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RESEARCH

Conceptualisation of human–AI dialogue in/for an educational semiosphere

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Abstract
This theoretical article argues that the encounter between humans and Artificial Intelligence (AI) in educational contexts is not an interaction between a knowing subject and a neutral tool, but a semiotic dialogue within a multilayered space that produces meaning. According to Lotman's (Universe of the mind: a semiotic theory of culture. Indiana University Press, Bloomington, 1990, Semiosfäärist (In: Lotman J, Semiosfäärist. Pruul K (trans). Vagabund, Tallinn, pp 7–36, 1999) semiotics, dialogue refers not simply to verbal exchange, but to a communication that is dynamic, generative, and based on difference; therefore, it is through dialogue that knowledge is produced and transformed into meaning. In this sense, a learning semiosphere is conceptualised as a dynamic space where signs interact, reinterpret, and circulate. The study draws on this view to critically explain the (im)possibility of placing AI in a dialogic education to shape AI-mediated approaches for the common good; furthermore, raising this critical question that if meaning emerges through dialogue as a form of inquiry, what does it mean to adapt AI as a generating agent in meaningful education? Thus, the article does not ask whether AI replaces human dialogue, but how AI now participates in the conditions through which dialogue and therefore meaning emerges, while humans and AI co-participate in the learning semiosphere.

Keywords Artificial intelligence · Dialogue · Education · Lotman's semiotics · Inquiry

1 Introduction

Nowadays, dialogue has become a subject of inquiry, as opposed to advocacy, across various disciplines to construct interpretations. Its relationship with, and potential applicability to, machine-based technologies such as Artificial Intelligence (AI) lets us raise questions regarding how dialogical interaction with AI (e.g., ChatGPT) may influence and expand our understanding of new concepts; hence, our subjective interpretation of them. However, as AI systems become more advanced, relatively little attention has been given to how they initiate and sustain conversations with humans, for example through generating prompts, nor how such interactions may shape deeper forms of inquiry, particularly within the dialogic aspect of educational contexts. The aim of this study is to further explore how these theoretical perspectives may contribute to the future of human–AI dialogue that is no ordinary talk but a mode of inquiry itself. Tackling this problem is, in fact, a way of emphasising how important it is to discuss and examine the philosophy of the human–AI relationship for the common good across various expressive and media forms for designing meaningful and ethically responsible learning experiences.

While Juri Lotman (1922–1993) did not explicitly develop a theory of dialogic education, his semiotic perspective on the concept of dialogue and communication provides a foundational dialogical approach grounded in the diversity and interaction of signs. Lotman's (1990) theory of *Semiosphere* —understood as a realm of signs and meaning-making that communication and language cannot exist beyond this space— offers a valuable framework for understanding how inquiry and dialogue function as semiotic processes within educational contexts. He emphasises that *texts* are not limited to written or spoken language; therefore, are not isolated artefacts; rather, they exist within a broader cultural and semiotic environment, continually interacting with other texts and contributing to the ongoing creation of meaning. In this sense, Lotman's definition of a text is expansive and inclusive, capturing the multifaceted nature

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of communication in human culture (see Lotman and Uspensky 1978). This Lotmanian perspective becomes particularly significant in the context of contemporary human–AI collaboration. As AI systems increasingly participate in the production and transformation of artistic and intellectual texts, Lotman's framework for understanding the function of dialogue offers a means to examine how this relationality affects meaning-making that is co-constructed across different forms of intelligence (human or non-human ones). Furthermore, instead of focusing solely on comparing human and machine cognition, a Lotmanian approach encourages us to view these interactions as a necessary condition for communication while being complementary, highlighting the relational and dialogic processes through which creativity and understanding emerge. This orientation aligns with inquiry-based and dialogic pedagogy, emphasizing the cultivation of meaningful relationships within the learning environment, not only between educators and students but also between humans and non-human agents, including AI. Such pedagogy conceptualises learners and teachers as relational beings interconnected with the broader semiotic and material world of the classroom and beyond (Lacković and Olteanu 2020). Within this framework, AI does not simply serve as a tool or substitute for human cognition but becomes part of a dialogic network of meaning-making, supporting educational practices that are reflective, collaborative, and culturally situated.

Building on this theoretical foundation, the inter-semiotic and dialogic relationship between humans and AI will be further examined through critical discussion and by analysing the conceptual questions that are: *In what sense can AI be considered as a persona, formed through inquiry and dialogue?* and most importantly, *when and how does this persona participate in a dialogic interaction with humans in the educational semiosphere?* Illustrating answers for these questions will foreground the concept of dialogic and inquiry-based learning in the philosophy of education with semiotics that serve as the main role to construct AI literacy as a futuristic competence necessary in the modern world. By forwarding education that considers AI in the various theories of learning, we can get closer to reshaping the cross-section of creativity, authorship, and deeper learning in a dynamic educational sphere.

2 An inter-semiotic view towards '*inquiry*' and '*dialogue*'

Inquiry refers to the process in which knowledge is constructed through active exploration, critical questioning, experimentation, and the resolution of doubt (Lacković 2018). Dewey (1938) positions inquiry parallel to reflecting on real problems, generating hypotheses, and testing ideas through experience. His theory emphasises curiosity, collaboration, and democratic participation in the learning process. In contemporary education, learning theories that prioritise inquiry as the main strategy have evolved from the discovery of isolated concepts toward the data-collection and data-interpretation of rules and relations between variables, asking questions such as *why* and *how*, requiring learners to systematically experiment and interpret data (van Joolingen et al. 2005). This inquiry process is inherently semiotic, as learning proceeds through the interpretation and transformation of signs, which itself is a subject of inquiry (Strand 2013). Deely and Semetsky (2016: 8) emphasise establishing semiotic inquiry for "learning [that] aims towards signification; signs, via the dynamics of multiple interpretations and translations into other signs". This view builds the ground for acts of inquiry in pedagogical practices that emphasise on the significance of semiosis—the dynamic process of sign growth and the potential for conceptual transformation—and subjective interpretation of learners as the main approach in constructing knowledge. Through semiosis, which is "inherently a conscious act" (Lee 1983: 394), we can imply support not only for problem-solving but also for being able to position inquiry as the material and symbolic mediation through which knowledge becomes part of the larger scope of real life. It is what students learn about inquiry that matters, and how they perform it during educational activities is, in fact, what teachers and curriculum designers have to focus on to help students learn through inquiry while developing higher-order thinking skills.

In a similar context, to apply inquiry, communication is an absolute factor; highlighting the role of dialogue and dialogic-based methods in education which conceptualise learning as a relational and co-constructed process of building new knowledge. "Our cognitive machinery is better designed for dialogue than for processing language in an isolated context" (Costa et al. 2008: 528). Dialogue involves encountering others —whether individuals, communities, or broader cultural voices— and generating understanding through difference and alignment. Communication and dialogue progress when participants are willing to reflect together on both their differences and their points of alignment, being shared concerns, common goals, or overlapping values. Although a "full alignment (in which interlocutors have identical mental states) may never occur" (Garrod and Pickering 2007, parentheses in the original text), dialogue continues to advance through the ongoing interplay of encoding and decoding. When alignment is too much or misplaced, it can undermine dialogue causing partial or full failure in supporting learning and inquiry. Therefore, differences step up and transform interpretation, perspective, or expectation, helping dialogue to become visible once again within the interaction. These moments of non-alignment do not halt communication; rather, they prompt clarification,

repair, and negotiation, thereby driving the dialogue forward and enabling the co-construction of meaning. Freire (1970) insists that dialogue becomes meaningful only when it supports collaboration and possibilities for transformation and praxis. Wegerif (2019: 21) describes dialogic learning as arising from the moment one is "called out by the other", which seems to be in line with Hurley (2021: 61) who emphasises that dialogic education is "[a] series of interactions for different points of view rather than a transmission of facts". Dialogue, accordingly, is not simply conversation but a '*mode*' of learning and joint attention placed within social interaction and interpretation (Kress 2010). It is further explained by Amalia and colleagues as:

> "Dialogue, for the purpose of our research method, is not just ordinary talk. Its focus is learning and learning leads to new understandings about the stories of individuals and groups, which in turn can lead to re-storying and multivocal interpretations. Dialogue is best sustained in democratic contexts where different perspectives are encouraged, trust is nurtured, and norms of social justice are maintained" (Amalia et al. 2014: 162).

3 Lotman's view on the notion of '*dialogue*'

From a semiotic perspective, Lotman positions dialogue as the fundamental mechanism of meaning-making in the *semiosphere*, described as a semiotic space outside of which "there can be neither communication nor language" (Lotman 1990: 124). The semiosphere is an expansive, open-ended space in which signs in any forms are dynamically and relationally interconnected. It functions as a heterogeneous field that produces diversity through these ongoing interactions and "includes territorial, social, cultural, and individual identities" (Torop 2021: 297) as part of its sign relations. If the semiosphere is where no sign exists in isolation and all sign systems continually interact directly or indirectly (Tian et al. 2023), then dialogue is an ontological characteristic of it. Dialogue requires both similarity, which enables mutual understanding, and difference, increasing the value and creativity of communication (Lotman 1999[1984]); though, it is by these two perspectives that new text is created in dialogue. For Lotman, meaning arises at the moment of interaction between differences, through negotiating tension between shared reference points and divergent perspectives (Laas 2016), expanding the area of inquiry further and allowing the philosophical domain to pay attention to other modes such as intercultural dialogue and what it brings to the discussion. Communication, though, is generative not because information is transmitted, but because new semantic relations are produced in the encounter between conversational partners.

From an inter-semiotic standpoint, Dervin and Tian (2023) invite us to continually reconceive dialogue, viewing it as a dynamic process in which meaning is translated and negotiated across diverse sign systems, encounters, and environments. This notion underscores that dialogue is itself a multilayered, open-ended construct shaped through shifting signs, practices, and subjective interpretations, helping meaning-making while, first, demanding humans to go through a semiotically built discovery and learn to make sense of signs they are surrounded with to understand who they are, how they relate to others, and most importantly, how they understand the world. Thus, dialogue is not merely an activity occurring within learning but a constitutive principle of the educational semiosphere itself. This perspective provides a better vision of learning that values the act of semiosis and takes place under the umbrella term of *inquiry-based approach*, shaped by the continuous dialogue between one's cultural background, values, and previous experiences to interpret signs (O'Halloran 2022).

One of Lotman's most generative insights is that the boundary of the semiosphere is where translation occurs. Boundaries are not walls that exclude; they are semiotic layers that filter, transform, and innovate while new meaning arises when something foreign is interpreted within the existing semiosphere. It can be worth mentioning that Lotman's definition of semiosphere reminds this author of Vygotsky's (1978) Zone of Proximal Development (ZPD) that is a core component in the discipline of educational psychology. ZPD is the space between what a learner can do independently and what they can do with guidance from a teacher or other types of assessments (e.g. books, maps, technology. etc.). It is mainly recognised as a key feature in constructivist learning theory, also known as sociocultural theory, which emphasises that learning and development are primarily driven by social interaction and cultural context. Vygotsky believed individuals construct their own knowledge through interactions with others, influenced by cultural tools and practices. He treats word meaning as a crucial site of inquiry for uncovering the intricate connections between thought and language. If we extend his framework, we can hypothesise that dialogue itself becomes the central mechanism through which these meanings are formed, transformed, and shared. Highlighting dialogue in this way opens up an important line of investigation: it creates space for interdisciplinary exchange among semiotics, cultural and educational studies, psychology, and neuroscience (Fadeev 2022). Such a perspective helps us better understand how human sign-using activity, especially dialogic interaction, drives cognitive and psychological development and how these developmental processes are inseparable from semiosphere context. If we want to draw a line between Lotman's

concept of semiosphere and ZPD, we could say that the boundary of the semiosphere functions as a dynamic contact zone where what is considered *one's own* meets what is perceived as *other*, marking the interface between internal meanings and external influences. This boundary is not a fixed border but a living space in which signs are continually translated, negotiated, and transformed functioning by a site of ongoing semiosis. In this sense, it resembles Vygotsky's ZPD, where learning and growth occur through interaction with what lies just beyond an individual's current capacities. Similarly, the semiospheric boundary is where new meanings emerge by encountering unfamiliar sign systems, engaging with them, and incorporating or reshaping them, moving towards the system that expands its interpretive possibilities. Both concepts highlight that development, whether cognitive or semiotic, takes place at the margins, in the zones of contact where similarity or difference in dialogue and communication becomes productive.

Aside from how one might find parallel threads between Vygotsky's and Lotman's work, the latter offers a foundational theoretical framework for understanding the centrality of dialogue within the semiosphere and its implications for educational practice. Lotman emphasises that highly complex, multilayered, and semiotically heterogeneous texts are not reducible to linear transmissions from sender to receiver. Instead, such texts participate in dynamic interactions with both their cultural surroundings and their interpreters. Their capacity to condense and reorganise information grants them a form of memory, enabling a self-growing sign (Lotman 1988). At this level of structural sophistication, the text in dialogue operates as an intellectual device capable not only of conveying externally introduced information but also of transforming and generating new meanings. Consequently, the communicative function of the text becomes substantially enriched. As Lotman (1988) observes, once a text manifests these intellectual properties, it transcends the role of a passive intermediary and effectively becomes an autonomous partner in the dialogue. In the dialogic encounter between author, text, and reader, the text functions as an independent participant, capable of shaping the interpretive process and contributing actively to meaning-making.

These insights hold significant implications for education. If texts can be understood as autonomous partners in dialogue, and if dialogue itself is a primordial condition for meaning-making, then pedagogical environments must be designed to cultivate dialogic interactions among learners, texts, and socio-cultural contexts. Education, from this perspective, is not a unidirectional transfer of knowledge but a participatory process in which learners actively engage with semiotically rich materials, negotiate meanings, and contribute to the continuous growth of the semiosphere. Recognizing the inherently dialogic nature of building new knowledge underscores the value of pedagogical models that foreground interpretive plurality, critical interaction, and the co-creation of understanding within semiospheres of mind.

4 Inquiry and dialogue with(out) artificial intelligence

The idea of an artificial machine to be deeply involved in our everyday lives sounds like a great plot for a science-fiction story. Nevertheless, contemporary AI platforms are increasingly advancing in different fields, and we can see them being mentioned in conferences, books, social media, etc., which demonstrate the fast-ascending capacity of AI to support and even generate creative work, including visual art, writing, and music (Ghazvineh 2024). AI-generated text differs from other textual forms not merely in degree, but in kind. While all texts are situated within networks of prior discourse, AI text is structurally dependent on a prompt and mediated by layers of meta-prompts that shape tone, scope, etc. AI can reproduce stylistic continuities without lived continuity, citation without intellectual lineage, and synthesis without responsibility. This situation creates *non-normal textual relations*, transforming dialogue into default mode, memory into statistical surface, and authorship into an emergent effect of systems designed to speak without speaking subjects.

The emergence of AI as a collaborator or tool in human creativity necessitates the development of frameworks and regulations that shape how the human user understands, interprets, and interacts with AI, whether as an illustrative tool or as a responsible agent capable of producing meanings (Arkhipova and Viidalepp 2023). This view optimistically enhances having possible advantages for a well-trained platform where humans and AI engage in co-creative philosophical dialogue. This shift demands understanding the benefits that interaction with AI could have, including its growing sophistication within one's own field and the broadened interdisciplinary perspectives it brings (Nguyen and Ho 2025). Nevertheless, significant epistemological and empirical issues remain to be explored. As AI increasingly occupies a central place in the philosophy of education, the evaluation of its ethical and social implications has faced significant debates among scholars who have raised this critical question about how AI has been "exaggerated by misplaced fears, possibly based upon misconceptions of what AI is or can do" (Boddington 2023: 39). To look at AI as a substitute in developing inquiry and initiating dialogue, first, we need to understand that technologies like AI can play a critical part in shaping how humans view and interact with others depending on the structure designed for it to be embedded in (Mantello 2025), and we should be mindful about how much this structure plans to apply AI-based approaches in learning. This is why considering

ethical points is the first step to take while trying to design curriculums that attempt to put AI into service. Furthermore, ethics emphasises both the importance and the challenge of working with AI in moral education and character formation of learners, while it views the surrounding social environment (our semiosphere) as a crucial factor in that process.

The role of AI in educational dialogue and inquiry-based learning should be designed as content that is pedagogically and culturally reusable in a variety of different learning situations. As mentioned before, alignment in dialogue is often treated as a prerequisite for successful progression; however, excessive or uncritical alignment can undermine dialogue itself (Garrod and Pickering 2013). Contemporary AI systems are particularly effective at producing surface alignment, which mirrors users' lexical choices, stance, and assumptions. Although such alignment can scaffold engagement, it also risks prematurely stabilising meaning. When alignment occurs too quickly or too completely, dialogue may shift from inquiry toward confirmation, reducing epistemic friction and limiting the interpretive space available to learners. To think about having a dialogue with AI in an educational setting, it is essential to understand that AI is not an independent and self-standing unit within the learning semiosphere as it is bound to be in connection with human beings to manifest outputs (textual, visual, audio pieces, etc.). In addition, when we intend to promote knowledge transformation, it becomes important to discuss AI affordance and ethical challenges that it brings with itself to the domain of education. On the one hand, when inquiry and dialogue occur without AI, learners engage directly in processes of questioning, hypothesis formation, evidence-gathering, interpretation, and reflection. In progressive inquiry, learners construct knowledge by iteratively cycling through phases of asking, planning, exploring, constructing, and reflecting (Pata et al. 2007: 1362). Such inquiry supports the development of higher-order thinking skills, interpretive agency, and the ability to navigate semiotic complexity (Lim 2004). Dialogue in this context allows learners to maintain heterogeneity, negotiate meaning, and co-construct understandings that are situated and open-ended. AI algorithms write and rewrite text, influence attention and interpretation, causing meaning to be no longer created only by humans; as a matter of fact, it is co-produced by humans + technological systems. This shift requires expanding the semiosphere and developing critical thinking over the encounter between distinct texts, languages, and interpretive frameworks that generate new semantic possibilities. Meaning, therefore, does not precede dialogue but arises from it. This view provides the philosophical basis for asking whether and how AI *speaks*. If meaning is co-constructed, then machine speaking is less a matter of possessing interior subjectivity and more a matter of participation in dialogic exchange within a cultural space.

On the other hand, when inquiry and dialogue are mediated with AI, these processes take shape within algorithmic structures that often provide pre-formulated answers, predictive scaffolds, and optimised decision pathways structured like alignment or difference to match the prompts' instruction. While AI dialogue systems may support efficiency, generate alternative representations, or stimulate exploration, they may also narrow interpretive space by reducing dialogic tension and limiting opportunities for learners to struggle with ambiguity or difference. From a dialogic perspective, learning depends on sustained negotiation (Metcalfe and Game 2008). Partial misalignment, ambiguity, and resistance of AI's produced content break dialogue into foreclosing contestation, displacing learner agency, and transforming dialogue into adaptive echoing rather than co-construction which presents a dangerous condition for meaning-making and inquiry. This point is also emphasised by Zhai et al. (2024), asserting that over-reliance on AI-driven guidance can diminish learners' capacity to engage in self-directed inquiry and critical meaning-making. Thus, the challenge is not to reject or uncritically embrace AI, but to sustain the dialogic and semiotic conditions necessary for meaningful inquiry. AI-supported dialogue narrows rather than expands interpretative possibility when learners defer rather than respond and when alignment substitutes for productive struggle. These risks are not merely ethical or practical; they are semiotic and dialogic, reshaping how meaning is stabilised, authority is distributed, and voices are positioned within the interaction. Therefore, inquiry and dialogue with AI can expand possibilities for learning when they support openness, plurality, and interpretive agency; at the same time, cause friction if alternatives are no longer explored. But inquiry and dialogue without AI or rather, beyond its automatisms remain crucial for cultivating the human capacities to question, to reflect, and to co-construct meaning in relation with others.

5 Deeper into the context of AI in/for education

As digital technologies become increasingly embedded in teaching, learning, and institutional processes, educators and researchers are challenged to rethink established pedagogical models and consider new opportunities for personalisation, scalability, and innovation. The Human-Centred AI Lab[1] at the University of Oxford suggests that combining educational philosophy with technology-supported learning represents a transformative shift toward creating systems that genuinely support learning through practice. In this view,

[1] Retrieved from: https://hailab.ox.ac.uk/ (Accessed in May 2025).

learning with AI becomes a form of dialogue that extends beyond human interaction, encouraging experimentation with forms of conscious learning that depend on learners being actively involved in the design of educational experiences. Parallel to this notion, Beetham and Sharpe (2019) remind us of the importance of technology as a critical component of contemporary education systems, underscoring the urgency of understanding how AI can be responsibly and effectively integrated into diverse educational contexts. However, before considering the force of AI in both theoretical and applied pedagogy, this study aims to depict how it could be approached through philosophical perspectives of semiosis to better imagine the future of learning when the dialogue between humans and AI is at its peak. The integration of AI has already caused scholars to worry and question whether it would improve or hinder learning (Wang 2025). This challenge of validation has led many institutions and educators to consider excluding AI technologies from learning environments altogether (Corbin et al. 2025a). In educational contexts, this issue raises critical questions regarding how ideas are represented, interpreted, and transformed when learners engage with AI systems (Sidorkin 2024). One theoretical solution according to Wellner (2024: 3) can be that "we need to examine not only the functional, technical, and cultural aspects of a given technology, but also its ethical and political traits, […] that affect technology developers". At the moment, the portrayal of AI in education resembles looking at the moon's dark side, marked by uncertainty and wondering about its (im)possibilities for learning which are also referred to as AI-generated *hallucinations* that are either "factually incorrect or nonsensical" (Rapanta et al. 2025: 3). Considering that AI can be depicted as a technology-based tool in learning, it is mostly viewed pessimistically as the ultimate disembodiment of learning and considered a burden on students' learning experience and responsibility (Flenady and Sparrow 2025; Zipory and Dishon 2025).

The introduction of AI, especially its generative platforms, caused fears and fantasies of the end of education as we know it, and we as thinkers and practitioners struggle to understand its potential impacts on learning and how to use it responsibly for students. At the same time, let us be clear that it is essential to consider the point of not studying about AI and its potential role in education both in theory and practice limits teachers, staff, and students' ability to conceptualise this phenomenon in other aspects of their lives, never be able to manifest in understanding and engaging with it effectively (or neither accept or reject it completely). The purpose of this study is not to emphasise a simple decision to be made about the acceptance or ignorance of using AI, nor is it about finding regulatory strategies capable of addressing new risks associated with it in education. What we propose as the main theoretical approach, which must be identified and enacted, is to move towards an optimistic scale and theorise the role of AI in a dialogic-based interaction with humans, and what it means in education to seek definitive answers about placing it within practice. For start, let us talk about Generative AI (GenAI) as a problem and source for cheating in educational society, but it's also a problem for engagement and workload, issues that are dramatically challenging in classrooms for teachers and students. AI-generated texts are not independent of human inputs. They incorporate both the users' voices through their prompts and the community's voices through the patterns derived from a massive corpus of human-authored texts (Tang 2025). With the increasing use of GenAI, the boundaries of its theory need to be expanded since it creates a shift in the role of teachers from being the sole arbiters of meaning and facilitators of dialogic space to someone whose presence somehow vanishes from the learning space altogether. Educators can guide students in interpreting GenAI output, mediating between human and machine contributions, and fostering productive negotiation of differences; therefore, their role must be kept while AI stays as the smaller scale and adapts itself to however the educators decide to apply it in education. This aligns with contemporary perspectives on digital pedagogy, which emphasise orchestration of learning environments rather than unilateral instruction.

In this sense, if dialogic-based interaction between humans and AI is carefully structured and rules are applied by teachers and content creators, the generative mode of AI in education can be promoted as *AI for education*. This perspective views the application of GenAI as a tool-mediated approach to active and social learning that is previously mentioned by many great minds such as Dewey, Vygotsky, etc. as the main concept to be wary of in pedagogy. This approach promotes engaging students and teachers in ongoing, adaptive, and dynamic activities shaped by evolving conditions that place GenAI as an assessment in finding solutions for society (Fulsher et al. 2025; Kalaitzidis 2025). In this way, it is easier to navigate the challenges of using AI by human agents after their participation in tasks that promote dialogic inquiry-based learning with AI in education.

Another important thing to be cautious about while involving the use of AI technology in education, however marginalised, is to accept that one approach in a specific educational context often does not apply in another and we need to give permission to divergent strategies and methods to show themselves (Corbin et al. 2025a). According to Zipory and Dishon (2025), the natural and the artificial are often positioned as fundamentally distinct, with the latter regarded as inferior to the former. Such distinctions mirror broader tensions between the human and the non-human: the non-human is simultaneously framed as a potential enhancement of the human, while at the same time being seen as merely an approximation of what is considered natural. These concerns surrounding emerging information

technologies strongly echo contemporary anxieties about AI. If such fears prove unfounded, then perhaps the *new artificial* should not be understood as unprecedented, but rather as part of a longer and more complex continuum of technological innovation in learning. This notion becomes more real when we can observe that AI dialogue systems are already affecting the way students approach writing and decision-making, critical thinking, cutting across the core practices in research and learning about life (Corbin et al. 2025b); therefore, let us be open-minded and at least welcome it, then decide to "adopt a critical stance, to help ensure that the introduction of AI into education reaches its potential and has positive outcomes for all" (Holmes et al. 2023: 653). In this new landscape, it is crucial to develop frameworks which empower the implications of methods where human–AI dialogue becomes a means for cultural meaning-making, translation, and inquiry-driven negotiation that enhances the responsible integration of AI in education. This goal ensures the students' need to inclusively question the concept of knowledge and to acquire it is supported by the kind of theories that are semiotically constructed and well-promoted in the matter of "cognitive, social, and emotional growth" (Sidorkin 2024: 2).

We can further argue that within this vision AI can be framed in a context where students are allowed to fulfil a dialogic and inquiry-based conversation because it follows the process of exchange which always implies feedback from the other one (human or non-human). Human–AI interaction should be understood as mediated dialogue through texts, prompting semiosis and subjective interpretation while placing AI as an assistant next to humans. If meaning is not a property contained within a speaker or a text but instead emerges through dialogue, then to describe AI systems as *speaking* is not to attribute consciousness or intentionality to them; rather, it is to recognise that AI language models participate in the semiotic conditions through which meaning becomes possible. This aim draws attention both to the generativity of AI and the underlying assumptions surrounding it, and to the present embedded perceptions of human–technology relations in teaching and learning (Bates 2019). Though technologies shape our experiences, an AI-based theory in learning can vary depending on social and cultural contexts, as well as users' perspectives and goals (Dishon 2025). In educational settings, the role of AI-generated content becomes even more pressing because of the value in the subjectivity and critical thinking of learners. Students often treat AI-generated responses as expressions of a textual persona, attributing style, stance, or perspective where none is internally held. This reflection is not a mistake but a semiotic response; leading the student to personally be engaged with the AI's output as if it were part of the dialogic fabric of the classroom semiosphere. The meaning of the AI's output is therefore not inherent but emergent, formed through the interaction between student, AI-generated text, and the educational context that frames interpretation. This setting will be clearer to visualise in education if we conceptualise the philosophy of Lotman's semiotics as the conductor of orchestrating interactions within a heterogeneous semiotic space where new meanings emerge. Additionally, classrooms become a site for meaning-making, translation, and transformation by exposing students to AI-generated texts that serve as didactic provocations, encouraging students to compare, contrast, and translate between familiar and unfamiliar semiotic forms (Bower 2017).

6 The human–AI dialogue: towards a framework for the future of education

The term '*persona*' refers to the voice or character that can be adopted when communicating (Marshall et al. 2019). To describe an AI system as *persona* is not to attribute interiority, agency, or subjective consciousness to it. Rather, the term refers to the coherent stylistic, discursive, and rhetorical patterns that emerge from the model's training on large-scale corpora. To further clarify the concept of AI *persona* and avoid conceptual slippage, it is useful to distinguish among three analytically distinct but interrelated dimensions: (1) persona as a semiotic effect, (2) persona as an interactional affordance, and (3) persona as a pedagogical risk. At the level of semiotics, persona refers to the patterned linguistic cues and stylistic features that users perceive when interacting with generative AI outputs (Leone 2025). These patterns emerge from the structure, fluency, and coherence of AI-generated language, which often resembles human communication closely enough that users cannot reliably distinguish it from human-authored text (Arkhipova and Viidalepp 2023). The second dimension suggests that beyond perception, persona functions as an *affordance* in interaction, a feature of dialogue that shapes how users orient to and engage with the system's outputs. In human–AI dialogue, the affordances of an AI agent do not derive from innate mental states but from the social expectations, communicative cues, and relational dynamics that users bring to the interaction (Haqqu et al. 2025). Framing persona as an interactional affordance therefore highlights that AI language shapes *how* learners behave in dialogue while determining trust, participation, turn-taking, and emotional engagement without implying that the AI possesses interiority (Karimova 2025). Finally, persona can become a pedagogical risk when interactional orientations lead learners to misattribute authority or epistemic competence to the system. In educational settings, learners may treat an AI's fluent or stylistically consistent output as reliable or evidence of understanding (Karan and Angadi 2023). When this happens, AI persona ceases to function

as a neutral affordance and instead shapes learners' trust and decision-making in ways that can undermine critical thinking and learner agency (Chaparro-Banegas et al. 2024; Mouta et al. 2025).

This issue highlights the problem of '*cognitive offloading*' in educational practices—broadly understood as the lack of cognitive tasks that can affect students' competence and problem-solving. In this sense, AI's conversational and generative capacities intensify the ambiguity between support and substitution in exceptional ways. If AI is used in education, its function as a dialogical partner must be scaffolded as a companion to learning rather than replacing it. The learner must remain responsible for framing questions, evaluating responses, and reflecting on the outputs by an inquiry-based approach that is conceptualised according to a human-AI dialogic structure. Therefore, cognitive effort becomes reorganised but not eliminated; understanding emerges through interaction rather than delegation and competence is simulated rather than acquired. Another important scenario is to always question the role of AI in education to make sure that it is not about whether AI was used, but how it was used in learning. Hence, questioning whether the human-AI interaction leaves cognitive traces in the learner, such as the ability to explain, transfer, or critique the resulting knowledge. Regulating this relationship, therefore, cannot rely solely on detection or prohibition of the use of AI in educational activities. Instead, it calls for pedagogical and institutional frameworks that foreground process transparency, reflexive documentation, and task designs that require situated judgment, contextual adaptation, or personal synthesis—capacities that cannot be fully offloaded. In this sense, AI does not eliminate the need for learning but renders its conditions more visible, forcing a rearticulation of what it means to know, understand, and think with tools.

Any AI dataset primarily analyses repetitive elements that form groups and can be united based on some logical or mathematical regressions. This notion impacts the understanding of AI and its relation to creativity. Debates surrounding AI and creativity are currently polarised between two broad positions. On one side, scholars argue that AI can function as a creative tool insofar as it performs novel recombination of elements at a scale and speed unavailable to human authors (Erden 2010). From this perspective, AI-generated outputs are not straightforward acts of imitation but emergent configurations in which stylistic features, semantic fragments, and formal structures are rearranged in ways that often evade direct traceability (De Vries 2020). Indeed, the opacity of this argument renders traditional plagiarism-detection methods ineffective, reinforcing the impression that AI produces genuinely new textual artefacts. On the other side, critics emphasise that such novelty is procedural rather than inventive (Runco 2023), arising from statistical variation rather than intentional deviation or conceptual disagreement. This is also one reason why AI is incapable of innovative or creative per se operations. It generates new texts using already existing texts within an operative dataset often pre-selected by designers and found within the semiosphere of a given culture. AI as an agency introduces a higher probability of highlighting repetitive elements within these selected sets, also selected elements of the semiosphere and producing an output that promotes already pre-set bias, which later can be confirmed by designers and audiences. AI systems contribute not by knowing what they generate, but by producing textual output that enters into the semiosphere, where it is taken up, interpreted, contested, and woven into dialogue.

AI can speak back in communication, help shape our interpretation, and generate new semiotic relations. A persona, in this sense, is the recognisable pattern of expression through which a text enters into dialogue within the semiosphere. Crucially, the meaning of the AI's persona is not self-sufficient; it becomes meaningful only as humans respond to it, same as how Lotman (1988) suggests that holding a dialogue between the addressant and addressee turns is a conversation that goes back and forth to possess a high degree of profound meaning. The persona is enacted in dialogue when a reader (student or educator) encounters the AI's output and treats it as coming from a more expert agent while negotiating its intention and evaluating the text with human intelligence. From this perspective, to say that AI *speaks* is shorthand for something more precise and saying that AI generates culturally readable texts that can function as utterances within dialogic processes. The particular meaning remains relational, situated not in machine intention but in the interpretive labour performed by human participants who position the AI's text within ongoing personal, social, and cultural narratives.

Human–AI dialogue can be understood as a boundary process. If education is understood as participation in the semiosphere and learning as navigating, translating, and reshaping meaning, then AI's role is neither merely instrumental nor supplementary. AI becomes a mediator of dialogue, an interlocutor through which learners encounter both familiar and unfamiliar articulations of knowledge. AI models are trained on the internal memory of the semiosphere, yet the way they recombine cultural elements can appear unfamiliar or defamiliarised. This introduces productive differences that prompt new interpretations. In educational contexts, these differences surface when students attribute intentionality, personality, or understanding to AI-generated responses. There has to be a semiosphere for inquiry functioning for the learners, and also a space for AI literacy to be developed and tested instead of being blocked altogether (Pratschke 2024; Kalaitzidis 2025). Let us assume that learners can yield knowledge in this way and only by altering the meanings in the dialogical intercourse between the common

and aligned parts of the binary semiotic objects; therefore, it is important to test whether learners perceive AI-generated outputs with different affordances.

If AI's text is treated as a participant in dialogue, then it can be considered a *voice* within the classroom semiosphere. This interaction exemplifies Lotman's principle of texts as quasi-subjects, where meaning arises through relational interpretation rather than intrinsic properties of the text or speaker. AI-generated text often contains ambiguities or novel combinations of ideas. Learners will respond to this text by questioning, critiquing, or reframing it while it occurs at the boundary of the classroom semiosphere, a site Lotman identifies as generative and able to make new meanings. Importantly, the educational semiosphere is dynamic, meaning that the introduction of AI-generated content does not merely supplement instruction; it actively reshapes the interpretive ecology. Learners negotiate the relevance, reliability, and stylistic cues of AI's text, constructing meaning through dialogic engagement rather than passive consumption. Ultimately, the AI's role is viewed as co-constructive, producing contents that become meaningful only as learners situate it within the social, cognitive, and expand it into real-life situations.

Overall, the theoretical aspect of this article argues that the encounter between humans and AI in educational contexts is not merely an interaction between a knowing subject and a neutral tool, but a semiotic dialogue within a multilayered semiosphere that produces meaning. Lotman's semiotics sharpen this view by conceptualising dialogue not primarily as intersubjective exchange, but as a systemic process through which meaning emerges from the interaction of heterogeneous agents and helps achieve inquiry. Unlike dialogic theories grounded in Bakhtinian voice, Vygotskian mediation, or pedagogical reciprocity, Lotman's concept of the semiosphere allows dialogue to be easily theorised beyond human consciousness and intentionality, emphasising non-identity, partial untranslatability, and boundary-crossing as generative conditions of meaning. In this sense, a learning semiosphere is understood as a dynamic space in which human and non-human agents co-participate in the circulation, transformation, and reconfiguration of signs. This systemic conception of dialogue is particularly salient for theorising Human–AI relations in education, where meaning emerges from the translation, misalignment, and reconfiguration of signs across human and algorithmic interactions.

7 Conclusion

Approaching human–AI interaction through a Lotmanian semiotic and dialogic framework highlights the importance of viewing dialogue as a form of inquiry rather than simple information exchange. As AI systems increasingly participate in educational environments, their role in shaping how learners encounter, interpret, and generate meaning becomes a crucial area of study. With Lotman's understanding of dialogue and text, we can critically pivot our focus from comparing human and machine cognition to seeing how, in fact, forms of intelligence coexist within a shared semiosphere. When humans encounter AI-generated output in educational settings, they engage not merely with text but with a semiotic presence that occupies a space within the classroom semiosphere. In Lotmanian terms, the classroom is itself a micro-semisphere, a bounded cultural environment where meaning is co-constructed through dialogue, interpretation, and negotiation. AI, in this sense, becomes part of a dialogic network that can extend and challenge humans' conceptual frameworks and acts of semiosis. By integrating semiotic theory with dialogic and inquiry-based pedagogy, we can design learning experiences that are more reflective, collaborative, and attuned to contemporary forms of knowledge production. Such an approach prepares learners to navigate a world in which meaning is co-constructed through dynamic interactions between humans and intelligent technologies.

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