

Generative Artificial Intelligence (AI) in education: from organizing visions to official guidelines

Andy Nguyen

Learning and Educational Technology (LET) Research Lab, University of Oulu, Oulu, Finland and

Oulu Advanced Research on Service and Information Systems (OASIS) Research Group, University of Oulu, Oulu, Finland

Shohil Kishore

Department of Information Systems and Operations Management (ISOM), University of Auckland, Auckland, New Zealand

Yvonne Hong

School of Information Management, Victoria University of Wellington, Wellington, New Zealand

Saima Qutab

Department of Information Systems and Operations Management (ISOM), University of Auckland, Auckland, New Zealand, and

Belle Dang

Learning and Educational Technology (LET) Research Lab, University of Oulu, Oulu, Finland

Abstract

Purpose – This paper aims to explore the initial formation of organizing visions within digital platforms regarding the use of Generative Artificial Intelligence (GAI) in education. It examines how these emerging visions align with official guidelines. Understanding the early development of these organizing visions and the consensus formation around official guidelines for GAI in education has significant research and practical implications.

Design/methodology/approach – The present study uses a multimethodological approach with qualitative content-coding and inductive thematic analysis of digital trace data from the social media platform X and deductive thematic analysis of guideline documents. It first examines organizing visions within digital platforms through 1,260 tweets, focusing on opportunities and challenges posed by GAI, particularly ChatGPT, in educational settings. The study then analyses practical guidelines from international organizations, governments, and universities.

Findings – The empirical findings demonstrate that, although all three Organizing Vision (OV) functions are present in the early development of OVs for GAI in education, early-stage online discourse predominantly emphasizes the legitimization function. The findings also indicate a noticeable alignment between the topics discussed in the early development of OVs for GAI in education and the official guidelines and policies issued by international organizations, governments, and universities worldwide, indicating the need for educational reform, and ethical considerations.

Originality/value – This study contributes to the existing literature on the emergence of OVs in digital platforms by examining the context of GAI in education. This study also provides insights into the collective



stance and recommendations from various authoritative sources, offering a comprehensive perspective on early-stage GAI policy development in an educational context.

Keywords Generative Artificial Intelligence, Organizing visions, AI in education, Educational information systems

Paper type Research article

1. Introduction

The widespread adoption of Artificial Intelligence (AI) in society represents a fundamental shift in the paradigms that govern various domains, including education (Chen *et al.*, 2022). The advancement of Generative AI (GAI), exemplified by models such as Gemini and GPT-4, has heightened the discourse surrounding its utility and implications for learning and teaching (Kasneci *et al.*, 2023; Kishore *et al.*, 2023). According to a quantitative report from 2024, approximately half (51%) of young people aged 14 to 22 indicated that they have used GAI at least once (Hopelab & Common Sense Media, 2024). These GAI models demonstrate the ability to interpret textual content and generate human-like text, which can be utilized for personalized learning, automated feedback, and the creation of dynamic learning environments (Hina *et al.*, 2025; Chen *et al.*, 2022; Nguyen *et al.*, 2020a). Approximately 62% of employees' working time is dedicated to language-related tasks. As a result, Large Language Models (LLMs) such as GPT-4 have the potential to influence nearly 40% of total working hours (Daugherty *et al.*, 2023). Professionals initially adopted LLMs due to their significant capacity for processing natural language and generating information rapidly, which improved productivity and supported decision-making in digitally intensive workflows (e.g. Li *et al.*, 2024). Nevertheless, while research indicates that LLMs augment routine tasks, the irreplaceable benefits of human judgment and collaborative decision-making remain essential (Järvelä *et al.*, 2025). Furthermore, while GAI promises transformative advances, the risks, particularly regarding misuse and ethical concerns, are equally consequential (Nguyen *et al.*, 2023; Holmes *et al.*, 2021). This situation places significant pressure on education to prepare learners for changing workforce demands.

The integration of GAI in educational contexts raises critical questions that necessitates the examination of emergent structures and processes contributing to the development of institutional guidelines (Swanson *et al.*, 2025). For instance, a recent study has shown that GAI may encourage learners to become overly reliant on technology, potentially leading to a phenomenon known as “metacognitive laziness,” where individuals may engage less in critical thinking and self-regulation of their learning processes (Fan *et al.*, 2024). The sophisticated capabilities of GAI may create an environment where students are passive recipients of information rather than active constructors of knowledge. In this context, the convenience offered by GAI may hinder the cognitive struggle necessary for substantive learning. Another concern lies in the domain of epistemological integrity. The risk that GAI-generated content may propagate biases, inaccuracies, and misinformation directly threatens educational quality and fairness (Lund *et al.*, 2023). The complexities surrounding the use of GAI, including applications such as ChatGPT, in educational settings naturally prompt the need to carefully consider how communities engage in organizing their understanding and adoption of GAI, as well as the development of guidelines to ensure its responsible use. Educational institutions, including schools and universities, face strategic and operational questions when adopting GAI. However, educational institutions are not yet fully prepared to address these challenges. For example, a recent study found that less than a quarter of staff members believe their university has provided them with sufficient training to effectively engage with GAI, while more than three-quarters expressed a need for additional support (Lee *et al.*, 2024).

Organizing Visions (OVs) has emerged as a conceptual framework to understand how technological innovations are adopted and integrated into an organization, community, or society (Bunduchi *et al.*, 2020; Currie, 2009; Ramiller and Swanson, 2003; Swanson and Ramiller, 1997; Swanson *et al.*, 2025). As technological innovations are introduced, OVs arise to

construct meaning both within and across organizations (Swanson and Ramiller, 1997). A “complex community” of organizational actors engage in discourse to evaluate the potential discontinuity posed by the innovation which leads to the development of an OV (Swanson and Ramiller, 1997, p. 460). GAI constitutes a disruptive technological innovation, as its expanding influence in workplaces (e.g. Hessari *et al.*, 2024; Engström *et al.*, 2024; Heimburg *et al.*, 2025) and educational environments (e.g. Giannakos *et al.*, 2024) prompts the need to reevaluate current practices. GAI qualifies as an innovation because it represents a fundamental breakthrough in technology and organizational practice, exemplified by its capacity to disrupt traditional models through radical new methods of creative content generation (Rogers *et al.*, 2014). In this context, Organizing Vision Theory (OVT) (Swanson and Ramiller, 1997) offers a valuable lens to examine the adoption and integration of GAI in education, highlighting how shared interpretations, framing, and collective action shape the trajectory of GAI. OVT comprises three functions (interpretation, legitimation, and mobilization) which frame the adoption of innovative technologies. Interpretation involves conveying the usefulness of innovative technologies to a broader community, legitimation involves demonstrating and debating its applicability to current challenges, and mobilization involves motivating community actors to adopt and diffuse technological innovations (Davidson *et al.*, 2015; Parameswaran *et al.*, 2023). In the process of engaging with and comprehending technological innovations, OVs play a crucial role in recognizing potential benefits and drawbacks. Through discourse, the community “collectively interprets the innovation, legitimates it, and mobilizes the collective action necessary for its diffusion” (Miranda *et al.*, 2022a, p. 1422).

While previous research has primarily examined discourses occurring in the offline realm (Kim and Miranda, 2018), recent research highlights that OV functions manifest differently in the digital realm (Miranda *et al.*, 2022a; Amadoru *et al.*, 2021). Digital platforms, particularly social media, are reconfiguring how OVs are formed. Unlike conventional institutional settings where consensus is built through established authority structures framed around organizational rationales for adoption, the participatory nature of social media enables a diverse array of actors to engage in rapid, emergent and decentralized discourse (Swanson *et al.*, 2025). Social media platforms now functions as a compelling discourse vehicle which allows various actors to actively engage in OV formation (Amadoru *et al.*, 2018). Following this line of inquiry, the present study explores the early-stage development of OVs on social media related to GAI, specifically ChatGPT, in educational contexts. In addition, the study investigates how the functions of OVs correlate with subsequently formulated ethical guidelines. In particular, we seek to answer the following research questions:

- RQ1. How is the early-stage formation of OVs for GAI in education reflected in social media discourse?
- RQ2. How does the early-stage development of OVs for GAI in education align with established practical guidelines and policies?

This study contributes to existing knowledge on how online discourse shapes OVs for GAI, particularly ChatGPT, by showing a strong focus on the legitimation function in the early stages of technological adoption and diffusion. Through an integrated analysis of digital trace data from X and relevant policy documents, the findings reveal discussions centred on key aspects needed to be considered for GAI in education, reflecting its disruptive potential for existing assessment designs (Schiff, 2022; Stahl and Eke, 2024) and the importance of responsible learner engagement (Fui-Hoon Nah *et al.*, 2023; Swiecki *et al.*, 2022; van Slyke *et al.*, 2023). These insights contribute to a unified perspective on GAI-related guidelines and call for institutions to adjust practices in ways that enhance opportunities while minimizing risks, in alignment with other studies that highlight the need for balanced and inclusive approaches. Practically, this study provides educators and educational technologists with an integrated perspective on crucial practical guidelines for using GAI technologies, such as ChatGPT, in educational settings. The study serves as a foundational reference by synthesizing a consensus view on key practical

guidelines for the responsible use of GAI in educational settings (Stahl and Eke, 2024). This allows educators to navigate the complex ethical landscape associated with implementing GAI-driven solutions in the classroom (Akgun and Greenhow, 2022; Chang *et al.*, 2025), thereby aiding them in balancing innovation with ethical considerations (Schiff, 2022).

The following sections present an overview of the research background and literature review on GAI in learning and teaching and OVs in technological innovation research. We then outline the data collection and analysis methods used in our study. This is followed by our findings, where we discuss our research's main contributions and potential implications. Finally, we conclude with the limitations of our study and suggest directions for future research.

2. Research background and literature review

2.1 *The emergence of Generative Artificial Intelligence (GAI) in learning and teaching*

Generative Artificial Intelligence (GAI) has attracted significant attention for its potential to transform teaching and learning processes (Cukurova, 2024; Giannakos *et al.*, 2024; Nguyen *et al.*, 2024). GAI is a subset of AI models characterized by their ability to generate new content or predict outcomes based on input data. Unlike narrow AI, which excels in specific, predefined tasks, GAI can generalize knowledge across different domains, making it far more versatile and capable of providing answers upon requests in a wide array of contexts. In learning and teaching, an immediate concern is that learners may rely on GAI to complete their assessments with minimal effort (Xia *et al.*, 2024). This reliance can lead to a superficial engagement with the learning process (Yang *et al.*, 2024), as students may bypass critical thinking and problem-solving activities that are essential for deep understanding (Fan *et al.*, 2024). Such practices could undermine the development of essential skills and competencies that assessments are designed to evaluate (Mao *et al.*, 2024; Swiecki *et al.*, 2022).

Despite these concerns, GAI also presents valuable opportunities to enhance learning and teaching experiences. In personalized learning, for instance, GAI models could be leveraged to create individualized learning experiences (Yang *et al.*, 2024), customizing content based on learners' unique patterns, strengths, and weaknesses. This aspect of GAI is critical in addressing individual students' varied learning styles and paces, allowing for a more adaptive and responsive educational environment (Kasneci *et al.*, 2023). Research demonstrates that GAI can significantly enhance learning efficiency and increase student engagement by providing customized content and exercises that adapt to each learner's specific needs (Chen *et al.*, 2022; Yan, 2023). Recent research suggests that when introduced with careful instructional design, these technologies can improve writing quality (e.g. Nguyen *et al.*, 2024; van Niekerk *et al.*, 2025), foster creativity, and promote reflection (e.g. Nguyen and Nguyen, 2024). Moreover, these technologies are instrumental in facilitating a more inclusive educational approach, catering to diverse learning needs and potentially reducing educational disparities (Markauskaite *et al.*, 2022; Nguyen *et al.*, 2020b). With both crucial concerns and significant opportunities, the integration of GAI in education at the institutional level is complex, posing threats to academic integrity, challenging existing assessment methods, and necessitating curriculum reforms to address future skill demands. This has forced educational institutions to urgently find ways to embrace GAI (Swanson *et al.*, 2025). The advanced capabilities of GAI, combined with the inherent challenges of infrastructure compatibility, user training, and ethical considerations, highlight the necessity of understanding the development of OVs. Gaining insights into OVs enables a deeper understanding of how GAI, as an emerging technology, is embraced across organizations, communities, and societies, highlighting their critical role in steering technological advancements and shaping policy frameworks.

2.2 *Organizing visions (OVs) for technological innovation*

OVs align closely with the study of technological innovations. It offers a macro-level framework to understand the implementation, adoption, and diffusion of innovative technologies (Parameswaran

et al., 2023) both within an organization and across the broader organizational field (DiMaggio and Powell, 1983). Introduced by Swanson and Ramiller (1997), OV's encompass a community's collective understanding and expectations about technology innovation, influencing organizational decision-making and technology adoption. From a broader perspective, complex communities engage in collective discourse to enable innovation diffusion (Barrett *et al.*, 2013; Miranda *et al.*, 2022a). These collective understandings are especially visible in the context of GAI in education, where such technologies have rapidly gained traction for individual use. By framing the shared narratives and interpretations that guide decision-making, OV's may help educational institutions and stakeholders determine how best to adopt and integrate GAI into curricula and teaching practices. The role of OV's in shaping the adoption and diffusion of technology innovations, although an evolving field (Kim and Miranda, 2018), has been well-documented (Swanson *et al.*, 2025). The literature highlights the necessity of an OV to generate interest and foster a shared understanding of the potential implications of technological innovations (Ramiller and Swanson, 2003). Additionally, the presence of an OV has been shown to expedite the diffusion of technological innovations by providing a common language and reference point (Amadoru *et al.*, 2021; Davidson *et al.*, 2015; Palas and Bunduchi, 2020). Swanson and Ramiller (1997) suggest that these visions are developed and spread through a process of interpretation and communication among stakeholders, including technology vendors, consultants, researchers, and industry analysts. This collective effort shapes the OV, which in turn, influences the perceptions and expectations of adopters (Barrett *et al.*, 2013; Wang and Ramiller, 2009).

The success factors for OV's have also been explored in the literature. The credibility and legitimacy of the stakeholders promoting the vision are critical for its acceptance (Wang and Ramiller, 2009). Furthermore, the alignment of the OV with organizational values, goals, and broader industry trends is essential for its effectiveness (Amadoru *et al.*, 2021; Bunduchi *et al.*, 2020). The relationship between an OV and the institutionalization of technological innovations, through changes to institutional processes and practices, has been examined in-depth (Swanson *et al.*, 2025). A coherent OV can lead to the institutionalization of technological innovation by providing a shared understanding of its value, increasing its use and adoption within organizations (Parameswaran *et al.*, 2023). In other words, through the lens of OV's, one can examine how communities coalesce around these possibilities, articulate benefits and risks, change their associated practices, and develop policies that encourage the effective application of such innovations (Swanson and Ramiller, 1997). This process, characterized by community-driven coordination and shared meaning-making, can illustrate how GAI is not merely introduced into educational contexts but socially constructed and diffused, thereby influencing long-term outcomes.

Beyond its crucial role in influencing how innovations are perceived, adopted, and implemented within various organizational contexts, OV's can also influence industry standards and policies (Wang and Swanson, 2007, 2008). It can inform policy-making processes, guide regulations, and set standards that govern the use and impact of technological innovations. However, there are limited empirical studies examining their direct impact on policy and standard-setting activities (Davidson and Vaast, 2010; Ramiller and Swanson, 2003). In order to comprehensively understand how OV's are reflected and potentially influence the formulation of practical guidelines on GAI, our study aims to address these identified gaps by conducting a thorough examination and comparison of practical guidelines and reports from prominent organizations and exemplary universities across the globe. By examining these documents, we intend to uncover the interplay between online discourse and their eventual codification into formal guidelines, thereby contributing to a nuanced understanding of the development of OV's through policies and standards on GAI in education.

3. Study design and analysis

The increasing availability of digital trace datasets from social media platforms presents significant opportunities for researchers to develop rich theoretical insights through intensive

data exploration, supported by innovative analytical methods (Dindar and Yaman, 2018; Berente *et al.*, 2019; Miranda *et al.*, 2022b). This study leverages this potential by utilizing qualitative coding to analyze updates generated on the social media platform, X (previously known as Twitter). Social media platforms, such as X, represent a rich source of human interactions and patterns where different types of “organizations are drawn into active participation” (Swanson *et al.*, 2025, p. 12).

To investigate the relationship between OV functions articulated on social media platforms and the formulation of formal practical guidelines, a comprehensive document analysis was also conducted. This analysis focused on guidelines issued by prominent international organizations, such as UNESCO, the OECD, and the European Parliament, as well as policies from exemplary universities worldwide. The themes derived from document analysis were qualitatively coded and linked to the digital trace data gathered from X for further analysis. Figure 1 demonstrates the overall methodological framework applied in this study.

Our multimethodological research approach is grounded in the pragmatism research philosophy, which considers concepts relevant only if they support action. Pragmatism acknowledges that there are multiple ways to interpret the world and conduct research, recognizing that no single perspective can provide a complete understanding and that multiple realities may coexist (Saunders *et al.*, 2012). In this context, our study aims to generate actionable insights for the application of GAI in education.

3.1 Data collection and sampling

3.1.1 X (Twitter) data collection. We gathered data through the X API v2 full-archive endpoint, which provided access to the entire archive of tweets dating back to 2006 (X, 2022). Our data collection spanned the initial four months of discourse following the release of ChatGPT on November 30, 2022 (i.e. December 1, 2022, to March 31, 2023). Understanding the initial stages of adoption and diffusion is essential, as institutional processes are engaged with from the inception of an innovation to create and employ a coherent OV (Swanson and Ramiller, 1997; Swanson *et al.*, 2025). Given ChatGPT’s prominence in the GAI debate, particularly in educational settings (Lim *et al.*, 2023), we focused on this technology specifically.

To iteratively generate data collection parameters, we initially used the hashtag #chatgpt and the keyword “chatgpt” as seed parameters to collect an initial dataset: (#chatgpt OR chatgpt). From this dataset, we then extracted and ranked co-occurring hashtags and keywords based on frequency. A sample of tweets specific to each new term was extracted and manually verified to ensure that the discourse was specific to ChatGPT. Once agreed upon, the author team expanded the search query to include common variants and version-specific terms (e.g. ChatGPT-3, ChatGPT-4) to capture the broader discourse. This process resulted in our final query: (#chatgpt OR chatgpt OR “chat gpt” OR #chatgpt3 OR chatgpt3 OR “chat gpt3” OR

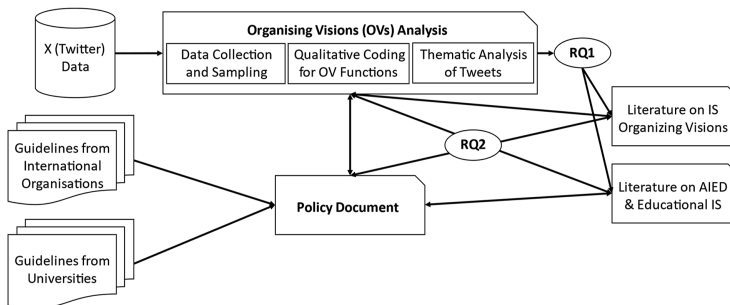


Figure 1. Multimethodological approach adopted in this study for examining organizing visions and practical guidelines. Figure created by the authors

“chat gpt 3” OR #chatgpt4 OR chatgpt4 OR “chat gpt4” OR “chat gpt 4”) lang:en -is:retweet. Retweets and non-English tweets were excluded to focus on content generated by different actors and ensure accurate interpretation by the English-speaking author team. In alignment with recommendations, the query was not extended further as other emergent parameters were too broad in their utilization, which would have introduced unnecessary noise into the dataset (Kishore *et al.*, 2025, p. 6). Data collection occurred on the 14th of March and 14th of April using a custom toolkit developed by the author team (Kishore *et al.*, 2019). Data collection resulted in 2,408,153 English tweets.

3.1.2 Document gathering. Our document sources are selected from influential organizations actively involved in technology guidelines and ethics. These include UNESCO (Miao and Holmes, 2023; UNESCO, 2023), for its international perspective on educational, scientific, and cultural matters; the OECD (Lorenz *et al.*, 2023), providing economic and societal impact analyses; the European Parliament (Madiaga, 2023), offering insights into legislative frameworks within the EU; as well as the UK Government and the Australian Government, reflecting national-level guidelines.

The collection process involved an extensive search of online databases, official websites, and digital libraries, using key terms related to GAI and practical guidelines. Each document identified through this search underwent a verification process to confirm its authenticity and relevance. Only those documents officially published or endorsed by the mentioned organizations and directly relating to GAI were included as the perceived authority of organizations impacts mobilization (Swanson and Ramiller, 1997; Davidson *et al.*, 2015).

Given our objective to triangulate and compare these university-sourced guidelines with those from international organizations, the selection criteria for university documents were intentionally broad. We opted for a convenience sampling method, choosing universities from different continents around the world. The utilization of convenience sampling in the selection and analysis of official guidelines related to GAI from certain countries acknowledges the practicality of accessing documents in English and the availability and accessibility of these documents. All selected universities are major, public, well-established institutions, chosen to facilitate the triangulation and comparison of national policies with guidelines issued by renowned and influential organizations. This approach was designed to capture a wide range of viewpoints and approaches to GAI ethics from countries across different continents, reflecting the diverse contexts and considerations that universities globally might have. This approach aims to provide a representative sample of countries from around the world, allowing the findings to offer valuable insights that can contribute to the development of policies for educational institutions. Furthermore, this method of collecting university documents complements our analysis of guidelines from international bodies. By doing so, we aim to provide a comprehensive view of the global landscape of practical considerations on GAI, showcasing the international standards set by organizations such as UNESCO and OECD and the applications and interpretations of these standards in academic institutions worldwide. The documents were selected as of 31 October 2023 where one relevant document was identified for each selected university. The demographic distribution of the selected universities includes the United Kingdom (UK1 and UK2), the United States (US1, US2, and US3), Canada (CA1 and CA2), New Zealand (NZ1), Australia (AU1), Finland (FI1 and FI2), and Hong Kong (HK1 and HK2).

3.2 Data analysis

3.2.1 X (Twitter) data sampling and reduction. Data sampling and reduction, particularly when handling large-scale digital trace datasets, enhances data analysis (Miranda *et al.*, 2022b). As highlighted in Table 1, the dataset was reduced to 1,260 tweets using a two-step process. First, given the varied discourse on ChatGPT, all education-related tweets were identified using partial string matching. The partial string match query was developed in conjunction with the author team to capture all relevant tweets. Initially, one author created a list of terms, which

Table 1. Data reduction approach

Step	Explanation	Tweets
Data collection	Number of tweets mentioning ChatGPT between December 1, 2022, and March 31, 2023 (excluding retweets and non-English tweets)	2,408,153
Identify education-related tweets	Restricted dataset to tweets containing <i>educ*</i> , <i>teach*</i> , <i>universit*</i> , <i>school*</i> , or <i>college*</i>	91,842
Conduct unsupervised topic modelling (BERTopic)	Restricted dataset to a specific topic discussing banning ChatGPT in an educational setting	1,260

Source(s): Table generated by the authors based on collected data

was then evaluated by another author who reviewed a sample of included and excluded tweets. This process was repeated three times, at which point the author team agreed that all relevant tweets were included. For instance, we collected all tweets containing the string “educ*,” which encompasses relevant terms like “educator” and “education.” Our approach aligns with the method used in the prior study by [Kishore et al. \(2023\)](#), which filtered tweets relevant to GAI in the context of education. This manual process reduced the dataset to 91,842 tweets.

Second, we applied BERTopic, a transformer-based topic modeling package, to identify salient topics ([Grootendorst et al., 2023](#)). BERTopic generates sentence embeddings through the all-MiniLM-L6-v2 model by utilizing the pre-trained transformer-based language model Bidirectional Encoder Representations from Transformers (BERT). While other approaches, such as Latent Dirichlet Allocation (LDA), are popular, BERT outperforms existing topic modeling approaches in terms of interpretability which enriches contextual understanding ([Abuzayed and Al-Khalifa, 2021](#)).

For parameter tuning, we initialized UMAP with a fixed random state to ensure reproducibility across multiple iterations. After clustering, we used CountVectorizer to remove stop words and improve interpretability. Additionally, we considered unigrams, bigrams, and trigrams to capture both basic word frequencies and more complex contextual patterns. To evaluate different patterns, we varied the minimum topic size over multiple iterations which consistently revealed a specific discourse arguing both for and against the ban of ChatGPT in an educational context. As OVs are negotiated by a community of organizational actors, both contention and cooperation play an important role in understanding the competing discourses that shape the broader OV ([Swanson and Ramiller, 1997](#); [Barrett et al., 2013](#)). In addition, as this discourse displays uncertainty, it aligns with the development of an OV as it “addresses the uncertainties shrouding a technology innovation by providing a community-level interpretation or public account of the innovation’s purpose and destiny” ([Swanson and Ramiller, 1997](#), p. 461). Therefore, this discourse was extracted from the larger dataset and manually assessed by the author team to ensure coherence, leading to a final subset of 1,260 tweets. In summary, we applied a mix of automated computational methods (e.g. partial string matching and topic modelling) and manual methods (e.g. query development and quality assurance) to identify a coherent subsample.

3.2.2 Qualitative coding for organizing visions (OVs) functions. Qualitative coding was employed to analytically encode each tweet with the corresponding OV functions. Following the definitions provided by [Swanson and Ramiller \(1997\)](#), engagement with OV functions on X were categorized into one of three primary functions: interpretation, legitimation, or mobilization. [Table 2](#) outlines the coding scheme for these OV functions with their definition, operationalization and exemplars. To ensure the rigor of our qualitative coding, we implemented several strategies. Firstly, we utilized researcher-researcher corroboration on the operationalization of the OV function based on its definition by [Swanson and Ramiller \(1997\)](#). In the initial phase of coding the tweets, for instance, two authors independently coded the first

Table 2. Coding scheme for OV functions

OV functions	Definition (adapted from Swanson and Ramiller, 1997)	Operationalization	Exemplars
Interpretation	Involves how a community develops a shared understanding of an innovation's features, implications, and relevance. Helps construct a coherent narrative, clarifying the innovation's purpose, reducing uncertainties, and framing it as significant for broader adoption. This function provides clarity through experimentation and shared insights	Who: Typically observed among early adopters such as individual teachers, students, and tech-savvy staff engaging in informal or pilot settings, including classroom trials, social media exchanges, and department-level meetings/discussions Activities/Artifacts: Sharing of screenshots or videos showcasing the use of GAI, anecdotal narratives of personal success or failure, and debates around perceived benefits, limitations, or risks associated with its adoption	"I'm trying to get #ChatGPT to teach me Dutch, and it's going pretty well so far" (ID# 42) "The end of humanity, that's a bit extreme. What is true is that CHATGPT is easy to manipulate. What school urgently need to do, instead of banning the tool, is to teach them how to evaluate an online information and spot the BS" (ID# 669) "Students created presentations, posters and videos for their arguments on to ban #ChatGPT or not in schools. It was amazing to see their creativity using #GoogleSlides @canva and art to communicate their message. @CSforAllNYC #NYCSchoolsTech" (ID# 1236) "Teachers, have you checked out #ChatGPT yet? It's pretty useful for lesson planning and grading tests" (ID# 1231)
Legitimation	Involves developing a rationale to justify the innovation's adoption, answering "Why do it?" Legitimation ties the innovation to broader business concerns and is reinforced by the reputation of its advocates and adoption by others. This process transitions the innovation from a novel idea to accepted practice	Who: Led by high-status stakeholders – such as school administrators, district policymakers, and prominent academics – who engage through formal channels including policy documents, conference panels, and media interviews Activities/Artifacts: Advocacy emphasizing GAI's potential to reduce educational inequalities, cultivate future-oriented skills, and address educational gaps. Endorsements or position statements from recognized authorities and institutions signal the moral and practical significance of adopting GAI in education	"By banning ChatGPT from classrooms, schools risk depriving students from these communities of the opportunity to access new technologies and ways of learning. This can further widen the already significant gap between these students and their more privileged counterparts" (ID# 66) "ChatGPT should not be banned in schools. It's a tool like any other (e.g. computers). The way I see it, it will inspire a whole new generation of kids to try new stuff or think deeper about problems. In a way, I think prompt engineering will lead kids to ask better questions" (ID# 1214) "This. Academia is Stiller bases on memorization and often forgets learning and intelligence diversity. They should not ban ChatGPT, they should teach how an amazing assistant it is and how to actually use it to win time and help you in learning" (ID# 1207) "If the objective of education is to equip individuals for the future economy and global landscape, how do such bans align with this foundational principle?" 👉 #GenerativeAI #ChatGPT" (ID# 1164)
Mobilization	Involves activating and structuring market forces to realize an innovation. It motivates vendors to develop aligned products and services and helps adopters identify necessary resources. By catalyzing commercial opportunities and facilitating social networks, this process transforms an emerging technology from concept to practical reality	Who: Universities, professional development providers, educational technology platforms, and broader learning networks offer courses, webinars, and implementation guidelines. Major conferences and expos (both virtual and in-person) feature demonstrations and showcases of GAI applications in educational contexts Activities/Artifacts: Distribution of training materials, how-to videos, policy templates, formal adoption announcements issued by leading schools or districts	"Here's an excellent outline of promising ways that teachers and profs can make good [use of] ChatGPT rather than fear it and try to ban it. But it's going to take work, for sure . . . 'Center for Innovative Teaching and Learning' Northern Illinois University" (ID# 939) "This article is all about trying to stop/prevent #ChatGPT in the classroom. I'm more interested in the other way around. What are educators doing to proactively use ChatGPT as a learning tool in their classes? Let's zig when others zag" (ID# 458) "10. Additionally, schools should have policies in place to protect students' privacy and security when using ChatGPT. Finally, schools should also ensure that the system is regularly monitored for bias and that any biases are corrected as needed" (ID# 1205)

Source(s): Table generated by the authors based on collected data

50 tweets and then compared and discussed discrepancies. Cohen's Kappa score was 0.79, indicating a substantial level of agreement, with only 7 tweets subject to disagreement. These discrepancies were discussed, revealing that one coder did not code a tweet unless it specifically described how the GAI tool was being experimented with, while the other coder included tweets based on presumptive experimentation. This issue was clarified, and tweets lacking specific details were subsequently omitted.

3.2.3 Thematic analysis of X tweets. The primary focus of this thematic analysis is to identify and develop key themes within the tweets related to GAI in education, with the aim of understanding the emergence of OV. To do this, we employ the inductive approach for thematic analysis outlined by Braun and Clarke (2012) as it enables us to explore patterns in novel or relatively underexplored data systematically – here, the content of social media posts – without imposing pre-existing theoretical frameworks on the analysis. This inductive stance prioritizes the data-driven development of themes, allowing unanticipated patterns to the surface and ensuring that insights remain closely tied to the lived experiences, viewpoints, and discussions in the tweets.

The analysis begins with an in-depth familiarization phase involving iterative re-reading of the tweets. During this phase, particular attention is given to patterns in the text, such as the recurrent use of specific words, common points of discussion, and the definitions employed. This detailed engagement with the content allows initial impressions to form and potential themes to be identified.

Following this, an open coding approach is adopted to capture the frequency of certain terms and any distinct ways in which they were used or contested. This open-ended initial reading avoids prematurely narrowing the focus, thereby enabling the discovery of unexpected concepts or thematic elements. Once relevant terms, definitions, and concepts are identified, they are categorized, and each category is assigned a specific code. This translation of raw data into a structured format provides a basis suitable for deeper analysis.

3.2.4 Document analysis of official guidelines on GAI in education. As our study seeks to examine the interplay between public online discourse and the formulation of official guidelines for technological innovations, we conducted a document analysis using a deductive thematic analysis approach. This approach was informed by the key themes identified through the inductive thematic analysis of the data from X. We specifically examined how the key themes emerging from the early OV of GAI in education are reflected in official guidelines to understand alignment across the broader community of discursive participants (Swanson and Ramiller, 1997). To ensure the reliability of this deductive thematic analysis, all three authors independently coded one entire document (UNESCO, 2023) before reconvening to compare codes and discuss differences. The document's well-laid-out keywords facilitated coding, resulting in the three authors arriving at either identical or very similar codes. The Cohen's Kappa score for this phase was approximately 0.9, indicating a high level of agreement.

4. Results and findings

4.1 Early-stage formation of OV for GAI in education reflected in social media discourse

With respect to the first research question on how the early-stage formation of OV for GAI in education is reflected in social media discourse, the qualitative coding offers insights into the OV functions, while the thematic analysis reveals the key content themes involved in this early-stage development.

4.1.1 OV functions for GAI in education reflected in social media discourse. The results of qualitative coding of OV functions indicate an uneven distribution across function instances, with interpretation ($N = 310$), legitimation ($N = 913$), and mobilization ($N = 37$) showing varying levels of representation. The results from the Chi-square goodness-of-fit test also provide statistical evidence confirming differences in online engagement across the OV functions with $\chi^2(2, N = 1,260) = 956.757, p < 0.001$, indicating a disparity in the frequency of engagement across the functions. Specifically, engagement with the legitimation function

was significantly higher compared to the interpretation and mobilization functions. The results demonstrate that emergent online discourse primarily focused on the legitimization function to discuss the adoption of GAI, specifically ChatGPT, in educational contexts. This indicates that online engagement focused on “who” is adopting ChatGPT and “why” they are deciding to do so (Swanson and Ramiller, 1997). In contrast, engagement with the interpretation and mobilization functions was relatively limited. These engagement patterns provide an initial understanding of the formation of OV functions in this context, which is further explored in alignment with relevant policy guidelines.

4.1.2 Social media discourse themes in the early-stage formation of OV functions for GAI in education. The thematic analysis of X data for OV functions for GAI in education reveals two overarching themes: (1) The Need for Education Redesign and Preparedness and (2) Digital Inclusion and Exclusion in the Age of AI. There are five subthemes under these overarching themes. The first overarching theme consists of three subthemes which are: (1a) Leveraging Emerging Technology to Enhance Learning; (1b) Assessment and Evaluation Reform; and (1c) Students’ and Teachers’ Preparedness for AI. The second overarching theme involves two subthemes: (2a) Accessibility to Counter Learning Inequity and (2b) Accessibility to Promote Learning Equity. A chi-square test of independence showed that there was a significant, albeit moderately sized, association between the identified themes and OV functions ($\chi^2(10, N = 1,260) = 63.3, p < 0.001, V = 0.16$). Appendix 1 (Table A1) presents the cross-tabulation table between OV functions and the identified themes.

4.1.2.1 The need for education redesign and preparedness. The first overarching theme encompasses the need for curriculum and assessment redesign and training educators and students in appropriately using learning technologies. As the integration of GAI technologies such as ChatGPT into society is an inevitable reality that cannot be ignored (Swanson et al., 2025), it may be more effective for educational institutions to adapt and redesign assessment methods instead of banning these tools altogether.

Leveraging Emerging Technology to Enhance Learning: A significant subtheme identified in tweets positively portraying ChatGPT’s application in education emphasizes leveraging cutting-edge technologies to improve teaching and learning quality. Incorporating GAI tools such as ChatGPT into educational settings opens avenues for customized learning experiences, significantly benefiting students. For instance, Denny et al. (2015) highlighted the promise of NLP technologies, including chatbots, in fostering personalized learning in higher education. Such technologies are adept at discerning individual learning trends and tailoring teaching methods to suit each student’s specific needs. Moreover, ChatGPT and similar GAI tools can enrich student learning by providing immediate, on-demand responses.

Academia has to embrace ChatGPT – it’s here to stay. It would be insane to ban it. It’s an opportunity to shift the focus from memorisation to focusing on learning how to learn. Would they ban it for teachers too? It will likely be a great tool for preparing course material. (Academic, ID 967)

Schools really should be teaching students how to correctly use ChatGPT instead of outright banning it. It’s like not allowing people to use Google or an online dictionary, [which] makes no sense moving forward into the future. (Student, ID 1190)

Assessment and Evaluation Reform: Furthermore, traditional curriculum and assessment designs may no longer be fit for purpose, mainly as technology can quickly take over tasks that once required human effort (Nguyen et al., 2024; Lund et al., 2023). To avoid discouraging learning or encouraging indolent learning behaviours, assessment methods should change to better incorporate emerging technology meaningfully into the syllabus (Kabudi et al., 2021; Lawless and Pellegrino, 2007).

Instead of banning ChatGPT in schools, teachers should learn to use it to create better lesson plans. Focus on how you can define action-oriented objectives that can generate curiosity in the learner. Remember: use cases / problems first, facts / process later. (General Individual, ID 515).

Banning #ChatGPT from schools and colleges would be a difficult thing to achieve in this hyper connected world. As a faculty, we have to innovate and challenge students differently. It is going to be another exciting moment for teaching. But information is not knowledge. (Influencer, ID 464)

The main concern expressed in tweets expressing negative sentiments about the use of ChatGPT in education is the possibility that it may encourage academic dishonesty and cheating, resulting in poor learning habits. As previously noted, both contention and cooperation are crucial in shaping the broader OV (Swanson and Ramiller, 1997).

Are you kidding me? There are many Academic Integrity cases being caught due to students misusing ChatGPT by letting it do their entire homework in university. What are you talking about? This is about integrity, and I am glad that Microsoft is pushing it to this direction. (Organization, ID 1114)

ChatGPT should be banned. Amazingly surprised to see a public university providing workshop on how to use ChatGPT in teaching and learning. Irreversible damage in students critical thinking and problem-solving skills, leading to a generation of illiterate graduates. (Academic, ID 966)

Teachers' and Students' Preparedness for AI: Another notable subtheme is educators' responsibility to keep up with technological advancements, emphasizing the importance of teacher preparedness in the age of AI. Educators and students require training in technical skills and learning pedagogies before implementing emerging technologies such as ChatGPT into the classroom (Nguyen *et al.*, 2023; Ertmer and Ottenbreit-Leftwich, 2010).

ChatGPT can advance education and banning it would be counterproductive. However, it's crucial that teachers are properly trained and guided in using the tool effectively and responsibly. Teachers play a critical role in ensuring that it's used for learning purposes. (Organization, ID 1127)

Blocking #chatgpt in schools is a short-sighted solution that deprives students of valuable learning opportunities. Instead, schools should teach responsible usage and internet safety to empower students to make informed decisions online. (General Individual, ID 90)

It is crucial to acknowledge that while advanced technologies like GAI can greatly enhance students' learning, potential drawbacks need to be considered. Steps should be taken to mitigate these risks, and students should be equipped to use these technologies effectively to enhance their learning and skills. Additionally, tweets expressing concerns about the use of GAI in education often focus on the accuracy of the content generated by these tools and the potential harm they could cause. This highlights the critical need for students to understand both the advantages and limitations of AI to ensure they can use these tools effectively and responsibly.

Yes, schools should block ChatGPT because it can be used to bypass traditional filters and is not suitable for academic purposes. It can also be used to access inappropriate content, which can be harmful to students. (General Individual, ID 64).

Last time I checked, #ChatGPT is still in validation mode. Schools are right in refusing to allow it within their premises at this stage. Of all people, should know the importance of Verification and Validation (VandV) before release to human consumption/use. (Academic, ID 105)

4.1.2.2 Digital inclusion and exclusion in the era of AI. The second key theme in the discourse about ChatGPT's role in education centres on a paradox: these technologies can perpetuate and mitigate learning inequities. On the one hand, there is concern that GAI might widen the educational divide due to unequal access or familiarity with these technologies. On the other hand, ChatGPT offers the promise of more tailored and accessible educational experiences, potentially narrowing the learning gap. This discussion is closely tied to digital inclusion, a priority for the European Union (European Commission, 2022) and globally.

Accessibility to Counter Learning Inequity: Digital inclusion ensures universal participation in the digital landscape, especially in education, where AI can significantly

influence existing disparities. According to [Nguyen \(2022\)](#), digital inclusion means ensuring that everyone, regardless of their economic background, location, or other variables, has the opportunity to access and benefit from digital technologies. This encompasses physical access to devices and the internet, digital literacy, and proficiency in effectively using these technologies. In contrast, digital exclusion occurs when general individuals are unable to engage fully in the digital world, often due to factors such as poor connectivity, financial limitations, or lack of digital skills.

The initial insights from X related to the emergent OVs of GAI reinforce the significance of tackling learning inequity before introducing and implementing technologies such as ChatGPT in classrooms. These findings emphasize the vital importance of ensuring access to devices and internet connections inside and outside school settings. This approach is crucial for fostering equitable access to education, acknowledging that the benefits of such advanced technologies can only be fully realized when all students have the necessary tools and connectivity to engage with them.

Am not sure that's the best idea. Not unless schools can give ALL their young people laptops for their own personalised learning. And to access #ChatGPT (Influencer, ID 1248)

I am very concerned about the equity issue already emerging in districts that just "block ChatGPT" and consider problem solved. Students with means and access individually already have an advantage in education, and this could exacerbate that exponentially. (Influencer, ID 558)

Educators are tasked with equipping learners for a future workplace heavily influenced by technology ([Thomas and Brown, 2011](#)), including empowering students through technology training ([Ertmer and Ottenbreit-Leftwich, 2013](#)). GAI stands out as a tool that can potentially diminish learning inequity with educational institutions "scrambling to find ways to embrace it" ([Swanson et al., 2025](#), p. 12). It supports a wide range of learners, notably those with learning disabilities ([Nguyen et al., 2018](#); [Rose and Meyer, 2002](#)) and enhances educational experiences by aligning with contemporary learning pedagogies ([Kirschner and De Bruyckere, 2017](#)).

Accessibility to Promote Learning Equity: On the other hand, GAI has the potential to promote learning equity. They suggest it can support various learner groups, especially those with learning disabilities, by enabling self-paced learning. Additionally, ChatGPT is perceived as a tool that can offer educational resources to learners without access to formal education, thereby promoting a more equitable distribution of educational opportunities. This perspective views ChatGPT as a tool that can level the playing field in education, bridging gaps and providing diverse educational experiences to all learners.

This seeming paradox aligns with the argument posited by [Nguyen et al. \(2020b\)](#), which suggests that while digital learning activities have the capacity to foster digital inclusion by offering more equitable access to education, they can simultaneously exacerbate the digital divide. This occurs by perpetuating existing disparities in access to technology and digital literacy skills. In essence, while digital learning tools such as ChatGPT hold the promise of democratizing education, they also risk widening the gap if disparities in technological access and proficiency are not adequately addressed.

4.2 Alignment between early-stage development of OVs for GAI in education and established practical guidelines and policies

Regarding the second research question, the deductive thematic analysis of documents from international organizations and universities worldwide shows alignment between early OVs and official practical guidelines ([Swanson and Ramiller, 1997](#)), revealing a diverse range of considerations on these key themes (details and examples are reported in [Appendix 2 \(Table A2 and A3\)](#)).

The results indicate that all the international organizations and governments examined share a common perspective on GAI in education, which aligns with the themes that emerged from social media discussions during its early-stage development of OVs. Particularly, both

subthemes “Leveraging Emerging Technology to Enhance Learning” and “Students’ Preparedness for AI” was supported by guidelines published by all the studied international organizations and governments, including the OECD (Lorenz *et al.*, 2023), UNESCO (Miao and Holmes, 2023; UNESCO, 2023), European Parliament (Madiega, 2023), and Australian (Australian Department of Education, 2023) and UK governments (GOV.UK, 2023).

For instance, the subtheme on “Assessment and Evaluation Reform” was mentioned in most of them apart from OECD (Lorenz *et al.*, 2023) and EU AI Act (European Union, 2024). However, an in-depth document analysis also reveals subtle differences among the guidelines. The documents from UNESCO, and the Australian and UK governments, have distilled several vital concepts essential for integrating GAI into educational contexts. They stress the importance of personalizing learning, enhancing user experience, and tapping into GAI’s potential for various applications. Meanwhile, the EU Act lightly touches on “Leveraging Emerging Technology to Enhance Learning” and mainly focuses on facilitating the creative use of GAI in education for optimized learning experiences. Looking towards the future of work, these policies encourage testing and expanding evidence-based applications of GAI in both educational and research settings. They advocate for guiding the use of GAI to foster advanced research and innovation while encouraging the creative incorporation of these technologies in educational practices. Integral to this vision is the promotion of Human-AI Collaboration, aiming to harmonize AI capabilities with human intelligence to enrich learning experiences.

The discussion on “Assessment and Evaluation Reform” has predominantly focused on GAI systems’ transparency, explainability, and verifiability and how they are used in learning and teaching. While most university guidelines across the globe share a common perspective on the need for acknowledgment and proper referencing when using GAI (85% of the studied universities), there are notable differences in their specific approaches to assessment and evaluation reforms across countries. For example, universities in the United States place a strong emphasis on the use of GAI in programming and explicitly prohibit the use of AI detection tools for plagiarism. In contrast, some universities in the United Kingdom and Hong Kong place greater emphasis on requiring students to demonstrate the originality of their work, particularly in tests and specific courses. There is also an emphasis on avoiding cognitive biases in students, ensuring content integrity, and rethinking assessment and learning outcomes to acknowledge GAI’s role. This includes addressing potential hallucinations, disinformation, synthetic content, and the scalability of solutions. Furthermore, the guidelines also indicate the need to rethink assessment and learning outcomes in the age of AI.

The guidelines also consistently highlight the need for educational stakeholders to be well-informed and adept at handling GAI technologies, ensuring they can effectively and responsibly leverage these tools within the educational framework. However, it is notable that less than half of the guidelines issued by universities worldwide address the issue of adequately preparing teachers and students for GAI. This indicates a potential gap in the current university-level policy frameworks, where the emphasis on readiness and adaptability for GAI in educational settings may not be sufficiently prioritized in an equal way across countries.

Nevertheless, the analysis of guidelines from international organizations and governments reveals an interesting pattern concerning digital inclusion and exclusion. The findings suggest a predominant focus on addressing existing inequities in access to learning resources, with comparatively less emphasis on promoting learning equity through the integration of GenAI. When analyzing university guidelines related to digital inclusion and exclusion, the observed trend appears to contrast with that of international organizations and government policies. There is a stronger emphasis on “Accessibility to Promote Learning Equity,” particularly in adapting teaching and assessment methods to ensure equality, with 38% of university guidelines highlighting this aspect. This suggests a greater focus on proactive measures to foster equitable learning opportunities within the academic sector.

Overall, the findings indicate that discourse themes emerging in the early-stage development of OV are closely aligned with existing policies and guidelines related to Generative AI as a technological innovation. Figure 2 conceptualizes the interplay between OV discourses and these policies and guidelines. Specifically, as technological innovation undergoes adoption and diffusion within a community, OV discourse arises within digital spaces. This discourse subsequently contributes not only to the ongoing adaptation and re-invention of the technological innovation itself but also plays a role in informing and influencing the policies and guidelines that direct and regulate the broader development and diffusion processes of the innovation.

5. Discussion and implications

This study set out with the aim of assessing the early-stage development of OVs for GAI in education, particularly focusing on ChatGPT discourse on social media, and how these emergent visions align with official guidelines issued by international bodies, governments, and universities worldwide. This investigation offers a detailed overview of the early-stage emergence of OVs for ChatGPT and provides a unified perspective on practical guidelines for GAI in education.

5.1 Contributions and implications for research

Theoretically, this research builds on the existing body of knowledge by examining how emergent online discourse facilitates the development of OVs through the interpretation, legitimation, and mobilization of technological innovations (Swanson and Ramiller, 1997; Swanson et al., 2025; Miranda et al., 2022a; Amadoru et al., 2021; Palas and Bunduchi, 2020). Specifically, the study contributes to the literature on the formation of OVs through digital platforms (Miranda et al., 2022a; Amadoru et al., 2021), in the novel context of GAI in education (Swanson et al., 2025). Empirical evidence from this study reveals that, while engagement with all three OV functions are evident, early-stage online discourse disproportionately focuses on engaging with the legitimation function. This may be attributed to the accessibility of GAI where users are able to rapidly interpret the potential impact of the innovation and transition to social media to engage with the legitimation function. By reducing participatory barriers, digital platforms such as social media are transforming how OVs are formed, allowing a more diverse set of actors to shape emerging discourse. Greater accessibility can accelerate legitimation through the dissemination of normative claims, endorsements, and early-stage use cases online. Unlike traditional institutional processes, which are often hierarchical and deliberate, online spaces facilitate the decentralized development of OVs. However, this openness can also fragment discourse,

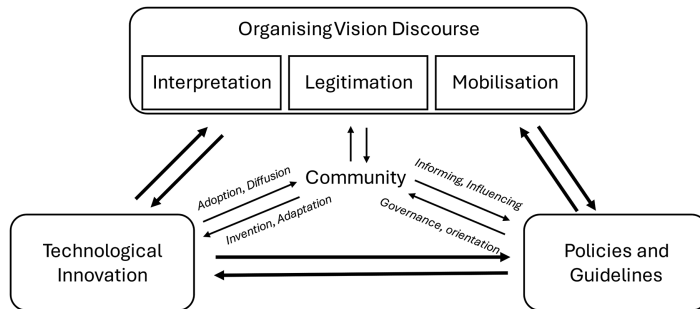


Figure 2. Conceptual framework illustrating the relationship between Organizing Visions (OV) and Policies and guidelines for technological innovation. Figure created by the authors

as conflicting narratives rapidly emerge. This tension between acceleration and fragmentation provides insight into the early-stage prominence of the legitimization function as varying actors openly deliberate the potential implications of the innovation. This contrasts with prior research which suggests that legitimization typically lags behind interpretation during early-stage discourse (Kaganer *et al.*, 2010). To the best of our knowledge, this is the first study to provide empirical evidence that the legitimization function can manifest during early-stage OV development in an online setting, as conjectured by Amadoru *et al.* (2021).

This finding is an important contribution to the body of knowledge as it demonstrates that discourse surrounding technological innovations which are designed for individual use can rapidly shift towards legitimization in the digital age. For example, ChatGPT's accessibility enabled users to quickly recognize its potential impact on educational institutional processes, prompting discourse that either legitimized or challenged its role from "the outside in" (Leonardi and Vaast, 2017, p. 153). Users' initial interactions with the innovation prompted engagement in legitimization as they assessed its implications for broader institutional practices. The prominence of the legitimization function highlights the role of social media platforms, particularly X, as conduits for normative discourse (Swanson and Ramiller, 1997). This function is especially evident within the "Leveraging Emerging Technology" theme which reflects how GAI's disruptive nature evokes both excitement and scepticism. ChatGPT's unprecedented adoption rate – reaching 100 million users faster than any previous digital platform (Chow *et al.*, 2023) – signals a shift in voluntary technology adoption. This dynamic reinforces the centrality of the legitimization function in early-stage online discourse. Central to this legitimization process is a fundamental question: "Why do we need GAI?". This inquiry drives discourse on its necessity and intersects with broader ongoing debates regarding how GAI can enhance learning and teaching while mitigating associated risks (Kishore *et al.*, 2023). The emphasis on such questions reflects a broader societal and educational imperative to justify the integration of GAI in ways that maximize its benefits while addressing potential harms. This novel finding invites further research into the conditions that drive early-stage legitimization of technological innovations, particularly in domains with high potential for institutional change, such as in education.

In parallel with legitimization, mobilization is critical in shaping real-world adoption (Swanson *et al.*, 2025), whereby actors shift from discourse to doing. Although less prominent in our data, signs of early-stage mobilization are evident in how various actors engage with social media to discuss GAI in an educational context. For example, educators began to share resources, pilot classroom uses, and exchange implementation strategies to solicit feedback on their approaches. These activities suggest that social media functions as a platform for early-stage action as actors draw on shared interpretations to shape policies, practices, and curricula. Compared to traditional institutional pathways, mobilization in digital spaces appears to occur in a more distributed manner, but further research is required to understand dynamics of engagement with OV functions during different discourse stages. Understanding these dynamics represents an emerging area of research that bridges online discursive spaces, technological innovation, and institutional change.

This study also extends the application of OVT beyond a purely organizational context which demonstrates its relevance in broader socio-technical domains. As noted by Swanson *et al.* (2025, p. 14), OVT may allow "individuals, organizations, collectives, societal sectors, nations, humanity, and the planet" to come into focus, which we explore in the context of GAI in education. Social media platforms, in particular, have enabled a "complex community" of actors to engage in technologically-mediated discourse, contributing to a collective interpretation of GAI's meaning in an educational context. The accessibility of these platforms facilitates dynamic discursive exchanges, allowing a diverse range of actors to actively participate in shaping the OV. While individuals often initiate online discussions, organizations are also drawn into these conversations, becoming active participants in the evolving discourse (Swanson *et al.*, 2025). In this context, widespread student use forced

educators, administrators, educational institutions to scramble to find ways of effectively embracing GAI (Swanson *et al.*, 2025).

This study also contributes methodologically by applying a multimethodological approach to examine how the early development of OVs for technological innovations, such as ChatGPT, aligns with official guidelines and policies issued by international organizations, governments, and universities globally. By integrating digital trace data analysis from X with document analysis, this study demonstrates how published guidelines are mirrored in early-stage online discourse surrounding GAI on social media. Our findings also reveal a correlation between the functions of online discourse and key themes emerging from the digital trace data.

5.2 Implications for policy and practice

Building on previous research that aimed to establish a consensus on official guidelines (Nguyen *et al.*, 2023), we inform a unified perspective on guidelines for GAI. This study provides insights into the collective stance and recommendations from various authoritative sources, offering a comprehensive perspective on the early stages of GAI policy development. In line with recent studies (Nguyen *et al.*, 2024; Pillai *et al.*, 2023; Yan, 2023), our findings reveal a critical need for a comprehensive redesign of pedagogical practices and an increased level of preparedness for effectively incorporating GAI into teaching and learning processes. This involves adapting curricula and teaching methods to harness the potential of GAI but also ensuring that educators and students are adequately equipped to engage with this technology. Furthermore, the findings highlight the importance of thoroughly evaluating the dual effects that GAI could have on social inclusion in education. On one hand, GAI has the potential to enhance accessibility and personalized learning, potentially reducing educational inequalities. On the other hand, there is a risk that GAI could exacerbate existing disparities if not implemented thoughtfully, potentially marginalizing certain groups. Therefore, the study calls for a balanced approach that carefully considers both the opportunities and challenges associated with GAI in order to foster a more inclusive educational environment.

The findings from this study offer valuable insights for various educational stakeholders at different levels, including policymakers, educators, administrators, students, and technology developers, particularly in the context of rapidly evolving GAI technologies (Kasneji *et al.*, 2023; Lund *et al.*, 2023).

At the macro level, related to national and global guidelines, the study highlights policymakers' need for a balanced approach that fosters innovation while ensuring the responsible and ethical use of GAI in education. It is essential for policymakers in international organizations and government bodies to collaborate with educational institutions and technology developers to create guidelines and standards that address key concerns with GAI-generated content, such as biases, inaccuracies, and misinformation. Consistent policies and guidelines facilitate the development of a coherent overarching OV which supports constructive change in associated practices and institutional processes (Parameswaran *et al.*, 2023; Swanson *et al.*, 2025).

At the meso level, related to institutional guidelines and practices, institutional administrators and managers can utilize the insights of this study to guide the development of effective strategies for integrating GAI technologies into education. By understanding the key elements of the guidelines, they can make informed decisions on how to adapt curricula, train teachers, and support students in engaging with GAI. Additionally, these insights help to identify and address potential concerns, such as the ethical implications, the impact on social equity, and the technical challenges associated with GAI adoption. The adoption of GAI in educational institutions is shaped by disparities in both technical and non-technical expertise, leading to biases in its use. Institutions with strong technical infrastructure and AI literacy among educators and administrators are more likely to integrate GAI effectively, leveraging its potential for personalized learning, assessment automation, and content generation. In contrast, institutions lacking these resources or expertise may either avoid GAI altogether or

implement it with limited efficacy, exacerbating disparities in digital competency and educational innovation. Non-technical factors, such as institutional policies, ethical concerns, and faculty resistance, further contribute to uneven adoption. These discrepancies risk widening the gap in AI-enhanced education, where well-resourced institutions advance their pedagogical practices while others struggle to keep pace, reinforcing existing educational inequalities. Thus, a proactive approach is needed to ensure that the integration of GAI technologies enhances teaching and learning while minimizing potential risks, ultimately contributing to a more effective and inclusive educational environment.

At the micro level, which concerns course or module matters, the study emphasizes the importance of AI readiness for both teachers and students. Teachers and students can consider the insights from this study to enhance their understanding of the need for integrating AI in teaching and learning, develop the necessary skills for its effective use, reforming assessment practices, and adapt their learning and teaching approaches accordingly.

5.3 Limitations and future research directions

This study should be considered within the context of its limitations. The digital trace dataset was collected exclusively from a single platform, X, which may not fully capture the diversity of perspectives and discussions surrounding GAI. While X, in particular, is recognized as a platform where discursive social engagement can emerge (Amadoru *et al.*, 2018), collecting data from a singular platform using a specific query limits generalizability. While best practices were applied to select the platform and iteratively generate the query (Kishore *et al.*, 2025), it is important to acknowledge that relying on X as a data source introduces potential biases. Specifically, the user demographics of X may not effectively represent broader public opinion, potentially leading to an overrepresentation of certain viewpoints. Furthermore, the exclusion of non-English discussions restricts the scope of analysis which limits diversity. Future research could benefit from incorporating data from a wider range of platforms and multilingual sources to cross-validate these findings. Additionally, this study primarily focuses on ChatGPT, without examining other GAI tools. While ChatGPT played a critical role in initiating discussions around OV for GAI, shedding light on the early stages of these developments, it does not encompass the full spectrum of GAI tools and their evolving impact. Future studies should consider expanding the scope to include other GAI models and tools, such as Gemini, to provide a more holistic view of the later phases and the broader landscape of OV for GAI. Furthermore, collecting data from X API v2 only provides access to public X accounts; therefore, this dataset does not include data generated by private X accounts. Finally, while this study focuses on identifying alignment between early-stage discourse and the content of international and institutional guidelines, it does not trace how these themes may have entered or influenced the processes by which such documents were developed. Understanding whether and how public or practitioner discourse contributes to future policy formation remains an important direction for further research. This direction would benefit from involving interviews with or access to internal drafting processes or engagement with policy actors, which lies beyond the current scope of current study.

Future research should explore the long-term impact of GAI on education and evaluate the effectiveness of various interventions in mitigating its associated risks. Additionally, this study highlights a potential gap in university-level policy frameworks, where preparedness and adaptability for GAI in educational settings may not be adequately prioritized. Future design research will be essential for developing practical approaches from translating and refining existing policy frameworks. Additionally, further research should investigate shifts in organizational vision within digital environments and the evolution of related policies over time, using the current findings from the early phase of organizational visioning as a benchmark. As GAI continues to evolve rapidly and exert a growing influence on education, it is crucial for future research and policy efforts to address this gap, ensuring that educational institutions are well-equipped to navigate and integrate GAI effectively.

6. Conclusion

In recent years, GAI tools are among some of the most transformative tools developed, holding unparalleled implications to multiple facets of the educational landscape. These technologies offer new opportunities for personalized learning, streamlined administrative processes, and innovative pedagogical practices. However, as with previous revolutionary tools, its transformative nature brings disruptive challenges for educational institutions, educators, and individual learners. The imperative is clear: the implementation of GAI must adhere to core educational values and augment teaching and learning practices, rather than disrupt them without careful oversight. Nonetheless, with the current state of regulatory measures unable to keep pace with the rapid adoption of GAI that surpass many others before it, there is a high risk of these tools being misused or exploited. The present study makes a significant contribution to the discourse on integrating AI technologies, particularly GAI, into education responsibly and ethically through an in-depth examination of the OVs surrounding ChatGPT and representative guidelines for its implementation. The findings are theoretically and practically relevant for educators, administrators, policymakers, and other stakeholders in the educational sector as they navigate the complexities of AI technologies.

Despite these contributions, several challenges remain in translating these guidelines into practice. Educational institutions vary widely in their capacity to adopt new technologies effectively, often due to disparities in resources and levels of digital literacy. Resistance from established stakeholders, combined with the swift pace of technological innovation, may further hinder the timely and effective implementation of these guidelines. Moreover, the absence of comprehensive regulatory frameworks heightens the risk of misapplication, which could undermine the intended benefits of GAI in education.

Looking ahead, the path forward is clear: the most effective approach lies in a holistic strategy that combines robust human oversight, well-defined policy frameworks, comprehensive competence development, and proactive stakeholder engagement. To do this future research need to address several key avenues. First, while GAI offers remarkable potential, it cannot fully replace human expertise. Further work must identify how best to integrate human oversight to ensure that learning materials are contextually relevant and meaningful. Second, there is an imperative need for international coordination in policymaking. As our work demonstrates, while implementation guidelines may vary across countries and institutions, certain core themes remain consistent, underscoring the need for the learning technology community to establish international guidelines to address the global nature of GAI. Equally, it is essential to determine the evolving competencies required by educators, students, and other stakeholders and design targeted training initiatives to support effective use. Finally, future studies should evaluate the impact of ongoing collaborative dialogue among researchers, practitioners, and policymakers as they are crucial for shaping the narrative, which in turn facilitates the appropriate adoption and diffusion of technological innovations such as GAI.

Table A1. Matching between OV functions and themes to X data

Content subthemes	OV functions			Total
	Interpretation	Legitimation	Mobilization	
Leveraging Emerging Technology	108	446	13	567
Assessment and Evaluation Reform	15	79	5	99
Students' and Teachers' Preparedness for AI	37	108	7	152
Accessibility to Counter Learning Inequity	10	29		39
Accessibility to Promote Learning Equity	6	17		23
Others*	150	218	12	380
<i>Total</i>	326	897	37	1,260

Note(s): *Apart from these main themes extracted from the analysis, tweets that are not related to these five themes are annotated as "Others" themes

Source(s): Table generated by the authors based on collected data

Table A2. International organizations' and governments' policies and guidelines for Generative Artificial Intelligence (GAI) in education

Overarching content themes	Content subthemes	Codes	OECD (2023)	UNESCO (2023)	UNESCO (2023)	GOV.UK (2023)	GOV.UK (2023)	EU AI Act (2023)
Education Redesign and Preparedness	Leveraging Emerging Technology to Enhance Learning	Personalized learning; creative application of GAI in education; Diverse application of GAI in education; Test and scale evidence-based AI in academia; Human-AI collaboration	✓	✓	✓	✓	✓	✓
	Assessment and Evaluation Reform	Explainability, transparency, and verifiability of assessments and learning design; Addressing learners' cognitive bias; Curating reliable content and learning sources for assessment; Reimagining learning assessment methods; Acknowledging the use of GAI		✓	✓	✓	✓	
	Students' and Teachers' Preparedness for AI	Cultivating critical awareness of GAI, Equity and workforce Readiness; Preserving Human agency in the age of AI; Fostering GAI competencies; Mitigating bias amplification; Safeguarding intrinsic motivation; Anticipating the future of work	✓	✓	✓	✓	✓	✓
Digital Inclusion and Exclusion in the Age of AI	Accessibility to Counter Learning Inequity	Mitigating digital Poverty; Balancing AI resources; Lowering entry barriers; Promoting equity through technological accessibility guidelines; scalable solutions for ethical AI implementation	✓	✓	✓		✓	✓
	Accessibility to Promote Learning Equity	Promote equity in cognitive and social skills, fostering inclusion and diversity		✓			✓	✓

Source(s): Table generated by the authors based on collected data

Table A3. Universities' policies and guidelines for Generative Artificial Intelligence (GAI) in education

Content subthemes	% of documents (13) mentioning	Codes	Document
Leveraging Emerging Technology to Enhance Learning	54%	Positive attitude toward usage	(CA2, 2023; FI1, 2023; FI2, 2023; NZ1, 2023; UK1, 2023; UK2, 2023; US1, 2023)
	38%	Encourage responsible usage	(AU1, 2023; CA1, 2023; CA2, 2023; FI2, 2023; US2, 2023)
	15%	Facilitate the use of AIED in education	(FI2, 2023; UK1, 2023)
Assessment and Evaluation Reform	85%	Acknowledgement/reference required	(AU1, 2023; CA1, 2023; CA2, 2023; FI2, 2023; HK1, 2023; HK2, 2023; NZ1, 2023; UK1, 2023; UK2, 2023; US1, 2023; US3, 2023)
	15%	Allowed for coding/programming	(US2, 2023; US3, 2023)
	77%	Allowed/moderated/specified by the course director	(AU1, 2023; CA1, 2023; CA2, 2023; FI1, 2023; FI2, 2023; HK1, 2023; HK2, 2023; NZ1, 2023; UK2, 2023; US2, 2023)
	31%	Prohibit usage for tests, certain courses, task type	(FI1, 2023; FI2, 2023; NZ1, 2023; US2, 2023)
	8%	Prohibit usage of tools to detect plagiarism from GAI	(US2, 2023)
	8%	Allow usage of tools to detect plagiarism from GAI	(HK1, 2023)
	15%	Require originality (or demonstrably of own) of work for tests, certain courses	(HK2, 2023; UK2, 2023)
	15%	Misuses of GAI	(HK2, 2023; US2, 2023)
	15%	Detailed misuses of GAI example	(CA2, 2023; US2, 2023)
	8%	Detailed steps on prevent misuses (in assessments)	(CA2, 2023)
	62%	Detailed steps on how to use GAI (GPT)	(AU1, 2023; CA2, 2023; FI1, 2023; HK1, 2023; HK2, 2023; NZ1, 2023; UK2, 2023; US3, 2023)
	8%	List out ethical issues	(US3, 2023)
	8%	List out the type of course that fits the purpose	(HK2, 2023)
	31%	Pedagogical steps for writing with GAI	(CA1, 2023; CA2, 2023; HK2, 2023; US2, 2023)
8%	Refer to specific GAI tools or their Privacy Notices	(HK1, 2023)	
Students' and Teachers' Preparedness for AI	46%	Support AI-literacy	(CA1, 2023; CA2, 2023; FI2, 2023; UK2, 2023; US2, 2023; US3, 2023)
	23%	Share best practices of technology application	(CA2, 2023; UK1, 2023; US2, 2023)

(continued)

Table A3. Continued

Content subthemes	% of documents (13) mentioning	Codes	Document
Accessibility to Counter Learning Inequity	15%	Allow prohibition (of some software/tools to ensure equity across groups)	(FI2, 2023; US2, 2023)
	23%	Prohibit all use of AI	(HK1, 2023; HK2, 2023; US3, 2023)
Accessibility to Promote Learning Equity	38%	Adapt teaching assessments to ensure equality	(CA1, 2023; FI1, 2023; FI2, 2023; UK1, 2023; US2, 2023)
	46%	Ensure academic rigor and integrity	(CA1, 2023; CA2, 2023; FI1, 2023; UK1, 2023; US1, 2023; US2, 2023)
	15%	Ensure transparency	(FI1, 2023; UK1, 2023)
	8%	Ensure accountability	(FI1, 2023)
	8%	Usage only after vetting PIA (Privacy Impact Assessment)	(HK1, 2023)

Source(s): Table generated by the authors based on collected data

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Corresponding author

Andy Nguyen can be contacted at: andy.nguyen@oulu.fi