

What youth imagine, what AI reproduces: sociotechnical imaginaries in education futures research

O que os jovens imaginam, o que a IA reproduz: imaginários sociotécnicos na pesquisa sobre futuros da educação

Lo que imaginan los jóvenes, lo que reproduce la IA: imaginarios sociotécnicos en la investigación sobre los futuros de la educación

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Abstract

Interest in Artificial Intelligence in Higher Education contexts has surged, ranging from a discourse of enthusiastic promotion to that of critical scrutiny. This paper examines the role of Generative AI as a non-neutral participant in educational technology research. We present a case study in which youth socio-technical imaginaries regarding the role of AI in education (n=117), were first analyzed by human researchers and subsequently by a Large Language Model. We report two main findings: (1) participants envisioned a future of education characterized by deep tensions between technological empowerment and displacement and (2) the Large Language Model produced worthwhile analytic and thematic directions but reproduced hegemonic discourses. We urge researchers to resist “good-bad” binaries in favor of more critical co-engagement and co-support models that empower them to acknowledge AI biases and limitations but wrestle with the insights it might produce.

Keywords: artificial intelligence; education futures; socio-technical imaginaries; youth perspectives; education technology.

Resumo

O interesse pela Inteligência Artificial no contexto do ensino superior cresceu exponencialmente, abrangendo desde discursos de promoção entusiástica até aqueles de análise crítica. Este artigo examina o papel da IA Generativa como um participante não neutro na pesquisa em tecnologia educacional. Apresentamos um estudo de caso no qual imaginários sociotécnicos de jovens sobre o papel da IA na educação (n=117) foram analisados primeiramente por pesquisadores humanos e, posteriormente, por um Grande Modelo de Linguagem. Relatamos duas descobertas principais: (1) os participantes vislumbraram um futuro educacional marcado por tensões profundas entre o empoderamento tecnológico e o deslocamento humano; e (2) nossa exploração metodológica revelou que a própria ferramenta de IA Generativa sugeriu caminhos valiosos, mas reproduziu discursos hegemônicos. Incentivamos os pesquisadores a resistir a dicotomias do tipo “bom vs. ruim” em prol de modelos de coengajamento e coapoio mais críticos, que lhes permitam reconhecer os vieses e as limitações da IA, ao mesmo tempo em que se debruçam sobre os *insights* que ela pode gerar.

Palavras-chaves: inteligência artificial; futuros da educação; imaginários sociotécnicos; perspectivas de jovens; tecnologia educacional.

Resumen

El interés por la inteligencia artificial en contextos de educación superior ha experimentado un auge considerable, abarcando desde discursos de promoción entusiasta hasta otros de análisis crítico. Este artículo examina el papel de la IA generativa como un actor no neutral en la investigación sobre tecnología educativa. Presentamos un estudio de caso en el que los imaginarios sociotécnicos de los jóvenes sobre el papel de la IA en la educación (n=117) fueron analizados primero por investigadores humanos y, posteriormente, por un modelo de lenguaje de gran tamaño. Reportamos dos hallazgos principales: (1) los participantes vislumbraron un futuro educativo caracterizado por profundas tensiones entre el empoderamiento tecnológico y el desplazamiento, y (2) el gran modelo de lenguaje generó orientaciones analíticas y temáticas válidas, pero reprodujo discursos hegemónicos. Instamos a los investigadores a evitar las dicotomías simplistas de «bueno frente a malo» y a optar por modelos de colaboración y apoyo mutuo más críticos, que les permitan reconocer los sesgos y limitaciones de la IA al tiempo que profundizan en las perspectivas que esta puede generar.

Palabras-clave: inteligencia artificial; futuros de la educación; imaginarios sociotécnicos; perspectivas de jóvenes; tecnología educativa.

1 What youth imagine, what AI reproduces: Sociotechnical imaginaries in education futures research

This paper was originally conceptualized to address an under-examined dimension of scholarly research on education futures and the roles of educational technology in those futures at a time in which interest in Generative Artificial Intelligence (GenAI) was surging: the perspectives of youth and what they might tell us about Socio-technical Imaginaries (SIs). This work was situated within a larger study exploring the role of imagination in youth in the U.S. and Canada who were invited to envision and engage with possible futures for education. Specifically, this study aimed to identify what stories about the combined future

of technology and education youth have encountered, in order to better understand what SIs pervade youth awareness. In conducting this study, we employed GenAI as a tool for facilitating knowledge production and discovered that what we learned through the process of integrating AI in our methodology was a story that was equally worth telling. To tell the full story, we wrote the paper you are now reading which combines aspects of a traditional research study with reports on our methodological reflexivity.

We found that for many youth, AI is a primary factor in how education futures are imagined. As a result, AI figures prominently in our paper around how youth imagine the future. However, AI is not the only consideration related to technology that youth have heard about, and we explore these findings as well. In doing so, this paper demonstrates the influence of dominant SIs on youth visions of education futures. Our analysis situates these youth perspectives within the broader theoretical framework of socio-technical imaginaries, emphasizing their ethical and democratic significance. While the AI tool we used to support our research efforts offered helpful suggestions to aid reflection and reflexivity, it also reproduced hegemonic and techno-optimistic discourses, leading us to recommend that researchers reject binary stances around whether or not AI has a role in research efforts and instead explore more nuanced considerations which acknowledge AI biases/limitations *and* wrestle with the insights it produces.

2 Review of Relevant Literature

2.1 Socio-technical imaginaries

Jasanoff and Kim's (2009, p.120) earliest theorization of sociotechnical imaginaries described them as “collectively-imagined forms of social life and social order reflected in the design and fulfillment of nation-specific scientific and/or technological projects”. In this original formulation, Jasanoff and Kim compared South Korean and US perspectives on nuclear energy to understand how state policy reflects narratives about the technology, and how those narratives in turn drive policy. A benefit to understanding these processes as imaginaries is the recognition that how the world is imagined, now and in the future, shapes social order. In other words, there is a kind of power of normalization associated with SIs, one which enables “the political will or public resolve to attain them” (Jasanoff; Kim, 2009, p. 123). Such imaginaries, they further argue, are connected to what is desirable and feasible, “visions of what is good” (Jasanoff; Kim, 2009, p. 123). SI's are not policy itself but the ideas that influence policy and the support of policy implementation related to technology.

Over time, the framework has expanded to include perspectives beyond state actors, such as corporations, professional groups, and interest groups. For example, in later work, Jasanoff and Kim (2015) observed how corporations increasingly shape state interests in the future of technology through their own ideas about the future. In the context of education, we can look at the influence of educational technology companies on the ways they frame education and the future of education as being fundamentally mediated by and improved with digital technologies, such as Microsoft and McKinsey & Company's white paper "The class of 2030 and life-ready learning: The technology imperative" (Holzapfel, 2018). While much work on SIs has focused on SIs as they relate to desirable futures, Hoff (2023) notes that scholars have expanded them to include dystopian futures as well (Felt, 2015).

Further iterations of SIs have also included not just the perspectives of the aforementioned actors but the general public as well. Tidwell and Tidwell (2018, p. 104) for example suggest that SIs need to be understood not just through hegemonic perspectives but by examining the perspectives "held by people from all different walks of life within society" (p. 104) in an analogous way. Doing so enables a more comprehensive view of SIs, which may not actually be the same across demographics. What's more, examining perspectives of non-experts is also a way to understand the degree to which SIs, as mobilized by states and other invested groups, are or are not diffused into public consciousness, and what alternatives might exist. That is, this approach reveals not only the degree to which dominant narratives permeate public consciousness but also the potential for counter-narratives to emerge.

2.2 Socio-technical imaginaries, education, and AI

The SI framework has been applied extensively in technology-heavy domains, including energy transitions and healthcare (Hoff, 2023; Longhurst; Chilvers, 2019). The framework has also informed substantial recent research in education. Swist and Gulson (2023), for example, write about the value and importance of examining futures of education and technology imaginaries and their consequent socio-technical controversies. Elsewhere, Ferrante *et al.* (2024) use the framework to compare contexts and education policy across three world regions with distinct and specific histories. Often, in the context of education, the use of the SI framework emerges to explore how the idea of advancing technology operates in the service of ideas about improving education (Mamluk, 2024; Rahm, 2023; Vincent-Lancrini; van der Vliesi, 2020).

AI has also figured prominently in recent work on SIs, both within and beyond education, with increased interest in the perspectives and complexities of social aspects and influences on technological development (Sartori; Bocca, 2023). In the context of education, the available evidence suggests that narratives of GenAI as an inevitable, powerful, and beneficial force in education has become the dominant lens through which technology companies, government agencies, consultancies, and academic institutions are currently envisioning its immediate and future use in education (Williamson, 2024). Reports about the future of education often feature GenAI as having an important and necessary role, one where AI integration “has the potential to enrich our education system by streamlining administrative tasks, enhancing efficiency, and enabling a dedicated focus on student-centered activities” (Government of British Columbia, 2024), though this optimism is often tempered by cautions from some quarters about associated risks (Giannini, 2024; Elhussein *et al.*, 2024; U.S. Department of Education, 2023).

What remains less clear is how individuals outside these powerful groups — particularly youth — perceive and imagine AI in education. To what extent do dominant socio-technical imaginaries trickle down into their consciousness, and what alternative imaginaries might they hold? While there are many education imaginaries under exploration today, especially in the works of those exploring the balance between hope and dystopia in education and education technology (*e.g.* Bayne; Ross, 2024; Houlden; Veletsianos, 2025; Veletsianos; Houlden, 2026), what, if any, alternate imaginaries are in play for youth and other less dominant groups? These questions are critical because participation in shaping imaginaries is both an ethical and democratic issue. As Jasanoff and Kim (2015) argue, SIs not only reflect but also actively shape policies and practices, making it essential to include diverse voices in their construction.

2.3 Futures literacies and their relationship with AI literacy

To critically engage with and contribute to SIs requires futures literacy, a skillset regarding one’s ability to reflect on imagined futures to inform present decision-making. The future isn’t simply a thing that exists; it also informs and directs action in the present. Being aware of this, *i.e.*, how different futures guide and direct us today, and responding and thinking accordingly, is a kind of futures literacy, as is the ability to understand and reflect on the future to make relevant decisions in the present. Futures literacy is complex, to the extent that Mangnus *et al.* (2021) suggest a taxonomy of literacies where each literacy emerges from different genealogies or traditions with slightly different objectives. They name several

types of literacies, each with specific goals, which among others include “predictive futures” *approaches*, or those which aim to anticipate likely possibilities, “experimental futures”, which “aim to generate shared realities that have mobilizing power in the present” and “critical futures approaches”, which aim to better understand the relationship between power, especially normative or hegemonic power, the future, and who controls the future (p. 132).

Critical futures approaches are particularly significant in the context of sociotechnical imaginaries because they foreground the question of who gets to shape visions of the future. As Jasanoff and Kim (2015) argue, SIs are not merely descriptive — they are collectively held and publicly performed, functioning as normative frameworks that guide policy and mobilize resources toward particular futures. If imaginaries are to serve democratic rather than purely technocratic or capitalist ends, participation in their construction cannot be limited to states, corporations, and expert communities. Developing the capacity to critically interrogate dominant futures narratives — to ask whose interests they serve, what alternatives they foreclose, and how ordinary people might participate in shaping them — is therefore not only a pedagogical goal but a democratic one. Futures literacy, understood in this way, becomes a precondition for meaningful civic participation in decisions that will shape education and society.

In the specific context of education and technology, critical futures approaches are essential for understanding who shapes dominant imaginaries and who benefits or profits from them (*e.g.* Houlden; Veletsianos, 2024). This includes scrutinizing the role of private companies in promoting technologies like AI, including how the technologies and products themselves may reinforce this promotion. Being able to think critically about the futures such groups promote and even paint as inevitable is an important competency because such analysis might shed light on what might be prioritized compared to what might be receiving less attention (*e.g.*, profit over equity or sustainability). Developing this competency matters not only for understanding the present but for expanding what futures feel possible: when the inevitability of a particular technological trajectory goes unexamined, the range of imaginable alternatives narrows and with it the scope of democratic deliberation about what education should become.

Notably, given the role AI and other digital technologies are anticipated to play in possible futures or SIs, to be skilled in the future seems to mean developing some level of AI literacy. This parallels the logic behind the relationship between scientific literacy and futures, as Rasa, Lavonen and Laherto (2023) explore. In their work, they highlight the relationship between agency and science literacy, acknowledging that as scientific progress

and change is likely to continue, to think in meaningful ways about the future means understanding how science works. That is, to actively participate in effective futuring or using the future, as UNESCO (2021) promotes, solid foundation of scientific literacy is required. The same can be argued about certain specific and highly impactful technologies, including AI, meaning that AI literacy is one skill required when thinking critically about the future in robust and empowered ways.

In the context of education, AI literacy has become a prominent point of discussion for researchers and educators alike. A number of AI literacy frameworks have emerged as well as recent systematic reviews seeking to understand and delineate the differences and similarities between them (*e.g.* Allen; Kendeou, 2024; Pinski; Benlian, 2024). Across a number of these frameworks, certain key skills emerge, with AI literacy being defined according to a kind of hierarchy of literacy, which ranges from the skills associated with being able to use AI to being able to understand how AI works and to being able to actually produce AI (Almatrafi; Johri; Huyna, 2024). These literacies also often include ethical awareness of AI, not just in terms of how to *use* it ethically, but to understand the ethics of AI materiality (*e.g.*, its resource requirements), as well as how AI are trained, on what data, and what consequent biases might be evident within their operations. By fostering these literacies, educators and policymakers can empower youth to critically assess the imaginaries they inherit and to imagine alternative futures.

3 Methods

Understanding how youth engage with dominant and alternative imaginaries is essential for exploring the broader implications of SI narratives in education futures. In this study we examine what imaginaries youth have encountered, aiming to better understand which narratives dominate and where alternatives might exist. Our research questions were as follows:

RQ1: What stories have youth heard about the future of higher education?

RQ2: What do these stories tell us about sociotechnical imaginaries and the future of education?

The subsequent research question that arose as a result of the decision to explore the use of AI in research was:

RQ3: What happens when researchers employ AI as an analytic aid?

3.1 Participants and Data Collection

To answer the first two research questions, we recruited youth from the United States and Canada who responded to a questionnaire described below. We collected data from April 1-11, 2024 using the services of Dynata, a research panel firm. We focused on the United States and Canada because we are familiar with the social, cultural, political, and economic contexts in these countries due to having lived, worked, and held institutional affiliations there. The questionnaire involved a broader research study on education futures and speculative methods. One aspect of this study focused on stories youth had heard about the future of education. More specifically, the data used in this study resulted from the following open-ended prompt included in the questionnaire: “We are interested in the stories that are being told about the use of technology in future colleges and universities. Tell us a story that you have read or heard about technology and future higher education”. The question was intentionally broad to elicit any information participants may have heard or read independent of source, including in newspapers, magazines, TV, radio, social media, or from acquaintances, friends, and family members. Our goal was to reach 900 complete survey responses. In total, 1875 surveys were distributed to the panel. Of the 900 complete responses, 755 were usable. Data cleaning of the full questionnaire and of this particular survey question involved eliminating responses which (a) stated they had not heard any stories about the future of education, (b) were blank, incomplete, nonsensical, and/or completed rapidly, (c) were suspect of AI usage, and (d) did not contain elements of all three variables under study (i.e., the future, education, and technology). The resulting dataset consisted of responses from 117 participants. Notably, 182 respondents stated they had not heard any stories about the future of education, and this is a point we will return to in the discussion section of the paper. The 117 participants ranged in age from 18 to 25 years, with a median age of 20. The majority of them identified as women ($n = 60$), followed by men ($n = 53$). They resided in Canada ($n = 63$) and the United States ($n = 54$), and their educational background was varied. Full demographic characteristics are detailed in Table 1.

Table 1 — Participant Demographic Characteristics (N = 117)

Characteristic	n	%
Gender Identity		
Woman	60	51.3
Man	53	45.3
Non-binary	2	1.7
Transgender	1	0.9
Prefer not to answer	1	0.9
Location		
Canada	63	53.8
United States	54	46.2
Education Level		
Less than high school	1	0.9
High school	36	30.8
Some college/university	50	42.7
Bachelor's degree	24	20.5
Master's degree	4	3.4
Professional degree	2	1.7
Age		Value
Mean (SD)	20.91 (2.2)	
Median	20	
Range	18-25	

Source: Elaborated by the authors.

3.2 Data analysis

Data analysis followed an inductive approach: one researcher identified themes aligned with the research questions, which were reviewed, discussed, iterated, and confirmed with the second author. One author then coded the data in NVivo and both authors reviewed and discussed findings. Initial observations and discussions suggested a number of emergent themes:

1. The future of educational technology and education includes or is dominated by AI (both positive and negative perceptions)
2. “Technology” is deeply mediated through ideas about AI
3. The future of education is online (largely positive, including accessibility and flexibility of online learning)
4. Many youth could not think of stories about the future of education that they had heard.

Up to this point in time, the research process was free of any GenAI use. At this time, after considering these initial themes, we decided to attempt an exploratory use of AI to further support the analysis. This led us to asking the third research question noted above.

This part of the work was conducted in early November 2024 using Anthropic's Claude (Opus 3.5). At the time of writing (April, 2026), Anthropic's current models included Opus 4.6 and Sonnet 4.6, both released in Feb 2026, meaning that the Large Language Model (LLM) used in this study was less capable than current models. Even if these models have advanced since our exploration, we believe that what we learned through the process of integrating AI in our methodology is worth sharing given the vibrant scholarly debates that currently exist around the need, ethics, and value of AI use in qualitative research (*e.g.* Friese *et al.*, 2026; Greenhalgh, 2026; Jowsey, 2025; Mehta *et al.*, 2025; Wise; Gresalfi; Spencer-Smith, 2026).

Our analytic process was designed to preserve the integrity of our original analysis while exploring what an LLM could contribute as an analytic aid and sense-checking mechanism. Rather than entering raw data into the LLM, we input the 29 codes and their associated reference tallies (n=148), using these as the basis for AI-assisted exploration. In other words, we did not prompt the LLM to conduct the initial coding or thematic analysis, but instead to work with our own analysis. We then prompted the LLM to categorize the codes into themes aligned with the research question, iterating on our prompts as we evaluated each round of output. After reviewing the LLM-generated thematic groupings, we found them to be broadly consistent with our initial observations, which gave us confidence to continue exploring the data through this collaborative process. To illustrate how this co-engagement with codes, themes, and analytic judgment unfolded in practice, we detail the progression of our prompting and decision-making in the results section.

3.3 Limitations

This research faces standard methodological limitations related to the collection of our data from a survey panel, including self-selection bias, the potential for a non-representative sample, and the constraints of self-reported qualitative narratives in a questionnaire. The digital nature of the recruitment process means that results may not be fully generalizable to the broader population of youth who lack presence on such platforms.

Other limitations include the hidden ways in which LLM use, as described here, might have influenced the analysis, even in the context of heightened researcher reflexivity and reflection. Importantly, our exploratory use of an LLM for thematic analysis comes with certain caveats, including the fundamental question of what data the LLM is trained on, what biases may consequently exist within responses, and the lack of transparency around that from Anthropic. This means that, while we verified the LLM's responses alongside our own

interpretations, and carefully read through these responses and modified them as needed, the mode of analysis is not fully reproducible because of the technology's opacity (*e.g.* Friese, 2026). The use of an LLM also invites questions around ethics, given that there are ongoing debates and concerns related to what data LLMs are trained on, and whether or not owners of that data have consented to that use.

4 Results

Half (n=74) of the stories that youth heard about the future of higher education pertained to AI, suggesting that there is a strong socio-technical imaginary in which the future of education as it relates to technology is heavily weighted towards AI. When prompted to organize the codes according to Jasanoff and Kim's framework, and accounting for reference volume in each code, four key themes emerged in the analysis suggested by the LLM. These themes both served to nuance our initial observations and confirm the prominence of AI in what youth have heard about the future of education. These themes were: "AI expansion and transformation" (n=42), "impact of technology on learning" (n=19), "digital transformation of education" (n=18) and finally, "technological disruption and anxiety" (n=17). These themes are detailed in Table 2 below.

Table 2 — LLM-Identified themes, along with author-identified codes, frequencies, and illustrative responses

Theme 1: AI expansion and transformation (n=42)		
Code	n	Example response
AI expansion	19	“I have not heard anything other than the talk of AI expanding” “I’ve heard about the increased use of AI in higher education”
AI replacing teachers	15	“Artificial intelligence may be taking over jobs and university professor jobs” “I have heard that robots would teach instead of human beings”
AI improving education	8	“I haven’t really heard much but I would say artificial intelligence will soon take over and make school and teaching easier and faster”
Theme 2: Impact of technology on learning (n=19)		
Technology helping students	9	“Technology coming in and helping assist the students” “I remember hearing something about how the use of technology in universities will help disabled students with their learning”
Technology making education more accessible	6	“Technology is greatly growing and improving education bit by bit by making content more accessible and engaging for students”
Technology for personalized learning	4	“That it can provide any learning anybody needs and help them improve” “Virtual reality classrooms and AI-driven personalized learning transformed traditional teaching methods”
Theme 3: Digital transformation of education (n=18)		
Use of AR and VR	7	“I read that the improvements in VR technology will help the people receive better online classes”
Increased use of technology	6	“I’ve definitely heard that further note into the future colleges will be implementing more technology into their courses such as getting students to download more learning apps that you can sign on and off to in case you’re sick and couldn’t be in class that specific day. You will be able to log onto this app to see and catch up on everything you missed that day.”
Education exclusively online	5	“It will all move online”
Theme 4: Technological disruption and anxiety (n=17)		
AI seen as a threat	8	“I have heard that this is dangerous for the future education” “I heard of a story about how artificial intelligence will take over and there will be no longer any need for education. We could just download the information into our brain and use the rest of our day to do whatever else our hearts desired. This will all of course be possible if the AI doesn’t educate itself until it becomes unstoppable and either erases humanity or enslaves it.”
AI making education more difficult	5	“I have heard that technology can make higher education a lot more difficult because of the use of artificial intelligence and almost everything”
Technology decreasing quality of education	4	“Well, there is a lot of talk about AI being used but people will not learn if it is all done by AI”

Source: Elaborated by the authors.

The four themes suggested by the LLM are not particularly surprising to critical scholars working in the field of education technology and higher education futures, as they capture much of what concerns and engages experts in the field. There are diverse threads in these futures, some positive and some negative, which highlight a kind of ambivalence in

which advancing technology might herald both hope and positive transformation or harm and destruction. That is not a novel finding in and of itself. Yet, by collecting stories from students rather than experts, we can see more clearly whether or not those concerns and interests are evident elsewhere in other potentially impacted groups and see the degree to which people have bought into, or at least are aware of, the different threads of this imaginary. Importantly, these narratives stand in contrast to the polished, optimistic stories that AI and educational technology companies tell through their websites, advertisements, and social media posts. While corporate narratives often emphasize efficiency, personalization, and innovation they tend to gloss over the complexities, trade-offs, and unintended consequences that youth identify. By reading the stories of the future identified by youth alongside corporate messaging, we can begin to see which hopes are amplified, which concerns are ignored, and whose perspectives are missing from dominant conversations about AI in education.

A generative effect of using an LLM to support the analysis is that the LLM itself invited further analysis of the findings. Included in the weighted thematic analysis, a summary was offered by the LLM as follows:

- By accounting for the number of references, we get a more nuanced view of the socio-technical imaginary. The reference counts reveal that while there are significant anxieties about technological transformation, there's an even stronger current of excitement and potential.
- The analysis shows that AI expansion, technological impact on learning, and digital transformation are the most prominently discussed themes. The imaginary is not simply about technology replacing education, but about fundamentally reshaping educational experiences.

This latter claim by the LLM, that the “imaginary is not simply about technology replacing education, but about fundamentally reshaping educational experiences” effectively captures what the data suggest, that this socio-technical imaginary isn't one-dimensional, as can sometimes appear to be the case around technology, especially AI, and the future of education, where techno-solutionism and techno-optimism prevail. Unprompted, the LLM suggested pursuing a research direction:

- Would you like me to elaborate on any aspect of this weighted analysis? I'm particularly interested¹ in how the reference counts might reveal underlying narratives or tensions in the conceptualization of educational futures.

This query and direction reflected our own interests in what the distribution of references could tell us about what strands of the imaginary were prominent in the group under study (beyond the obvious theme of expansion and increasing uptake of AI in the future of education) and what tensions or conflicts might exist between those strands. Subsequently, the LLM identified three core tensions: “replacement vs. augmentation”, “quality concerns vs. improvement potential”, and “accessibility vs. complexity”. We used these themes and tensions to identify illustrative responses that fit them, as shown in Table 3.

Table 3 — Identified tensions, along with themes, frequencies, and illustrative responses

Tension 1: Replacement vs. Augmentation		
Theme	n	Example response
Replacement narrative	25	“I have heard some theories that many school teachers are being replaced by AI computers.”
Augmentation narrative	12	“I heard that some schools were thinking about using artificial intelligence to combat the lack of teachers.” “Technology coming in and helping assist the students.” “Students gonna get access to multiple digital products that will easily aid them in learning.”
Tension 2: Quality concerns vs. Improvement potential		
Quality anxiety	15	“I have heard that more and more of students are using artificial intelligence to complete their assignments, creating a knowledge gap between the current and future generations.” “Some people say that they are afraid that our future doctors had actually cheat and won't know anything.”
Quality improvement	16	“Use of automation in some of my classes is reliable and good for the future classes.” “I haven't really heard much but I would say artificial intelligence will soon take over and make school and teaching easier and faster.”
Tension 3: Accessibility vs. Complexity		
Democratization	11	“Technology making learning more remote and accessible to more people at more affordable rates” “There could be online courses being offered by famous universities for the general public.”
Complexity and control	4	“I heard a story in which colleges are making an app where they can caught students who are using AI in their assignments”

Source: Elaborated by the authors.

Perhaps of most value in this part of the analysis was the identification of three key interpretations that emerged from the core tensions. The first is a narrative that AI and

¹ We would be remiss not to mention here that the LLM is using anthropomorphizing language.

technology are in a state of advancing, and that there is a sense that there is an inevitability to this advancement. This narrative appears to reflect broader socio-technical imaginaries pertaining to digital technologies and in particular AI (*e.g.*, Magalhães; Smit, 2026; Tacheva; Appedu; Wright, 2024). The second, also a narrative, focuses on modality of education, suggesting that the future of education will be significantly or totally online and virtual. The LLM described this as a narrative of “Embodiment and Materiality”. We feel, however, that “Digital place transformation” better labels this narrative with reference to the relevant codes, which include “Exclusively Online”, “Increased Virtual or Hybrid”. “Use of AR and VR”, and “making everything digital”.

The final analytic interpretation of notes is that within these core tensions are paradoxical positions between displacement and empowerment, and control and freedom. These paradoxes, and the overall analysis, the LLM suggests is characterized by “dynamic ambivalence”, in which there’s a sense of a certain inevitability to advancing technology, that technology isn’t just transformative at a surface level but at a fundamental level, and these can be good or bad realities. Again, this analysis isn’t a radical departure from what researchers are also identifying and describing, at least from critical perspectives. It is, however, divergent from and more complex than technodeterministic and tech-evangelist perspectives which assure techno-utopian futures.

5 Discussion

5.1 AI, AI literacy, and futures literacies

Youth in our study are immersed in AI-saturated imaginaries of education’s future, yet what they have heard is marked less by coherence than by ambivalence. They hear stories of transformation alongside fears of replacement. Optimism about how education might be improved coexists with uncertainty about what is lost. This complexity suggests that sociotechnical imaginaries, as a framework, are useful not only for surfacing dominant narratives about technology and education, but also for excavating the tensions and contradictions within them.

What these tensions highlight is that futures literacy alone is insufficient for navigating the current moment. Because AI figures so prominently in what youth are hearing about the future of education, a meaningful capacity to engage with these futures likely requires not just the ability to use AI tools effectively, but a deeper understanding of what AI can and cannot do and where its hard limits lie. Our findings illustrate this concretely:

that many respondents had heard stories about teachers being replaced by AI points to a specific opportunity for developing the kind of literacy that would allow youth to critically assess such claims, including understanding the pedagogical needs AI cannot meet.

While the case for such kinds of AI literacies has been made at a pedagogical level, we argue that this is also a case for democratic participation and governance. If sociotechnical imaginaries function as guiding narratives for policy, governance, and research, then they must be collective structures shaped by broad and informed participation, not only by the interests of a powerful few. This requires relevant literacies. Without them, youth are left to negotiate deeply complex and ambivalent terrain with limited tools. If, for example, young people are hearing stories about AI achieving super-intelligence but are unaware of the material and social costs of AI development, their capacity to imagine alternative futures, and to participate in shaping them, remains constrained.

5.2 Literacy and its implications for youth participation in educational futures

Given the prominence of AI in the stories youth have heard about the future of education, a specific focus on AI literacy as a component of futures literacy seems important, just as Rasa, Lavonen and Laherto (2023) argue that science literacy is necessary for understanding the future. But alongside this, our findings surface another fundamental concern: in the process of data cleaning to arrive at our final dataset of 117 participants, we identified that a substantial number of participants (n=182) could not report having heard any stories about the future of education at all. On the one hand, this may suggest that the elite futures promoted by technology companies are less pervasive than they appear and that dominant imaginaries have not saturated public consciousness in the ways often assumed. On the other hand, it may point to a deeper absence of awareness about education as something with a future that can be imagined, contested, and shaped.

This second possibility is worthy of further investigation. For many youth, education may function as a constant, as something that simply exists as is rather than something that could be otherwise. If education feels fixed and inevitable in one's lived experience, the idea that it has a future worth imagining may not register as a meaningful question. In this reading, the absence of stories reflects not apathy or ignorance but a kind of institutional permanence and naturalization. In other words, education is so deeply embedded in the rhythms of daily life that it becomes difficult to see as something open to transformation. If this is the case, then futures literacy must not only equip youth to evaluate

competing visions of education's future, it must also disrupt the assumption that the current state of education is its permanent condition.

This concern is sharpened by the fact that our respondents were youth, meaning they were precisely the demographic most directly affected by whatever education becomes. Why is it that so many indicated they hadn't heard any stories? This is likely the result of a confluence of factors, including study methodology, a result of stories about the future not registering, and other factors. Further research would be useful to better understand what youth hear and are thinking about the future of education, underlying dynamics around democratic participation in such futures, and especially the relationship between institutional naturalization and the capacity for futures thinking among young people.

5.3 AI use in research beyond the binary

The literacy challenges we have described for youth, however, are not confined to them. In the course of this study, we found that we, as researchers, faced similar challenges to youth, including the need to engage critically with AI's outputs, remain aware of its normative tendencies, and engage our capacity to resist default narratives. In using an LLM to aid analysis, we encountered fruitful directions that encouraged reflexive thinking in working with our data. Yet, despite how thorough the suggestions data appeared, what the LLM lacked was a deeper critical engagement with what the findings suggest. Where the LLM articulates the data suggesting a future of inevitable technological transformation, a more critical read might highlight the ways in which sociotechnical imaginaries reflect a normative understanding of history as reflecting progress and infinite economic growth, as well as a reification of Western attitudes and approaches to education. Indeed, Claude interpreted "AI expanding" largely as a positive, but for many, the expansion of AI is not just undesirable but dangerous and harmful, both in terms of what it represents for education and democracy, but also to the planet itself given its profound material requirements.

Which brings us to reflect on using AI in an exploratory fashion for this research. The decision to use it was largely driven by curiosity. What happens when we employ AI as a tool for facilitating knowledge production vis-à-vis data analysis? And specifically, not just quantitative data for which its use is increasingly common in several fields, but qualitative social science data? From our positionality as seasoned researchers, our experience leads us to view Generative AI as a complex analytic aid/mechanism that reshapes the ethics, cognition, and interpretive validity of qualitative inquiry. While much of the conversation around AI skills and knowledge centers around learners' AI literacies, our experience

emphasizes the importance of researchers being attuned to the roles and implications of AI in research. Approaching AI in educational research requires eschewing the “good-bad” binary in favor of more critical co-engagement and co-support, where researchers acknowledge AI biases and limitations *and* wrestle with insights LLMs/AI produce. In such an approach, researchers neither accept nor reject AI and its answers. What this approach demands of researchers, however, is to develop expertise over content, context, and methodology in addition to technological skills and knowledge, in order to audit the normative biases embedded in such algorithmic tools *and* make effective use of them.

6 Conclusion

The critical stance we found necessary in our own use of AI as an analytic aid mirrors what is needed at a broader societal level. Just as we, as researchers, had to resist accepting LLM outputs at face value, so too must youth and publics develop the capacity to critically engage with the sociotechnical imaginaries that are shaping the future of education. Researchers and youth face a similar risk: uncritical acceptance reproduces dominant narratives of progress, inevitability, and technological expansion as inherently beneficial while foreclosing alternative futures. We have argued that part of effective engagement with the future, which offers agency and empowerment to people, requires both AI literacy and futures literacy as important capacities for democratic futuring. In doing so, we are suggesting that sociotechnical imaginaries, given their guiding and normative power, need to be collective structures, and that those structures ought to be created with input from diverse and informed perspectives. Indeed, our data show that AI figures prominently in what youth have heard about the future of education, and that there’s significant ambivalence about these stories.

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Language revision: Ananda Missailidis

Submission date: 13/04/2026

Approval date: 21/05/2026