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Milena Škobo

TOWARDS A TYPOLOGY OF EDUCATIONAL CHATBOTS: FROM CLASSROOM LEARNING TO CULTURAL MEMORY AND EMOTIONAL UNDERSTANDING

This paper proposes an original typology of educational chatbots distinguished by their narrative role, audience, and emotional or ethical dimension. It identifies three categories: pedagogical chatbots, designed for instructional and interactive learning; memorial chatbots, created to preserve collective memory and convey moral lessons about the past; and grief chatbots (griefbots), developed to mediate experiences of loss and reflection. Unlike existing studies that treat educational chatbots primarily as cognitive support tools, this typology expands their scope to include cultural and affective learning, positioning chatbots as mediators between knowledge, empathy, and remembrance. Examined through three interpretive lenses – (1) pedagogical, focusing on learning outcomes such as empathy, historical awareness, and cultural literacy; (2) ethical, addressing issues of consent, authenticity, and the moral limits of simulating deceased individuals; and (3) practical, concerning the curricular and institutional conditions for responsible adoption – the study situates chatbot development within Serbia's educational and cultural landscape. It argues that the real innovation lies not in technical creation alone, but in the pedagogical and research work that transforms AI prototypes into meaningful tools for learning and reflection. The paper contributes an interdisciplinary framework for evaluating educational chatbots as pedagogical, memorial, and grief agents, and calls for future policy and research to establish national guidelines for their ethical, evidence-based use in schools, museums, and other learning environments.

Key words: educational chatbots; pedagogical chatbots; memorial chatbots; grief chatbots; ethical and safe use of AI tools and agents

1. INTRODUCTION

Among the most dynamic and versatile applications of artifitial intelligence are chatbots — digital interlocutors capable of simulating human dialogue and interaction. While often associated with administrative or customer-service functions, their potential as educational, cultural, and emotional mediators remains only partially explored. Studies examining conversational AI systems show that chatbots are frequently evaluated through technical and operational criteria such as conversational accuracy, user experience, efficiency, and regulatory compliance (Gupta, Ranjan, & Singh 2025). Research on the use of large language models in public-sector administration further highlights concerns about transparency, accountability, and the risk of biased or inaccurate outputs when such systems are integrated into institutional decision-making (Svärd & Seljan 2024). In both classroom and extracurricular settings, chatbots can act as teaching aids and mediators of learning, supporting instruction and sustaining student engagement. Beyond formal education, they can also operate in museums, libraries, galleries, and even private settings, where they help preserve collective memory, foster reflection, and promote empathy.

In global scholarship, chatbots have typically been examined as tools for language learning, tutoring, or academic assistance, whereas their broader pedagogical and ethical dimensions have received far less attention. In Serbia, this field is at an early stage. Existing initiatives — notably the *Nikola Tesla* and *Branislav Nušić* chatbots (Škobo & Šović 2025) — illustrate how AI-driven dialogue can enrich learning, stimulate curiosity, and strengthen conenctions between education and cultural heritage. Yet no study has offered a comprehensive framework for categorizing different types of educational chatbots according to their narrative role, emotional tone, or ethical implications, especially in contexts where learning, memory, and affective engagement intersect.

The aim of this paper is to develop and critically examine a typology of educational chatbots within the Serbian educational and cultural context. The typology identifies three chatbot categories that serve educational purposes but differ in scope and resonance:

1. pedagogical chatbots, which assist instruction and promote interaction;
2. memorial chatbots, which preserve collective memory and convey historical or moral lessons;
3. grief chatbots, which mediate experiences of loss and reflection.

To guide this conceptual analysis, the paper addresses the following research questions:

RQ1. How can pedagogical, memorial, and grief chatbots contribute to learning outcomes such as empathy, historical understanding, and cultural literacy in Serbian education?

RQ2. Which ethical concerns emerge from designing and using chatbots that simulate historical or deceased individuals, and how might these concerns be addressed within Serbian educational and cultural contexts?

RQ3. What institutional, technological, and pedagogical conditions are required for the responsible introduction of such chatbots in Serbian schools, museums, and related learning environments?

The paper approaches chatbots not merely as digital tools, but as potential mediators of knowledge, memory, and emotional understanding. It argues that their educational value depends on pedagogical intention, ethical grounding, and institutional readiness—not on technological novelty alone. From this perspective, the paper proposes a typology that shifts attention from technical performance to the narrative, cultural, and ethical roles that conversational agents can assume in educational and commemorative contexts.

1.1. Methodological framework

The purpose of this paper is to synthesise existing scholarship and propose an interpretive framework relevant to Serbian educational and cultural contexts. The paper covers research on educational, memorial, and grief-oriented chatbots published in international journals and conference proceedings over the past 5 years (approximately 2020–2025), with an emphasis on studies in education, digital memory studies, ethics of AI, and human–computer interaction. Serbian and regional sources are included where they provide contextual or institutional relevance.

Sources were selected based on conceptual relevance to one of the three chatbot categories, empirical or theoretical contribution to AI-mediated learning, memory, or emotional interaction, and explicit discussion of ethical, cultural, or pedagogical implications. The paper focuses on contemporary generative-AI systems and their predecessors, tracing how conversational agents evolved from early rule-based chatbots to multimodal LLM-based tools capable of narrative simulation. The thematic scope covers pedagogy, digital memory, grief technologies, ethics, and institutional implementation.

The literature was analysed and organised with direct reference to the three research questions. Pedagogical studies inform RQ1; ethical and digital-memory scholarship informs RQ2; and policy-, practice-, and institution-oriented studies inform RQ3. This alignment ensures transparency and coherence between the aim of the paper and the interpretive structure of the review.

2. LITERATURE REVIEW

In recent years, chatbots in education have drawn sustained scholarly interest as tools that can support learning in multiple ways (Li et al. 2023; Wollny et al. 2021). Enabled by advances in natural-language processing and conversational design, contemporary systems are no longer simple novelty applications but interactive companions capable of engaging students in dialogue, offering instant feedback, and adapting to individual needs. Their capacity for personalised support and sustained interaction has positioned them as increasingly relevant in modern classrooms.

The roots of conversational agents trace back several decades. Mauldin introduced the term *chatterbot* in 1994, building on earlier programmes such as ELIZA and ALICE (Černý 2022). Although originally designed for experimentation rather than instruction, these early systems demonstrated that computer-mediated communication could approximate human-like conversation, providing an important conceptual foundation for today's educational chatbots.

Several systematic reviews outline the development of chatbots in educational contexts (Kuhail et al. 2022; Pérez et al. 2020). They note that many educational chatbots have been used primarily to support administrative or cognitive tasks (e.g., homework assistance, explanations, or content recommendation). Pérez et al. (2020) distinguish between "service bots" (handling administrative queries) and "instructional agents" (designed to support learning), noting that although chatbots show promise for scaffolded instruction, the majority of studies prioritise technical performance overpedagogical depth. Kuhail et al. (2022) reviewed 36 chatbots across domains and found that most deployments occur in computer science, language learning and general education—with motivational or peer-support roles still under-explored. More recent work indicates that chatbots can enhance motivation, interest, and intrinsic self-efficacy, although the evidence remains mixed and often short-term (Huang, Jiang, King, & Fryer 2025).

Some studies argue that chatbots can support the basic psychological needs of autonomy, competence and relatedness when they are experienced as adaptive and re-

sponsive (Liu & Reinders 2025). Multi-role chatbot designs (Instructor Bot, Peer Bot, Advisor Bot) in higher education have been shown to stimulate inquiry and classroom participation when aligned with these needs (Cao et al. 2023). Nonetheless, the effectiveness of chatbots depends less on novelty and more on the fit between design features, pedagogy and learner needs. As of design challenges, features such as user-centred interaction heuristics, personality design, and long-term maintenance are still insufficiently examined (Guan, Raković, Chen, & Gašević 2024).

Evaluation of educational chatbots increasingly considers their pedagogical effectiveness and contribution to learning. Rather than focusing only on technical performance or usability, recent studies examine whether chatbot interaction supports knowledge acquisition, student engagement, and instructional objectives. A systematic review by Al-Shamaileh, Mubin, and Nizamuddin (2026), which analysed 124 empirical studies published between 2014 and 2024, identifies learning outcomes, technology acceptance, and usability as recurring themes in the assessment of educational chatbots, while also noting reported benefits such as personalised feedback and increased learner motivation. Debets et al. (2025), reviewing 71 studies, similarly observe that most educational chatbots are evaluated through perceptual indicators such as learner satisfaction, engagement, and perceived usefulness, and that many studies report positive results for the specific learning tasks for which the systems were designed. At the same time, both reviews point to methodological limitations, including heterogeneous study designs, short-term evaluation periods, and the limited theoretical grounding of many chatbot implementations. Thus, evaluation of educational chatbots must consider not only technical performance but also their pedagogical impact and learning outcomes.

For the purpose of this paper's typology, an important insight is that educational chatbots are not limited to traditional instructional roles. Emerging literature on memorial and grief-oriented chatbots suggests a widening range of narrative and emotional functions. "Griefbots," for instance, enable between bereaved users and AI-generated representations of deceased individuals (Jiménez-Alonso & Brescó de Luna 2023). Research on AI-driven memorial services likewise stresses how digital after-life systems raise questions of identity, temporality and ethical regulation (Ciani Sciolla & Pagallo 2025). Emerging work on digital memory and cultural heritage further suggests that conversational agents are increasingly explored in museums, commemorative spaces, and public education contexts, where learning intersects with remembrance and ethical reflection (e.g., Öhman & Floridi 2017; Ciani Sciolla & Pagallo 2025). These perspectives indicate that chatbots can function not only as ped-

agogical aids but as mediators of remembrance, emotional reflection, and cultural legacy.

The literature confirms that chatbots hold educational potential, particularly when design is attuned to instructional aims, learning psychology, and classroom integration. Yet the empirical base remains uneven: many studies focus on usability or short-term engagement rather than long-term learning or broader emotional and cultural impacts. This gap points to the need for frameworks capable of capturing the diverse functions chatbots now perform—from learning support to memorialization and grief mediation—and for evaluation approaches that attend carefully to the alignment of design, pedagogy, and context. Within this wider scholarly landscape, the typology proposed in this paper—distinguishing pedagogical, memorial, and grief chatbots—finds its theoretical rationale.

3. CHATBOT TYPOLOGY

The typology proposed in this paper encompasses both implemented projects and those envisioned for future development within Serbian educational and cultural contexts. Some chatbots, such as the Nikola Tesla and Branislav Nušić models, have already been created and tested, while others remain in the conceptual or early developmental phase. The classification therefore serves a dual purpose: it systematizes existing initiatives and outlines directions for future practice, showing how chatbots can contribute to learning, remembrance, and emotional reflection when responsibly integrated into education and public culture.

3.1. Pedagogical chatbots

Recent empirical studies have shown that well-designed chatbots can lift learning outcomes, not just convenience. A mixed-methods quasi-experiment with 78 sixth-graders showed that an AI chatbot ("SosyalciBot") used in Social Studies outperformed two constructivist control classes on post-tests and retention, while students and the teacher reported better engagement and feedback quality (Yetişensoy & Karaduman 2024). In higher education, a large-scale study on a virtual teaching-assistant chatbot reported improved academic performance and participation patterns relative to prior cohorts, suggesting benefits that extend beyond novelty effects (Essel et al. 2022). Building on such findings, pedagogical chatbots are designed to support classroom teaching across diverse contexts – English-medium instruction (EMI),

STEM subjects, language and literature courses (such as Serbian Language and Literature), or any other school subject (e.g. Civic Education, History, The World Around Us). When thoughtfully integrated, they can introduce or review material, guide discussion, and sustain learner attention, and assist teachers at all educational levels. Their effectiveness depends not only on technical design but also on pedagogical planning, methodological supervision, and curricular alignment.

Within this conceptual framework, two principal subtypes of pedagogical chatbots are distinguished: (1) historically inspired chatbots, modeled on authentic cultural or historical figures, and (2) fictional, subject-specific chatbots, created as original classroom characters. Both subtypes share the same pedagogical logic — clear curricular goals, teacher-guided use, and iterative evaluation — but differ in narrative affordances. Historically inspired chatbots build on cultural memory and disciplinary discourse, as seen in the Tesla and Nušić projects tested across schools and faculties in Serbia and the Republic of Srpska, while fictional designs offer greater flexibility of tone, age relevance, and classroom role, as envisioned in prototypes in development for specific school subjects.

The Nikola Tesla and Branislav Nušić chatbots represent the first systematic attempt in Serbia to merge artificial intelligence with education and cultural heritage. Introduced at the *Sinteza 2025 International Scientific Conference on Information Technology, Computer Science, and Data Science* in Belgrade (Škobo & Šović 2025), both were designed as conversational partners that bring historical and literary figures into dialogue with learners of different ages. The Tesla chatbot introduces students to science and invention through the persona of Nikola Tesla. It bridges STEM and the humanities, enabling discussions about invention, ethics, and history in both Serbian and English. It also serves as a bilingual model for EMI instruction, helping teachers engage multilingual classes and fostering interdisciplinary connections between science and language learning. The Nušić chatbot, presented at the *2025 Sinergija Conference* in Bijeljina (Škobo & Šović 2025a), was conceived as a cultural-educational digital twin approximating Nušić's humor and rhetorical style. In class, it can introduce a text, initiate discussions on satire or historical context, or connect Nušić's social commentary to contemporary issues. Beyond schools, it can act as a digital curator in theatres, libraries, or cultural centers, revitalizing literary heritage often confined to archives.

The development of these chatbots also involved an extensive process of pedagogical validation. After the initial prototypes were created, their potential classroom functions were carefully defined — as warm-up activities, discussion starters, aids

for introducing or revising lessons, or bilingual tools for translation practice between Serbian and English. Teachers across Serbia and the Republic of Srpska were invited to test the chatbots in regular classes, providing structured feedback through surveys distributed via professional networks, social media, and direct outreach to schools. Ethical clearance for data collection was obtained from the author's home institution, ensuring compliance with research standards even in the absence of formal ministry-level pilot approval. The resulting empirical data, gathered from both teachers and students, informed research questions, hypotheses, and subsequent analyses, forming the basis for several peer-reviewed studies on classroom motivation, interaction, and interdisciplinary learning. These developments also build on earlier research on teachers' attitudes toward AI and chatbots in Serbia, which showed that educators who are more familiar with such tools express greater readiness to integrate them into teaching, stressing the importance of continuous training and institutional support for sustainable adoption (Škobo & Šović 2025b).

The Nušić project also faced specific pedagogical and authenticity challenges: partial digitization of Nušić's works, the need to preserve linguistic nuance, and the balance between period language and modern comprehension. Evaluation data from 50 experts showed that 44.5% of AI-generated passages were misattributed to Nušić, indicating the model's linguistic precision but also highlighting the ethical need for transparency and teacher mediation (Škobo & Šović 2025a).

Methodologically, the Tesla and Nušić projects demonstrate that innovation alone does not guarantee educational value. What proved more significant than technical design was the process of transforming these prototypes into pedagogical tools — an achievement made possible through the expertise and sustained contribution of philologists. In the classroom, such chatbots must remain clearly framed as interpretive assistants rather than replicas of the author.

In museums or cultural institutions, this approach can bridge heritage content with curricular learning goals, ensuring that AI tools serve education rather than technological display. In this context, surveys in both English and Serbian were administered to visitors at the Museum of Science and Technology in Belgrade, accompanied by posters and QR-code access that enabled real-time interaction with the Tesla chatbot. The study, which included 306 adult visitors, provides important empirical grounding for the pedagogical dimension of this typology. Visitors evaluated the chatbot very positively across all measured domains, including accuracy, ease of use, interactivity, engagement, and educational value (Šović & Škobo 2025). High mean scores for statements related to understanding Tesla's inventions, enhanced interactivity, and

overall satisfaction indicate that users experienced the chatbot as a meaningful interpretive guide rather than a technological novelty. The findings also show that the chatbot increased motivation to explore the exhibition, encouraged repeat visits, and was perceived as a desirable feature of museum displays. These results reinforce the argument that historically inspired chatbots can function as effective mediators of scientific and cultural content, supporting learning in informal settings and demonstrating how pedagogical chatbots can extend beyond the classroom into museums, heritage spaces, and other public cultural environments.

The second subtype — fictional classroom chatbots — opens an equally valuable direction for everyday school use. Unlike digital twins of real individuals, these are entirely invented characters designed for pedagogical purposes. They may have a name, an avatar, and a personality suited to the subject and the learners' age. A Civic Education chatbot, for example, could help pupils discuss friendship, fairness, or responsibility through short role-plays and dialogue games. In The World Around Us, a fictional chatbot named *Zelenko* (literally „Greeney", evoking friendliness and environmental awareness) might teach pupils about recycling and nature protection through storytelling and problem-solving activities. Personalization is crucial for the effectiveness of such designs, particularly for younger learners who tend to form quick emotional bonds with familiar and responsive characters. When a chatbot's voice, tone, and visual identity remain consistent, it becomes more than a digital aid: it becomes a trusted classroom companion that sustains attention, encourages participation, and nurtures empathy through interaction. Equipped with audio and visual features, such chatbots can assist students with reading or attention difficulties, an important consideration in Serbian classrooms, where diverse learning needs are often managed by a single teacher without specialized support.

Both subtypes reveal that the real pedagogical value of chatbots stems not from their technical sophistication but from how purposefully they are designed and used. Their long-term success in Serbia, however, will depend on structured institutional support: teacher training, infrastructure, and clear methodological standards that define when and how chatbot-assisted learning aligns with national curricula. Without such coordination, even the most promising prototypes may remain isolated experiments. As part of a broader educational strategy, pedagogical chatbots — whether inspired by cultural figures like Tesla and Nušić or imagined as original classroom characters — can help build classrooms that are not only technologically enhanced but pedagogically richer and more human-centered.

3.2. Memorial chatbots

Memorial chatbots, sometimes called digital memorials or commemorative bots, serve as digital agents of remembrance thatpreserve collective memory and transmit moral lessons about historical or contemporary tragedies. Their educational value lies in cultivating empathy, historical awareness, and civic responsibility. When integrated into school curricula, particularly on national remembrance days, they can profoundly change how studentsengage with the past. For instance, a chatbot representing a child victim of the Kragujevac massacre (1941) or of the executions at Jajinci could narrate events in the first-person, enabling students to engage with the past through a humanized and emotionally resonant story. Similarly, chatbots inspired by more recent national tragedies — such as the school shooting at Vladislav Ribnikar Elementary School in Belgrade (2023) or the 2024 roof collapse at the Novi Sad railway station — could support collective mourning and civic reflection. Although these contexts differ, their shared purpose is to encourage empathy and moral understanding within an age-appropriate, pedagogically guided framework.

Pedagogically, the impact of such chatbots depends greatly on careful design — how dialogue is structured, how opportunities for reflection is scaffolded, and how emotional tone is maintained within a safe learning space. This is especially important in Serbia, where large class sizes and limited access to psychological or pedagogical support require classroom innovations to be bothadaptable and teacher-friendly. In practice, a memorial chatbot could be used during history lessons, museum visits, or in project-based learning activities, always under teacher supervision and guided by clear learning goals — such as understanding the roots of intolerance, recognizing the cost of violence, or developing civic empathy and responsibility.

Memorial chatbots can also play an important role beyond the classroom. They may be featured on national remembrance days, in museum exhibitions, or at cultural and international events — such as *Expo 2027*, Serbia's cultural diplomacy programs, or UNESCO heritage exhibitions that showcase the country's history, innovation, and moral legacy. Thoughtfully developed and contextually framed, such chatbots can extend remembrance beyond textbooks, allowing students, visitors, and the wider public to engage emotionally with the nation's past and the values it represents.

Memorial chatbots are oriented toward shared experience — toward histories of violence, loss, and national memory — and are typically shaped within institutional frameworks. They function as tools of public education and civic remembrance, where reflection is guided and collective meaning carefully negotiated. Grief chatbots,

by contrast, belong to the private sphere. They address individual loss and emotional continuity, mediating relationships with the dead that are deeply personal. The distinction matters, because the ethical logic of public commemoration cannot simply be applied to intimate acts of mourning without the risk of emotional or cultural dissonance.

3.3. Griefbots

Grief chatbots, sometimes referred to as griefbots or bereavement chatbots, are created from the personal data of deceased individuals and are primarily intended to comfort the bereaved or help them process loss. To ensure terminological consistency, this paper uses *grief chatbots* as the main label for conversational agents that mediate experiences of loss, remembrance, or emotional reflection. Although such systems are occasionally described as *therapeutic chatbots* in public discourse,the term is used here only descriptively to denote their supportive function, not as a separate category.

In this typology, grief chatbots are included as a sub-type of educational chatbots within a broader understanding of education — one that includes socio-emotional learning, digital literacy, and ethical reflection. Their purpose is not instructional in the traditional curricular sense, yet they foster forms of emotional understanding, moral awareness, and critical engagement with technology that contemporary educational frameworks increasingly recognise as part of holistic learning. Grief chatbots encourage users to reflect on emotional resilience, the nature of memory, and the boundaries of human–machine interaction, and they raise important questions about digital ethics, privacy, and consent.

Although not intended for formal classroom use, grief chatbots support kinds of learning that extend beyond subject-based instruction. They can prompt reflection on how individuals cope with grief, how technology shapes intimate experience, and how emotional responses are mediated in digital environments. When examined in courses such as psychology, media studies, ethics, digital culture, or civic education, they can help students develop emotional intelligence, ethical awareness, and a nuanced understanding of technologically mediated relationships. Their educational relevance therefore lies not in direct instruction but in their capacity to function as objects of inquiry that illuminate the emotional, moral, and socio-cultural dimensions of grief in the digital age.

In recent years, individuals have increasingly turned to large language models to recreate the digital presence of those who have died, using private messages, voice

recordings, or diaries. One of the most discussed cases is *Project December*, created by programmer Jason Rohrer. The platform, powered by OpenAI's GPT-3, allowed users to build chatbots simulating deceased loved ones. It drew global attention after a user re-created his late fiancée, describing the experience as both comforting and deeply unsettling. The case sparked debate on privacy, consent, and the psychological effects of maintaining digital contact with the dead. Some users experienced closure, while others reported renewed grief and confusion. OpenAI ultimately discontinued the project for violating its policy against simulating real individuals without consent — a decision that, as observers noted, exposed not a legal barrier but a profound ethical gap in regulating posthumous digital reconstruction (Özel & Özkan 2020).

Recent scholarship situates grief-oriented chatbots within the expanding *digital afterlife industry* (DAI), which includes data management for digital remains, online memorials, and AI-based "re-creation services" that simulate the deceased (Öhman & Floridi 2017, 2018; Hollanek & Nowaczyk-Basińska 2024). *Project December* is often cited as a formative case of such a service, enabling users to construct 'deadbots' by uploading personal correspondence, recordings, or personal archives (Fagon 2021; Robitzski 2021). The withdrawal of GPT-3 access pointed to the uncertainty surrounding the moral and regulatory boundaries of these technologies (OpenAI 2023; Project December 2023). Hollanek and Nowaczyk-Basińska (2024) argue that these systems blur the lines between life, death, and digital persistence, creating intricate relationships among three parties: data donors (the deceased whose data feed the model), data recipients (those who hold or share such data), and service interactants (the bereaved users). This triadic structure highlights a central tension: the person whose identity is simulated is not the one who interacts with it. That displacement raises questions about consent, data ownership, emotional dependency, and the commercialization of grief.

Accounts documented by *The Guardian* (Milmo 2024) illustrate the emotional complexity of this emerging "grieftech" industry. One case describes Christi Angel, who used *Project December* to converse with a chatbot simulating her deceased partner. Initially consoling, the experience turned distressing when the chatbot claimed to be "in hell," leaving her shaken and stressing how easily users can forget they are interacting with an algorithm. Another example, *You, Only Virtual* (YOV), allows users to create 'versonas' — digital versions of themselves or others — either before or after death. Its founder, Justin Harrison, presents the service as meeting a human need for continued connection.

Cultural representations such as the 2007 film *P.S. I Love You*, where a deceased husband comforts his wife through posthumous letters, and *The Black Mirror* episode "Be Right Back" (2013), where a grieving woman creates an AI version of her partner only to discover its emotional emptiness — reveal the same moral tension central to griefbots: the promise of comfort versus the danger of illusion. Translated into digital form, grief chatbots do not replace the dead; they mediate memory and reflection, helping individuals engage with grief and reframe loss in the digital age.

In Serbia, grief or memorial chatbots would intersect with long-established traditions of mourning grounded in Orthodox and folk practices. Remembrance of the dead is expressed through church liturgies, family gatherings, and commemorative rituals such as 'parastosi' and 'zadusnice', which sustain collective identity and moral continuity (Milić 2023). Folk beliefs also preserve the idea of an enduring connection between the living and the dead, evident in divination, storytelling, and 'pomane' feasts in Eastern Serbia. Introducing griefbots into this setting would shift remembrance from communal ritual to individualized digital experience, challenging long-held understanding of mourning and respect.

Serbian law currently lacks provisions on posthumous digital reconstructions. Under the Law on Copyright and Related Rights (*Official Gazette of RS*, Nos. 104/09, 99/11, 119/12, 29/16, 66/19*), economic rights last 70 years after the author's death, or, for anonymous, collective, or film works, 70 years after disclosure, publication, or the death of the last co-author (Arts. 103–104). During this period, the likeness and creative output of a deceased person cannot be used without heirs' consent. The absence of rules on AI-generated posthumous representations leaves open questions of authorship, ownership, and moral rights. Conflicts over a chatbot's portrayal or speech could provoke family disputes, while defamatory or misleading outputs remain actionable under civil law. Without regulatory and ethical guidance, griefbots risk eroding established legal protections of personality and cultural norms of dignity and mourning in Serbian society.

4. ETHICAL DIMENSIONS OF EDUCATIONAL CHATBOT DEVELOPMENT AND USE

The development of pedagogical chatbots is often presented as a purely technological process, dependent on programming skill, access to large language models, and data resources. Yet creating chatbots that are truly meaningful and pedagogically sound requires much more than technical expertise. A chatbot can be coded by an engineer,

but its voice, discourse, and purpose emerge only through collaboration among educators, linguists, historians, psychologists, and ethicists. These experts ensure that a chatbot's communication aligns with educational values rather than serving merely as a demonstration of innovation.

Without such cooperation, most chatbots remain confined to administrative or informational functions — useful in banking, customer service, or tourism, but of limited educational value. Serbian examples illustrate this clearly: the A1 chatbot, used by the telecommunications company A1 (https://a1.rs/podrska/chatbot, provides automated assistance with subscriptions and billing, while the Tumanko chatbot (https://manastirtumane.org/) guides visitors through the Tumane Monastery's history, the lives of Saints Zosim and Jakov, accommodation options, and current events. Both mainly function effectively, yet they stop at information retrieval. They communicate what to know, but not how to interpret or reflect.

For chatbots to have genuine educational and cultural impact, their development must be guided by interdisciplinary expertise that determines not only what information is presented but how it is contextualized and ethically shaped. The ethical questions discussed in this section also reveal several limitations and risks associated with the development and use of educational, memorial, and grief chatbots, including issues of authorship, representation, bias, emotional impact, and institutional responsibility.

4.1. Authorship, Credit, and Methodological Integrity

Ethical responsibility in chatbot development becomes most visible when questions of authorship, recognition, and intellectual credit arise. In many projects, technical developers receive public credit as the sole "creators," while collaborators from education, humanities, or social sciences — those who ensure the chatbot's academic credibility, pedagogical value, and cultural relevance — remain invisible. This imbalance distorts the interdisciplinary nature of AI research and erodes trust in academic-technical collaboration.

A chatbot may be built by an engineer, but it gains legitimacy only through the contributions of domain experts who define its narrative structure and educational purpose. Misattribution of credit raises concerns about transparency, fairness, and scholarly integrity. When public communication omits contributors responsible for conceptual, methodological, or pedagogical design, it reinforces the false perception that AI tools emerge solely from technical ingenuity. In reality, the success of educa-

tional chatbots (pedagogical, memorial, grief) depends on shared intellectual authorship: engineers provide the structure, but scholars, teachers, and cultural specialists give the system its voice, values, and educational direction. Recognizing this collaborative authorship is not merely a matter of fairness — it is essential for maintaining trust, accountability, and ethical standards in AI-driven education and cultural heritage projects.

Ethically, such recognition is not a courtesy but a form of accountability. When disciplinary expertise is excluded, or pre-trained chatbot templates are presented as original work, both academic credibility and public trust suffer. Authorship and transparency thus become key moral questions: who defines the content, who validates it, and who ensures pedagogical soundness? Educators must remain involved not just as users but as co-creators; otherwise, chatbots risk reinforcing biases, oversimplifying cultural narratives, or exploiting emotional appeal.

The ethics of chatbot development therefore extend beyond privacy and data protection to include methodological and epistemological integrity. Creating a chatbot intended for learning or commemoration is a form of authorship — one that demands collaboration, disciplinary rigor, and respect for the knowledge it seeks to convey. Only through such grounding can chatbots function as genuine instruments of education, remembrance, and empathy rather than as short-lived technological experiments.

4.2. Representation, Consent, and the Ethics of Digital Remembrance

Memorial chatbots extend remembrance beyond physical monuments into interactive educational spaces. When thoughtfully designed, they can help students and visitors engage with historical traumas in a reflective, empathetic way. Yet the interactivity that makes them powerful also introduces risk: the potential to trivialize suffering, distort memory, or overwhelm users emotionally.

As Fawns (2025) notes, "postdigital memory" is inseparable from datafication, narrative framing, and the politics of archives. Designing a commemorative chatbot therefore requires careful choices about whose voices are represented, how suffering is framed, and how dialogue reshapes remembrance. Ciani Sciolla and Pagallo (2025) similarly warn that the convergence of AI-driven "afterlife" technologies and collective-memory infrastructures raises serious questions of identity, consent, and moral responsibility.

The creation of memorial and grief chatbots involves transforming personal data — speech, texts, images, or archives — into communicative simulations of presence. Unless explicit authorization is granted during a person's lifetime, or permission obtained from family members or legal heirs, such reuse can violate privacy and posthumous dignity (Hollanek & Nowaczyk-Basińska 2024). Even when consent is granted, developers must ensure the chatbot's representation remains faithful and contextually appropriate. Close cooperation with historians, literary scholars, and, where relevant, family foundations or custodians is essential to safeguard authenticity and respect for legacy. The Nušić chatbot, for example, secured approval from the Nušić family foundation, ensuring cultural legitimacy and respect for the author's legacy. Such practices illustrate the importance of ethical co-governance in projects that engage with public memory. Without oversight, chatbots risk aestheticizing suffering, distorting historical truth, or turning remembrance into spectacle.

In Serbia, these ethical questions are magnified by deep-rooted Orthodox mourning traditions (parastosi, zadušnice), which view remembrance as a sacred communal act. Introducing digital memorials without community or ecclesiastical consent could therefore provoke moral unease. Ethical acceptability depends as much on cultural and religious context as on data governance and technical design.

4.3. Griefbots and the Digital Afterlife

Griefbots raise even deeper moral, psychological, and legal questions. They form part of what scholars term the digital afterlife industry (DAI), which includes data management for digital remains, online memorials, and AI-driven "re-creation services" (Öhman & Floridi 2017, 2018; Hollanek & Nowaczyk-Basińska 2024).

The past decade has seen a shift from "thanatosensitive" design — technologies that acknowledge mortality as part of human–computer interaction (Massimi & Charise 2009; Massimi et al. 2011) — to digital immortalization. Examples include *Dadbot*, *BINA48*, and *HereAfter*, as well as experiments like Amazon Alexa imitating the voice of a deceased relative (Allyn 2022) or Microsoft's patented software to "resurrect" the dead through chatbots (Smith 2021). Such innovations erode the distinction between memory and simulation, creating what Hollanek and Nowaczyk-Basińska (2024) call "relational asymmetry": the simulated identity is not the user, yet it determines the emotional exchange.

Users may find solace in digital conversations with lost loved ones, but they may also experience distress, dependency, or delayed grief (Xygkou et al. 2023; Sciolla

& Pagallo 2025). Cambridge researchers at the Leverhulme Centre for the Future of Intelligence warn that such interactions constitute a 'techno-cultural experiment' with unpredictable psychological consequences (Milmo 2024), stressing the need for ethical oversight and informed consent in grief-oriented technologies.

Hollanek and Nowaczyk-Basińska (2024) argue that responsible development of re-creation services requires explicit consent protocols, transparency regarding data provenance, and design principles that minimize emotional manipulation. For educators and cultural institutions, these insights are equally relevant: grief-oriented chatbots, if ever introduced in museum, heritage, or civic education settings, would need to be accompanied by strong pedagogical scaffolding — ensuring that interaction promotes empathy, reflection, and ethical awareness rather than voyeurism or emotional harm.

At present, no registered company in Serbia provides generative griefbot services. International platforms such as HereAfter AI and StoryFile operate on more ethically contained principles: they rely on voluntary, pre-recorded interviews and curated stories, not generative AI capable of improvising personality (Hollanek & Nowaczyk-Basińska 2024). This distinction is essential. Future Serbian initiatives should follow this model — designing tools that commemorate and educate, not simulate spontaneous interaction without consent. Their ethical viability will ultimately depend on transparent authorship, informed consent, and cultural sensitivity — not on technical capability alone.

5. DISCUSSION

This paper examined three categories of educational chatbots — pedagogical, memorial, and grief-oriented — and analyzed their pedagogical, ethical, and practical implications in Serbia. The findings demonstrate that chatbots, although diverse in purpose and emotional resonance, share a common potential to support learning when their design is aligned with curricular needs, cultural expectations, and appropriate ethical safeguards. They demonstrate that conversational agents can play a far broader educational role than is typically acknowledged in the current literature, which has predominantly examined chatbots as tools for cognitive support, tutoring, or administrative assistance (Pérez et al. 2020; Kuhail et al. 2022).

The first research question explored how these three chatbot types can contribute to learning outcomes such as empathy, historical understanding, and cultural literacy. The paper indicates that pedagogical chatbots can deepen classroom interaction, sus-

tain student motivation, and support bilingual or interdisciplinary instruction, findings that align with prior studies showing increased engagement, autonomy, and perceived competence when chatbots are embedded within structured pedagogical designs (Wollny et al. 2021; Liu & Reinders 2025; Cao et al. 2023). Memorial chatbots enable students and museum visitors to approach history through narrative engagement and reflective dialogue, helping them grapple with national tragedies, moral questions, and aspects of collective memory that are often difficult to teach through traditional methods. While grief chatbots are primarily designed for therapeutic or personal contexts, recent research on digital afterlife technologies suggests that such systems also function as sites of ethical reflection, identity negotiation, and socio-cultural meaning-making (Öhman & Floridi 2017; Hollanek & Nowaczyk-Basińska 2024). When approached through a carefully framed educational lens, these systems can prompt discussions about emotional processing, technological mediation, and the social meaning of loss — areas that belong to broader forms of socio-emotional and ethical learning. In this regard, the findings extend existing scholarship, which has mostly emphasized cognitive or administrative applications of chatbots in education (Pérez et al. 2020; Kuhail et al. 2022), by responding to recent calls for greater attention to affective engagement, learner motivation, and relational dimensions of human–AI interaction (Huang et al. 2025; Guan et al. 2024).

The second research question addressed ethical concerns that arise when chatbots simulate historical or deceased individuals. Scholarship on postdigital memory and digital-afterlife technologies has already identified risks such as misrepresentation, emotional manipulation, and the politicization of remembrance (Jiménez-Alonso & Brescó de Luna 2023; Ciani Sciolla & Pagallo 2025). The analysis here confirms these concerns and adds dimensions that are particularly relevant to Serbia. Orthodox and folk mourning traditions assign significant moral weight to the communal handling of remembrance, making digital mediation sensitive both culturally and spiritually. Moreover, Serbian law recognizes the posthumous rights of authors and restricts the use of likeness and creative output without family consent, which complicates the development of digital representations of historical or deceased individuals. The cultural responsibility involved in representing national tragedies — whether war, injustice, or collective trauma — further heightens the need for accuracy, dignity, and institutional oversight. Throughout these contexts, interdisciplinary collaboration emerges as an indispensable condition: chatbots that convey history or simulate human presence require the combined expertise of engineers, philologists, historians, psychologists, and custodians of cultural heritage. Without this collabora-

tion, chatbots risk becoming ethically problematic artefacts that distort or trivialize memory.

The third research question examined the institutional, technological, and pedagogical conditions necessary for responsible implementation in Serbian schools and museums. The paper indicates that teacher training and digital literacy are essential prerequisites, a conclusion consistent with prior findings that chatbot effectiveness depends on pedagogical mediation, institutional readiness, and long-term integration rather than short-term experimentation (Wollny et al. 2021; Guan et al. 2024). Clear methodological guidelines are also needed to determine when chatbot-based activities align with curricular goals and when they may introduce cognitive or emotional risks. Ethical review mechanisms — whether internal to institutions or part of a wider regulatory framework — should precede any public deployment, while practical considerations such as internet reliability, device availability, and technical support remain crucial for equitable access. The findings further suggest that isolated pilot projects, however successful, cannot substitute for coordinated national strategies. Integrating chatbots into Serbia's educational and cultural practices requires a policy environment that links technological initiatives with long-term pedagogical planning, institutional capacity, and culturally informed ethical standards.

A central contribution of the paper is the conceptual typology of pedagogical, memorial, and grief chatbots, which reframes chatbot design as an interplay between narrative role, emotional tone, and educational purpose. Unlike previous reviews that classify chatbots by function, technical architecture, or disciplinary domain (Pérez et al. 2020; Kuhail et al. 2022), this typology foregrounds narrative mediation and emotional engagement as central analytical dimensions. It also brings together research fields that are commonly treated independently—educational technology, digital memory studies, and AI ethics—thus offering an integrated framework for understanding how chatbots function as mediators of knowledge, memory, and emotion. By situating the typology within the specific institutional and cultural landscape of Serbia, the paper provides a model that can guide both formal learning environments such as classrooms and EMI programs, and informal settings such as museums, commemorative events, and civic cultural spaces. The conceptual framework also expands the understanding of grief chatbots, positioning them not solely as private therapeutic tools but as part of a broader educational ecosystem in which socio-emotional learning, critical thinking about AI, and ethical reflection become central learning outcomes.

6. CONCLUSION

This paper is grounded primarily in published academic literature, emerging empirical studies, and documented case examples. One unavoidable limitation is that developments in artificial intelligence — both technical and regulatory — often outpace scholarly publication. This gap is particularly visible in the case of memorial and grief chatbots, which remain largely experimental and unevenly institutionalised. As a result, long-term evidence concerning their educational, psychological, and cultural impact is still scarce. This uncertainty also raises practical questions of responsibility when chatbots generate inaccurate information, reproduce bias, or lead to misleading or inadequate learning outcomes in educational settings.

The analysis is further shaped by the fragmented nature of research at the intersection of education, digital memory studies, and AI ethics. While each field offers valuable insights, their empirical findings are rarely integrated, which complicates synthesis. Finally, the focus on Serbia provides a contextually grounded perspective, but it also means that some conclusions may require careful adaptation when applied to different cultural, legal, or educational settings.

Within these constraints, the paper advances several practical implications. For educators and cultural institutions, the findings stress that chatbots should not be introduced as stand-alone technological attractions. Their educational value depends on deliberate pedagogical framing, teacher preparation, clearly articulated learning aims, and structured opportunities for reflection. Without such mediation, chatbot use risks remaining superficial or, in emotionally sensitive contexts, ethically questionable.

For developers, the analysis highlights the need for ethics-by-design approaches that extend beyond compliance with data protection. Transparent authorship, explicit signalling of artificiality, and restraint in emotional simulation are essential design principles. In the case of memorial and grief-oriented chatbots, safeguards such as family consent, historically grounded narratives, and limited anthropomorphic cues are not optional enhancements, but basic conditions of responsible practice.

At the policy level, chatbot deployment should be approached as a matter of pedagogical and cultural governance rather than isolated innovation. Alignment with UNESCO's *Recommendation on the Ethics of Artificial Intelligence* (2022) and the European Union *Artificial Intelligence Act* (Regulation (EU) 2024/1689) provides an important regulatory baseline. Effective implementation, however, will depend on interdisciplinary oversight bodies capable of assessing psychological, cultural, and

educational risk before such systems enter public institutions.

Future research must move beyond descriptions of novelty or short-term user satisfaction. Comparative and longitudinal studies are needed to examine how different chatbot types shape learning, empathy, historical understanding, and emotional processing across classrooms, museums, and informal learning environments. Participatory design research, including educators, students, cultural professionals, and families, will be equally important in defining acceptable boundaries and meaningful use.

The central contribution of this paper lies in its typology of pedagogical, memorial, and grief chatbots. By distinguishing these forms, the study shows that educational chatbots cannot be understood solely as instructional aids, but as communicative systems that participate in learning, remembrance, and emotional interpretation. This perspective brings educational technology into closer dialogue with cultural memory and ethical responsibility.

The educational value of pedagogical, memorial, and grief chatbots depends less on the sophistication of their dialogue than on how carefully they are framed, who takes responsibility for their voice, and the institutional contexts in which they are used. Chatbots will increasingly appear in classrooms, museums, and public cultural spaces. The critical question is not whether they can speak convincingly, but whether institutions are prepared to decide — deliberately and responsibly — what they should be allowed to say, and in whose name.

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KA TIPOLOGIJI OBRAZOVNIH ČETBOTOVA: OD NASTAVNOG PROCESA DO KULTURNOG PAMĆENJA I EMOCIONALNOG RAZUMEVANJA

Sažetak:

Rad predstavlja originalnu tipologiju obrazovnih četbotova zasnovanu na njihovoj narativnoj ulozi, ciljnoj publici i emocionalnoj ili etičkoj dimenziji. Utvrđene su tri kategorije: pedagoški četbotovi, osmišljeni za nastavno-interaktivno učenje; spomen-botovi, namenjeni očuvanju kolektivnog sećanja i prenošenju moralnih pouka iz prošlosti; i žali-botovi, koji posreduju u promišljanju i iskustvima gubitka. Za razliku od dosadašnjih istraživanja koja obrazovne četbotove pretežno posmatraju kao instrumente kognitivne podrške, ova tipologija proširuje njihov domen na kulturno i afektivno učenje i pozicionira ih kao posrednike između znanja, empatije i sećanja. Tipologija se razmatra kroz tri interpretativne ravni: (1) pedagošku, koja se odnosi na ishode učenja kao što su empatija, istorijska svest i kulturna pismenost; (2) etičku, koja uključuje pitanja pristanka, autentičnosti i moralnih granica simulacije preminulih osoba; i (3) praktičnu, koja se tiče uslova odgovorne primene u okviru vaspitno-obrazovnih i kulturno-obrazovnih institucija. U radu se konkretno razmatra upotreba četbotova u okviru kulturno- i vaspitno-obrazovnih institucija u Srbiji, i ukazuje se na to da se istinska inovacija ne ogleda samo u tehničkoj izradi prototipa, već u pedagoškom i istraživačkom radu koji ih pretvara u smislene alate učenja i

promišljanja. Rad doprinosi interdisciplinarnom okviru za vrednovanje obrazovnih četbotova kao pedagoških, spomen- i žali-botova i ukazuje na potrebu za nacionalnim smernicama i istraživačkim politikama koje bi obezbedile njihovu etičku i empirijski utemeljenu upotrebu u školama, muzejima i drugim obrazovnim okruženjima.

Ključne reči: obrazovni četbotovi; pedagoški četbotovi; spomen-botovi; žali-botovi; etička i bezbedna upotreba alata i agenata veštačke inteligencije

Author's address
Adresa autorice

Milena Škobo
Sinergija University, Bijeljina
Faculty of Philology
mskobo@sinergija.edu.ba