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Speculative futures of artificial intelligence in education: A causal layered analysis of education fiction

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ABSTRACT

This study examines how university stakeholders speculatively imagine futures for artificial intelligence in education (AIED) and the challenges these futures entail. Sixty-nine teachers, students, researchers and PhD candidates from Swedish higher education submitted short speculative scenarios via a bespoke web platform. Using Causal Layered Analysis (CLA), each text was coded across litany, systems, worldview and myth/metaphor layers to surface the assumptions and values underpinning imagined futures. Further analysis yielded four recurring configurations: Enhancement (AI as assistant/partner that personalises learning while keeping human judgement central), Transformation (human-AI fusion and continuous learning ecosystems that reconfigure institutions), Displacement (market logics and automation that deskill educators and render universities credential factories), and Resistance (protective constraints and AI-free spaces to preserve autonomy, authenticity and empathy). Across configurations, three cross-cutting tensions persisted: the human remainder (what stays uniquely human), the assessment paradox (how to evaluate learning amid AI-assisted outputs), and the efficiency-depth trade-off. It is argued that these tensions reflect AIED's character as a wicked problem: they are not resolvable by technical fixes alone, but demand negotiated, value-explicit choices. The findings suggest that debates about AI in education reflect fundamental educational philosophies rather than merely technological capabilities. By documenting diverse stakeholder voices through education fiction, this study provides empirical grounding for understanding AIED as a site of contested imaginaries requiring negotiation between multiple futures. The study contributes methodologically by demonstrating education fiction's value for exploring complex sociotechnical futures and practically by revealing tensions that educators and policymakers must navigate in designing AI-integrated educational systems.

1. Introduction

> *In 2050, schools focus on completely different skills. Just as teachers around the turn of the millennium were wrong when they said, 'You'll never walk around with a calculator in your pocket' to motivate mental arithmetic, teachers around the 2020 s were wrong to say that you need to learn how to search for sources and write texts.*

This excerpt from a futuristic scenario, written by a student in Swedish higher education in this study, revolves around an anticipated version of a future where artificial intelligence (AI) has significantly changed how education traditionally operates and

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how knowledge works. As AI capabilities in education advance rapidly (Bond et al., 2024; Wang & Fan, 2025; Xia et al., 2024), a critical gap emerges: we may know what AI is currently capable of, but not how educators and students believe it should work within teaching and learning. As anticipatory assumptions, combined with models of possible, probable and preferable futures, shape present-day decisions about technology adoption and pedagogical innovation (Miller, 2015; Robertson, 2022; Voros, 2017), it is perhaps with great importance that a timely question needs to be asked: how do we envision AI in our education futures?

The multiplicity of possibilities that opens up for AI in education (AIED) makes preparing and designing for its future inherently challenging. Either in the form of generative AI chatbots that teachers, students, or researchers use for simplifying their tasks or in the form of predictive or assistive technologies that get embedded in tools or services already commissioned by education institutions, AI may quickly be turning into a powerful actor in the field of digital learning (Labadze et al., 2023; McGrath et al., 2025). Amid the enthusiasm, however, critical stances against the technology have been highlighted in the literature: the turn to data-driven personalisation (Jauhiainen & Garagorry Guerra, 2024), for example, intensifies debates on the datafication of education (Williamson, Bayne, & Shay, 2020), where teachers enter a deeper conversation with learning analytics than with actual students (Broughan & Prinsloo, 2020). Such issues surface debates around trust and trustworthy AIED: transparency, fairness, and human oversight are needed (Yin et al., 2025), on top of technical safeguards combined with investment in teacher professional learning and robust regulatory frameworks (Chan, 2023; Holmes et al., 2022).

With such issues becoming more relevant as more capable versions of AI systems are being released, education researchers turn to forward-looking approaches in their research by introducing speculative or fictional writing (Bayne & Ross, 2024; Ross, 2017), among other methods. The future is being written, borrowing from speculative fiction, design fiction, science-fiction prototyping, and the emerging concept of education fiction, which foregrounds educational aspects in fictional texts (Cox, 2021; Houlden & Veletsianos, 2022; Li & Bertrand, 2026) in order to elicit and examine the values and trade-offs people attach to AI in education. In human-computer interaction and design, these approaches have long been used to surface 'diegetic prototypes', artifacts and stories that make possible worlds feel thinkable and discussable (Bleecker, 2022; Dunne & Raby, 2013; Kirby, 2010). In education, recent work formalises education fiction as a method that can be either speculative or informed, inviting reflection and critique while remaining grounded in educational concerns (Houlden & Veletsianos, 2022; Hrastinski, 2023, 2025). In sociology of education, social science fiction has likewise been used to stage situated futures for schooling (Selwyn et al., 2020). This article aligns such work with anticipation/foresight terminology and futures studies, treating speculative texts as anticipatory assumptions (Miller, 2018b; Poli, 2017) and reading each text through causal layered analysis to connect litany, systems, worldviews, and guiding myths (Inayatullah, 1998).

While recent literature in this space (of speculative scenarios about the future of AIED) has largely reflected researchers' perspectives (Hrastinski & Jandrić, 2023), this study set out to give voice to teachers, students, as well as researchers in higher education by encouraging these stakeholders to creatively imagine what the future holds for AI and education. The following research question guides this research: *what futures for AI in higher education do university stakeholders imagine, and what challenges do these futures entail?*

More specifically, this study sets out to examine the speculative futures that university stakeholders [teachers, (PhD) students, researchers] imagine about AI through education fiction. This topic has been shown to be a multifaceted and complex one, through its classification as a *wicked problem*: it has no definitive formulation, no stopping rule, and every attempt at solution affects the problem itself (Rittel & Webber, 1973). Therefore, challenges around its proposed solutions are bound to appear in discussions about the future; engaging with such 'solutions' in the form of challenges is meant to promote meaningful discussion addressing the problem itself.

No single analytical lens could capture how diverse narratives from education stakeholders represent valid realities of the same technological future(s). This research is situated within the broader field of futures studies, defined as the systematic study of possible, probable, and preferable futures (Bell, 2007), while drawing specifically on three interconnected strands. First, anticipation studies provide the rationale for studying futures as resources for present action rather than only attempts at prediction (Miller, 2018b; Poli, 2017). Second, the tradition of sociotechnical imaginaries helps situate visions of AIED within nationally inflected educational values and governance logics (Jasanoff & Kim, 2015). These perspectives share a social constructivist foundation: futures are not predetermined realities to be discovered, but socially constructed narratives shaped by collective sense-making, cultural context, and institutional positioning (Adam & Groves, 2007; Selin, 2008). From this view, diverse university stakeholders do not simply hold different opinions about AI futures, but they construct fundamentally different realities based on their situated experiences and professional identities. Third, critical futures methods provide further foundations: these emerge from poststructuralist thought and interrogate which futures are privileged by particular methodologies and who benefits from their realisation (Inayatullah, 1990). Such approaches, deriving from Shapiro's work on the politics of representation (Shapiro, 1988) and Foucault's relations of power and knowledge (Foucault, 1970), critically ask not merely what futures are imagined but whose interests they serve. Specifically, Causal Layered Analysis (CLA) operationalises this critical futures orientation by inviting text readings at multiple depths: from surface claims and institutional arrangements to underlying worldviews and guiding myths (Inayatullah, 1998). These depths are often guided by and grounded on metaphors that help us understand the issue at hand (Carbonell et al., 2016), reminding us that the medium of literature has multiple powers (Gidiotis & Hrastinski, 2025).

2. Background

2.1. The turn to speculative methods in education research

Since the commercial release of generative AI chatbots and agents (OpenAI's ChatGPT, Anthropic's Claude, Google's Gemini to name a few), education scholars have increasingly adopted speculative methods to probe how AI might reshape teaching and learning.

Here, *speculative* refers mainly to narrative and fiction-based techniques that let researchers step outside conventional empirical reporting to articulate hopes, risks, and tensions around AI in education (Gidiotis & Hrastinski, 2024). Speculative narratives that relate to issues of education in the future have been termed *education fiction* (Hrastinski, 2025). The basic concept of education fiction is not entirely novel; in fact, it originates in the idea of *social science fiction* and its use of narrative form to reflect on social issues (Cansler, 1972; Lackey, 1994), as inspired by science fiction works that are regarded as classics today, such as George Orwell's *1984* and Ray Bradbury's *Fahrenheit 451*, or Mary Shelley's *Frankenstein* (Kelleher, 2021).

The intersection of futures studies and education has a substantial history. Hicks and Slaughter's (2012) comprehensive 1988 vol established futures education as a distinct field, documenting case studies and theorising how futures thinking can be translated into educational practice. Indeed, futures studies has engaged with artificial intelligence for decades, including questions and early discussions of synthetic citizenship and machine consciousness that foreshadow contemporary AIED debates (Sudia, 2001). Methodologically, futures can be reframed as *contested imaginaries* to be interrogated rather than trajectories to be predicted. This reframing builds on Milojevic (2005) foundational analysis of how education futures are shaped by dominant and contesting visions, demonstrating that every approach to educational change inherently rests on underlying images of the future. Ross (2017) positions speculation as a counter to *what works* pragmatism by embracing the 'not-yetness' of digital technology. In futures studies, narrative approaches cultivate 'futures literacy', the capacity to anticipate and navigate uncertainty through imaginative engagement (Miller, 2018a). Attending to the 'storiness' of futurity fosters critical reflexivity (Liveley et al., 2021), surfacing the cultural and ontological assumptions embedded in educational visions (Gümüsay & Reinecke, 2024; Lee, 2021).

To date, however, researcher-authored fictions dominate, with comparatively fewer educator or student perspectives. Some recent works utilise student viewpoints (Bayne & Ross, 2024; Curcher, 2022; Flynn et al., 2023; Garza et al., 2022) or zoom out and focus on the entire entity of a future school (Selwyn et al., 2020) or different aspects of administration affecting the normal operations of a highly digitalised school (Cox, 2021). The degree of speculation (i.e. whether such fictional narratives have been inspired by specific empirical data or research) has not been systematically evaluated; however, it has been suggested that fiction written for research purposes can be an amalgamation of different lived experiences (e.g. of the researcher/author) and research data or purely speculative ideas that do not have a specific prior grounding (Hrastinski, 2025) or are not necessarily original.[2] In response, participatory forms of speculation align with anticipation studies' call to treat futures as resources for present action, not predictions to be passively received (Miller, 2018b; Poli, 2017).

2.2. Current AIED discourse

The literature reveals several key themes for the implementation of AI in education, with a frequent focus on higher education (Guo et al., 2024). AI is widely framed as a tool for enhancing existing educational processes, including the potential to tailor instruction to individual student needs (Bond et al., 2024; Crompton & Burke, 2023; Orlanda-Ventayen, 2024) and to improve teachers' workload through automated feedback and administrative assistance (Giannakos et al., 2025; Weegar & Idestam-Almquist, 2024). AI tools can also support students with disabilities by providing accessible learning materials and personalised support, with considerable room for development in this area (Seung et al., 2025). Related roles include AI as an assessor/evaluator, automating feedback and peer review processes (Topping et al., 2025), and AI as a collaborator or co-creator, where AI engages as a thought partner in dialogue, creativity, and knowledge construction alongside humans (Butson & Spronken-Smith, 2024; Gupta et al., 2024; Heinsfeld & Veletsianos, 2025). Such metaphors (e.g., 'AI is a brain' versus 'AI is a tool') have historically structured research priorities and ethical debates (Carbonell et al., 2016) and are particularly evident in recent literature around AIED (Ferreira et al., 2025; Gupta et al., 2024; Jin et al., 2025; Mitchell, 2024; Vallis et al., 2025; van Es & Nguyen, 2025).

These role-specific imaginaries exist within broader competing future discourses. Techno-optimistic visions paint AI as revolutionary, enabling hyper-personalised learning, relieving faculty burdens, and democratising access to quality education globally (Schiff, 2021). Speculative research also envisions AI systems that autonomously generate lesson plans, assessments, and learning materials, potentially transforming teacher roles and assessment agency (Linderoth et al., 2025; Xia et al., 2024). In contrast, critical and cautionary perspectives warn about social harms like bias and surveillance, and environmental costs (Selwyn, 2022; Williamson & Eynon, 2020). Techno-solutionism puts forward a concern that over-reliance on AI could erode teacher autonomy and promote a narrow, solutionist view of educational challenges, highlighting the need for ethical frameworks (transparency, fairness, stakeholder collaboration) for AI use in education (Holmes et al., 2022; Khosravi et al., 2022). Between these poles, human-centred futures emphasise integration rather than replacement, with AI and educators working together while preserving irreplaceable human qualities like mentorship, emotional support, and ethical judgment (Chan & Tsi, 2024; Oh & Ahn, 2024).

Recent research has also viewed AI in education as a wicked problem, particularly AI in assessment (Corbin et al., 2025), course

[2] At this point, it could be argued that what we perceive as originality can in fact be a complex process of unconscious influence, cultural zeitgeist, and creative transformation of existing materials. Such a discussion warrants its own elaborated space, and it would be nearly impossible to minimise this into a paragraph- or footnote-long note. However, the convergence of literary theory, psychology, and science studies provides empirical and theoretical support to suggest that original ideas in speculative fiction can be difficult to come by, not due to lack of creativity, but because of fundamental patterns in how human culture and cognition operate. Central to this line of thought are Mikhail Bakhtin's dialogism, Julia Kristeva's intertextuality (1967), Roland Barthes' 'the death of the author,' as well as Harold Bloom's anxiety of influence (1973), among others. Parallel support comes from multiple discovery/simultaneous invention theory in science studies, which suggests that the sociocultural system as a whole (the zeitgeist) is ultimately responsible for any given technoscientific advance.

design (Scalzer et al., 2025), and education leadership (Moran Jackson & Papa, 2024). Rittel and Webber (1973) differentiated between 'tame' and 'wicked' problems to stress that 'wicked' problems (in their case, relating to public policy and planning fields) do not have a clear mission, meaning that it is not clear "whether or not the problems have been solved" (Rittel & Webber, 1973, p. 160). They defined ten characteristics of such problems, which can also apply to AI in education. Some of these include: no definite formulation or natural stopping point, good-or-bad solutions rather than right-or-wrong answers, and limitless possible solutions. In planning contexts, they argue that, with wicked problems "the aim is not to find the truth, but to improve some characteristics of the world where people live" (Rittel & Webber, 1973, p. 167). Similar parallels emerge with AI in education: its evolving landscape resists stable problem definition and stopping rules, true-false answers give way to better-worse trade-offs (integrity vs. student trust, personalisation vs. privacy), and designing for AI futures remains boundless in its possibilities.

Recent evidence suggests that generative AI is simultaneously becoming normalised and contested in everyday life and educational practice. At population level, Eurostat estimates that 32.7 % of EU residents (16−74) used generative AI tools in 2025, including 9.4 % for formal education, indicating that AIED is already embedded in ordinary study practices rather than remaining a niche innovation (Eurostat, 2025). In Sweden, Internetstiftelsen similarly reports that 4 in 10 people aged 8 + use AI tools, with ChatGPT used by over 1 in 3, underscoring broad public uptake alongside shifting information habits (e.g., substituting AI tools for search) (Internetstiftelsen, 2025). Within education, however, adoption is paired with uncertainty and boundary-work: a UNESCO survey of higher-education networks found very high professional use (nine in ten) and substantial experimentation in teaching, yet over half report hesitancy or limited confidence, while institutions move unevenly toward formal policies (19 %) and developing frameworks (42 %) (UNESCO, 2025). Swedish sector snapshots echo this mix of pragmatism and concern: Stockholm's school development report notes weekly AI use by over half of participating teachers (Utbildningsförvaltningen Stockholms stad, 2025), while students at a Swedish university report widespread everyday use coupled with requests for clearer guidance and support (Öhrn et al., 2025). At the current policy level, Swedish universities have responded to AI largely through decentralised, educator-targeted guidance which, as Sporrong et al. (2025) demonstrate, tends toward 'educator responsibilisation', delegating to teachers the boundary-setting, upskilling, and safeguarding work that policies themselves may leave ambiguous. The Swedish Higher Education Authority's 2025 mapping of institutional responses confirms widespread assessment redesign in distance learning, including increased on-site examinations, oral defences, and revised policy documents, as AI-related disciplinary cases have increased (Åsén, 2025; Boberg et al., 2025). Read together, these reports contextualise stakeholder imaginaries in this study as emerging within a moment of rapid dissemination but unresolved legitimacy.

2.3. AIED as socially constructed imaginary

The future of AIED does not consist of a closed narrative but constitutes a site of contestation structured by sociotechnical imaginaries, "collectively held, institutionally stabilised, and publicly performed visions of desirable futures" articulated through, and in support of, science and technology (Jasanoff & Kim, 2015, p. 4). Competing imaginaries circulate in education debates: hyper-automated personalisation anchored in progress-and-efficiency myths; human-centred augmentation that keeps teachers central; and resistance to datafication grounded in autonomy and justice.

Against 'inevitable progress' storylines, critical scholarship shows how seemingly neutral AI trajectories are socially produced. A speculative vision for a 2030 school depicts data surveillance, deskilling, and platformisation as outcomes of political-economic agendas, not technical necessity (Selwyn et al., 2020). Historically informed analyses emphasise the co-production of AI with policy enthusiasm and commercial logics (Williamson & Eynon, 2020) and caution against 'technochauvinism', the belief that digital solutions automatically improve education (as discussed in Williamson, 2024). On a similar note, Knox et al. (2020) highlight machine behaviourism (a deterministic vision where economic efficiency supersedes pedagogical values, and human cognitive labour becomes devalued), where 'learning-as-data' narrows pedagogy and can shift control from educators to automated systems. Taken together, these accounts view AIED as a contested and negotiable future, and one that educators and students should help author. Such a framing foregrounds AI futures as products of values, institutions, and power, always open to critique and re-imagination.

3. Methods

3.1. Data collection

This study focused on faculty and students in Swedish higher education institutions. The selection of Sweden as the context for this research served two purposes. First, a single national context allowed deeper data exploration while being aware of contextual variables that may influence participants' imagination and creativity. This included a consideration of how Sweden's educational structures, cultural norms, and pedagogical practices may shape future education visions. Sweden's progressive educational mindset combined with reserved attitudes toward new technologies (Albris et al., 2024; Forsler, 2025; Samuelsson et al., 2021) provides a distinctive yet representative case for examining educational innovation, offering insights potentially relevant for broader educational communities in developed countries. Second, the researcher's location in Sweden facilitated efficient data collection and ensured compliance with local ethical guidelines and institutional standards.

Purposive sampling was used to recruit diverse stakeholders from Swedish higher education institutions. Between April and May 2025, the author screened websites of six universities to identify contact information for faculty across disciplines, researchers, and enrolled PhD candidates. Emails invited 2009 potential participants to contribute speculative scenarios about the future of AI in higher education, including: (1) a brief study description emphasising diverse perspectives, (2) information about the web-based scenario-

writing exercise, (3) estimated time commitment (5–15 min), and (4) a bespoke platform link. Participation was voluntary with no-consequence withdrawal. Between June and July 2025, 69 participants submitted scenarios through the platform. These texts were analysed for this article.

A bespoke website was created for handling the data collection process (see Appendix A). Participants first completed informed consent and provided basic demographics (occupation and discipline), without any further personal data being collected at this point. Upon completing the speculative activity, participants could opt in for further contact from the researcher by providing details and answer questions about tool usability and their experience. Those sharing contact information were reminded their submission would no longer be fully anonymous. Asynchronous data collection provided a private, reflective space for crafting narratives without time constraints or social pressures of synchronous settings like focus groups or interviews. The platform functioned as a narrative sandbox for creative speculation while ensuring data security and streamlining narrative collection and anonymisation (where possible).

Participants' stated disciplines were grouped into broad academic fields (Education, Engineering/Technology, Humanities, Natural Sciences, Social Sciences, and a small residual category) by clustering related subject areas. Occupations were categorised as Teachers, Students, Researchers, PhD candidates, and Other to provide role-based counts across these fields. Table 1 presents participant demographics by reported field of study/activity:

3.2. Data analysis

Data were coded using qualitative analysis software (Dedoose, version 10.0.35) following causal layered analysis (CLA). CLA was employed as the analytical framework because it "serves to assist the researcher in deconstructing an issue from four, increasingly complex perspectives" (Bishop & Dzidic, 2014, p. 17). The four categories of Causal Layered Analysis (Inayatullah, 2009) provide the blueprint for analysing a complex problem based on: litany (surface claims), systems (emergent rules), worldview (present or future assumptions), and myth/metaphor (metaphorical problem presentation). The litany level includes trends or problems that are often exaggerated and provide an overview of the problem; the systems level provides technical explanations by focusing on political or cultural factors, among others; the worldview or discourse level is concerned with "deeper social, linguistic, cultural structures"; and the myth level encapsulates the "unconscious dimensions of the problem or the paradox" (Inayatullah, 1998, p. 820).

The analysis followed Bishop & Dzidic's (2014) five iterative steps for CLA: (i) considering the research question, (ii) familiarisation with data, (iii) coding between layers, (iv) coding within layers, and (v) reconstructing the issue. After considering the research question (types of futures imagined; challenges in these futures) and familiarisation with the data, each text was read multiple times and first coded deductively, staying true to the four primary layers. Once the initial layers were accounted for, coding moved inside (*within*) each layer. The difference between coding between and within the layers in this study is explained here:

- Coding *between* layers: excerpts were assigned to the layer that best captured their analytical depth, whether they addressed surface-level events (Litany), structural systems, underlying worldviews, or foundational myths and metaphors.
- Coding *within* layers: once data were distributed across the four layers, emergent sub-themes inside each of the four layers were coded for. This process was iterative and moved along the between-within axis, since quotes could be considered differently according to the layer they were initially attached to.

4. Results

The recommendations of Bishop and Dzidic (2014) were followed to open up alternative framings of future of AIED according to the four CLA layers (litany: L-, social/systemic causes: S-, discourse/worldview: W-, and myth/metaphor: M-). Each layer is presented here through the subthemes that were generated while coding within the layers. To facilitate cross-layer connections for the reader, each quote is accompanied by the code(s) that were applied to it in the other layers, along with the type of participant that it originated from.

4.1. Litany

On the litany level, which is concerned with surface considerations around the issue at hand, the topic of **efficiency** was taken up the most out of the other litany considerations. In particular, higher education teachers can benefit from AI in multiple ways: "AI offers the opportunity to relieve the burden of more tasks, such as generating inspiring lectures in a subject of your choice, exercises,

Table 1
Distribution of participants across academic fields and roles.

Field (overall categories)	Teachers	Students	Researchers	PhD candidates	Other
Education	10	3	1	4	1
Engineering/ Technology	10	2	2	6	2
Humanities	6	1	2	-	-
Natural sciences	2	-	3	2	-
Social sciences	3	3	-	-	-
Other	-	2	2	1	1
Total (=69)	31	11	10	13	4

examination tasks and assessment templates that match the lectures" (Researcher 49, M-partner). Additionally, AI is presented as a tool that can "democratize learning … by allowing many more people to access source texts and thereby open up new and innovative interpretations" (Student 37, M-assistant). A teacher identified a problem that AI use is causing in modern education discussions, since AI generated content can replace students' thought and knowledge: "What should we teach? … The challenge we face is to identify what are the skills that are valuable for (most) humans to have … without losing the ability to move knowledge forwards" (Teacher 19, M-mirror, S-curriculum, W-human purpose). The promise of efficiency, however, was also viewed in a more negative light: "It's 2040. … Students speak any language with AI help. Glasses translate in real time. No need to memorise, no need to try. I remember the old days, … the joy of learning a word by heart" (Researcher 64, L-access, W-human purpose, M-evolution).

The second most popular consideration on the litany level was that of **assessment**. In the future, "student writing has become a pedagogical tool rather than something done to pass various types of examinations" and, as a result, "teaching also becomes more focused … on students learning new ways of thinking" (Teacher 55, M-evolution, W-knowledge). Other litany considerations related to matters of **access** ("AI also enables education to be provided to more people globally in a qualified manner … This also makes it less dependent on physical presence at an educational institution", Student 48), **job displacement** ("it was no longer possible to make a living by creating new knowledge and new material, and the world's information came to be dominated by AI garbage", Researcher 13, W-knowledge, W-human purpose), and **personalisation** ("For education, this means that we will receive suggestions for micro-merits/ modules that fit with the educational path we are trying to achieve", Student 26, S-efficiency).

4.2. Systems

On the systems level, concerned with structures and institutions, the participants viewed **pedagogy** as the primary systemic focus. Alternative visions of universities were presented: "universities have hybridized by loosening subject boundaries and new fields of knowledge have emerged- most at a 'meta level' with a focus on where and how, less on the question of what" (Teacher 61, W-learning theory). A participant's text was suggestive to the future students: "don't rely on making everything streamlined- there's a reason why those 'humps' in the stream exist, because once upon a time, people found an interest in solving the problems themselves" (PhD student 12, M-evolution, W-knowledge). The concept of pedagogy is also imagined to have evolved from its current classroom-based stage: "Just imagine: after 2035–2040, education will smoothly blend with everyday life. … You follow your ideas, gain knowledge, and still feel happy and well-prepared, because your AI mentor organised everything" (Researcher 59, W- human-machine, M-assistant). The fundamentals of education are also imagined in a different way: "it will be unnecessary to make future children look for information in books" (Student 62, W-knowledge, M-partner). This has a direct impact on the way knowledge is perceived: "overreliance on chatbots has given society a false sense of confidence in their knowledge" (Researcher 45, M-mirror).

On the systemic level, participants also speculated around **assessment systems**, either in hopeful terms ("assessment tools are now fully transparent and fair, with AI continuously adjusting to counter bias and ensure representation for all student groups", Teacher 6, W-progress) or in a negative way ("unfortunately, it has meant written exams are the only remaining way to tell if students genuinely understood the material", PhD student 24). Other systemic engagements revolved around **safeguards** ("finally, guidelines and safeguards have been established to prevent malicious use of AI", Teacher 36), **labour** ("the academic precariat will be completely marginalised and not in demand- the new household gods are the technicians and code writers; in the long term, I see a fusion between them and the machines into cyborgs" Teacher 50, W- human-machine, M-evolution), and **credentialing** ("this has led to an identity crisis for universities, which are no longer engaged in mass education, but are more of an exam-degree factory", Researcher 18, W-knowledge).

4.3. Worldview

On the worldview level, participants took up the value of **knowledge** more than others. In a future world, "people are expected to update their actionable knowledge through life-long learning, and traditional educations typically undertaken in your 20 s is a thing of the past" (PhD student 25, S-pedagogy, L-access). New skills emerged as necessary: "we need to train technologists in new skills such as prompt engineering, to generate valuable output and critical thinking in evaluating AI-generated output" (Researcher 49, W- human purpose, M-partner). Acquiring and using knowledge in a traditional sense is also challenged by future material advancements: "Aaron has been training with his augment, which is an AI data chip that is installed in the brain… He can collaborate with information from several large data sources to make wise decisions and optimise his potential" (Student 26, M-evolution, S-pedagogy, W- human-machine). Closely related to the value of knowledge were the worldviews relating to human purpose and the relation between humans and machines in the dataset. Regarding **human purpose**, it can relate to humans still possessing critical skills that machines don't ("there is also a deep underlying reason to these skills to humans when machines can do them better: we hope to generate a 0.1 % of students who want to do research … to push the boundaries forwards", Teacher 19) or maintaining the decisive factor after the machine has generated its output ("The final submission (after AI generations) wasn't neat. It was … Rewritten…, bending the assignment into something more relevant, more engaged. They didn't let the tool lead They made it answer. And that, to me, is learning" PhD student 43, W-knowledge).

The dynamics between **humans and machines** were also a prominent worldview in the dataset. A rhetorical question about this relationship is poignant: "If we teach machines to understand themselves, shouldn't we first ask if we ourselves have ever understood ourselves, and the universe we claim to master?" (Researcher 69, M-mirror, W-progress, S-pedagogy). The teacher's irreplaceable role in the equation was also highlighted: "In the future, a robot might handle routine classes, but Sara's expertise, judgement, and creativity will remain irreplaceable. … humans like Sara have an innate drive to grow, innovate, and teach in ways machines never

will" (Teacher 31, S-pedagogy). At the same time, this relationship relates to matters of knowledge: "I see AI as doping for learning and I think that this will speed up human learning, but not necessarily intelligence" (Student 60, L-access, W-knowledge). Worldviews that were taken up include matters of **progress** and how that is defined ("the creation of artificial consciousness has gone so far in copying the human that these AI intelligences with their human-like forms have begun to become increasingly difficult to distinguish from real people", Teacher 34, W-human-machine, M-evolution) and **equality** ("contrasts will not lessen in the world but be enhanced. Injustices have always been present among mankind and will continue to be so", Student 52, L-access).

4.4. Myths or metaphors

The deepest stories and archetypes from the dataset are linked to the layer of myths or metaphors. The most common myth of AI in the speculative texts was that of an assistant, closely followed by that of a partner. The difference between the two codes was in the intricacies of the relationship: an assistant is not treated as an equal, which is the case for a partner sometimes (in the dataset). In matters of **assistance**, AI is imagined to offer advanced systems of supporting the user: "the assistant had offered polished answers before the student even finished their prompt: code suggestions, clean phrasing, familiar UX solutions" (PhD student 43, L-efficiency). In another speculation, AI helps with assessment: "AI will be able to be applied to make assessments of students' knowledge. Then, one could read what knowledge is missing and be alerted to details or knowledge gaps" (Other 67, L-assessment, W-human purpose). Assistance even took the form of emotional support: "we all know how sometimes you just need a friend to explain and completely understand. That friend could be AI!" (Student 3, W- human-machine). Taking up the role of a **partner** in learning processes, AI is imagined enhancing situations where having conversations and practicing with other students could be supported by AI, which "could help creating fictional conversation partners with different types of concerns that the students get to explore" (Teacher 40, W-knowledge, W- human-machine). Academic writing is also reimagined in the future, in partnership with AI: "Today, I write my articles with AI in a way that has revealed separate authorship to be impossible. … together we work on them until we're satisfied with the content" (PhD student 53, W- human-machine).

The myth of **evolution** was also prominent in the speculations. Evolution in this case was interpreted differently, depending on other elements (or layers) present in each text. For example, evolution could raise issues of efficiency ("sustainability will become increasingly important, as training large AI models requires an enormous amount of energy and it will become increasingly relevant to reduce it as the need increases" PhD student 22) or even transformative ways in which AI can generate groundbreaking knowledge ("The results were astonishing. The AI found new paths through mathematical labyrinths, formulated theories about the origin of matter that no human had ever imagined. It grew faster than someone could keep up." Researcher 69, W- human purpose, L-efficiency, M-mirror). At the same time, such imaginaries can hold up a **mirror** to humanity, which forces us to reexamine what is fundamentally human and what is the role of machines: "the question is how to assess what is real knowledge and ability …You need to cognitively process and compare with previous knowledge to create something that will be valued and lasting." (Teacher 46, W-knowledge). AI was also pictured as a metaphorical **overlord**, (implicitly) controlling human conditions: "In 2040, …the student lives in his own bubble and has no reason to seek outside it. Community and belonging are forgotten as important human needs" (Teacher 56); "just as AI exists to match people in dating apps and streaming services, the technology will be used to match careers, diets, medicine, and health" (Student 26). In a similar fashion, AI was assigned **oracle**-like features: "AI can also identify each individual's level of competence in real time and thereby shape learning journeys that are optimised for that particular person" (Other 5, L-personalisation, S-pedagogy).

Table 2
Mapping four configurations of AIED futures (Enhancement, Transformation, Displacement, Resistance) across Causal Layered Analysis layers (Litany, Systems, Worldview, Myth).

	Enhancement (AI as Assistant/ Partner)	Transformation (AI as Evolution)	Displacement (AI as Replacement)	Resistance (AI as Threat)
Litany (Surface events & trends)	AI personalises learning to individual needs	Continuous lifelong learning replaces credentialing	Teachers gradually rendered redundant	Critical thinking skills deteriorate
	Democratised access to quality education globally	Assessment shifts (from summative to formative)	AI- generated content dominates knowledge production	Students develop dependency, not capability
Systems (Structures & institutions)	Dual assessment: AI-free zones & AI-enabled authentic tasks	Disciplinary boundaries disappear; meta-level fields emerge	Universities become exam/ degree factories	Protective structures needed (ban AI from K-12)
	Teachers focus on judgment, creativity, care	Continuous training replaces 'old model' of education	Competition based on AI sophistication, not pedagogy	Deliberate constraints on AI use
Worldview (Paradigms & values)	Human judgment remains central and irreplaceable	Human-AI fusion creates new, emergent forms of intelligence	Economic determinism prevails over pedagogy	Learning requires authentic struggle and friction
	21st-century skills: prompting, evaluating, synthesising	Knowledge shifts from 'what' to 'where and how'	Human cognitive labour has diminishing value	Community essential for developing empathy
Myth/Metaphor (Deep stories & archetypes)	Collaboration & partnership	Evolution & transcendence	Replacement & obsolescence	Contamination & preservation
	Tool metaphor: hammer, calculator, assistant	Cyborg metaphor: human-machine fusion	Humans cannot compete with machine efficiency	Nature vs. machine: organic growth vs. optimisation

4.5. Development of four configurations

After coding *between* and *within* the layers, and before reconstructing the issue (Bishop & Dzidic, 2014) in the Discussion, an overview of the four layers and their accompanying sub-themes revealed that, content-wise, certain imaginaries were related with some more than they were with others; these relations originated from the way that CLA codes co-occurred but expanded beyond them, by looking at the language that each speculation was using. As a result, four configurations were formed, accounting for four types of engagements with possible AIED futures. Here, these are termed the *Enhancement*, *Transformation*, *Displacement*, and *Resistance* configurations. These configurations do not simply represent different predictions about what will happen; rather, they reflect different assumptions about human nature, knowledge, education's purpose, and technology's role.

Table 2 presents these four configurations across all four CLA layers. Each cell captures the characteristics of that configuration at that particular analytical depth. Reading horizontally across a row reveals how the same analytical layer (e.g., litany) manifests differently depending on mythological framing. Reading vertically down a column shows how a single configuration (e.g., Enhancement) expresses itself from surface concerns through structural arrangements to deep metaphorical foundations. Reading from the bottom to the top of the table, one can reconstruct each configuration from its representative myth, through the worldview and systemic considerations, to the surface events that the configuration is based on.

Appendix B includes the full table with all the examples from the dataset for each configuration; Table 2 includes representative examples that aid readers' understanding, with space considerations in mind.

5. Discussion

The research question for this study asked: *what futures for AI in higher education do university stakeholders imagine, and what challenges do these futures entail?* In line with Bishop and Dzidic (2014)'s suggested CLA steps, a reconstruction of the issue (future of AI in education) is attempted in this section.

5.1. Imagined AIED futures

In the Results, the participants' speculations were grouped under four configurations: Enhancement, Transformation, Displacement, and Resistance. Each of these represents a particular discourse about AIED at the moment: Enhancement focuses on the positive aspects and productive features of AI; Transformation adopts a more careful or considerate approach to the invasion of AI in education; Displacement takes a(n active) stance against the domination of AI; and Resistance warns against the downfall of education as we know it. The emergence of these four configurations suggests that debates about AI in education may be less about technological capabilities and more about fundamental educational philosophies. Participants are not simply rejecting a fixed technological future (Ross, 2017), but actively constructing competing visions of what education *is* and what it should *become* (Jasanoff & Kim, 2015). This finding aligns with futures studies' longstanding recognition that the field operates across predictive, interpretive, and critical epistemologies (Inayatullah, 1990), with the present study contributing primarily through the interpretive and critical traditions by surfacing competing images of AIED futures and interrogating how different configurations may serve different interests or visions.

To anchor these abstract visions, participants relied on poignant metaphors which help illuminate both the pathways they imagined and the future questions that need to be asked (Carbonell et al., 2016; Ferreira et al., 2025). The Enhancement configuration's **AI-as-tool** or **'study buddy'** metaphor reflects an imaginary where education remains fundamentally unchanged in purpose, with technology serving established pedagogical goals (Vallis et al., 2025), treated in the literature as a personalised assistant (Heinsfeld & Veletsianos, 2025) that can either take over teachers' repetitive tasks or provide support to students (Gupta et al., 2024; van Es & Nguyen, 2025). The Transformation's **cyborg** metaphor imagines a more radical break where human-AI fusion creates emergent forms of intelligence, positioning adaptation as imperative. This would align with human-AI partnership discourses in the literature, where the technology supports teaching but may reduce human oversight (Oh & Ahn, 2024). The Displacement's **replacement** metaphor embodies what Knox et al. (2020) describe as machine behaviourism, where economic determinism prevails and survival depends on defining defensible human purposes (Crawford et al., 2024). The Resistance's **contamination** metaphor treats certain humanistic educational values as non-negotiable and requires active preservation from technological intrusion, also addressing discussions around ethical uses of AI (Bond et al., 2024). Though these framings appear absolute, they constitute examples of how stakeholders in this study constructed the problem of AIED; different metaphors generate different problem definitions and solutions, in line with the use of myths/ metaphors according to CLA and Inayatullah (1998) and the classification of AIED as a wicked problem.

Conceptually, the results of this research yielded certain futures for AI in education that have also appeared in recent literature. For example, metaphors for AI such as those of the assistant or the tutor, or the study partner and the knowledgeable other are not novel in research (Crompton & Burke, 2023; Gupta et al., 2024) or speculative education fiction (Gidiotis & Hrastinski, 2024). Moreover, the four combined configurations of the speculative futures envisioned here can be *loosely* matched to the 4 T Pyramid model (Jin et al., 2025), which grouped 53 empirically collected metaphors into four levels: technical support (here, *enhancement*), text development, transformative potential (here, *transformation*), and threat (here, *resistance*). Similarly, enhancement and transformation have been identified as impacts of AI implementation in higher education analysed through the Substitution, Augmentation, Modification and Redefinition (SAMR) framework (Belkina et al., 2025). Finally, the configurations parallel Dator's (2009) four generic futures (Continued Growth, Transformation, Collapse, Discipline), suggesting they may capture archetypal orientations to technological disruption that transcend the specific case of AI in education. Unlike some prior categorisations, however, this study did not aim to create classifications of different types of futures for AIED, as these were only a by-product of further analysis of the dataset, following

CLA.

The conservative results in the participants' speculations can be attributed to two factors: first, the degree of speculation, even when it refers to a long-term future, can be highly context-dependent and therefore each participant projects their current situation (or their current knowledge about how AI works) in only a slightly altered future, where AI is the norm; second, imposing analytical categories through CLA on participant data may produce specific types of associations between themes and subthemes, which might have been interpreted differently through a different method of analysis. Additionally, the presence of a single researcher/ coder working with this dataset can have an impact in its results, as is also pointed out in Limitations.

The Swedish context may have also shaped these configurations in particular ways. Sweden's history as an early adopter of educational technology, with national digitalisation strategies since the 1960s, combined with recent policy reversals prioritising textbooks and limiting screen time in schools (Albris et al., 2024; Forsler, 2025) may explain the pronounced presence of Resistance configurations in some of the data. The Nordic educational model's emphasis on equity and democratic values (Imsen et al., 2017) likely informs worldview-level concerns about AI amplifying inequalities. Conversely, Sweden's strong technology sector and innovation culture may underpin the detailed technical imaginaries in Enhancement and Transformation configurations, though these are sometimes attributed to 'recognised ignorance' (Sundberg et al., 2025) or the disconnect between utilising AI for mere efficiency or as a result (or prerequisite) of democratic participation (Hill & Ovesson, 2025).

5.1.1. Contextualising the configurations

The four configurations identified through education fiction point to a simple but important observation: disagreement about AIED is driven less by uncertainty about the technology and more by different views of what education is for. Unlike policy texts that may plot a straight path to a preferred future, or studies that assess current tools, the speculative approach makes visible how stakeholders build parallel, often non-convergent futures. In Jasanoff and Kim (2015)'s terms, these are true sociotechnical imaginaries; more practically, they operate as organising logics. When one logic frames problems and solutions, alternatives become difficult to see or act on. This suggests that debates in AIED are not only about implementation details but about underlying assumptions regarding knowledge, learning, and human development. The fiction method therefore works as an analytic device, able to surface structural disagreements that conventional accounts may overlook.

The configurations identified in this study resonate with findings from recent international surveys on AI in higher education. UNESCO's (2025) survey of higher education institution networks across 90 countries found that while nine in ten respondents used AI tools in their professional work, over half felt uncertain about AI's pedagogical applications and broader implications for human rights and social justice (UNESCO, 2025). This uncertainty mirrors the tensions between Enhancement and Resistance configurations in the present study. Similarly, the survey found that one in four institutions had already encountered ethical issues linked to AI, ranging from student overreliance to authorship disputes, reflecting concerns articulated across all four configurations. The parallel emergence of these themes in both Swedish stakeholder fiction and global institutional experience suggests that the configurations may capture fundamental tensions in AIED discourse rather than culturally specific concerns.

Importantly, novel results in this study can also be found in the associations that participants made between certain AI futures or metaphors (e.g., AI as an assistant) and the values they assigned to them (human judgement being irreplaceable vs. diminishing human cognitive labour), depending on their overall attitude or speculations about the future. For instance, the connections between what counts as knowledge (W-knowledge) and its impact on pedagogy (S-pedagogy), which can be viewed differently depending on the mythological framing adopted (M-evolution or M-overlord), provide a blueprint for design solutions that can also be utilised for futures planning. In dealing with several issues under the umbrella of AIED, three main challenges emerge as overarching in the dataset. These (and their proposed solutions) are presented in the next section.

5.2. Three persistent challenges for AIED across configurations

Analysis across the four configurations (also see Appendix B) revealed an interesting pattern: despite different mythological foundations and contrasting visions, all four dealt with similar fundamental tensions. The most pervasive concern was **'what stays uniquely human'** - which capacities, roles, and qualities remain distinctively human when AI can perform many educational functions. The Enhancement configuration positioned this as solvable through role division; Transformation saw the question as obsolete since humans would become augmented beings; Displacement saw the human aspect shrinking toward elite meta-level work; and Resistance treated certain human capacities as non-negotiable and requiring protection.

A second tension centred on **the assessment paradox**: how to evaluate learning when AI generates outputs indistinguishable from human work. At each layer, attempted solutions reveal deeper complications. Technical detection can fail, structural redesigns such as oral exams merely shift what is evaluated, and epistemological reframing from 'knowing facts' to 'evaluating sources' relocates rather than resolves the problem. This may be genuinely unsolvable, making it not a temporary problem awaiting technical fixes, but a fundamental transformation in what assessment means. A third tension explored whether AI's capacity to accelerate learning constitutes genuine progress, or whether something essential is lost through optimisation. The Enhancement configuration suggests synthesis through careful AI implementation; Transformation positions the dichotomy (**efficiency vs. depth**) as problematic, since human nature is already transformed; Displacement sees efficiency winning inevitably; and Resistance insists depth must be protected even at efficiency's cost.

These three cross-cutting tensions represent features of a wicked problem that any configuration must address. They have no stable solutions because they reflect deeper incompatibilities: the *human remainder* depends on which AI capabilities develop next; the assessment problem reflects an epistemological crisis about validating authentic engagement; the efficiency-depth tension embodies

incompatible educational philosophies. These tensions are intrinsic to the wicked problem structure, where "the aim is not to find the truth, but to improve some characteristics of the world where people live" (Rittel & Webber, 1973, p. 167).

This has significant implications for how future(s) research on AIED can proceed with the medium of speculative fiction. Ross (2017)'s call for speculative methods that embrace the 'not-yetness' of technology is validated: participants' speculative texts revealed not just what they *predict* will happen, but what they can assume about education's nature and purpose in the future. However, the diversity of configurations challenges any singular vision of the future (or decision to reach that future). If different mythological frameworks generate incompatible problem definitions, then preparing for AI futures cannot mean achieving consensus on *the* future, but rather developing capacity to recognise and negotiate between competing imaginaries. The emphasis on participatory speculation as resistance to 'big' narratives is crucial here (Suoranta et al., 2022): by documenting how teachers, students, and researchers construct AI futures in their own voices, this study provides empirical grounding for claims that alternatives to dominant Big Tech or policy imaginaries exist.

6. Limitations

The speculative nature of the texts that were analysed here presents both opportunities and constraints. While speculation may have freed participants from modern-day (technical) limitations, enabling exploration of deeper educational values, it also means that these visions may not present actionable policies. The configurations identified represent possible ways of thinking about AI-education relationships. Additionally, the interpretive nature of CLA's deeper layers means that other researchers might construct different mythological frameworks from the same texts, particularly given the cultural and temporal specificity of educational metaphors. The absence of a second coder and therefore of interrater reliability may reduce the trustworthiness of the results but it nevertheless suits the nature of qualitative inquiry, which puts emphasis on the participants' contributions. In addition, the low response rate is a sign of self-selection sampling, which carries a certain type of bias: participants who agreed to take part could have been more interested in the topic than those who did not, potentially impacting the demographics or the opinions expressed in the dataset. This self-selection likely skews the dataset toward stakeholders with stronger pre-existing orientations toward AI, whether enthusiastic or critical, potentially underrepresenting those with neutral or ambivalent positions. The configurations identified may therefore represent the poles of AIED discourse rather than its centre. Furthermore, those who chose to respond may possess greater comfort with speculative or creative tasks, meaning the dataset may overrepresent imaginative capacity relative to the broader population. These biases do not invalidate the results but suggest they capture articulated positions rather than the full range of assumptions that may be circulating in Swedish higher education.

Moreover, the fixed categories of analysis that CLA dictates means that this paper has overlooked (or underestimated) factors of pure literary interest, such as literary techniques (outside of metaphors), that could have formed the basis for the analysis of the speculative texts (Gidiotis & Hrastinski, 2025). While this is a limitation of the chosen approach, CLA enabled the compartmentalisation of the participants' arguments in categories that helped extract cohesive arguments from the dataset. Future studies can look at such datasets from a literary point of view, as well as combine them with more empirical investigations, such as interviews or workshops, to extract more comprehensive insights from speculative dealings with education futures.

The 69 scenarios were contributed by participants across different institutional roles, from teachers to students and researchers, with some participants combining roles ('others'). The four AIED configurations presented and discussed above were products of qualitative engagement with the dataset. Therefore, a comparison with possible **quantitative** implications will move the focus away from the interpretive work that resulted in those configurations onto statistical correlations. Exploratory numerical analysis of code distributions across participant roles reveals suggestive patterns at multiple CLA layers, though these should be interpreted cautiously given small within-group sample sizes (see Appendix C). At the myth layer, teachers ($n = 31$) and students ($n = 11$) predominantly framed AI through the Assistant metaphor (42 % and 55 % respectively), suggesting an imaginary of AI as helpful tool subordinate to human direction. Researchers ($n = 10$), by contrast, showed the highest rates of Evolution framing (40 %), positioning AI as part of a broader developmental trajectory. PhD candidates ($n = 13$) displayed the most distributed pattern across metaphors, with notably higher rates of AI-as-Overlord framing (23 %) compared to other groups, perhaps reflecting the precarity of early-career academic positioning.

At the litany layer, distinctive concerns emerged across roles. Students showed pronounced attention to access and equity issues (45 %, compared to just 6 % among teachers), while PhD candidates and researchers expressed greater concern about job displacement (31 % and 30 % respectively, versus 6 % for teachers). Researchers demonstrated the strongest efficiency orientation (60 %), while teachers' concerns centered on assessment (19 %) and personalisation (16 %), reflecting their direct engagement with pedagogical practice. Regarding what remains distinctively human, meaning-making emerged as the dominant human remainder for teachers (48 %) and PhD candidates (54 %), while researchers emphasised wisdom (40 %). Students showed a more distributed pattern across care, ethics, and relationships, suggesting perhaps a more holistic conception of human educational contribution. These patterns, while not statistically generalisable, indicate that stakeholder positionality, particularly career stage and pedagogical proximity, may shape how AI futures in education are imagined across all CLA layers. The author maintains that these observations should be interpreted ***cautiously*** given the small sample sizes within each category, the iterative revisions of the codes attached to each fictional product and, above all, the qualitative, emergent nature of the configuration analysis, which did not aim for statistical representation.

7. Conclusion

This study set out to examine the types of futures for AIED that Swedish university stakeholders imagine through education fiction.

CLA allowed for a deconstruction of the issue through the participants' visions and subsequent restructuring of these visions through the four analytical layers. This process yielded several surface considerations (litany: efficiency, access, job displacement), necessarily affected systemic structures (systems: pedagogy, assessment, labour), important values (worldview: knowledge, human purpose, equality), and metaphors that structure the future visions (myths: assistance, evolution, mirroring). These results were then grouped into four configurations (Enhancement, Transformation, Displacement, Resistance) that have largely appeared in the literature in other forms before. Across the dataset, the issues of the human remainder, assessment, and efficiency were central to the exploration of speculative futures. While several connections can be found between this study and the literature, the results here indicate that speculative methods can creatively integrate AIED discourse while attempting to solve problems that are yet to be presented.

The array of the configurations across the CLA elements gave a rich overview of how participants collectively imagined different futures for AIED. Each configuration, however, when adopted, enables certain possibilities while simultaneously foreclosing others; that is, it establishes what becomes thinkable, sayable, and doable within educational institutions and policy discourse. Enhancement enables practical integration strategies with clear human-AI role divisions but may overlook a critical interrogation of whether tools are ever neutral, as it cannot adequately address when assistance becomes dependency. Transformation enables radical reimagining beyond current constraints, empowering fundamental educational restructuring, but it cannot address the violence of forced adaptation or account for resistance to change. Displacement addresses realistic economic analysis of labour market shifts and institutional power dynamics, but it skips imagining positive alternatives by undermining agency. Finally, Resistance maintains a critical stance against AI solutionism but may nurture existing inequalities (e.g., access to AI services or tools) due to its resistance to change. In short, each configuration solves problems others cannot address while creating blind spots others illuminate. This is why they are all equally important aspects of the debate about AIED, foregrounded by using fiction as a medium to deal with unknown futures. Bridging the gap between optimistic policy narratives and the lived experiences of educators and learners still requires nuanced, interdisciplinary, and ethically grounded approaches.

The findings carry practical implications for those designing education futures. For curriculum designers, the persistence of tensions across all configurations (see 5.2) suggests that AI integration cannot be treated as a purely technical implementation but requires explicit engagement with underlying values about knowledge, human purpose, and educational depth. Curricula might be designed to cultivate students' capacity to recognise and navigate between configurations rather than assuming a single 'correct' relationship with AI. For AI application designers, the configurations reveal that stakeholders evaluate technologies not merely on functionality but on alignment with deeper worldviews. Applications designed solely within Enhancement logics may face resistance from stakeholders operating in Resistance configurations; conversely, tools that acknowledge the assessment paradox or preserve spaces for authentic struggle may find broader acceptance. The myth/metaphor layer proves particularly relevant: applications that position AI as 'partner' rather than 'replacement' may align with more stakeholder worldviews, though such positioning must be substantive rather than merely rhetorical.

While this study cannot empirically track configuration shifts, the theoretical structure suggests plausible trajectories. Enhancement framings may prove unstable as AI capabilities expand: educators experiencing assessment challenges might shift toward Resistance, while those discovering productive collaborations might move toward Transformation. Displacement, as the most deterministic configuration, may function as a 'default' position when institutional support is absent, while Resistance may intensify in response to policy mandates perceived as top-down. The configurations might also be understood not as sequential stages but as orientations that educators move between depending on context; this could include, for example, adopting Enhancement logics for administrative tasks while maintaining Resistance framings for core pedagogical relationships.

Subsequent research and practice should prioritise inclusivity, scalability, and the co-construction of AI futures that reflect the diverse needs and values of global education communities. Future longitudinal research could examine whether and how stakeholders' configurations evolve over time, as AI capabilities develop and institutional responses crystallise. The configurations presented here may not only represent fixed positions but also orientations that can shift in response to lived experience: an educator initially adopting Enhancement framings might move toward Resistance following negative experiences with AI-generated student work, or toward Transformation as they discover novel pedagogical possibilities. Understanding such trajectories could inform more dynamic approaches to AIED policy and professional development.

CRediT authorship contribution statement

Iosif Gidiotis: Writing – review & editing, Writing – original draft, Visualization, Methodology, Data curation, Conceptualization.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

To construct the frontend platform of the bespoke tool used for data collection (Appendix A), the author used AI models during March-May 2025 (ChatGPT o3 and 4.5, Claude Sonnet 3.7 and 4) through an AI code editor.

During the preparation of the article after the requested minor revisions, Claude Opus 4.5 was used for ideation purposes relating to the order of presentation of newly inserted information in the form of sections or paragraphs. No text was copied from generated AI output into the manuscript. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of the published article.

Declaration of Competing Interest

The author declares that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

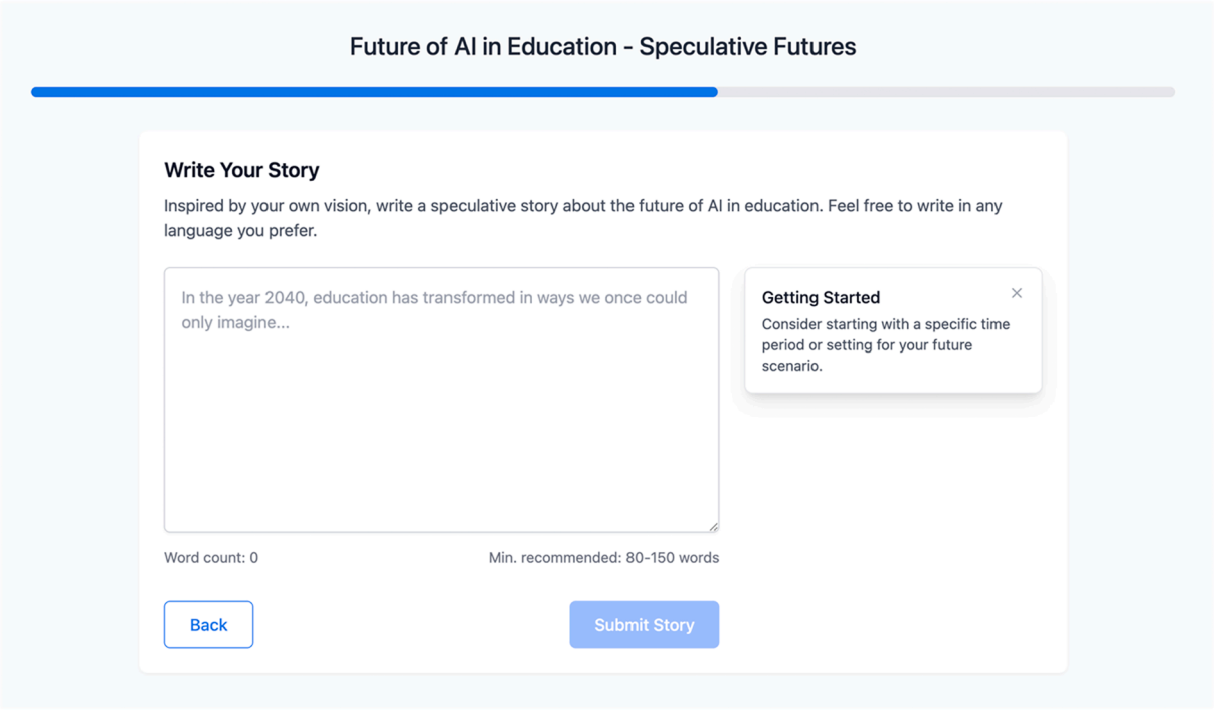

Figure A.1. Scenario-submission interface of the bespoke "Future of AI in Education - Speculative Futures" platform

Appendix B

Table B.1
Full configuration table with representative examples across CLA layers

	Enhancement (AI as Assistant/ Partner)	Transformation (AI as Evolution)	Displacement (AI as Replacement)	Resistance (AI as Threat)
Litany (Surface events & trends)	AI personalises learning to individual needs Teachers freed from routine administrative tasks Democratised access to quality education globally Students receive instant support when feeling stuck Faster completion of assignments Language barriers eliminated through instant translation	Radical changes to daily teaching practice Human-AI authorship boundaries blur Traditional degree programs become obsolete Continuous lifelong learning replaces credentialing Assessment shifts (from summative to formative) Real-time translation makes language learning optional	Teachers gradually rendered redundant Students complete work without genuine understanding Academic dishonesty becomes undetectable AI-generated content dominates knowledge production PhD positions disappear, except for 'elite' subjects or philosophers	Critical thinking skills deteriorate Students develop dependency, not capability Authentic struggle and effort disappear Performance gaps between students widen Misinformation proliferates in classrooms Motivation to learn facts is minimised
Systems (Structures & institutions)	Dual assessment: AI-free zones + AI-enabled authentic tasks Pedagogical systems, personalisation	Universities cease to exist in current form Disciplinary boundaries disappear; meta-level fields emerge	Institutional hollowing around data extraction Universities become exam/ degree factories	Protective structures needed: ban AI from K-12 Resistance movements within institutions

(*continued on next page*)

Table B.1 (*continued*)

	Enhancement (AI as Assistant/ Partner)	Transformation (AI as Evolution)	Displacement (AI as Replacement)	Resistance (AI as Threat)
	Teachers focus on judgment, creativity, care	Student writing becomes pedagogical tool, not assessment	Mass teacher redundancy: skeleton crew remains	Deliberate constraints on AI use
	Structural barriers (linguistic, accessibility) removed	Continuous training replaces 'old model' education	Competition based on AI sophistication, not pedagogy	Preservation of AI-free learning spaces
	Human contact valued for wellbeing, not just efficiency	New forms of collective intelligence	Identity crisis for education institutions	Systems designed to prevent over-reliance
			Only elite critical studies programs survive	Heterogeneous educational futures maintained
Worldview (Paradigms & values)	Progress through optimisation	Progress as fundamental transformation, not improvement	Zero-sum competition between human & machine	*Bildung* and cultivation as core educational values
	Knowledge is accessible and applicable	New forms of augmented human capability	Economic determinism prevails over pedagogy	Learning requires authentic struggle and friction
	Human judgment remains central and irreplaceable	Human-AI fusion creates new, emergent forms of intelligence	Human cognitive labour has diminishing value	Depth cannot be rushed or optimised away
	Efficiency (AI) in routine tasks enables depth elsewhere	Traditional epistemology and authorship transcended	Institutions optimise for cost/ scale, not quality	Community essential for developing empathy
	Balance achievable through thoughtful design	Knowledge shifts from 'what' to 'where & how'	Displacement is inevitable given market forces	Some capacities must remain non-negotiable human
	21st century skills: prompting, evaluating, synthesising	Evolution of human potential	Knowledge work gets automated	Authenticity vs. efficiency trade-off
Myth/Metaphor (Deep stories & archetypes)	Collaboration & partnership	Evolution & transcendence	Replacement & obsolescence	Contamination & preservation
	Tool metaphor: hammer, calculator, assistant	Cyborg metaphor: human-machine fusion	Economic determinism: cost always wins	Nature vs. machine: organic growth vs. optimisation
	Human remains in the loop, directing AI	Transformation of human nature itself	Humans cannot compete with machine efficiency	Essential human qualities under threat
	Progress as removing obstacles and friction	Progress as phase transition to new form	Education as factory production	Authentic development requires inefficiency
	Education as problem-solving system	Education as becoming, not acquiring	'Cognitive inferiority' dooms humans	Education as cultivation of whole person
	'Study buddy' companionship	AI develops consciousness, questions itself		Resistance as moral and pedagogical necessity

Appendix C

Table C.1
Distribution of selected CLA codes by participant role

Role	n	Myth Layer (AI Metaphors)	Litany Layer (Surface Concerns)	Human Remainder (What Stays Human)
Teachers	31	**Assistant: 42 %**	**Efficiency: 35 %**	**Meaning-making: 48 %**
		Partner: 29 %	Assessment: 19 %	Ethics/Judgment: 29 %
		Evolution: 23 %	Personalisation: 16 %	Wisdom: 23 %
		Overlord: 13 %	Job displacement: 6 %	Creativity: 16 %
			Access: 6 %	
Students	11	**Assistant: 55 %**	**Access: 45 %**	**Meaning-making: 36 %**
		Partner: 36 %	Efficiency: 36 %	Care: 18 %
		Evolution: 18 %	Job displacement: 18 %	Ethics/Judgment: 18 %
		Overlord: 9 %	Automation: 18 %	Relationships: 18 %
PhD candidates	13	Evolution: 31 %	**Job displacement: 31 %**	**Meaning-making: 54 %**
		Partner: 31 %	Automation: 23 %	Wisdom: 31 %
		Assistant: 31 %	Efficiency: 23 %	Ethics/Judgment: 15 %
		Overlord: 23 %	Access: 15 %	
Researchers	10	**Evolution: 40 %**	**Efficiency: 60 %**	**Wisdom: 40 %**
		Assistant: 30 %	Access: 40 %	Ethics/Judgment: 20 %
		Partner: 20 %	Job displacement: 30 %	Meaning-making: 20 %
		Overlord: 20 %		

Note: Percentages indicate proportion of scenarios within each role group coded with the respective code. Bold values indicate highest rates within each column or notable overall patterns. **Due to small within-group sample sizes, patterns should be interpreted as exploratory, as highlighted in the main text of the article**.

Data availability

Data will be made available on request.

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