakeholders, fostering trust and engagement, while top-down decision-making processes may disinvite participation by alienating those affected.

This demonstrates how the 5Ps can either enhance or undermine education, depending on whether they are implemented in a way that aligns with the principles of intentional invitation. While people operate at different levels depending on the occasion, issue, and intent, the idea remains to operate at an intentionally inviting level in which educators work with a wholeness of purpose and a genuinely reflective experience base.

The IE is immensely detailed, with many subtle nuances and a rich and robust scholarship on various aspects. For this study, we categorize qualitative data collected from interviews with high school teachers regarding the opportunities and challenges of using GenAI tools in Ontario schools. Three components are particularly relevant: people, programs, and policies. Below is a brief discussion of these elements.

In the context of IE, the *people* theme highlights the importance of building positive relationships and engaging all individuals involved in the educational process. This includes creating a sense of belonging and respect among students, teachers, parents, and the broader community (Hoover-Dempsey and Sandler 1997). Teachers' creation of a learning environment for students takes a specific form based on any number of factors like subject, grade level, learning objectives, inter alia. Similarly, school and board administrators establish a learning environment for teachers based on the latter's prior knowledge, time, contractual terms, and support. Whether these environments are created and facilitated intentionally invitingly or begrudgingly under duress affects how enthusiastically the initiative is received and learning objectives are met. The theory behind IE argues that learning is enhanced when learners are positively encouraged and invited into the educational experience (Haigh 2011). The invitation goes beyond teachers and involves administrators playing a prominent role. Then, together, school leaders and teachers create a collaborative learning environment that encourages the participation and involvement of various stakeholders (Steyn 2014).

The pillar of *programs* within the framework of IE underscores the significance of designing and organizing activities or practices that have a specific purpose or goal. By implementing programs that invite participation and collaboration, schools can create a more inviting and supportive learning environment in which learners—be the students or teachers, in this case—flourish (Leung and Chu 2023). The supporting environment can take the form of professional and skills development opportunities for teachers that can contribute to the intentional creation of inviting schools through practices like courses on GenAI, professional development on integrating AI tools in teaching, learning, and assessment, and strengths and limitations of AI. In a culture where learning is normalized, everyone benefits. It is essential to note that programs comprise a set of carefully calibrated practices.

Lastly, the *policy* theme in IE emphasizes the importance of establishing guidelines and practices that support inclusivity, involvement, transparency, and consistency. School policies should reflect a commitment to creating a welcoming and respectful atmosphere for all individuals within the educational community, regardless of their differences (Pollock and Yoshisato 2021). Within the context of GenAI and teacher needs, this means policies that support exploration, experimentation, and evaluation. Creating such policies signals to teachers that their exploratory efforts are recognized, supported, and endorsed.

In conclusion, the IE framework provides a comprehensive approach to fostering a positive and inclusive educational environment. Educators can leverage this framework to categorize and analyze qualitative data collected from interviews with high school teachers regarding using GenAI tools in Ontario schools by focusing on the themes of people, programs, and policies. This approach ultimately aims to enhance opportunities and ultimately address challenges within the educational landscape.

Method

Study participants were recruited via various social media site postings, including X and LinkedIn, in accordance with our university's Research Ethics Board (REB 23–059). This recruitment strategy permitted participants from various school boards in Ontario to participate in the study. The selection criteria were that interested parties had to be

practising Ontario secondary school teachers. No requirements correspond to gender, years of experience, or teachable subjects. This approach was intentionally adopted to allow for the inclusion of any interested participants, ensuring a broad and diverse range of perspectives. By avoiding restrictive criteria, the study aimed to capture a more representative understanding of teachers' perceptions and experiences with GenAI across various contexts.

Seventeen interested teachers filled out an online form to express interest in participating. One researcher reached out to arrange an interview date and time. The semi-structured interview consisted of the following questions:

1. Describe your teaching experience: length of your teaching career, subjects taught, length of your time at the present school and school board.
2. What is the biggest disruptive force you have encountered in your teaching career?
3. How does generative artificial intelligence (GenAI) (ChatGPT being an example) compare with the previous disruption you encountered?
4. How have *your* practices altered, or are you going to alter them, because of GenAI?
5. Who is in charge of altering your school's teaching, learning, and assessment practices?
6. What is GenAI's effect on teachers? On students? On school culture and morale?
7. Do you think GenAI has a beneficial/harmful role in your teaching practices and/or student learning?
8. Do you feel you will be supported in altering your assessment and instructional practices?
9. Do you think GenAI should be adopted in (a) your class, (b) your subject, (c) your school?
10. Anything else you would like to say on the subject of GenAI?

Interview questions were sent to potential participants after the terms of the consent form were agreed upon. Interviews lasted approximately 60 min and were conducted outside of teachers' regular working hours on MS Teams or Google Meet, per participants' choice.

Participants chose pseudonyms and were addressed as such throughout the interview and in reporting. The interviews were audio recorded and then transcribed using the transcript feature of MS Teams when the interviews were conducted through that platform. For Google Meet sessions, Google Read and Write was used to transcribe the interview. All transcripts were checked against the recordings, and participants member-checked transcripts. The data was collected between November 2023 and January 2024. Table 1 provides a demographic overview of the participants.

The finalized transcripts were uploaded to Atlas.Ti. Each transcript was read and coded within the platform, which helped manage codes and transcripts. A total of 1,133 unique codes were created and eventually collapsed into three themes that align with invitation education, which is discussed in the next section.

Findings and discussion

Through a detailed analysis of the interviews, we identified three major themes: *generating people*, *generating programs*, and *generating policies*. These themes encapsulate the critical areas where teachers perceive significant impacts and potential changes due to

Table 1 Participant demographics

Participant number	Participant's pseudonym	Gender	School board	Years of experience as a secondary teacher
1	Rob	M	SB1	15
2	Rebecca	F	SB2	6
3	Tina	F	SB2	20
4	Rose	F	SB3	18
5	Freya	F	SB2	13
6	Dani	F	SB2	12
7	Dawn	F	SB2	16
8	Joe	M	SB2	28
9	Arborist	F	SB2	22
10	Sarah	F	SB2	24
11	Crystal	F	SB4	3
12	Harper	F	SB2	10
13	Myles	M	SB5	10
14	John	M	SB2	3
15	Mary	F	SB4	23
16	Stella	F	SB2	20
17	Caroline	F	SB2	18

GenAI integration in their educational practices. These three themes map onto the IE framework we chose.

Generating people

Teachers emphasize the significance of positive communication with students and parents. Caroline advocates for expertise in GenAI education, stating, "I definitely think there needs to be people" advocating for structured training to understand GenAI's benefits and drawbacks (Caroline, 17, para 40). She suggests that "the board could hire people who this is their field of expertise. So, they could teach people… how it works… and specifically teach us as teachers… [how to] use it to benefit our teaching practices… [and then] the teachers could teach the students" (Caroline, 17, para 40). Stella echoes this sentiment stating, "[We need to] change how we're kind of communicating to families and students about how we're gathering data about [students'] skills and skill sets" (Stella, 16, para 33). Freya adds that "as soon as parents start challenging" teaching and evaluation practices "or as soon as students start challenging" them, a spotlight will be shone on the need for transparent communication between stakeholders by giving teachers, parents, and students information about GenAI and its integration into education (Freya, 05, para 117). This highlights the necessity for transparent communication between stakeholders, "specifically giving teachers and parents and students" information about GenAI (Caroline, 17, para 40).

Furthermore, it is imperative to explore the evolving role of human educators and identify the requisite skills in this changing landscape (Edwards and Cheok 2018). Recognizing the dynamic nature of educational technology and its impact on teaching practices is essential. By fostering a culture of continuous learning, educators can effectively adapt to the evolving landscape of GenAI integration in education.

The perspectives shared underscore the crucial role of teachers' expertise in educational technology and the necessity for transparent communication between

stakeholders. Collaboration among educators, administrators, school leaders, parents, and students is paramount. Comprehensive training in GenAI for teachers is vital for its effective integration into classroom practices (Backfisch et al. 2020). However, this integration cannot occur in isolation; it requires a coordinated effort involving all stakeholders.

The integration of GenAI into education highlights the increasing importance of the teacher's role in a technological classroom (Ozgur 2020). Administrators and school leaders play a pivotal role in facilitating this collaborative effort by providing support and resources for teacher training initiatives on GenAI. They should establish frameworks that recognize that the integration of GenAI into education should not diminish teachers' role; rather, it should serve as a supportive tool while preserving professional autonomy and academic freedom (Colonna 2022).

In this collaborative ecosystem, clear guidelines and best practices are necessary to guide the integration of GenAI into teaching and learning practices (Allen et al. 2021). Educators, administrators, and other stakeholders must work together to develop these frameworks, ensuring they align with pedagogical objectives and ethical considerations. By fostering a culture of collaboration and open communication between people, stakeholders can collectively navigate the challenges and opportunities presented by GenAI in education.

In summary, Harper says, "Currently nobody is leading the charge to alter my school's teaching, learning and assessment practices" (Harper, 12, para 89). Her sentiment underscores the missed opportunities for practical applications like the "creation of exemplars or rubrics" (Harper, 12, para 89). Similarly, Dawn, another teacher, stresses the need for support and targeted professional development: "We just need the support. We need the higher-ups and we need, like for everything else, we need the right PD" (Dawn, 07, para 98). These voices underscore the necessity for leadership and structured training to harness GenAI's potential in education. Stakeholders must provide the necessary guidance and resources to empower educators to maximize GenAI integration to support student learning.

Generating programs

Our teacher participants across all subject disciplines that they teach in, stressed that dealing with the proliferation of GenAI will mean an increased workload for teachers—whether they seek to enable or restrict it. For instance, John states, "an increased workload [would require] learning how to alter all parts of my planning and my curriculum and my assessments" (John, 14, para 46). Another teacher states the need for "a tonne of good discussion about how we are assessing and evaluating… the skills that students really need" (Stella, 16, para 33). With over 23 years of teaching experience, Tina foresees GenAI as a catalyst poised to fundamentally change assessment and evaluation. She says, "[teachers] will really have to change the way that they teach and assess and evaluate" (Tina, 03, para 48).

Teachers are now asking the central question: "How can we ensure that assessments are completed by students?" (Dani, 06, para 28). In response to the concern about students using GenAI, teachers are now "alterer[ing] their grading to reflect more of an emphasis on the process of the writing than the actual product.… I don't grade anything based on the final project.… Kids have to do videos and explain what they did, but the

actual final product, I didn't even look at it because I knew they were cheating (Joe, 8, para 40).

Teachers in this study expressed concerns about how integrating GenAI in high schools will impact their workload and require adjustments to their teaching practices. The concerns expressed by participants likely will resonate universally with teachers everywhere. This sentiment is well understood. For instance, Moorhouse and Kohnke (2024) call for substantial shifts in teachers' curriculum and skill development. However, the reality is that additional resources to support GenAI in teaching and learning practices are meagre (Tanjga 2023) at best.

Participants express a keen desire for an enhanced understanding of GenAI and its implications on modifying curriculum, assessment, and evaluation tasks to enable students to leverage GenAI as an effective tool. Mary voices the need for "professional development on it" (Mary, 15, para 71). This echoes research by Barrett and Pack (2023), who surveyed educators, revealing that while teachers demonstrated an openness to innovation by incorporating GenAI into their pedagogy, a staggering 95.6% reported receiving no training on GenAI usage from their institutions.

Therefore, new strategies must be invented to help teachers integrate GenAI into their teaching, learning, management, and assessment practices. However, these strategies cannot be haphazard activities; instead, they must be carefully coordinated practices that form a program that builds teachers' capacity to acquire skills to use GenAI productively. Tanjga's (2023) suggestion includes a collaborative approach among teachers, students, administrators, and developers to develop serviceable suggestions to address the evolving challenge.

Administrators realize that the challenges posed by GenAI are real and will have to be dealt with earnestly through support for teachers (Murphy 2019). However, a chronic shortage of resources impedes teachers' skill development on many fronts, including technology (Voogt et al. 2012). The challenge lies in the shortage of available discretionary resources and demands in many directions to address teacher needs. Until these resources are deployed, teachers must create and develop solutions suitable for their specific disciplines and contexts.

Skill development for integrating GenAI into teaching, learning, and assessing will be crucial. Failure to attend to this will result in an educational system that falls behind, uses outdated practices, and ill-prepares students for their future (Aldosari 2020). The workload issues highlighted by our participants would persist as they cannot harness GenAI tools' efficiencies in their own practices (Kamalov et al. 2023). Perhaps most significantly, the academic integrity infractions would persist. As it is, several participants commented on problems with the status quo: Crystal articulates apprehensions regarding potential declines in academic standards, cautioning that if GenAI is used indiscriminately, "practices could get worse" (Crystal, 11, para 57). Rose advocates for monitoring students' writing process to prevent academic dishonesty facilitated by GenAI tools, stating, "I'm more aware of the writing process" (Rose, 04, para 47). Rebecca's concerns are about the detection of GenAI-generated work; she says, "now, when I receive work, I have to vet it through multiple sources to ensure its authenticity… to make sure they're submitting things that are academically honest" (Rebecca, 02, para 44).

Through the teachers' voices, it becomes apparent that academic integrity literacy will be as crucial as any other technical skill acquisition. Modelling practices exhibiting

academic integrity will also demonstrate to students how academic integrity can be practised using the tools (Eaton 2021; Hossain 2022). For instance, Rebecca believes that using GenAI detection tools is problematic because of privacy, intellectual property, and consent issues. Nevertheless, Rebecca's concerns represent many teachers' views and practices. Teachers suggest that the time to act is now. The accelerated speed of GenAI innovations requires immediate action as the catalyst to engage in critical exploration. Peters (2023) proposes pictographs, which she calls logos, to indicate if GenAI is used and in what manner. This transparency is one way to show how GenAI tools can be used while providing accountability for what is submitted. This approach will allay the fears expressed by participants.

Another approach is to initiate meaningful dialogue. Bacchi's (2000) concept of the problem-questioning paradigm suggests that the absence of discourse among school leaders regarding GenAI conveys a lack of urgency or need for change. According to Bacchi (2012), "what we say we want to do about something indicates what we think needs to change and hence how we constitute the 'problem'" (p.4). The absence of urgent meaningful dialogue, particularly as educators sense that students are increasingly using GenAI tools, signals to students that the covert use of unsanctioned tools can persist. In turn, that undermines academic integrity. Freya likens this lack of established practices in the current educational landscape regarding GenAI integration to "the Wild West" (Freya, 05, para 25). Freya explains that GenAI "is so new that [teachers] do not have a language of discourse for it yet" and "without a language of discourse for it, then [teachers] can't really set parameters for effective use (Freya, 05, para 25). This lack of clarity is leading teachers to do different things with respect to the use of GenAI, leading them to come up with their own definitions of what constitutes acceptable use and what constitutes cheating. Such inconsistency is due to the lack of dialogue across individuals and lack of guidance from leaders. Harper, a teacher with 10 years of experience, says, "I hope that when someone takes the lead, we're looking at ways to incorporate the technology instead of only safeguarding academic integrity" (Harper, 12, para 89). This underscores the need for concerted efforts to establish a cohesive framework for GenAI integration in education, fostering dialogue, and addressing the evolving landscape of academic integrity in the digital age.

Crystal emphasizes the quintessential role of teachers: "educate the students. To get them to think critically. To uphold principles of academic integrity and to run courses with high levels of academic rigor to prepare students for whatever they want to do when they graduate from high school, whether that's to join the workforce, start their own business, go to university or go to college" (Crystal, 11, para 131). Teachers' reflections on GenAI integration underscore the importance of maintaining academic integrity and aligning educational practices with provincial policies.

Generating policy

In the current educational landscape, conversations surrounding the integration of GenAI into pedagogy are palpable but lack a clear direction. Crystal, a secondary educator with nearly 2 years of experience, acknowledges the potential of GenAI, stating, "I think that AI can, in theory, be used ethically if we're given clear guidelines of what to do and how to do it" (Crystal, 11, para 83). Crystal expresses the sentiment for direction and boundaries. Similarly, Sarah emphasizes the need for clear expectations and policies

to navigate the integration of GenAI effectively, stating, "if a clear system is put in place, if there were outlined specific expectations for students and teachers, I think that would be helpful" (Sarah, 10, para 46). These sentiments are echoed by Arborist, who remarks on the lack of direction, indicating a collective struggle among educators and learners alike to adapt to the evolving technological landscape: "Our practices are worse. This is because we don't have any direction yet" (Arborist, 09, para 50). Drawing from personal experience, Freya underscores the common sentiment of educators being left to navigate GenAI integration independently due to insufficient institutional support. She posits, "in my experience, any kind of practical sense does come from the teachers because there is so little support that comes from the board or the Ministry. It gets downloaded, and it's a teacher's problem to go figure it out" (Freya, 05, para 57). Myles further articulates a critical concern about the unchecked expansion of GenAI in education, warning "if we're not diligent [in addressing the proliferation of GenAI] it will become pervasive and start to erode the integrity and expectations that we set forth for our students" (Myles, 13, para 93).

Rob, a teacher who works with students with developmental delays, says that "students with autism, who have a lot of communication difficulties, might be able to use generative AI to sort of communicate" but people in the school have "never really had any discussion about [GenAI]" (Rob, 01, para 76). This underscores the urgent need for schools to explore and discuss how GenAI can support diverse students' needs.

Policies are meant to resolve problems (Wu et al. 2018). A significant problem has emerged as GenAI permeates various aspects of education. As GenAI rapidly evolves, the set of possible solutions eludes policymakers. Teachers are left to operate within this unregulated space. The proponents and adversaries of GenAI usage demand new sets of policies to further their aims. The problem areas include, but are not limited to, capacity building in educators, permissible uses by students, degrees of freedom afforded to educators and learners, and recourses when permissible uses of GenAI are breached. Additionally, policies are expected to address issues such as data privacy, equity and access, ethical considerations, and the potential impact on student–teacher relationships. Until clear and comprehensive policies are created and implemented to guide the integration of GenAI in education, educators and learners alike will continue to face significant challenges (McDonald et al. 2024) and uncertainties, as our participants indicated. For example, Sarah says, "policy needs to be developed instead of having each individual teacher try to bumble around and figure it out for themselves and not really having any overall guidelines or expectations" (Sarah, 10, para 82).

Chan and Lee (2023) indicate a growing interest in incorporating GenAI tools like ChatGPT in teaching and learning, which underscores the importance of developing evidence-based guidelines and policies to regulate the integration of GenAI in education, ensuring responsible and effective use. To collect this evidence and discover what works, teachers will have to experiment and discover what works within their specific contexts.

A further significant challenge in creating such policies lies in the lack of consensus and understanding among educators, policymakers, and stakeholders on the potential benefits and risks of integrating GenAI in education. The problem is further compounded by the rapid advancement of technology, which often outpaces policy development and creates a lag in addressing emerging issues. To address these challenges, educators,

policymakers, and stakeholders to engage in meaningful dialogue and collaboration. The lack of systematic and purposeful dialogue was the source of angst and frustration expressed by our participants. For instance, Mary states:

> *We haven't really talked about it specifically, like at least not in the context of, like any professional development. So, I would say we're just kind of weird. So, I hear conversations about it, like in the staff room and stuff, but I haven't heard how we are tackling it. I mean, there's a lot of people who say that when they get something written by a student, it's really obvious it's not written by them because they're using words that the student wouldn't normally use. So, I think like having access to what they would write on the normal on every day if you get something that looks completely different, it's like okay, this is either a parent or they're using AI to write it. That's what I've heard. I've heard people talk about, but I would say we're really behind the gun. 100% we are. (Mary, 15, para 71)*

Unlike in secondary schools, faculty members in higher education are encouraged to enhance their digital literacy and understanding of GenAI to leverage these technologies in educational settings effectively (Wolf 2023). This has been possible because academic freedom permits university instructors to explore and experiment with integrating GenAI. Secondary school teachers have limited autonomy and are bound by more rigid curriculum guidelines. In response to this emerging landscape of GenAI, there is a growing interest in K–12 education to establish guidelines delineating what students should know about GenAI at various grade levels (Touretzky et al. 2019). Therefore, explicit opportunities will need to be crafted through policies. For instance, it will be necessary for educators at all levels to be provided with professional development and support to navigate the integration of GenAI into their practices (Karampelas 2021). Such policies will be expected to address space, time, and resources for teachers if the onus is on them to integrate GenAI into their classrooms. It will be crucial for policies to also focus on enhancing teachers' data literacy, as suggested by Yan and Guo (2021), to support them and help them construct classrooms for effective GenAI integration.

However, teachers are not the only central stakeholders in this enterprise. Barrett and Pack (2023) emphasize the importance of understanding both student and teacher perspectives on GenAI use in the writing process to establish evidence-based guidelines for its integration. Furthermore, Mundy et al. (2012) stress the importance of considering teachers' professional expertise in evaluating curriculum development and strategies, especially in the context of technology integration.

Incorporating GenAI in education will require a collaborative effort that involves not only teachers and policymakers but also students, their parents, tech companies, and possibly even teacher unions. Such collaboration might ensure that the voices and needs of all stakeholders are considered, creating a more inclusive and effective educational system.

To address these challenges and ensure the ethical and effective integration of GenAI in education, schools, boards, and ministries of education must provide clear guidelines, expectations, and support for teachers and students. Despite its attendant cost, such support is needed if teachers are to educate students for the future. If educators are to discover innovative solutions, they need additional freedom and resources to conduct thorough research and experimentation. The scope of their workload and responsibilities

may need to be adjusted to accommodate the integration of GenAI (Zhai et al. 2021). As GenAI continues to evolve and permeate education, educators and policymakers need to recognize the need to adjust teachers' professional roles and organizational structures within educational institutions.

Ensuring GenAi's cohesive and effective integration in education requires a concerted effort from all stakeholders. As demonstrated through the themes of generating *people*, *programs*, and *policies*, the potential of GenAI in transforming educational practices is significant. Yet, it is fraught with challenges that need to be addressed through strategic planning, professional development, and robust policy frameworks. By fostering open dialogue, providing comprehensive training, and developing clear guidelines, educators can harness the benefits of GenAI while maintaining the integrity and quality of education. The collaborative efforts of teachers, administrators, policymakers, and other stakeholders are essential to navigate this evolving landscape and ensure that GenAI serves as a valuable tool in enhancing teaching and learning experiences.

Recommendation: a modest proposal

The question that emerges from the analysis of findings is: What can be done based on what we have learned from this study? The answer is partial and provisional because the limitations, restrictions, and pressures facing administrators are not fully understood. Thus, we recommend fostering a collaborative ecosystem where school leaders and classroom teachers work together to generate opportunities for people, programs, and policies that uphold the fundamental values of academic integrity: honesty, trust, fairness, respect, responsibility, and courage (International Center for Academic Integrity [ICAI] 2021).

Generating people involves empowering teachers with comprehensive training and professional development initiatives. By equipping educators with the necessary skills and knowledge, they can effectively integrate GenAI tools into their instructional practices while preserving academic integrity. Open communication and collaboration among stakeholders, including administrators, parents, and students, is crucial for establishing a shared understanding and collective responsibility.

Generating programs necessitates the development of transparent guidelines and informed practices for the ethical use of GenAI in educational settings. Generating programs is akin to creating a culture of academic integrity, which might include modelling practices that uphold academic integrity and demonstrating accountability, such as GenAI-generated content disclosure. Engaging in meaningful dialogue, which sometimes might be uncomfortable, is vital in establishing clarity in using GenAI and reducing concerns about academic misconduct.

Generating policies requires a proactive approach to establishing robust ethical frameworks and guidelines that align with pedagogical objectives and academic integrity principles. Educational institutions could involve prioritizing the development of policies that support inclusivity, transparency, and consistency in the integration of GenAI. These principles are important because GenAI is new, and no single sector has all the solutions that might work. Consequently, including a diverse cadre of people with various ideas is essential. These ideas can then be sifted through a critical discourse of debate and examination. For this to happen, people need to be treated as able, valuable, and capable of self-direction and should be treated accordingly (Purkey and Novak

1988), which reconnects with generating people. In essence, we have a cyclical relationship where people (teachers) are enhanced by the skill development programs, which are based on and inform policies. Then, the policies support programs in place, encourage the participation of teachers in these programs, and, in the process, enhance people. Figure 1 illustrates this interrelationship.

By addressing these three pillars—people, programs, and policies—educational institutions can harness the transformative potential of GenAI while safeguarding academic integrity, all the while meeting the goals of educating today's students. As John eloquently stated:

> *In its simplest terms, the point of education is to develop, train, and foster skill sets amongst developing kids. A good education system is one that doesn't exist in a vacuum. It's one that's sort of operating within the bounds of the society that it operates in and that the kids live in. And therefore, any good education system is malleable and flexible and is responsive and adaptive to things outside of school that are occurring that affect kids' lives. Technology tools, whether for entertainment or for learning purposes, are in kids' lives outside of school. Therefore, it should be adopted in the class because it does exist outside of school. It's not negligible, it's not a fad, it's not a trend. It's a very deep part of how kids are learning in the digital age. So, it does need to be adopted in any education system that's future proofing itself that's making sure kids are learning how to learn. (John, 14, para 90)*

To implement this collaborative approach effectively, we propose a structure that illustrates the roles and interactions between school leaders and classroom teachers. Figure 2 presents a model in which teachers form a community of champions who act as advisors, leaders, and champions across several schools, helping educators understand how they might incorporate GenAI into their teaching, learning, and assessments while preserving academic integrity. They also ensure that the usage is consistent with sanctioned policies and guidelines from the Ministry of Education. This configuration also allows for the cross-pollination of ideas across schools within the school board. Refinements in policies (i.e. generating policies) can also emerge from these implementation leaders or champions. This invitational approach structure would initiate Tanjga's (2023) collaborative approach to addressing the evolving challenge of GenAI.

The proposed structure within the existing structure and resources available to school boards permit the skill development of teachers with minimal additional resources, as the teacher champions are selected across the existing pool of teachers who have an

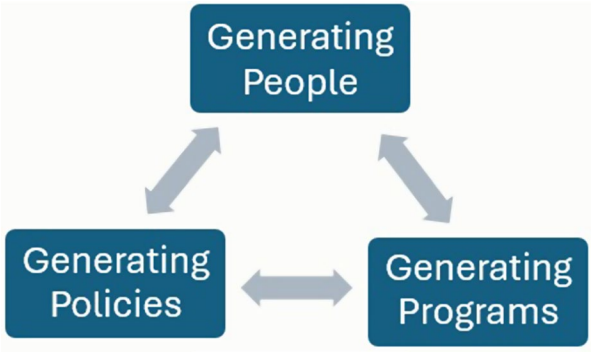

Fig. 1 Interrelationships among people, programs, and policies

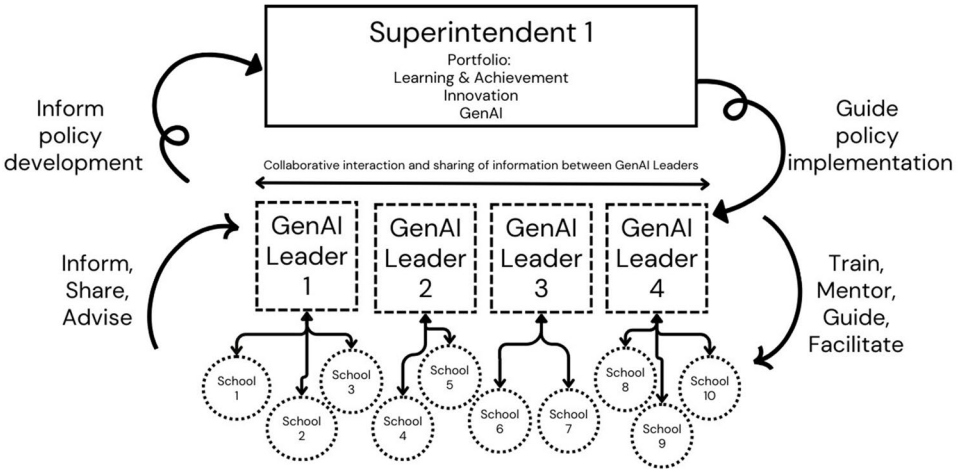

Fig. 2 An overview of the proposed invitational approach model of collaborative discovery of solutions

interest in the GenAI topic, some experience in using it, and ability to reflect and propose solutions. Even if these champions are made to take courses on GenAI integration, the proposed model turns into a train-a-trainer model, which is still cost-effective. At the superintendent level, other stakeholders, like teacher training faculty and external experts, could be involved to ensure a more inclusive, robust, and accountable structure. The model is also scalable since it can be replicated across various superintendents and school boards.

In conclusion, implementing a collaborative approach to GenAI integration in education requires a multifaceted strategy that addresses the development of people, programs, and policies. By fostering professional development, creating transparent guidelines, and establishing robust ethical frameworks, school boards can harness the potential of GenAI while maintaining academic integrity. Ensuring scalability, proper resource allocation, and continuous evaluation will be crucial to the model's success. With a concerted effort from all stakeholders, effective preparation of teachers and students for the future in an increasingly digital world can be achieved.

Limitations

No research study is without its limitations, and these need to be considered lest the findings be generalized and applied widely. This study's findings are not generalizable because only 17 participants contributed from five distinct school boards, all from the southern Ontario region in Canada. Additionally, all participants were from publicly funded school boards and self-selected to participate in the study.

Administrators' perspectives are missing, and their impressions might have informed the challenges they face in addressing some of the charges brought against them by teachers. We opted for an invitational educational framework, but interpretations from an equity, diversity, and inclusion (EDI) framework might have differed.

Despite these limitations, this study highlighted secondary school teachers' voices, which have largely been absent from discussions on the proliferation of GenAI. Understanding their perspectives will allow for an inclusive approach to emerge in preparation for the adoption of GenAI.

Conclusion and future directions

The voices of the 17 high school teachers from Ontario who participated in this study have been instrumental in understanding the complexities and challenges posed by the appearance of GenAI content through students' work in secondary education. Their insights reveal significant concerns and potential benefits, highlighting the urgent need for a supportive and well-informed approach to GenAI's disruptive presence in high school settings.

Firstly, the challenges identified by teachers underscore the need for comprehensive support from various stakeholders. Administrators, parents, and teacher unions must work together and not against each other to deal with the challenges of GenAI. The most significant need teachers identify is learning more about and integrating GenAI. In short, teachers need support in filling their skill gaps in navigating this new technological landscape. Without such support, GenAI's effective and ethical integration into the classroom remains elusive.

The quality of education and the competency of future graduates are at a critical juncture. The lessons learned and the habits acquired during high school will significantly impact students' readiness for postsecondary education. High school students will need guidance and support from knowledgeable teachers to acquire skills on how to use GenAI ethically and responsibly to learn. Bad or unethical practices are more likely to be acquired without competent teachers. Ensuring students receive a robust and well-rounded education in this GenAI-influenced environment is imperative for maintaining academic standards and producing quality graduates.

Central to navigating these challenging times is the principle of academic integrity. Upholding its values and practices is essential for maintaining honesty, trust, and credibility within the educational system. Teachers must illustrate and model the behaviours they wish to inculcate in their students; they know it and indicated in this study that they want to acquire requisite skills and pass them on to their students. For that, teachers need proper training, time, and support to integrate GenAI into their teaching practices and assessments. This includes the ethical use of GenAI, whereby tools like ChatGPT can be integrated effectively while adhering to academic honesty. Peters (2023) illustrates how GenAI can be used transparently through her pictograms, and Chng et al. (2023) provide examples of GenAI usage in STEM fields. Researching various techniques, experimenting within the disciplinary context, and refining them would require resources that teachers are demanding.

The invitational approach offers a promising framework for intentionally engaging and inclining teachers toward positive educational experiences of integrating GenAI technologies. By adhering to the principles that "people are able, valuable, and responsible and should be treated accordingly" (Purkey and Novak 1988, p.12), educators can foster an environment that encourages students to embrace learning and responsibility in the age of GenAI.

Finally, policies will need to provide the roadmap for this journey. Teachers will serve as the signposts, guiding students—the travellers—through the complexities of GenAI integration. Preparing teachers adequately is essential to ensure that students are not left ill-prepared, thereby preserving the robustness of our educational system.

In sum, the successful integration of GenAI in secondary education hinges on a collaborative, well-supported, and ethically grounded approach. By equipping teachers with

the necessary resources and support, fostering academic integrity, and adopting an invitational approach, we can navigate the challenges and harness the potential of GenAI to enhance the quality of education and prepare students for a dynamic future. That is what Ontario secondary school teachers desire to respond to the challenges and grasp the opportunities brought about by the proliferation of GenAI.

Abbreviations

AI	Artificial intelligence
EDI	Equity, diversity, and inclusion
GenAI	Generative artificial intelligence
IE	Invitational education
PSE	Postsecondary education
STEM	Science, technology, engineering, and mathematics

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval
The research study received ethics approval from our university (REB# 23–059) prior to the commencement of the research. Participants were informed of the details of the research study laid out in the Consent form, which was approved as part of the ethics clearance. A signed copy from each participant was obtained. The blank copy of consent form is attached as a supplementary file.

Consent for publication
The authors agree to the terms of publication.

Competing interests
The authors declare no competing interests.

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