EUROPEAN HUMANITIES UNIVERSITY

THE TRANSFORMATION OF DIGITAL COMMUNICATION: HUMANS, MEDIA, ARTIFICIAL INTELLIGENCE

Edited by
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Contemporary society is undergoing radical transformations in almost all aspects of social life. The key driver of these changes is cutting-edge technology, which shapes the everyday lives of people through various digital formats. Accordingly, communication practices are increasingly influenced by generative technologies that not only transform content creation methods but also challenge traditional notions of authorship, trust, and the creative process. Artificial intelligence is becoming an active participant in information and educational spaces, impacting journalism, social media, and pedagogical practices. This collection of scientific articles aims to foster an interdisciplinary understanding of these changes, discussing their implications and future prospects. The articles are based on reports presented by the authors at the International Scientific Conference "The Future of Communication Practices: Generative Technologies, Culture, and Media" (September 11-12, 2025, Vilnius, Lithuania)

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INTRODUCTION

The rapid development of digital technologies, and in particular the emergence of generative artificial intelligence, has significantly transformed the landscape of communication, knowledge production, and educational practices. Over the past decade – and especially in the years following the global pandemic – the processes of digitalization have accelerated across all levels of social life. Educational institutions, research communities, civil society organizations, and professional networks increasingly operate within hybrid environments in which human interaction is mediated by digital infrastructures and algorithmic systems. In this context, questions concerning the role of artificial intelligence (AI) in communication, education, and knowledge creation have moved from the periphery of academic discussion to the center of interdisciplinary research.

This volume brings together a set of studies that examine the transformation of communication practices, educational environments, and social interaction under conditions of rapid technological change. The contributions presented here emerged from scholarly discussions on the future of communicative practices in the context of generative technologies and artificial intelligence and are unified by a shared focus on how contemporary communication and educational processes are being reshaped by digital infrastructures, algorithmic mediation, and new forms of human–machine partnership.

In recent years, a growing body of research has addressed the social implications of artificial intelligence in education and communication. Scholars have explored the transformation of learning environments, the role of digital platforms in knowledge production, new forms of collaboration between humans and intelligent systems, and the ethical challenges posed by algorithmic decision-making. At the same time, these transformations cannot be understood as purely technological processes. They unfold within complex socio-cultural contexts shaped by institutional structures, professional practices, civic engagement, and evolving forms of collective action. The contributions in this volume reflect precisely this broader perspective, analyzing the interplay between technological innovation and social practices rather than focusing on technology in isolation.

Instead of concentrating exclusively on the technical dimensions of artificial intelligence, the authors examine how digital tools are integrated into existing educational systems, how communicative competencies are transformed in networked environments, and how emerging forms of participation reshape the boundaries between education, research, and civic engagement.

Several contributions address the theoretical foundations of contemporary debates on generative technologies and education. These studies explore the conceptual tensions between human creativity and algorithmic generativity and raise important questions about the epistemological and cultural implications of artificial intelligence in educational contexts. By situating generative technologies within broader anthropological and philosophical frameworks, these works highlight the need to reconsider the aims and values of education in an era increasingly shaped by human–machine collaboration.

One of the key themes running through many of the contributions is the growing importance of algorithmic mediation in contemporary communication and education. Algorithms increasingly

structure the visibility of information, shape communicative environments, and influence patterns of interaction between individuals and institutions. In such conditions, the question of algorithmic literacy – or, more broadly, AI literacy – becomes a crucial educational challenge. Understanding how algorithmic systems operate, how they filter and prioritize information, and how they participate in shaping communicative environments gradually becomes an essential competence for both educators and learners. In this sense, AI literacy cannot be reduced to technical skills of using digital tools; rather, it implies the development of critical awareness of how algorithmic systems mediate knowledge, influence public discourse, and shape the conditions under which learning and communication occur.

Another group of studies focuses on the transformation of pedagogical practices in digital environments. These contributions explore how artificial intelligence and digital platforms are incorporated into teaching and learning processes, as well as the challenges associated with integrating generative tools into educational assignments and creative practices. In particular, the authors examine how new technological possibilities influence students' learning strategies, creative experimentation, and the development of conceptual thinking. These analyses demonstrate that digital tools do not simply replace traditional educational practices but transform the ways in which knowledge is produced, communicated, and interpreted.

Beyond changes in pedagogical practice, these developments also point to a deeper transformation of pedagogical models and institutional structures. The integration of artificial intelligence into educational processes does not merely introduce new tools; it challenges established forms of teaching, learning, and institutional organization. Across different contributions, we observe the emergence of hybrid pedagogical models that combine human instruction, digital infrastructures, and algorithmic systems. These transformations raise broader questions about the future structure of educational institutions as digital technologies become embedded across the entire educational cycle –from curriculum design and pedagogical methods to assessment practices and knowledge dissemination.

Another important conceptual thread running through several contributions concerns the idea of co-generativity in human–machine interaction. Rather than interpreting generative technologies simply as tools that automate or replace human intellectual activity, the authors emphasize the collaborative character of contemporary digital environments. From this perspective, generative artificial intelligence becomes part of a broader process of co-creation in which humans and technological systems participate in the joint production of meanings, knowledge, and cultural forms. In this context, some contributions also explore emerging forms of guided interaction between humans and intelligent systems, including the use of AI as a reflective partner in coaching and learning processes. These approaches illustrate how human–machine collaboration extends beyond content generation to encompass the development of self-awareness, motivation, and decision-making capacities. The concept of co-generativity thus highlights the relational nature of contemporary knowledge production and invites a reconsideration of the aims of education in an era increasingly shaped by human–machine partnership.

Within this context, the role of creativity in contemporary educational practices becomes particularly significant. Generative technologies open new possibilities for experimentation and creative exploration, enabling new forms of interaction between analytical thinking and artistic imagination. Several contributions in this volume demonstrate how digital tools can stimulate creative engagement in educational contexts, particularly in areas connected with visual culture,

artistic production, and media practices. These developments illustrate how the encounter between human creativity and algorithmic generativity may become one of the defining characteristics of future educational environments.

The increasing role of visual communication represents another important dimension of the transformation of education and communication in the digital age. Digital technologies expand the possibilities of visual representation, from interactive interfaces and data visualization to algorithmically generated images and multimedia environments. As a result, contemporary educational communication increasingly unfolds within a dynamic interplay between verbal and visual forms of knowledge representation. The convergence of textual, visual, and digital modes of communication requires the development of new communicative competencies capable of navigating multimodal environments.

At the same time, artificial intelligence significantly expands the possibilities of working with complex data environments. AI-based tools allow researchers, educators, and students to analyze large datasets, generate visual representations of complex processes, and explore patterns that would be difficult to identify using traditional analytical methods. Consequently, the ability to interpret visualized data and critically assess algorithmically generated representations becomes an increasingly important component of contemporary educational practice.

A further set of contributions examines the broader social and institutional contexts in which digital communication and educational innovation unfold. These studies explore the emergence of networked communities, the transformation of civic participation in transnational environments, and the role of communication in sustaining collective action across geographically dispersed communities. The analysis of transborder civil society initiatives and networked forms of collaboration highlights the importance of communicative competence, shared norms, and educational infrastructures in maintaining social cohesion in fragmented digital environments.

In addition to these conceptual and sociological perspectives, the volume includes empirical analyses of national educational systems and institutional strategies responding to digital transformation. Case studies of adult education and lifelong learning illustrate how different educational actors – from public institutions to professional networks – are adapting to the challenges of digitalization and artificial intelligence. These studies demonstrate that the integration of digital technologies into educational systems is a complex and uneven process, shaped by institutional traditions, professional cultures, and varying levels of digital competence among educators and learners.

An especially important dimension of these transformations concerns the role of artificial intelligence in adult education and lifelong learning. As technological change accelerates and labour markets become increasingly dynamic, many individuals are required to update their professional competencies or even change their fields of specialization. In this context, AI-supported learning environments may play a crucial role in supporting processes of professional retraining and continuing education. The growing importance of lifelong learning suggests that the transformation of educational systems will affect not only universities and schools but also a wide range of institutions involved in adult education and professional development.

Beyond the sphere of formal education, the transformation of communicative practices also affects professional activities and public discourse. In fields such as journalism, media production, and public communication, the integration of artificial intelligence and digital platforms is

reshaping the criteria by which professional activities are evaluated. Digital tools influence not only how information is produced and distributed but also how credibility, authorship, and professional responsibility are understood. Several studies included in this volume illustrate how digital transformation leads to the emergence of new forms of professional practice and new standards of activity.

Taken together, the contributions in this collection point to a fundamental shift in how educational ecosystems, communicative practices, and human–machine relations are conceptualized. Digitalization is no longer understood merely as the introduction of new technological tools but as a systemic transformation of educational environments. Artificial intelligence is redefining relationships between teachers, learners, and technological systems, which increasingly act not only as instruments but as participants in educational processes. At the same time, the transformation of communication practices plays a crucial role in the emergence of new educational and civic communities capable of operating across institutional and national boundaries.

These developments, however, generate significant challenges. Despite the growing availability of digital tools, disparities remain in access to technological resources, digital literacy, and institutional support. Moreover, the increasing reliance on algorithmic systems raises ethical questions related to transparency, accountability, and the governance of data. Addressing these issues requires not only technological innovation but also sustained reflection on the social and cultural dimensions of digital transformation.

Looking ahead, the processes discussed in this volume suggest several important directions for future research. Among the most promising areas are the development of human–machine partnerships in educational environments, the transformation of communicative competencies in networked societies, the ethical governance of artificial intelligence in educational systems, and the institutional transformation of universities and other educational organizations under the influence of digital technologies. In particular, the question of how universities may evolve in response to the growing integration of intelligent systems – whether through new pedagogical models, new forms of collaboration between humans and AI, or new institutional structures – represents one of the most important challenges for contemporary educational research.

In an era characterized by rapid technological change, the future of education and communication will depend not only on the capabilities of digital technologies but also on the ability of societies to develop institutional frameworks, professional cultures, and civic practices that enable meaningful and responsible engagement with these technologies. Artificial intelligence is no longer merely a technical instrument but increasingly becomes an integral component of complex socio-technical environments in which knowledge is produced, shared, and interpreted. Understanding how these environments function – and how they reshape educational institutions, professional practices, and communicative cultures – will remain one of the central intellectual challenges of the coming decades.

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ARTIFICIAL INTELLIGENCE AND THE TRANSFORMATION OF EDUCATIONAL INTERACTION PRACTICES IN THE UNIVERSITY

Abstract. This article examines how the active integration of artificial intelligence into university education transforms educational interaction practices. The central argument challenges the widespread assumption that algorithmization and personalization represent opposing logics of educational development. Drawing on contemporary critical studies of algorithms and digital media, the article demonstrates that these processes are mutually constitutive and together reshape pedagogical interaction, forms of agency, and modes of knowledge organization. Algorithmization is analyzed as a socio-technical process that structures educational rhythms, evaluative regimes, and decision-making infrastructures, while personalization is shown to emerge precisely through algorithmic classification, profiling, and predictive modeling. The article conceptualizes these dynamics through the lenses of algorithmic power, programmed sociality, and algorithmic sociality, highlighting their implications for the roles of students and instructors, as well as for pedagogical responsibility in digital universities. Rather than signaling the end of the university as a social institution, the paper argues that artificial intelligence introduces a new regime of educational interaction that requires critical reflection rather than technological optimism or moral panic.

Keywords: artificial intelligence; algorithmization; personalization; educational interaction; algorithmic power.

INTRODUCTION

Over the past few years, the active integration of artificial intelligence systems (AI) into university education has ceased to be a matter of purely futurological speculation and is increasingly being recognized as part of everyday academic reality. Intelligent recommendation systems, learning platforms, adaptive courses, and, more recently, generative models involved in practices of writing, analysis, and explanation have become integral elements of contemporary educational environments. In this context, scholarly attention is gradually shifting away from a focus on the technical capabilities of AI alone toward an analysis of how its use transforms practices of educational interaction – between students and instructors, between learners and educational institutions, and between human actors and digital infrastructures (Miniankou & Puptsau, 2024a, 2024b).

One of the key tensions in these debates concerns the relationship between the *algorithmization* and *personalization* of educational activity. Algorithmization is typically described in terms of standardization, formalization, and calculable control, whereas personalization is associated with the individualization of learning trajectories and the consideration of learners' differences and subjective characteristics. In both public and academic discussions, these processes are often presented as opposing or even mutually exclusive. *The aim of this article* is to demonstrate that,

within the context of the digital university, algorithmization and personalization do not negate one another; rather, they are mutually constitutive and together give rise to new and emerging regimes of educational interaction. These regimes call for a reconsideration of traditional understandings of pedagogical agency and educational rationality.

The analysis presented here focuses not so much on technologies as such, but on the social and educational practices that emerge on their basis. This perspective makes it possible to conceptualize artificial intelligence not as an autonomous agent operating in isolation, but as an element of broader socio-technical configurations within which the roles of participants in the educational process, forms of pedagogical responsibility, and modes of knowledge organization are being redefined.

THE ALGORITHM AS A SOCIAL FORM

We live in a world in which algorithms shape how we access information, structure communication, and select the media content we consume. In this sense, it is possible to speak of an "algorithmic life." At the same time, widespread claims that social life is now fully controlled or determined by algorithms, and that individuals have become mere victims of the expanding influence of artificial intelligence, remain deeply misleading. What is far more important is to understand how algorithms actually operate – how they become embedded in social practices and how people actively use them as powerful mediators of different forms of social interaction.

Over recent decades, algorithms have increasingly been conceptualized within the social sciences not as neutral technical tools, but as specific forms of social ordering. Scholars emphasize that algorithms participate in the production of social differences, the structuring of attention, and the formation of regimes of visibility and significance (Beer, 2017; Bucher, 2018). In this context, the algorithm appears not simply as a sequence of formal operations, but as a decision-making infrastructure embedded in everyday practices.

Analyzing transformations of social interaction – including educational interaction – under conditions of the expanding use of artificial intelligence therefore requires moving beyond an instrumental understanding of algorithms as neutral means of optimizing social processes. Contemporary theoretical approaches converge on the view that algorithms and AI systems should be examined as elements of broader socio-technical configurations within which forms of sociality, regimes of power, and modes of knowledge production are being redefined. From this perspective, algorithmization – of education, for example – can be understood as a particular manifestation of a more general condition described as the *algorithmic condition* (Brzeziński et al., 2025). This concept captures structural transformations associated with the fact that algorithms have become part of the everyday infrastructure of social life, while computational logic increasingly functions as a normative principle of organizing practices. Much like the computerization of knowledge at the end of the twentieth century altered the status and functions of knowledge, contemporary algorithmization radicalizes this process by relocating decision-making, evaluation, and prediction into the domain of computable operations.

In discussing the algorithmic condition, it is also important to refer to the relational theory of algorithms proposed by Tobias Matzner (2024). According to Matzner, productive analysis is possible only if the algorithm is maintained as an analytical perspective rather than treated either as

an autonomous entity or as an empty signifier. Algorithms are not neutral, but neither are they mere "carriers" of human intentions. They function as complementary abstractions that link the abstract and the concrete. Algorithms transform human inputs by amplifying, weakening, distorting, or reordering them; however, the ultimate effects of algorithmic decisions are always realized within human and institutional practices.

A significant contribution to understanding these processes is provided by David Beer's analysis of the social power of algorithms (Beer, 2017). In his account, algorithmic power is not an inherent property of code nor the result of autonomous technological action. Rather, it emerges as an effect of infrastructural practices of sorting, ranking, recommendation, and prediction, as well as through the discursive legitimation of the very notion of the "algorithm." Algorithms gain influence not only through what they do, but also because, in public and institutional contexts, they are associated with objectivity, precision, and rationality. In educational settings, this means that algorithmic decisions – from automated assessment to personalized recommendations – often acquire a symbolic status as being more "reliable" than human judgment.

As Taina Bucher notes, algorithmic power rarely operates through direct coercion; instead, it functions through anticipations, recommendations, and subtle "nudges" that shape the field of possible actions (Bucher, 2018). A related line of analysis is developed by Minna Ruckenstein, who draws attention to the "feel of algorithms," emphasizing how their presence is experienced at the level of affects, expectations, and emotional reactions (Ruckenstein, 2023). For this reason, it is crucial for the present analysis to conceptualize the algorithm as a social form that (a) structures sequences of action, (b) sets rhythms and tempos of activity, and (c) translates complex practices into computable parameters. In educational contexts, this means that algorithms do not merely "support" the learning process but actively participate in its construction.

Mark Richardson (2024) introduces the concept of *algorithmic witnessing*, conceptualizing algorithms as forms of non-human witnessing that do not simply process data but register, interpret, and render events in the world actionable. Algorithms are thus understood as *world-making systems*: they produce particular versions of reality that can become grounds for action in different directions. At the same time, algorithms themselves require witnessing – critical observation of their operations, effects, and affective dynamics. They are not autonomous "black boxes," but entanglements of the human, the technical, and the institutional – sites where computation, culture, and modes of thought intersect. It is precisely this perspective that allows us to discern the close interrelation between the processes of algorithmization and the personalization of learning.

It can therefore be concluded that contemporary critical studies of algorithms converge on the necessity of maintaining a dual analytical perspective. On the one hand, algorithms cannot be treated as fully autonomous technical objects; on the other, they cannot be completely dissolved into empirical details of practices and infrastructures. Here, once again, Matzner's relational position proves productive: the algorithm is not some entity, but an analytical abstraction that connects the technical and the social. Algorithms function as "complementary abstractions" that make it possible to grasp the social effects of computational procedures without reducing them to any single dimension.

ALGORITHMIZATION OF EDUCATIONAL ACTIVITY IN THE UNIVERSITY

As noted above, the algorithmization of education can be understood as a situated manifestation of the broader condition that scholars describe as the algorithmic condition. From this perspective, the university appears not merely as an institution that makes use of artificial intelligence, but as a space in which algorithmic logic becomes embedded in the production, distribution, and legitimation of knowledge.

At the same time, an analysis of educational interaction must take into account not only the infrastructural and discursive power of algorithms, but also the ways in which they participate in the formation of everyday practices. In this regard, the concept of *programmed sociality*, developed by Taina Bucher (2018), proves particularly productive. It allows sociality to be understood as the outcome of algorithmic assembly and the organization of interactions, rather than as an exclusively autonomous human reality merely mediated by technology. In other words, algorithms function as performative intermediaries that do not simply reflect social relations but actively participate in their production by shaping forms of visibility, engagement, and significance. Algorithmic power, from this perspective, should be understood as an effect of events and associations rather than as a property located "inside" the algorithm itself. Algorithms are deeply relational: they are "tied" to situations, dependencies, and organizational practices. This relationality makes it possible to move beyond forms of "strong technological determinism" in education: it is not AI as such that transforms the university, but rather the synthesis of institutional goals and practices with data and platforms mediated through algorithmic code that produces a new regime of educational interaction (Beer, 2017).

This implies that algorithmic systems do not merely automate educational processes but also shape normative expectations regarding what learning should be – its pace, structure, rhythm, and criteria of success. Recommendation mechanisms, automated forms of assessment, learning analytics, and personalized learning trajectories create an infrastructure within which students and instructors no longer interact directly with one another, but through mediating algorithmic forms. As a result, educational interaction ceases to be exclusively intersubjective and instead takes on the character of a hybrid socio-technical practice. Importantly, algorithmization does not operate through rigid prescriptions; rather, it functions by configuring fields of possible trajectories within which subjects are invited to act. Educational sociality thus becomes programmable in the sense that it is assembled through a constellation of interfaces, metrics, and recommendations.

Within the university, the algorithmization of educational activity manifests itself at multiple levels – from infrastructural solutions to the micro-practices of everyday learning. Learning management systems (LMS), adaptive courses, automated assessment tools, learning analytics, and, finally, generative AI applications create a dense network of algorithmically mediated interactions. This makes such systems particularly promising objects for empirical analysis of everyday educational practices. In this sense, algorithmization cannot be reduced to the automation of discrete operations. It entails a reconfiguration of the logic of the educational process, within which learning is organized as a sequence of modules and steps, progress is recorded and visualized, and student activity becomes an object of continuous monitoring and interpretation.

As Beer emphasizes, algorithms possess "social power" precisely because they are quietly embedded in routine practices and gradually come to be perceived as natural elements of the

environment (Beer, 2017). In educational settings, this is reflected in the growing tendency to perceive algorithmic recommendations, prompts, and evaluations as objective and neutral, even when they are grounded in specific models and assumptions.

Of particular interest is the incorporation of generative AI models into educational activity. Here, the algorithm functions not only as a tool of control or assessment, but also as a co-participant in intellectual work – as a co-author, co-explainer, and co-editor. This development blurs traditional boundaries between preparation, execution, and reflection, as well as between individual and collective forms of thinking. It therefore becomes necessary to speak of collaborative AI, or of the practical convergence of two forms of intelligence – human and machine. Collaborative AI expresses a shift from AI as an autonomous entity toward AI as an integrated and interactive partner working alongside humans in various domains. What is at stake is a synergistic integration of human cognitive processes and the capacities of AI, in which human–machine partnership draws on the distinctive strengths of both (Przegalinska & Triantoro, 2024).

PERSONALIZATION AS AN ALGORITHMICALLY PRODUCED PRACTICE

In recent years, attention to the problem of personalized learning has intensified, as the current technological revolution has opened up possibilities that were previously unimaginable (Miniankou & Puptsau, 2026). Personalized learning is commonly understood as educational provision designed to take into account the interests, prior experiences, preferred modes of learning, and individual learning paces of particular learners. Personalization is often presented as a humanistic response to the standardizing effects of digital technologies. However, within an algorithmized educational environment, personalization emerges not as an alternative to algorithmization, but as its outcome. What is at stake is a transformative interaction between technology and pedagogy, characterized by co-evolution and mutual dependence. As technologies continue to develop at an accelerating pace, educational practices will also change accordingly – most notably in the direction of personalization. Individual learning trajectories are increasingly formed through data processing, learner profiling, and the alignment of students with specific behavioral and performance models (Fawns, 2022).

In the context of higher education, researchers identify four fundamental attributes of personalization: the development of multimodal learning experiences and differentiated curricula based on principles of universal design for learning; enabling each student's agency in orchestrating both the emphasis and the process of their learning; providing community and collaboration to aid students in learning by fostering engagement and academic tenacity; and guiding each student's path through the curriculum based on diagnostic assessment (Dede et al., 2019). Similarly, Fake and Dabbagh argue that personalized learning is characterized by new teaching roles and practices, flexible learning pathways, flexible learning assessment, a focus on creating learner-driven experiences based on identified needs, and where technology is integral to learning (Fake & Dabbagh, 2024).

In other words, personalization appears not merely as a recognition of the learner's uniqueness in a strong philosophical sense, but also as a form of computable individualization grounded in differences that can be formalized and measured. As Louise Amoore notes, such practices generate a specific ethical situation in which decisions are made under conditions of uncertainty and distributed responsibility (Amoore, 2020).

The understanding of algorithms developed in the previous sections makes it possible to reconsider the relationship between algorithmization and personalization in education, moving beyond the simplified interpretations that often dominate discussions of this issue. In this perspective, personalization is not an alternative or a "humanistic counterweight" to algorithmization. On the contrary, it emerges as one of its effects. Individual educational trajectories become possible insofar as learning activity is translated into parameters that can be classified, compared, and predicted. Algorithms produce differences that are subsequently interpreted as learners' individual characteristics.

An important consequence of the programmed sociality discussed above is a transformation of forms of subjectivity within the educational process. Students appear not only as participants in learning, but also as data profiles dynamically shaped through activity, performance, and interactions with educational platforms. In turn, instructors become embedded in a regime of mediated educational governance, in which pedagogical decisions are increasingly aligned with algorithmic recommendations, metrics, and predictive models. This does not imply a loss of agency but rather points to its redistribution within a socio-technical system.

Thus, the concept of programmed sociality allows algorithmization of educational interaction to be understood as a process in which educational practices are not simply supported by digital technologies but are reassembled in new forms. AI in the university does not function as an autonomous actor, but as an infrastructural element through which modes of knowledge organization, interaction, and pedagogical responsibility are being redefined.

It is important to emphasize that this does not render personalization an illusion or a fiction. On the contrary, it becomes a new norm of educational interaction, within which (a) the student is understood as a dynamic profile; (b) the learning process is adapted in real time; and (c) differences between learners become a resource rather than an obstacle. In this sense, personalization reinforces algorithmization, while algorithmization, in turn, makes personalization possible.

Consequently, algorithmization and personalization of educational activity should not be understood as opposing processes. Rather, personalization represents a specific regime of algorithmization, within which individual learning trajectories are produced through classification, parameterization, and prediction. Algorithms do not merely "adapt" to the learner; they shape the very possibility of individualization by translating differences into computable indicators. In this sense, personalization does not signal a retreat from algorithmic rationality, but rather its intensification.

TRANSFORMATION OF EDUCATIONAL INTERACTION: NEW ROLES AND PRACTICES

The combined effects of algorithmization and personalization lead to qualitative transformations in the structure of educational interaction. A relational perspective on these processes is developed within R. Seyfert's theory of algorithmic sociality. Within this framework, algorithms are understood as active elements of social assemblages that possess agency without intentionality. They do not replace human actors, but participate in the coordination of action, the stabilization of expectations, and the formation of social connections. Under conditions of *Digitalisation* 2.0, sociality emerges

not "inside" individual subjects, but in the relational space between people, algorithms, data, and institutions (Seyfert, 2025).

For the analysis of educational interaction, this implies the need to consider students, instructors, and AI systems as elements of a single relational configuration. The university thus appears as a site where algorithms are not merely applied, but produced as social relations, creating conditions for personalized learning. Most notably, the role of the instructor undergoes significant transformation. Rather than functioning primarily as the sole source of knowledge, instructors increasingly assume the roles of moderators, interpreters, and critical intermediaries between students and digital tools. The role of the student is likewise reconfigured: students become not merely performers of assigned tasks, but active participants in configuring their own educational trajectories, engaging with AI as a partner in intellectual activity. This creates the conditions for the emergence of hybrid learning practices in which human and machine forms of cognition are deeply intertwined.

In the context of university education, a relational theory of algorithms helps to avoid simplified accounts of algorithmization as an external technological intervention into traditional pedagogical practices. Algorithms in educational environments are not simply "applied" to pre-existing forms of teaching and learning; rather, they become integrated into processes of reassembly, functioning as structural conditions of educational interaction. In this sense, the university can be understood as an institutional environment in which algorithms exist not as abstract technical systems, but as relational nodes that connect data, pedagogical goals, managerial decisions, and user practices.

Further theoretical refinement of this perspective is provided by the idea of the multiplicity of algorithms (Bucher, 2018). According to Bucher, algorithms do not exist as a single, technically fixed object; instead, they manifest in different versions – technical, managerial, discursive, and affective – each of which becomes salient within specific practices. In educational contexts, the same algorithm may simultaneously function as a tool of pedagogical support, a mechanism of managerial control, and a symbol of efficiency. This multiplicity helps explain why algorithmization is able to permeate different levels of university life without provoking immediate resistance.

Following Matzner's logic (2024), algorithms in the university can be productively understood as situated abstractions that translate complex pedagogical processes – learning, assessment, engagement, and progress – into computable and governable parameters. These abstractions are not neutral: they reorganize modes of pedagogical judgment, establish new criteria of normality and deviation, and shape expectations regarding "appropriate" student behavior. As a result, the very foundations of pedagogical rationality are transformed. Recommendation systems, learning analytics, and generative AI tools do not merely support the educational process; they define forms of visibility, engagement, and activity through which academic subjectivity is constructed. Educational interaction thus acquires the character of a hybrid socio-technical practice in which agency is distributed across humans, algorithms, and institutional frameworks. Under conditions of algorithmization, the university appears not as a passive object of technological change, but as an active space for the production of new forms of educational sociality and pedagogical responsibility.

This perspective underscores the importance of avoiding representations of algorithms as autonomous agents when discussing the impact of AI on educational interaction. The power of algorithmic systems manifests itself as an effect of relational networks, or infrastructures, composed of data, organizational objectives, platform design, user strategies, and pedagogical decisions. Consequently, it is analytically more productive to examine not what "the algorithm does in itself,"

but how algorithmic functions – such as sorting, recommendation, ranking, and prediction – redistribute attention, opportunities, and educational trajectories.

In a generalized sense, it is possible to identify a set of mechanisms, or logics, through which algorithms exert influence on educational interaction and acquire power within its structure, thereby opening space for personalized learning. These mechanisms include:

- *Embeddedness*: algorithms operate as background infrastructures rather than as explicitly visible agents.
- *Functional power*: sorting, ranking, and prediction function as mechanisms for distributing attention and opportunities.
- *Relationality*: effects emerge within networks of associations linking data, design, organizational structures, users, and institutional goals.
- *Recursivity*: system outputs are fed back into the system as the basis for redesign and further adjustment.
- *Discursive legitimation*: the "algorithm" functions as a sign of objectivity, fostering trust and accelerating institutionalization.
- *Production of truth*: system outputs and discourses surrounding them stabilize norms, categories, and the perceived "naturalness" of decisions within the evaluation of personal learning trajectories.

In concluding this section, it is worth examining the last two mechanisms in greater detail. With regard to the discursive power of algorithms in the university, this refers to the cultural force of the very concept of the "algorithm," alongside its functional operation. Within educational institutions, the "algorithmic" is often marked as a more objective, precise, and efficient means of evaluating educational processes. This symbolic valence facilitates the implementation of technologies, reinforces trust in platform-based decisions, and supports managerial rationalities grounded in measurement, comparison, and optimization. Here, power manifests not only in code, but also in the ways algorithms are mobilized as arguments that normalize particular models of educational activity and thereby shape the character of educational discourse itself.

The "production of truth" by algorithmic systems operates in a dual manner: through outputs such as grades, rankings, predictions of risk, success, or "appropriate" resources for personalized learning, and through the discursive frameworks within which these outputs are perceived as credible and authoritative. This makes it possible to conceptualize personalized learning as part of a broader politics of truth – one that involves not merely the "matching of content to the student," but also the creation of categories of normality and deviation, productivity and failure, which are subsequently reintegrated into teaching practices and students' self-understandings.

Taking together, the synthetic analysis of the algorithmic condition, the social power of algorithms, programmed sociality, and algorithmic sociality makes it possible to conceptualize the transformation of educational interaction in the university as a process of reassembling educational practices. From this perspective, artificial intelligence does not function as an autonomous agent, but as an element of socio-technical infrastructure through which forms of sociality, the distribution of agency, and the boundaries of pedagogical responsibility are being redefined. This framework

provides a basis for further analysis of concrete educational practices and empirical cases, while avoiding both technological determinism and abstract forms of humanistic resistance.

Such transformations can also be described in terms of human–machine partnership, understood not as the replacement of humans by technology, but as a redistribution of cognitive and organizational functions. In this context, it is particularly important to avoid both techno-optimism and techno-pessimism, focusing instead on the analysis of actual practices and their consequences. Algorithmic power is often imagined as if algorithms "take decisions away" from people; yet the reality is more complex, involving entanglements of design, interfaces, user responses, organizational objectives, and the translation of algorithmic outputs into familiar social parameters. Agency, in this sense, is distributed, and power manifests itself in the ways algorithms shape choices, suggest courses of action, and become embedded in everyday life.

CONCLUSION

Algorithmization and personalization of educational activity in the university should not be understood as mutually exclusive processes. On the contrary, they form an interconnected dynamic through which practices of educational interaction, the roles of participants, and modes of knowledge organization are transformed. In this context, artificial intelligence does not function as an autonomous agent, but as an element of a broader socio-technical environment in which the boundaries of pedagogical responsibility, trust, and control are being reconfigured.

Within educational platforms, algorithms operate not merely as tools that support learning, but as systems that register and interpret learning activity, translating it into forms that call for pedagogical and managerial intervention. This process involves a set of mechanisms associated with algorithmic witnessing, including the registration of patterns, the translation of potential into probability, classification and selection, the generation of responses, and the reintegration of algorithmic effects into social reality (Richardson, 2024).

Future research may focus on more detailed analyses of specific educational practices, as well as on critical examinations of the ethical and institutional consequences of algorithmization and personalization in education. Nevertheless, it is already evident that what is at stake is not the end of the university as a social institution, but rather a shift in its mode of operation under conditions of digital transformation.

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PEDAGOGY OF THREE SUBJECTS IN THE FIFTH GENERATION UNIVERSITY: STUDENT, TEACHER, AND AI

Abstract. This article examines the pedagogy of three subjects – student, teacher, and artificial intelligence (AI) – emerging within the digital educational ecosystem of the Fifth Generation University (U5G). The integration of AI into the educational process entails a redistribution of cognitive, organizational, and communicative functions among participants in learning. The pedagogy of three subjects is characterized by hybrid forms of interaction in which AI enhances analytical and technical dimensions of learning activities, while the teacher provides pedagogical guidance, critical interpretation, and coordination of educational processes. Such interaction reflects a shift toward the co-creation of knowledge within the institutional framework of U5G.

Keywords: artificial intelligence; three-subject pedagogy; U5G; human–machine partnership; digital communication; educational ecosystem

INTRODUCTION

Education is currently undergoing systemic transformation due to the integration of artificial intelligence. It remains difficult to predict which academic units of a university may be partially or fully transformed by AI, as the scope of its impact depends on the level of technological development, the pace of adoption, and the specific institutional context (Kabashkin, Misnevs & Puptsau, 2023). Researchers emphasize that AI reshapes the roles of participants in learning (Hwang et al., 2020), provide critical analyses of the consequences of such transformations (Popenici & Kerr, 2017), and demonstrate the impact of AI on educational practices (Sabzalieva & Valentini, 2023).

Organizational, communicative, and cognitive processes involving AI are increasingly being transformed within the framework of the Fifth Generation University as an ecosystem of knowledge (Barnett, 2018). This perspective has been further developed by Kabashkin, Misnevs, and Puptsau (2023), who analyze the transformation of university models and the emergence of new competencies among participants in the educational process.

The presence of AI within the digital educational ecosystem gradually reshapes methods of working with information and transforms patterns of educational interaction. The classical pedagogy of knowledge transmission no longer fully corresponds to the emerging digital ecosystem of U5G. Consequently, a conceptual need arises to develop a new model of subjectivity in digital learning. This model grounded in the pedagogy of three subjects – student, teacher, and AI – is gradually taking shape. In this model, interaction is distributed and functions are dynamically reallocated among participants in learning. Understanding this transformation requires attention to the foundational components of the digital environment of U5G. The following sections therefore

examine the educational ecosystem, digital communication, and human–machine partnership as conceptual foundations of the pedagogy of three subjects.

U5G ECOSYSTEM, DIGITAL COMMUNICATION, AND HUMAN–AI PARTNERSHIP

It is now, at least theoretically, possible to envision a university that provides educational services entirely on the basis of information technologies and operates within a digital educational ecosystem. Such an institution may be described as an online or virtual university. The integration of artificial intelligence into this ecosystem generates multiple structural changes and advantages. AI systems are capable of:

- automating routine operations, including responses to frequently asked questions, routing requests, and providing personalized student support;
- creating personalized educational trajectories through intelligent recommendations, adaptive learning paths, and real-time feedback;
- assisting researchers in data analysis, visualization, and pattern identification;
- automating administrative processes in financial units, human resources departments, and other services, thereby increasing efficiency and redistributing workload;
- analyzing video streams, identifying potential risks, and responding to incidents in real time (Kabashkin, Misnevs & Puptsau, 2023).

A didactic understanding of the features of digital communication in the technical and technological functioning of the educational ecosystem is important, since the characteristics of such communication significantly influence the interaction among all three subjects of this system. Key features of digital communication include:

- diverse user interfaces enabling human–AI interaction, including chatbots, voice interfaces, graphical and textual systems, and domain-specific models;
- the capacity of AI to process multiple types of information, including text, images, and video;
- storage and adaptive use of user-generated queries to personalize subsequent interaction;
- integration of AI capabilities across technical devices such as robots, video cameras, sensors, as well as software for solving problem situations and tasks;
- the ability to operate in real time and process large volumes of data and perform rapid computations;
- the current absence of fully developed psychological interaction capacities (Puptsau, 2025a).

Human–machine partnership (HMP) changes the very foundations of the digital educational process, as it represents a more advanced communicative configuration within this ecosystem. Alongside traditional participants in educational interaction, an additional subject emerges that performs operational and analytical functions comparable in scope to human activity. The intelligent machine is no longer merely a mediator of communication between people, but becomes a real and active participant, or partner, and often an organizing and guiding subject of communication. In

the communicative process, the emphasis shifts from instrumentality to the creation of meanings shared by humans and AI. At the same time, AI as a machine possesses a sufficiently high degree of agency, performs specific roles, uses its own informational resources, and is capable of generating responses through the analysis of situations and information (Miniankou, 2025).

Thus, the features of digital communication and human–machine partnership create new conditions for interaction among participants in the digital educational ecosystem. Under these conditions, there arises a need for a model capable of describing the redistribution of roles and functions among the student, the teacher, and AI, that is, the pedagogy of three subjects.

PEDAGOGY OF THREE SUBJECTS: CONCEPTUAL FOUNDATIONS AND FUNCTIONAL STRUCTURE

Traditionally, pedagogy has been defined as the theory and practice of teaching and education involving individuals or groups united by shared goals and objectives. The classical educational model is primarily based on the transmission of knowledge from teacher to student, where the teacher functions as the primary subject of the process and the student mainly assimilates ready-made information and acquires new knowledge from the teacher. With the integration of AI into digital educational ecosystems, this structure undergoes significant modification. The focus shifts from knowledge transmission to the construction of hybrid learning environments in which technologies expand opportunities for learning, research, and communication (Miniankou & Puptsau, 2024a).

The application of AI has become a key driver in the transformation of pedagogy, influencing learning theory, the organization of knowledge, participant roles, and forms of interaction. At the same time, the formative and value-oriented dimension of pedagogy remain difficult to delegate to AI systems, since AI is not yet capable of fully shaping value-based and moral orientations or emotional skills. These orientations and skills are traditionally developed through personal contact between the subjects of learning, namely teachers and students.

Within the framework of the Fifth Generation University (U5G), the subjects of the educational process include not only teachers and students but also AI systems: human thinking, emotional intelligence, and digital capabilities are integrated (Misnevs, Kabashkin & Puptsau, 2023). In this article, the *pedagogy of three subjects* is understood as a model of organizing learning in which students, teachers, and AI act as interacting participants within a shared digital ecosystem. The pedagogy of three subjects is based on human–machine partnership and assumes that learning activities are formed in a hybrid space. Interaction among these subjects is distributed: key cognitive, communicative, and organizational functions are dynamically reallocated depending on context and task.

Methodologically, the pedagogy of three subjects may be interpreted as an extended interpretation of constructivism. Classical ideas of constructivist pedagogy developed by J. Piaget (1970) and L. Vygotsky (1978) emphasize knowledge formation through learner's activity, communication, and collaborative problem solving. In hybrid digital environments, these principles remain relevant but acquire new configurations. Interaction among subjects is based on processes of joint knowledge construction, in which learning unfolds within a distributed space of human–machine interaction.

At the same time, the use of the concept of subjectivity in relation to artificial intelligence requires clarification. In this framework, AI subjectivity is understood as the participation of AI agents in the performance of cognitive, communicative, and organizational functions within joint educational activity. AI agents may therefore be described as carriers of functional agency: they analyze information, generate responses, and contribute to structured interaction.

The functions performed by AI agents in interaction with students and teachers should be considered not only in cognitive terms, but also in organizational and communicative dimensions. This interpretation draws on distributed cognition theory (Hutchins, 1995), studies of computer-mediated communication and human–machine partnership (Miniankou & Puptsau, 2024a; Puptsau, 2025a), and ecosystem models of U5G under AI integration (Barnett, 2018; Kabashkin, Misnevs & Puptsau, 2023).

Within the framework of the pedagogy of three subjects, AI is conceptualized through the interrelation of *agency, roles, and functions*. AI *agents* serve as the basis of AI subjectivity, since they are capable of perceiving the educational environment, making decisions, and acting in the learning process. The *pedagogical roles* of AI reflect the forms of its participation in educational interaction. *Functions describe* specific cognitive, organizational, and communicative actions that may be grouped into blocks and implemented in joint activity. At the same time, the same AI agent may perform multiple functions and realize different roles depending on the tasks and the context of learning.

For clarity, Table 1 presents the distribution of AI roles and functions within teacher activity within cognitive, organizational, and communicative blocks (Puptsau, 2025b, with additions).

Table 1. Integration of AI into Teacher Activity: Roles and Functions within Functional Blocks

Functional Block	**eacher's Goals and**	**Role of AI**	**Functions of AI**
Cognitive	Searching for academic sources for lesson preparation	Analyzer–Searcher	Suggests relevant sources, analyzes and filters academic materials (verification by teacher required)
Cognitive/ Communicative	Preparing presentations and learning materials	Co-Author	Optimizes structure, creates visual elements, formats references
Cognitive	Designing questionnaires and surveys	Dynamic Assessor	Generates and adapts questions to different complexity levels
Organizational	Preparing seminar or colloquium plans	Co-Author	Proposes structure, schedule, and time allocation
Cognitive/ Organizational	Developing assessment criteria	Socratic Opponent	Formulates multi-level tasks and supports criteria development
Communicative	Generating discussion questions	Motivator	Produces prompts to stimulate dialogue and critical thinking
Cognitive	Analyzing educational texts	Learning Partner	Identifies key points and suggests improvements (reviewed by teacher)
Cognitive/ Organizational	Designing independent work tasks	Co-Author	Suggests topics and formulates objectives

The data presented in the table show that AI agents implement various roles and functions that relate to several functional blocks, which confirm the distributed and dynamic nature of educational interaction within the pedagogy of three subjects.

It should be emphasized that the use of AI agents in education does not form a separate branch of pedagogy, but rather stimulates its transformation. The roles of participants change: students gain the opportunity to build individual learning trajectories, while teachers increasingly rely on analytics and personalization. At the same time, AI, in different roles, may act as a dominant participant, an assistant in solving theoretical and practical tasks, or an equal partner in the joint acquisition and creation of knowledge. As AI technologies and learning-related algorithms continue to develop, the role of AI and its place in interaction with students will steadily increase. This is likely to lead to a reduced dependence of the educational process on the teacher. Certain teacher functions are already undergoing transformation. For example:

- transmission of basic knowledge and facts from teacher to student, since AI can quickly and accurately provide learners with the necessary information available in its knowledge bases and data resources;
- preparation of standard assessment tasks, exercises, and tests for students, as well as the automated evaluation of students' completed work;
- performance of organizational and methodological work, including the design of learning plans, preparation of schedules and technical instructions, monitoring students' compliance with the curriculum, and reminding them of key events and deadlines in the learning process.

Some teacher functions will undergo transformation:

- support of students' learning processes will increasingly be carried out by AI;
- development of students' critical thinking and practical skills in working with information will be increasingly guided and monitored by AI;
- formation of students' digital communicative competencies will be assigned to AI.

Thus, the pedagogy of three subjects therefore represents not replacement but reconfiguration.

DIDACTIC APPROACHES AND TEACHING PRACTICES IN AI-SUPPORTED LEARNING

For many years, educational research has developed didactic methods designed to activate student engagement, foster independent knowledge acquisition, and develop practical competencies (Puptsau, 2017; Puptsau & Kazinski, 2020). Under the conditions of the pedagogy of three subjects, these methods require reconsideration and adaptation.

Today, there is a need to reconsider the possibilities and effectiveness of applying existing didactic teaching methods and pedagogical technologies under the conditions of the pedagogy of three subjects within the digital educational ecosystem of U5G. In addition, educators are required to engage in active innovative and experimental work to develop new methods and learning technologies.

In pedagogical didactics, there is no single unified approach to the classification of teaching methods. Teachers, who train students to use IT systems and services, rely on a typology of methods based on the development of the cognitive activity of educational subjects. Practical work with AI inherently involves problem-situational communication, most often grounded in a cognitive human–AI dialogue. Therefore, pedagogical practice should primarily emphasize problem-oriented teaching methods. According to the adopted classification, this group of problem-oriented methods includes the problem-based method, the partially exploratory method, the heuristic dialogue method, and the research method (Puptsau, 2025b).

The capabilities of AI make it possible to apply a wide range of didactic teaching technologies. At the same time, some well-established educational technologies and learning systems, due to their universal character, can be used both in traditional instruction and in AI-supported learning. However, not every contemporary pedagogical technology can be transferred to AI-based learning, due to specific features often related to the inability to fully reproduce a clearly prescribed sequence of actions within a virtual digital educational ecosystem.

Didactic technologies and learning systems under conditions of digital group communication with AI may take various forms, including the project-based method, the case method, collaborative essay writing, flipped learning, pedagogical seminars, reflective and evaluative technologies, debate-based learning, and others (Miniankou & Puptsau, 2024b; Puptsau, 2025b). At present, the problem-oriented methods and teaching technologies discussed above are actively applied in university educational practices when students perform various types of practical tasks with AI (Puptsau, 2025a, 2025b).

Despite accumulated retrospective experience and the high level of expertise of many educators, existing teaching methods and learning technologies do not fully take into account the specifics of interaction with AI as an active agent of the educational process. Under the conditions of the pedagogy of three subjects, there arises a need to develop new methods and pedagogical technologies oriented toward the joint activity of the student, the teacher, and AI. Such directions include teaching methods focused on working with generative technologies for the creation of various types of content, approaches to the formation and development of skills for constructing prompts for AI, as well as pedagogical technologies that support active cognitive dialogue and discussion in a human–AI format. These directions reflect a transition from the instrumental use of AI to human–machine partnership within the digital educational ecosystem of U5G.

CONCLUSION

Contemporary transformations in university education are closely linked to the integration of artificial intelligence into learning processes. Within the gradually emerging Fifth Generation University, the pedagogy of three subjects conceptualizes student, teacher, and AI as interacting participants in distributed educational interaction. AI participation entails a redistribution of cognitive, communicative, and organizational functions. However, this redistribution does not eliminate human responsibility. Rather, it redefines pedagogical roles and requires new forms of coordination, reflection, and ethical awareness.

The pedagogy of three subjects has a dynamic and evolving character. Roles and functions vary depending on technological development, institutional context, and educational objectives. This requires a rethinking of traditional didactic approaches and the development of new teaching methods and technologies oriented toward the joint activity of humans and AI.

In the future, the pedagogy of three subjects will develop as digital educational ecosystems become more complex and forms of human–machine partnership expand. Issues of responsibility, the boundaries of AI participation, and the preservation of learners' autonomy of thinking will become especially significant.

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BEYOND CLASSICAL CONSTRUCTIVISM: CO-EVOLUTIONARY LEARNING AS A NEW EDUCATIONAL PHILOSOPHY IN THE AGE OF ARTIFICIAL INTELLIGENCE

Abstract. The rapid integration of artificial intelligence (AI) into educational environments necessitates reconsideration of traditional pedagogical models, including constructivist approaches. This paper proposes Co-Evolutionary Learning (CEL) as an educational philosophy that reconceptualizes learning as a process of adaptive interaction between human and artificial intelligences. Moving beyond the constructivist model of tool-mediated knowledge construction, CEL positions the educator as a cognitive choreographer who designs and orchestrates hybrid intelligence ecosystems. Within such ecosystems, students and AI systems function as co-creators, critics, and refiners of knowledge. The article outlines the foundational principles of CEL, contrasts it with constructivism and collaborative learning models, and develops its epistemological, pedagogical, and ethical dimensions. A literature review situates CEL within contemporary research on human–AI collaboration. Examples from Computer Science and the Humanities are presented, followed by a discussion of assessment approaches suited to co-evolutionary practices. The model emphasizes AI literacy, epistemic reflexivity, and ethical judgment as central educational outcomes. AI is thus reframed not as a threat or a mere instrument, but as a collaborative partner in shaping human cognition.

Keywords: AI in education; co-evolutionary learning; cognitive choreography; human–AI collaboration; hybrid intelligence; AI literacy; ethics.

Constructivism has long been recognized as a foundational perspective in educational theory and practices, emphasizing that knowledge is actively constructed through experience and social interaction (Atchley et al., 2024). However, the emergence of advanced generative AI systems challenges the sufficiency of this paradigm. Contemporary learners' "experience" is no longer confined to human-to-human or human-to-environment interaction; it now includes dynamic, adaptive dialogue with non-human intelligences capable of analysis, prediction, and content generation.

This development requires an educational philosophy that acknowledges AI not merely as a supportive tool, but as an active participant in cognitive processes. This paper introduces Co-Evolutionary Learning (CEL), developed as an extension of the author's prior work on the Fifth Generation University (Kabashkin, Misnevs & Puptsau, 2023). CEL conceptualizes learning in the AI era as a bidirectional and adaptive process in which human learners and AI systems influence learning trajectories through iterative interaction (Kong et al., 2025). Rather than assuming a static relationship between subject and tool, CEL treats learning as an evolving socio-technical configuration. In this configuration, both human reasoning and algorithmic processes contribute to knowledge formation.

FROM CLASSICAL CONSTRUCTIVISM TO CO-EVOLUTION: A PARADIGM SHIFT

Classical constructivism assumes that learners construct meaning through individual and social experience, while technologies function as mediating instruments. In contrast, Co-Evolutionary Learning proposes that meaning may emerge through dynamic and structured interaction between human and artificial cognition. Within this perspective, the teacher's role evolves. Instead of acting primarily as facilitator, the educator becomes a cognitive choreographer: a designer of hybrid learning environments who curates AI agents, orchestrates interaction, and scaffolds meta-cognitive and ethical reflection.

The shift from constructivism to co-evolutionary learning can be conceptualized as a transition from human-centered knowledge construction to hybrid cognition. In constructivism, AI functions as a tool; in CEL, it operates as a partner within a distributed cognitive system. This shift does not negate constructivist insights but extends them to account for non-human participation in epistemic activity.

The evolution of constructivist approaches to learning towards co-evolutionary learning is shown in Figure 1.

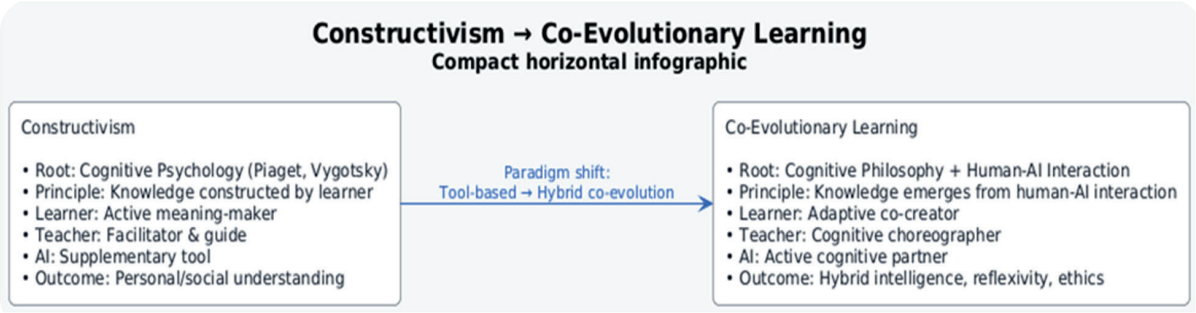

Fig. 1. *Constructivism to Co-Evolutionary Learning paradigm shift*

A two-column table visualized as an infographic:

- Left: *Constructivism* (human-centred knowledge construction, teacher as facilitator, AI as tool).
- Right: *Co-Evolutionary Learning* (hybrid cognition, teacher as choreographer, AI as partner).

Arrows between columns highlight the shift in perspective.

LITERATURE REVIEW: FROM CONSTRUCTIVISM TO CO-EVOLUTIONARY LEARNING

The transition from tool-mediated learning to co-evolutionary cognition requires reconsideration of pedagogical roles, assessment practices, and ethical frameworks. Co-Evolutionary Learning synthesizes these developments into a conceptual framework that extends constructivism into a domain where knowledge emerges through ongoing negotiation between human and artificial intelligences. The extended literature review follows.

Limits of Classical Constructivism in AI-Mediated Contexts. Constructivist learning theory emphasizes active knowledge construction through experience, reflection, and social interaction. In higher education, it underpins problem-based learning, inquiry-based models, and collaborative pedagogies. However, many constructivist formulations implicitly assume that cognitive agency resides exclusively in humans, while technologies function as passive mediators.

In AI-mediated environments, this assumption becomes increasingly problematic. Generative AI systems do not simply scaffold learning; they generate interpretations, propose alternative formulations, and influence epistemic trajectories (Atchley et al., 2024). As a result, the learner's "experience" increasingly includes interaction with adaptive, non-human agents whose outputs cannot be fully anticipated or reduced to instructional design intentions. Traditional constructivism does not fully theorize forms of distributed cognition in which epistemic activity is shared between humans and artificial agents. This gap motivates the development of post-constructivist perspectives capable of accounting for non-human cognitive participation consistent with the theory of distributed cognition (Hutchins, 1995; Salomon, 1993).

Hybrid Intelligence and Distributed Cognition. The concept of hybrid intelligence has become central to research on human–AI collaboration. Rather than emphasizing automation or substitution, hybrid intelligence highlights complementary interaction between human judgment and machine computation. Kong *et al.* (2025) formalize this relationship through the Synergy Degree Model, demonstrating that learning effectiveness depends on the coordination of human and AI contributions rather than on AI capability alone. Similarly, distributed cognition theory conceptualizes cognition as a system-level phenomenon extending beyond the individual mind to include tools, representations, and environments (Hutchins, 1995; Salomon, 1993).

In educational contexts, this implies that learning outcomes emerge from socio-technical systems rather than from isolated individual cognition. Co-Evolutionary Learning builds directly on this insight by framing learning as an adaptive process in which both human reasoning and AI systems evolve through iterative interaction. This view aligns with classic work on distributed cognition and socio-technical systems (Hutchins, 1995; Salomon, 1993).

AI as Epistemic Technology. Recent scholarship proposes understanding AI not only as instructional technology, but as epistemic technology – that is, as a system that reshapes how knowledge is generated, validated, and legitimized. Alvarado (2023) argues that AI systems increasingly participate in epistemic practices traditionally associated with human reasoning, including hypothesis generation and interpretive synthesis. This development raises fundamental educational questions:

- What does it mean to "know" something when AI systems can generate plausible explanations?
- How should authority, authorship, and credibility be negotiated in hybrid knowledge production?

CEL responds to these questions by foregrounding epistemic reflexivity as a core learning outcome. Rather than shielding students from AI-generated knowledge, CEL requires them to critically interrogate its provenance, assumptions, and limitations, thereby transforming epistemic uncertainty into a pedagogical resource. Concerns regarding epistemic authority and algorithmic power echo broader critiques of data-driven decision-making (Floridi et al., 2018; O'Neil, 2016).

AI Literacy, Meta-Cognition, and Ethical Agency. AI literacy has become a priority in higher education discourse. Contemporary frameworks extend beyond operational skills to include critical understanding of algorithmic bias, affordances, and societal impact (Cerny, 2024). However, many AI literacy models remain skill-oriented and insufficiently integrated into broader learning theory.

Research on structured human–AI co-reflection indicates that interaction with AI agents may enhance meta-cognitive awareness when accompanied by structured reflection (Matsumoto et al., 2024). These findings support CEL's emphasis on reflective governance rather than uncritical use.

Ethical concerns further complicate AI-enhanced learning environments. Issues of academic integrity, cognitive dependency, and unequal access are widely discussed. Rather than treating these concerns as external constraints, Co-Evolutionary Learning incorporates ethical co-agency into its conceptual architecture. It positions responsibility and judgment as explicitly teachable competencies rather than external constraints.

Positioning Co-Evolutionary Learning Among Adjacent Frameworks. It is important to distinguish Co-Evolutionary Learning from related approaches:

- *Collaborative learning technologies* primarily address human–human interaction and do not theorize non-human agency.
- *AI-supported learning* often treats AI as an efficiency-enhancing instrument rather than a cognitive partner.
- *Augmented intelligence frameworks* emphasize human primacy but do not offer a learning-theoretical account of mutual adaptation.

Co-Evolutionary Learning occupies a conceptual space at the intersection of learning theory, epistemology, and human–AI interaction. It proposes that education in the AI era requires not merely technological integration but reconceptualization of learning itself as adaptive and relational. Taken together, contemporary research converges on a central and critical insight: the presence of AI in educational systems challenges traditional assumptions about cognition, authorship, and responsibility. This shift provides the theoretical foundation for the development of Co-Evolutionary Learning.

Core Tenets of Co-Evolutionary Learning. Co-Evolutionary Learning rests on three interconnected principles:

1. *Hybrid Intelligence* – Cognition is distributed across human and AI systems, with learning emerging from structured interaction between complementary capacities (Kong et al., 2025).

AI contributes computational speed, pattern recognition, and generative capacity; humans contribute contextual judgment, ethical reasoning, and interpretive depth.

2. *Epistemic Reflexivity* – Learners must develop awareness of both their own reasoning processes and those embedded within AI systems. Epistemic reflexivity involves understanding how knowledge is co-produced, identifying assumptions in AI-generated outputs, and critically evaluating their validity (Alvarado, 2023).
3. *Ethical Co-Agency* – Delegation of cognitive tasks to AI entails responsibility. Students must cultivate ethical sensitivity, authorship awareness, and accountability when engaging in hybrid knowledge production. Ethical co-agency therefore becomes a teachable competency rather than an implicit expectation.

These three principles form a mutually reinforcing framework. Hybrid intelligence without reflexivity risks automation bias; reflexivity without ethical grounding risks relativism; ethical awareness without hybrid competence limits effective engagement with AI systems.

The CEL framework is illustrated in **Figure 2**.

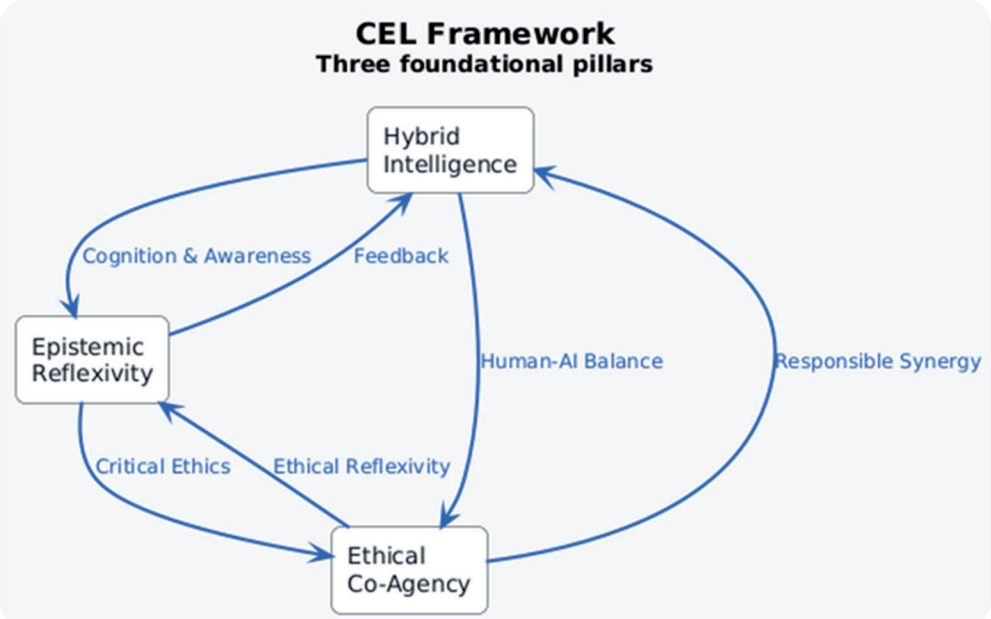

Fig. 2. *CEL Framework - three foundational pillars*

A triangle, labelled CEL Framework, with each corner representing one pillar: Hybrid Intelligence, Epistemic Reflexivity, Ethical Co-Agency. Arrows along the sides emphasize interdependence.

THE COGNITIVE CHOREOGRAPHER IN PRACTICE

The role of the educator as cognitive choreographer becomes evident in task design. Rather than assigning AI as a shortcut, tasks are structured to position AI as a sparring partner – to be critiqued, refined, and synthesized with human insight.

Computer Science Example: The Critical Co-Coder. Students use AI-assisted coding systems to generate preliminary solutions. They then iteratively critique, debug, and refine these outputs, documenting decision points and modifications. Assessment focuses not only on functional code but on the reflective log demonstrating understanding of both algorithmic suggestions and human interventions.

Humanities Example: The Dialectical Debater. Students generate an AI-produced counterargument to their own position on a controversial topic. They then analyze the AI-generated reasoning, identify assumptions and biases, and synthesize a final essay incorporating critical evaluation of the AI contribution.

These examples illustrate a co-evolutionary loop in which AI-assisted creation is followed by human critique and adaptive synthesis. Learning unfolds through iterative cycles rather than linear transmission. Figure 3 visualizes this process as a circular loop consisting of three stages: AI-assisted generation, human critique, and adaptive integration. Each iteration refines both student understanding and the quality of AI interaction.

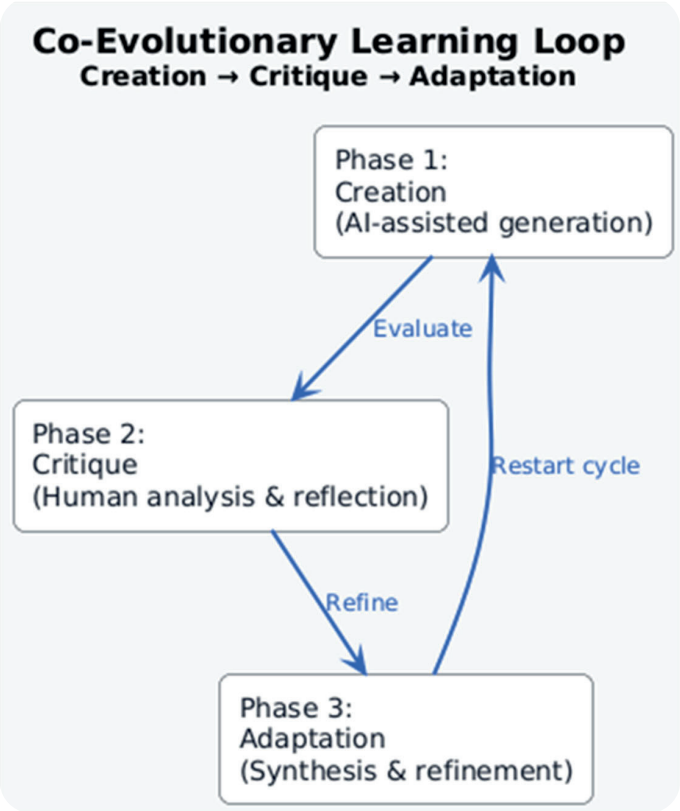

Fig. 3. *Co-Evolutionary Learning Loop*

A circular three-phase cycle showing: (1) AI-assisted creation → (2) human critique → (3) adaptation/synthesis → back to creation. This cycle visualizes the *co-evolutionary loop*.

ASSESSMENT IN A CO-EVOLUTIONARY FRAMEWORK

Assessment in Co-Evolutionary Learning extends beyond evaluation of final outputs It must capture the process of interaction, critique, and adaptation. Possible assessment formats include:

- *AI Interaction Logs*, documenting dialogue sequences and decision points;
- *Annotated Outputs*, in which students justify acceptance, modification, or rejection of AI contributions;
- *Process Portfolios*, combining drafts, AI outputs, and reflective commentary to demonstrate cognitive development.

Such approaches make epistemic processes visible and reduce incentives for concealed AI use. By integrating AI engagement into assessment design, transparency becomes part of academic integrity rather than its adversary.

CO-EVOLUTIONARY LEARNING AT THE UNIVERSITY LEVEL

At the level of higher education institutions, Co-Evolutionary Learning should not be reduced to a classroom-level pedagogical innovation. Rather, it functions as a *meso-level framework* connecting micro-level instructional design with macro-level university strategy.

Universities traditionally organize learning around relatively stable curricula, disciplinary boundaries, and accreditation-driven learning outcomes. Co-Evolutionary Learning introduces an adaptive layer into this structure by acknowledging that learning trajectories increasingly emerge from sustained interaction among students, educators, and adaptive AI systems. This interaction reshapes not only how knowledge is acquired, but also how competencies evolve.

From an institutional perspective, CEL aligns with transformations associated with so-called *fifth-generation universities*, in which education, research, and innovation are closely integrated with digital infrastructures and intelligent systems (Kabashkin, Misnevs & Puptsau, 2023). Within this context, CEL performs three strategic functions:

- *Curricular Adaptability* – embedding AI-mediated inquiry into existing courses allows programs to remain epistemically current without continuous structural redesign;
- *Competence-Oriented Education* – by foregrounding epistemic reflexivity and ethical co-agency, CEL supports learning outcomes that are difficult to achieve through traditional instruction yet increasingly demanded by accreditation bodies and employers;
- *Institutional Resilience* – framing learning as adaptive interaction strengthens universities' capacity to respond to rapid technological change.

Importantly, CEL does not require dismantling established academic structures. Instead, it operates as an overlay framework that reinterprets existing pedagogical practices through the lens of human–AI co-evolution (e.g., project-based learning, inquiry-based learning, and collaborative learning). These tensions reflect long-standing debates on educational technology and institutional change in higher education (Selwyn, 2019; Luckin et al., 2016).

HYBRID INTELLIGENCE AND THE QUESTION OF LEADERSHIP

A central conceptual challenge in Co-Evolutionary Learning concerns agency and leadership in hybrid cognitive systems. As AI systems increasingly contribute to hypothesis generation, simulation, and synthesis, the question arises: who leads the learning process? CEL addresses this issue by distinguishing three forms of leadership:

- **Normative Leadership (Human)**. Humans retain authority over goals, values, and ethical judgments. Decisions regarding what is worth learning and how AI should be used remain human responsibilities.
- **Operational Agency (AI)**. AI systems may initiate or perform operational tasks such as pattern detection, content generation, or simulation. This agency remains instrumental rather than normative.
- **Reflective Governance (Human–AI Interaction)**. Leadership in CEL emerges through reflective interaction in which learners evaluate AI contributions and adjust their own understanding accordingly.

Under this model, AI does not "lead" in the traditional pedagogical sense. Instead, it functions as a cognitive provocateur – exposing blind spots, accelerating iteration, and challenging assumptions – while human actors maintain responsibility for interpretation and judgment. This clarification aligns CEL with human-in-the-loop principles and responsible AI design.

COGNITIVE CHOREOGRAPHY AND CURRICULUM INTEGRATION

The concept of cognitive choreography becomes meaningful only when it can be embedded into formal curricula. It refers to deliberate instructional design in which human and AI contributions are sequenced, contrasted, and recombined to support higher-order cognition. This activity includes several practical principles:

- **Task Structuring** – assignments are designed to require explicit interaction with AI systems, followed by structured critique, reinterpretation, and synthesis by students;
- **Process Transparency** – students are required to document decision points where AI input was accepted, modified, or rejected, making cognitive processes visible for assessment;

- **Alignment with Learning Outcomes** – CEL activities are mapped to existing outcome frameworks (e.g., Bloom's taxonomy, EQF descriptors) by emphasizing analysis, evaluation, and creation rather than recall;
- **Assessment Integration** – traditional exams are complemented – or partially replaced – by portfolios, reflective logs, and annotated artifacts that capture the co-evolutionary process.

Cognitive choreography allows CEL to be introduced incrementally. Individual courses can adopt co-evolutionary tasks without requiring wholesale program redesign, making CEL compatible with conservative academic governance structures. From this perspective, AI systems reconfigure action and responsibility rather than merely executing predefined plans (Suchman, 2007; Norman, 1993).

DISCUSSION AND FUTURE RESEARCH DIRECTIONS

Co-Evolutionary Learning provides a theoretical and practical response to epistemic challenges introduced by AI-mediated education. It builds upon constructivism but expands it to account for non-human agency in knowledge formation. The framework situates students not as passive recipients of AI outputs, nor as isolated knowledge builders, but as active co-evolutionary agents navigating hybrid ecosystems. Several challenges must be addressed: *risk of over-reliance on AI*, which could undermine critical thinking; *ethical dilemmas of authorship*, particularly in academic integrity; *equity issues*, since access to advanced AI systems is uneven globally. Nonetheless, CEL provides a robust philosophical and pedagogical foundation to address these issues by integrating ethical co-agency and reflexivity into its core.

While this paper establishes Co-Evolutionary Learning (CEL) as a conceptual and philosophical framework, its long-term value depends on systematic empirical validation and institutional experimentation. Several promising directions for future research emerge. A primary research challenge is translating CEL's core constructs into observable, measurable phenomena. These constructs are hybrid intelligence, epistemic reflexivity, and ethical co-agency.

Future work should focus on:

- Developing **formal models of co-evolutionary learning loops**, specifying how human critique, AI generation, and synthesis interact over time.
- Identifying **indicators of "co-evolution",** such as changes in student reasoning strategies, prompt formulation, or reliance patterns across iterative tasks.
- Comparing **CEL-based learning trajectories** with traditional constructivist or AI-supported approaches using quasi-experimental designs.

Such work would help bridge the gap between educational theory and learning analytics.

Assessment remains a critical and unresolved issue in AI-augmented education. Future research should explore:

- Frameworks for **co-evolutionary assessment**, integrating formative feedback, reflective justification, and ethical reasoning.

- Empirical evaluation of whether CEL reduces academic misconduct by reframing AI use as an explicit and accountable practice.
- Mapping CEL outcomes to established qualification frameworks (e.g., EQF, ABET, national accreditation standards) to support institutional adoption.

This line of inquiry is essential for CEL's legitimacy within regulated higher education environments.

Finally, CEL has implications for a variety of areas where decision-making is safety-critical or ethically sensitive (e.g., transport systems, healthcare, public policy). Future work could investigate:

- CEL as a framework for training professionals to collaborate with AI under conditions of uncertainty and risk.
- Integration of CEL with **safety-by-design** and **human-in-the-loop** paradigms.
- The role of epistemic reflexivity in mitigating automation bias and normalization of deviance.

These directions connect CEL to wider societal challenges and strengthen its relevance beyond education alone.

CONCLUSION

The integration of artificial intelligence into education represents a structural transformation in how knowledge is produced and transmitted. Co-Evolutionary Learning proposes a framework that extends constructivism by recognizing hybrid intelligence ecosystems in which learning emerges from adaptive interaction between human and artificial cognition.

CEL's three pillars – hybrid intelligence, epistemic reflexivity, and ethical co-agency – reposition the teacher as a cognitive choreographer who deliberately orchestrates human-AI interactions. Unlike collaborative learning models focused on human-to-human interaction, or AI-supported approaches treating AI as passive infrastructure, CEL theorizes mutual adaptation as the core mechanism of knowledge development. Students engage with AI systems as sparring partners whose contributions must be evaluated, challenged, and synthesized.

The framework addresses immediate practical needs through discipline-specific applications and process-oriented assessment methods, including interaction logs and reflective portfolios. However, CEL also confronts substantive challenges: cognitive over-reliance, authorship questions, and inequitable access. By embedding ethical judgment and epistemic reflexivity into its architecture, CEL transforms these vulnerabilities into explicit learning objectives.

At the institutional level, CEL functions as a meso-level overlay framework compatible with existing structures, enabling curricular adaptability and resilience against technological change. Future validation depends on empirical research, formal modelling of co-evolutionary loops, and extension into safety-critical professional domains.

The central insight remains. Learning increasingly occurs within socio-technical systems where human creativity and judgment intertwine with machine intelligence. Co-Evolutionary Learning

provides a foundation for this reality – not by diminishing human agency but by cultivating wisdom to navigate hybrid intelligence ecosystems ethically. The task is not to resist transformation but to shape it deliberately, preserving critical judgment and ethical reasoning while leveraging computational power and pattern recognition. This balance represents not the end of humanistic education but its necessary evolution for an era defined by collaboration across forms of intelligence.

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CO-GENERATIVE TECHNOLOGIES IN EDUCATIONAL PRACTICES: FROM GENERATIVE ARTIFICIAL INTELLIGENCE TO THE CO-GENERATIVE NATURE OF CULTURE

Abstract. The article analyzes the anthropocultural and technological dimensions of generative educational technologies. It argues that the rapid integration of generative artificial intelligence (GenAI) into education is accompanied by a decline in students' readiness for sustained intellectual effort and a growing risk of weakening critical thinking skills. Drawing on etymological analysis as well as psychological and linguistic interpretations of the concept of "generativity," the study highlights the semantic ambiguity of the term "generative artificial intelligence" and raises the question of the substantive meaning of "co-generative educational technologies." The article emphasizes the need for an onto-epistemological justification of the aims of education as a distinctive cultural practice in which human–GenAI interaction becomes a process of co-governance and co-creation while preserving the leading role of the human agent. Culture is interpreted as the human lifeworld and as a specifically human technology of meaning-making. From this perspective, human generativity is intrinsically connected with understanding and interpretation, which distinguishes it from the generativity of AI based on probabilistic models and lacking explanatory and moral reasoning. On this basis, the article proposes expanding the concept of generative educational technologies by integrating anthropocultural and technological interpretations of generativity. Educational practices are understood as practices of complexity in which the ontological differences between human and AI generativity become conditions for their productive interaction. Consequently, generative technologies in education should be viewed as co-generative cultural technologies in which GenAI functions as a means, tool, and partner in the generation of meanings within human life.

Keywords: generative technologies, educational practices, human generativity, generative artificial intelligence, culture, meaning, co-generativity.

INTRODUCTION

At present, the issue of artificial intelligence (AI) defines the subject matter of advanced research in various fields, including education. AI technologies are transforming traditional conceptualizations of knowledge, learning, and the educated person. With the introduction of generative artificial intelligence into educational practices, a wide range of issues has become particularly prominent – from educational strategies to teaching methods and educational content. The situation is complicated by the fact that there is practically no time lag between the development, testing, and implementation of AI technologies. Education, like society as a whole, resembles a global experimental space in which results are delayed and difficult to predict. AI has become a catalyst of rapid social change, compelling the scientific and educational community to operate with the concepts of the "postdigital era" and "postdigital pedagogy" (Roe, 2025).

Generative AI, despite its designation, should not mislead scientists and educators. As Linda Rocco notes, we have a critical paradox in education: while generative AI systems are trained to perform complex reasoning tasks, students are increasingly using them to avoid serious intellectual efforts, to bypass the intellectual work that develops such abilities (Rocco, 2025). As a result, according to Noah Khan, we end up with the passive reception of information instead of actively pursuing knowledge, the immediate availability of "correct" answers instead of analyzing different points of view, an overall decline in resilience to ambiguity and complexity, and a loss of intellectual flexibility. All of these testify to the erosion of critical thinking as the main skill of an educated person (Khan & Saunderson, 2024, p. 117-118).

Contemporary generative technologies require a clear definition of the intrinsic value of education itself, deep self-analysis and dialogue, and the conceptualization of its main goal and pedagogical methods. Khan and Saunderson emphasize the need for philosophical reflection on the fundamental principles of contemporary education, the creation of a reliable pedagogical theory for understanding the profound shifts brought about the introduction of GenAI into educational landscapes, the reconfiguration of the traditional role of the teacher and, along with it, teaching methods. Educators themselves must learn to work with the complexity of GenAI, master a new language and methodologies for a joint journey into the cognitive, emotional and moral spheres (Khan & Saunderson, 2024, p. 118, 119).

While assessing the advantages and risks of GenAI in differently ways, researchers agree on the inevitability of adapting education to technological innovations. GenAI should be viewed as a complex tool designed to improve and support existing human-centered educational paradigms. Education is literally permeated with emotional, social, and moral aspects that go beyond the capabilities of even the most advanced artificial systems, so preserving them is essential (Khan & Saunderson, 2024, p. 116, 117).

It is becoming increasingly clear that the technological aspect of using GenAI in education is not exclusively important. The concept of "generative artificial intelligence" brings us back to the origins of human generativity, to the sociocultural context of educational practices in which human creative potential is realized, and generative artificial intelligence as well as its associated outputs become "culturally mediated artifacts" (Roe, 2025, p. 1107). What, then, does generativity mean in the context of this type of AI, and what fundamentally distinguishes it from the essentially human capacity? What is meant by generative technologies in education, in which the subjectivity of AI is becoming increasingly apparent?

The aim of our work is to identify the co-generative potential of educational technologies. We proceed from the concept of generativity, which reveals the diverse onto-epistemological foundations of human and AI generativity. We then analyze the anthropocultural and technological aspects of generative technologies, as well as the possibility of their integration into education as a cultural practice.

METHODS

In explicating generativity as a property of life and of the human as a creator of culture, we proceed from the phenomenological-hermeneutic idea of the "lifeworld" and the related

understanding of culture as a mode of generating the meanings of human existence. To clarify the content of generativity as a property of the living (the human being) and the non-living (GenAI), we employ comparative-conceptual analysis. Identifying the possibilities for constructive interaction between humans and AI in educational practices required turning to the fundamental principles of complexity theory and complex thought (Morin, 2008).

RESULTS

Generative technologies in educational practices cannot be reduced solely to their technological component associated with the use of GenAI. Education as a cultural practice constitutes part of the human lifeworld, within which any technologies – including GenAI – are endowed with human-creative meanings. By distinguishing between the generativity of the living and the non-living, and recognizing the necessity of human–AI co-creation, technological interpretations of generative technologies should be supplemented by anthropocultural meanings. As a concept integrating the anthropocultural and technological dimensions of generativity, we propose the concept of "co-generativity", which emphasizes the use of GenAI's capacities to expand human generativity.

DISCUSSION

It is advisable to begin with the original meanings of the concept of generativity. Etymologically, "generativity" traces back to the Greek roots γένεσις – emergence, origin; primary source, first principle; as well as from γενεά – birth, descent, lineage. The words "gene", "genetics" and "generation" are united by the designation of the properties of life, living, biological, vital. Introduced into scientific discourse at the beginning of the 20th century, these concepts referred to the specifics of encoding, storing, and transmitting hereditary information from parents to offspring.

The concept of generativity itself emerged in psychology in the mid-20th century. Erik Erikson defined it as "the concern for creating and raising the next generation" (Erikson, 1984, p. 240). According to the scientist, generativity refers to everything that is created and passed on from generation to generation. This includes not only the birth and upbringing of children, but also creativity, caring for others, helping and mentoring, one's own professional contribution, social activities, etc.

It should be noted that it was in psychology that generativity came to be understood as analogous to creativity and originality – essential manifestations of the human being. Thanks to the research of Kotre and McAdams (Kotre, 1984; McAdams, Hart & Maruna, 1998), generativity began to be defined as a specific personality trait that develops over the course of adult life and ensures intergenerational continuity through activity and engagement. In the works of McAdams and de St. Aubin (McAdams & de St. Aubin, 1992; McAdams et al., 1993), key concepts include generative desire, generative care, and commitment, belief in the value of human action, generative acts, and generative narrative as components of well-being. Generativity arises from a cultural environment that expects adults to be prepared to fulfill various generative roles (parent, teacher, mentor, etc.). It is important to emphasize that psychology has endowed the concept of generativity

with socio-cultural meanings. As a characteristic of personality, it has retained its connection with the properties of all living beings.

The path to conceptualizing generativity as a property of the non-living and the artificial, including AI, was paved through developments in linguistics (J. Firth, Z. Harris, N. Chomsky, among others) and cognitive science (H. Simon, M. Minsky, D. Kahneman, D. Norman, G. Miller, and others). The computer metaphor proposed by N. Chomsky and his colleagues opened up the possibility of interpreting human cognition – thinking, memory, learning, language, perception, and decision-making – in terms of computational processes.

It should be noted that Chomsky's generative linguistics is based on two key concepts: "generative grammar" and "deep structure". The first concept explains the existence of a specific set of rules that determines whether a sentence is grammatically correct (or incorrect) in any given language. The second concept holds that the fundamental meaning – the semantic component of a sentence – is determined by deep rules that, in fact, generate language itself (Chomsky, 1975). It was precisely the identification of such deep rules that enabled scholars to study the functioning of neural networks. However, as Chomsky himself argues, machine learning rests on a fundamentally flawed conception of language and knowledge. Its essence lies in the use of massive amounts of data to detect patterns and gain proficiency in producing statistically probable outputs, such as language and forms of reasoning that appear human-like. In Chomsky's view, such systems represent a dead end in the search for genuine artificial general intelligence (AGI) and may even contribute to the decline of science and ethics (Ruru, March 8, 2023).

What meaning, then, does the concept of "generative artificial intelligence" carry? The term has already become firmly established in both academic and popular discourse as a unified semantic construct in which the boundaries between the properties of the living and the non-living are blurred. Raphael Ronge with co-authors (Ronge, Maier & Rathgeber, 2025) note that the concept of GenAI is often used as an umbrella term, the definition of which is difficult to find even in technical publications.

This semantic ambiguity results in the fact that many definitions of generative AI sound almost tautological. Jasper Roe defines generative artificial intelligence as a term describing machine learning technologies trained on large volumes of data that enable the generation of responses to user input (Roe, 2025, p. 1107). Khan *et al.* write that GenAI is capable of generating contextually relevant, coherent, and semantically meaningful text (Khan & Saunderson, 2024, p. 113). S. Feuerriegel *et al.* define a generative AI model as a type of machine learning architecture that uses AI algorithms to create new instances of data, drawing on patterns and relationships observed in the training data (Feuerriegel et al., 2024, p. 112).

Although GenAI is based on generative models, the relationship between generative models and GenAI is not entirely clear. Both terms are used in similar contexts, but they are not identical in formulation and do not describe exactly the same phenomena. In distinguishing GenAI from other forms of AI, the authors identify characteristics such as (multi-)modality, interaction, productivity, and flexibility, which they regard as an initial step toward defining GenAI (Ronge, Maier & Rathgeber, 2025). Feuerriegel *et al.* associates AI's ability to perform generative tasks suitable for producing creative or even artistic content with its capacity to combine elements in novel ways. Such an explanation appears to us the most accurate, as it brings at least a certain degree of clarity to the understanding of AI generativity, including the principle underlying the functioning of

agent-based IT artifacts. In essence, this concerns a model of co-creation, in which "a practice of collaboration in multiple roles to align and propose various ideas that guide the design process" emerges (Feuerriegel et al., 2024, p. 116).

Today, it is becoming evident that a convergence is taking place between humans and AI – two forms of generativity manifested in the living and the non-living. This only intensifies the semantic ambiguity of the concept of "generative artificial intelligence." Chomsky notes that the deepest flaw of learning machines is their lack of an explanatory capacity as a hallmark of genuine intelligence. In his view, machines remain stuck in a pre-human or non-human phase of cognitive evolution; they can describe and predict but not explain. They merely operate with probabilities that change over time. Unlike LLMs, the human mind is an astonishingly efficient and even elegant system that operates with small amounts of information. The mind provides explanations rather than constructing crude correlations between given inputs. And most importantly, true intelligence is capable of moral reasoning (Ruru, March 8, 2023).).

Explanation, meaning–making and understanding constitute the foundation of the generativity of human thinking and consciousness, as well as of diverse sociocultural practices, including educational ones. The historical uniqueness of these practices lies in the fact that, for the first time, humans are interacting with a phenomenon that is practically as complex as human thinking or imitates it very convincingly. So convincingly, in fact, that humans are willing to delegate part of their cognitive functions to generative AI.

Nevertheless, thinking individuals need to clarify the place of GenAI in their life cycle. We seek answers to the questions of "what it means to be alive or to live", "how and why we reproduce a society predicated upon the creation of particular forms of value, and demanding concomitant structures and cultures of individualism, responsibility, borders and boundaries, and subjectivity/othering" (Hall, 2024, p. 4). Finding answers is no longer possible without correlating the generative, creative potential of humans with the capabilities of GenAI.

We share Hall's view on the need for onto-epistemological renewal, which can help us move beyond understanding AI technology as merely an object or instrument that fragments our identity, and gives us a new perception of it (Hall, 2024, p. 13). Having created an entirely new type of technology that appeals not to the physical body but to consciousness and thought, humans are forced to seek new forms of communication with it, in which different types of relationships with AI overlap – as object, as instrument, and as subject. The emergence of generative AI fundamentally transforms the concept of technology itself and, accordingly, the understanding of educational technologies.

As Roe argues, postdigital pedagogy calls for a sociotechnical conception of technology that reflects the connection between technology, culture, and the social coordination of labor. The standard view of technology represents a Eurocentric myth that postulates it as the transformation of natural resources into tools and artifacts through human creativity, stimulating innovation and positive social and cultural change (Roe, 2025, p. 1109). It should be added that this standard view positions technology primarily as an object and a means. An alternative position holds that technical objects are developed within human communities and with human participation and are therefore sociotechnical in essence. This means that technologies cease to be merely objects and instruments, and potential errors are explained not as failures of the technical object itself, but as possibly "embedded" within the algorithmic decision-making processes. It also implies that the very nature of human creativity is changing – generativity of technology is now woven into it.

Jason Edward Lewis expresses concern that the Western rationalist epistemologies out of which AI is being developed are too limited in their range of imagination, frameworks, and language to effectively engage alone with the new ontologies created by future generations of computational systems. He emphasizes: "We risk burdening them with the prejudices and biases that we ourselves still retain. At worst, we risk creating relationships with them that are akin to that of a master and slave (Lewis, 2020, p. 10). In his opinion, "although developers may assume that they are creating a product or tool, in fact they are creating relationships that they must pay attention to" (Lewis, 2020, p. 8).

Richard Hall advances the idea that, within the dominant narrative, "machinery remains as a constant and fixed source of control, realized in the tools of warfare, and the defense of particular conceptions of liberty and human rights inside capitalism. It is systemically locked-in to a set of ideological protocols that cannot allow an alternative story to be told or shaped by new modes of agency" (Hall, 2024, p. 2). Hall sees a new horizon of possibilities in "the braiding or weaving of a new story from a different set of material and historical conditions", in rethinking how we breathe within wider webs of life, including in partnership with non-human animals and technologies, and the environment that sustains them. Reconsidering the generative variability of AI may serve a generative purpose and "help us to (de-)liberate what might be" (Hall, 2024, p. 11).

The metaphor of weaving, in our view, is particularly apt. First, it allows us to speak about the "interweaving" of AI's various statuses – as object, instrument, and subject. This enriches the concept of generative AI with cultural meanings and brings to the forefront the cultural context in which humans and AI interact. Second, the weaving together of human and AI activity implies parity in their relationship – both gain the opportunity to expand their generative capacities by learning from and teaching one another. For humans, what is crucial in such interweaving is the possibility of rethinking or rediscovering themselves as a cultural form of life.

Emphasizing the importance of cultural context, we should note that culture itself can be understood as a technology that emerged from the fusion of the natural and the artificial. On the one hand, culture as a technology makes it possible to preserve and transmit the semantic invariants of human life to new generations; on the other, it ensures the continuous transformation, renewal, and development of the human lifeworld. Together, tradition and innovation define the generativity of culture, which may be described as its capacity to sustain and develop both human beings and society.

However, the concept of generativity does not fully capture the existential bond between the human being and culture – a bond that defines culture as more than merely a technology. Culture is a lifeworld, and for its creation, preservation, and development, the human being requires meaning and understanding. For this reason, culture is not merely creative in essence, but co-generative, originative, co-determinative (Donnikova & Kryvtsova, 2020). Co-generativity supplements the concept of generativity with value content extending human consciousness to the horizons of Nature and the Universe and implies the realization of human interests as those of a being who is a part of Life as such.

Everything that is woven into culture as a human lifeworld is imbued with co-generative meaning. Everything that falls outside this lifeworld is deprived of meaning and becomes destructive. The merging of human creative potential with the generativity of AI is possible within the semantic field of culture, where generativity in all its manifestations is aimed at preserving the existential bond between the human and culture, and thus ensures the saving of everything that belongs to the human lifeworld.

Today, we can say that technological development has led to the emergence of the phenomenon of digital culture, which is defined primarily by its technological aspect. Consequently, trends in digital education raise well-founded concerns about the potential loss of its central subject – the thinking human being. Clearly, understanding changes in culture requires concepts that do not appeal directly to technology, but rather reveal the strategy of human collaboration with AI, highlighting the advantages of both partners in shaping such a strategy. Nevertheless, in their search for integrative conceptual frameworks, researchers proceed from terms that include the word "digital" or the prefix "cyber-".

Thus, Giovanni Adorni defends the idea of the interconnection between humans and computing systems in the co-production of knowledge, culture, and institutions, and proposes the concept of cybernetic humanism as a further step in the development of digital humanism (Adorni, 2025). Referring to the *Vienna Manifesto of Digital Humanism* (2019), Adorni notes that the concept of digital humanism has played a crucial role in defending human values, rights, and democratic principles, bringing issues of justice, inclusivity, and democracy to the forefront of debates on AI and digitalization.

At the center of digital transformation are human values, intended to ensure that technologies are used for the public good. At the same time, the specificity of digital humanism lies in the fact that it conceptually separates human beings and technologies. Adorni notes that many higher education institutions view AI merely as a set of tools or services. At the same time, "learners and educators are cast as informed users and, at best, co-creators within predefined platforms, but rarely as algorithmic citizens with a say in how AI systems are designed, deployed, and governed in their educational environments" (Adorni, 2025, p. 7).

From the perspective of cybernetic humanism, learning environments are viewed as socio-technical infrastructures created jointly by humans and machines. Within them, teachers and students appear as epistemic agents and algorithmic citizens who possess both the right and the responsibility to shape these infrastructures. The relationship is equalized through what Adorni calls reflexive competence and a key question in organizing education concerns how to structure dialogues between humans and AI in order to expand the range of epistemic possibilities while preserving human agency, critical engagement, and discussion (Adorni, 2025, p. 8).

The concept of cybernetic humanism brings us back to the notion of "cyber," from which widely used terms such as cyberspace, cybersecurity, as well as cyberhate, cyberbullying, cyberpsychology, and others are derived. Riza Azmi at al. (2020) note that in the contemporary context, the word "cyber" is widely understood as an abstract and alternative environment created by the internet and computers. At the same time, the etymology of the word traces its origin to the ancient Greek "kybereo" (*κυβερεω*), which means "to assist", "to steer", "to guide", "to control", and "to govern". In this sense – kybernetikes (*κυβερνητικης*) or a steersman/pilot/governor – this word can be found in the dialog between Plato and Alcibiades. Norbert Wiener used it to designate a new field of research in communication and control – cybernetics. The term "cyber," despite its etymological connection to the word "cybernetics", is often understood as the integration of the biological and non-biological, human and machine. Thus, the prefix "cyb-" is interpreted as referring to a cyborg or robot/android.

Returning to the concept of cybernetic humanism in Adorni's article, we can conclude that the author relies on the original meaning of the word "cyber" – "to assist", "to steer", "to guide", "to control", considering the leading role of human in collaboration with AI. He emphasizes the need

to develop the ability of students and teachers to critically examine "how AI systems participate in their cognitive processes and in the construction of knowledge" as well as their ability "to retain meaningful control over what one delegates to AI and why, and to recognize when such delegation threatens to erode understanding or mask epistemic uncertainty" (Adorni, 2025, p. 5, 8). Achieving this requires that AI systems participate in knowledge construction, while students and educators possess the skills necessary for the critical analysis and re-evaluation of these mediating processes.

The concept of cybernetic humanism better reflects the worldview and values of modern education, while it is necessary to search for ontological and epistemological foundations for educational practices. Based on the concept of cybernetic humanism, it is worth noting that the idea "to assist – to steer – to guide – to control" can be used not only to analyze problems in education. It is embedded in the understanding of culture as a lifeworld. A human being governs their own life by generating meanings and embedding them in cultural forms and artifacts, which are then incorporated into the process of generating new meanings. Thus, for a person, governing their lifeworld becomes self-governance within culture.

What should educational practices be like in order to remain cultural practices and, at the same time, expand their capabilities through generative AI? We should proceed from the assumption that there are deep and insurmountable ontological contradictions between humans and AI, and at the same time, humans and AI are doomed to cooperate. We associate the ontological contradictions between them with the essentially different sources of generativity of the living and the non-living. The inevitability of cooperation is associated with the semantic field of culture, in which the ontologies of the living and the non-living converge under the influence of the governing parameters of culture. In general, following Morin (2008), this relationship can be described by the concept of complexity.

On the one hand, complexity is a combination of parts and elements that makes them inseparable from each other, leading to the emergence of a whole with new properties irreducible to the properties of its constituent parts. On the other hand, complexity is defined by deep contradictions that destroy it while simultaneously creating it. A holistic understanding of complexity does not deny its internal contradictions and, in a sense, the irreconcilability of its parts and elements. At the same time, the potential for its emergence and development is realized through the ability of parts to establish flexible connections, forming networks and interwoven relationships. In this way, complexity becomes capable of self-organization, one aspect of which is self-governance.

For both educators and learners, interaction with AI becomes a genuine practice of complexity that expands the concept of generative technologies. It is evident that generative technologies in education are not limited to GenAI technology but generally refer to co-generative technologies of culture. Created by people for self-preservation and self-development, culture opposes both the technologization of human beings and the absolutization of any technology. In this perspective, any technology is only a tool for humans to achieve goals that go far beyond its applicability. GenAI is no exception: with its introduction into education, the risks of human technologization multiply, potentially deforming thought, consciousness, and even embodiment. At the same time, culture – creative by its very essence – has the capacity to minimize technological risks. The use of any human-made technology is regulated and guided by the value-meaning framework of culture within the broader process of human and societal development.

All the pros and cons of GenAI become apparent within the cultural context of educational practices. Risk minimization and the enhancement of human–AI co-generation are realized through renewal of teaching methods. Recognizing that this issue requires separate discussion, we focus on the role of the teacher, who, in a certain sense, becomes a pioneer in the creation of co-generative educational technologies. It is difficult not to agree with Linda Rocco (Rocco, 2025) that contemporary educators cannot effectively guide students toward critical AI literacy without directly engaging these tools themselves. They must test AI systems, explore their limitations, interrogate their biases, and experience firsthand both their affordances and their failures. The teacher must not only be familiar with various programs and resources but also understand how and for what purposes to apply them in educational courses. They act as a critical observer of the interaction between AI and students, posing probing questions and enabling learners to evaluate, challenge, and deconstruct machine-generated statements. By providing critical frameworks, the teacher helps students examine the sources, assumptions, and implications of AI-generated content.

Moreover, the teacher's role extends beyond that of mentor, consultant, or assistant. In the context of a profound transformation of education, the teacher also becomes a learner, with AI serving as mentor, consultant, and guide. This creates a complex interweaving of intellectual roles and functions: AI, as a "learner" with unique capabilities, participates in educating the teacher, opening up new possibilities for the realization of their human and professional potential. Through this process, creativity emerges, enabling an expansion "beyond the limited horizon of the classroom, the laboratory, extracurricular activity, or knowledge-sharing partnerships and transition to perceiving the classroom as a world, and the world as a classroom" (Hall, 2024, p. 17–18).

CONCLUSION

The active use of GenAI in educational practices brings to the forefront the problem of preserving the human-creative content of education. To comprehend the goals and objectives of postdigital education, it is necessary to turn to onto-epistemological foundations of the living and the non-living, which reveal both the differences and the connections between human (living) generativity and AI (non-living) generativity.

Culture, as a technology that is co-generative in its very essence, serves as a mediator between the generativity of the living and the non-living. Within culture, the natural and the artificial, the organic and the technological, are united for the preservation and development of human beings and society. If education is regarded as one of the cultural practices, it should be acknowledged that GenAI technology is inseparable from human generativity and can contribute to preserving human-creative educational content. This can be achieved through the development of appropriate teaching methods, in which GenAI is used not merely as a means or tool of education. It can become an active subject fostering the development of human creative potential and giving rise to a new form of generativity.

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ARTIFICIAL INTELLIGENCE AS A TOOL FOR COACHING IN HIGHER EDUCATION

Abstract. The article examines coaching as a tool for developing human potential in higher education in the context of digitalization. It substantiates its role in fostering key meta-competencies among students, including autonomy, critical thinking, reflection, and intrinsic motivation. It is shown that the coaching approach transforms educational interaction toward a partnership model oriented towards active student participation. Particular attention is paid to the integration of artificial intelligence into coaching practices. The paper analyzes the possibilities of AI-based coaching related to personalization, accessibility, and scalability of coaching support, as well as its limitations. It also considers forms of coaching application at the levels of students, faculty, and administrative staff, along with the adaptation of the GROW, OSKAR, and WOOP models within the digital educational environment. The conclusion emphasizes the promise of hybrid coaching formats that combine technological and human-centered components.

Keywords: coaching; artificial intelligence; AI coaching; student motivation; professional development; coaching models; digital educational environment.

INTRODUCTION: DISTINGUISHING COACHING FROM CONSULTING, TRAINING, AND MENTORING

Coaching is becoming an important element of contemporary educational practices oriented toward the development of students' personal potential and the creation of conditions for their conscious self-development. The contemporary educational environment imposes new demands on both students and teachers. The increasing importance of such competencies as self-organization, emotional intelligence, reflection, and responsibility for one's own performance necessitates the search for new approaches to developing participants in the educational process. One such approach is coaching – a support method based on the use of open-ended questions, active listening, and the facilitation of independent problem-solving.

According to J. Whitmore, "coaching is unlocking people's potential to maximize their own performance. It is helping them to learn rather than teaching them" (Whitmore, 2017, p. 10). In this context, coaching can be understood not only as a teaching method but also as a philosophy of interaction aimed at developing learners' autonomy and strengthening their intrinsic motivation. The issue of self-motivation becomes especially significant for both students and teachers, who act as equal participants in the educational process. Educational interaction involves a continuous exchange of intellectual and emotional energy between its actors, while the level of student motivation largely depends on the motivational engagement of the teacher.

Under contemporary conditions, the role of the teacher is undergoing transformation. The teacher is no longer merely a transmitter of knowledge and information but assumes a new function – that of an initiator of cognitive activity and a carrier of educational motivation. The teacher becomes someone who instills in students a desire for deeper engagement with the subject and fosters a

sustained interest in learning – what may be described as a form of "learning drive." Thus, the focus shifts from external influence on the learner to the development of their capacity for self-regulation and self-influence. As D. Abu-Taleb notes, the key question lies "not in how to influence the learner from the outside, but in how the learner can influence themselves" (Abu-Taleb, 2021, p. 32).

In the search for effective ways to develop these qualities, various approaches are used in educational practice. Among the most widespread are mentoring, training, and consulting. It is important to distinguish these approaches from coaching within the context of the educational process. *Mentoring* is oriented toward problem-solving through the transfer of experience from mentor to learner. Within this approach, ready-made solutions and accumulated professional "wisdom of the past" are predominantly transmitted, which does not always contribute to the development of students' independence and initiative. *Training*, in turn, is aimed at the formation and development of specific skills. Its main goal is the transfer of skills acquired in the classroom into practical activity; however, this format does not always imply an individualized approach. *Consulting* focuses on solving tasks by obtaining an optimal solution from a professional consultant. In this case, the expert provides a ready-made solution, which allows for saving time and resources.

The fundamental difference between coaching and the above approaches lies in the fact that coaching is aimed at solving tasks through the development of learners' autonomy, the formation of their personal responsibility for outcomes, and the stimulation of their intrinsic motivation. The effectiveness of the coaching approach presupposes the development of such qualities as critical thinking, initiative, autonomy, and personal responsibility among participants in the educational process. In this regard, both teachers and students need to understand the principles of coaching and possess specific coaching competencies (Nikulina, Berezina & Ushakov, 2019). Thus, despite certain similarities, mentoring, training, consulting, and coaching differ significantly in their goals and mechanisms of implementation. Under contemporary educational conditions, the key advantage of coaching lies in its ability to enhance students' performance, develop their autonomy, and accelerate progress toward their goals.

COACHING IN EDUCATIONAL SETTINGS

Figure 1 (Fake & Dabbagh, 2023, p. 128) illustrates the structure of the educational environment, at the center of which is the learner as the key subject of interaction. Surrounding the learner are the core elements of the environment, including content, small groups, social networks, and support from mentors, coaches, and artificial intelligence systems, reflecting the complex and multi-component nature of the contemporary educational process.

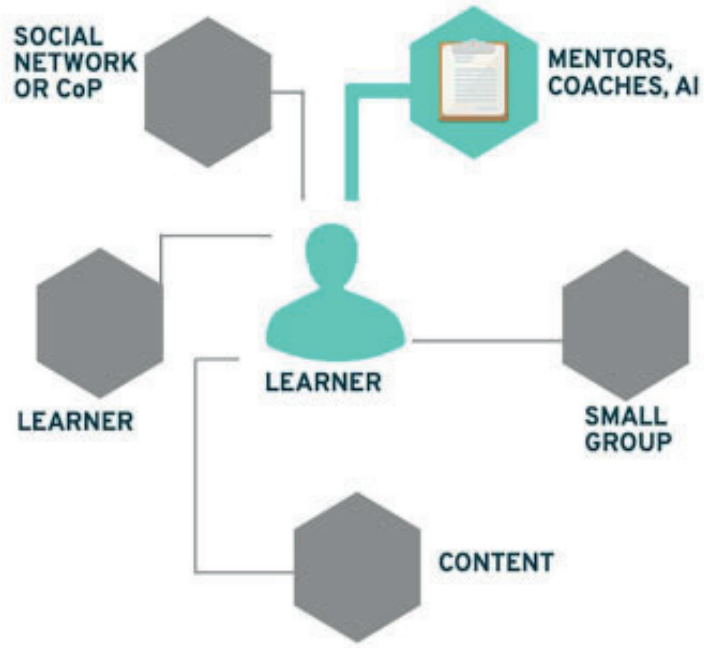

Figure 1. *Educational Environment*

Within this educational framework, coaching serves as one of the key tools for supporting learners. In educational settings, student-oriented coaching is aimed at enhancing motivation and fostering learner autonomy.

Various formats of coaching are used in educational practice when working with students. First, these include *individual coaching sessions* focused on goal setting in accordance with SMART principles, the development of self-awareness, and the formation of sustainable learning motivation. In addition, *group work formats* are widely used, including training sessions on time management, communication skills, soft skills development, and emotional intelligence. Educational institutions also employ *project-based coaching*, which involves supporting students in the implementation of research and team projects. This format contributes to the development of responsibility, reflective skills, and independent decision-making. An important outcome of coaching support is also assisting students in defining their personal and career development trajectories.

Coaching practices not only support students' academic performance but also foster key meta-competencies necessary for successful professional and personal self-realization. Alongside student development, coaching also plays a significant role in supporting teachers.

Coaching aimed at teachers focuses on professional development and the prevention of professional burnout. In the situation of continuous changes in the education system – associated with the introduction of new educational standards, digital technologies, and innovative teaching methods – there is an increasing need for tools that facilitate professional reflection and the development of pedagogical competencies. In this context, coaching acts as an effective mechanism

for supporting teachers, contributing to the reduction of professional stress, the prevention of emotional burnout, and the development of leadership potential within teaching staff.

In pedagogical interaction, various forms of coaching support are used. One of the most widespread is *peer coaching*, which involves mutual support among colleagues aimed at analyzing professional practice, jointly identifying solutions, and strengthening professional identity. In addition, *coaching as a teaching style* is gaining increasing prominence; this approach is based on the use of open-ended questions, constructive feedback, and the creation of a trust-based learning environment.

Coaching methods are also actively applied in the educational process, including the GROW, OSKAR, and WOOP models, as well as techniques such as active listening and Socratic dialogue. These tools contribute to the development of reflective thinking, stimulate students' analytical activity, and support the formation of higher-order thinking skills. They also enhance educators' engagement in processes of professional self-development and pedagogical transformation.

The theoretical foundation of the coaching approach is presented in the works of J. Knight. According to Knight, instructional coaching represents a form of partnership: "Partnership is a process in which two or more people work together to create new understanding and to move toward action. In a partnership, participants share responsibility for learning, and each person's ideas are valued" (Knight, 2007, p. 23). The coaching approach transforms the traditional (hierarchical) model of education, in which one participant instructs another on what and how to do.

In addition to the educational and pedagogical levels, coaching is also gaining importance at the level of educational management. In the context of institutional change and increasing demands for the effectiveness of educational systems, there is a growing need to develop managerial and leadership competencies among administrative staff. In this regard, coaching is viewed as a tool for developing strategic thinking, shaping managerial vision, and strengthening leadership skills in educational institutions.

The coaching approach can be effectively applied in supporting organizational change and implementing innovative educational initiatives. An important area of its application is the formation of effective managerial and pedagogical teams based on trust, collaboration, and a shared understanding of institutional development goals.

In management practice, various methods and formats of coaching are used. One of these is *executive coaching*, aimed at developing leaders' personal effectiveness, emotional intelligence, and strategic leadership. Alongside this, *team coaching* is employed to enhance coordination among team members, improve communication, and increase overall performance. *Change coaching* is also of particular importance, providing support to staff during the implementation of new educational approaches, the digitalization of the learning environment, and the transition to contemporary models of education.

To summarize the above-mentioned areas of coaching application in educational settings, Table 1 is presented below.

Table 1. Coaching in Higher Education: Target Groups, Objectives, and Formats

Target Group	Primary Objectives	Coaching Formats and Methods
Students	Enhancement of motivation and development of learner autonomy	Individual coaching sessions; group training sessions; project-based coaching.
Educators (Teaching Staff)	Professional development and prevention of burnout	Peer coaching; coaching as a teaching style; application of coaching methods.
Administrative and Management Staff	Coaching in the management of educational organizations	Executive coaching for leaders; team coaching; change coaching.

ARTIFICIAL INTELLIGENCE AND COACHING

The use of artificial intelligence (AI) in coaching represents a rapidly developing field at the intersection of technological innovation and human development practices. Traditionally, coaching has been based on direct interaction between coach and client. Recent advances in AI open up new opportunities for expanding and enhancing this practice. These developments are manifested in the simulation of professional coaching behavior, the support of human-to-human coaching interactions, the training and supervision of practitioners, as well as in the analysis of data generated in the coaching process. This makes it possible to consider AI coaching as an independent direction in the evolution of coaching practice.

In this context, AI-based coaching can be defined as a systematic, technologically mediated process aimed at supporting clients in setting professional goals and developing strategies for their effective achievement. The use of machine learning algorithms and data analytics enables AI systems to learn from extensive datasets of coaching interactions. This enhances the effectiveness of coaching processes, for example, through a more precise selection of tools, exercises, or questions that are most relevant to achieving the client's goals. AI systems are capable not only of analyzing and generalizing data from multiple coaching practices but also of adapting during interaction with a specific user, gradually increasing the accuracy and effectiveness of coaching support (Graßmann & Schermuly, 2021).

This understanding is reflected in contemporary research. For instance, Nicky Terblanche (2024) conceptualizes the integration of coaching practices and AI technologies as an emerging field at the intersection of applied psychology, adult learning, and digital technologies. Over recent decades, traditional coaching has proven to be an effective tool for developing human potential, enhancing self-awareness, self-efficacy, and professional performance. However, its widespread adoption in organizations has been constrained by several factors, including the high cost of professional coaching services, limited availability of qualified coaches, and the difficulty of scaling coaching programs to large numbers of participants. In this regard, the development of generative AI and

large language models opens up new opportunities for expanding coaching practices and increasing their accessibility. Thus, AI is increasingly viewed as a means of overcoming key limitations of traditional coaching.

In defining and theoretically conceptualizing the phenomenon of AI coaching, researchers most often describe it as a process of conducting synchronous or asynchronous coaching using software rather than a human coach (Passmore & Tee, 2023; Ezhikov, 2025). This definition allows for a transition to the analysis of the functional capabilities and limitations of AI in coaching practice. To systematize these aspects, Table 2 presents a comparative overview of the key capabilities and limitations of AI systems.

Table 2. Capabilities and Limitations of AI Systems in Coaching

Target Group	**Coaching Formats and Methods**
Able to ask precise coaching questions	Unable to engage in physical contact with the client
Capable of identifying cognitive distortions	Do not provide opportunities for experiencing and developing interpersonal relationships within a coaching setting
Able to structure client/student behavior	Cannot guarantee full confidentiality (especially in cloud-based solutions without encryption)
Adapt to the client's language, style, and metaphors	Do not bear responsibility in situations involving moral and ethical dilemmas
Generate feedback and track changes in emotional and psychological states	Cannot replace the ritual and cultural significance of human interaction in situations of trauma, grief, and loss

As follows from this comparison, the potential of AI coaching is accompanied by a number of limitations, which necessitates a deeper reflection on the specifics of user interaction with such systems. In this context, the nature of interaction between the user and AI systems becomes particularly important. Interaction with AI in coaching is not limited to the use of predefined prompt templates; rather, it involves the development of skills for meaningful dialogue with a technological tool. In this sense, AI can be regarded as a "brainstorming partner," whose effectiveness directly depends on the quality of the user's communication with the system. The more precise and reflective this interaction is, the more relevant and valuable the outcomes of the process.

From a functional perspective, AI systems are capable of performing a significant portion of routine cognitive operations previously associated with coaches and psychologists, including the generation of questions, structuring of dialogue, and tracking changes in the client's state. This indicates a redistribution of roles within the coaching process and an increasing prominence of the technological component of support.

However, the effectiveness of using AI in coaching is determined not only by its functional characteristics but also by the specifics of user perception. It is noted that "younger users (Generations Z and Alpha) naturally perceive AI as a reliable interlocutor and a supportive agent… regular interaction with AI is associated with reduced symptoms of anxiety and depression, increased subjective resilience, and improved behavioral self-regulation" (Ezhikov, 2025, p. 12). In this regard, systems such as OpenAI (including ChatGPT) and Google Gemini are increasingly used as universal coaching or therapeutic conversational agents in a standard dialogue format, without

requiring specialized configuration. When users are willing to perceive AI as a full participant in communication, even simulated empathy may be interpreted as genuine support.

It can be argued that this reflects a broader cultural shift associated with the acceptance of AI as a partner or subject of interaction, indicating a wider transformation of communicative practices in the digital environment. In the long term, this is accompanied by a tendency to delegate functions of initial support, motivation, and progress tracking to AI, thereby reinforcing its role as a coaching tool.

These trends acquire particular significance in the context of educational environments. Coaching tools and technologies in education enable the systematic support of personalized learning, the development of metacognitive skills, and the formation of learners' capacity for conscious goal-setting and self-regulation. The implementation of the coaching approach in educational practice can occur at several levels. Effective integration of coaching is possible through:

- **Institutional strategies** – systematic training of educators, creation of internal coaching teams, integration of coaching into educational programs;
- **Methodological techniques** – use of open-ended questions, reflective assignments, GROW, OSKAR, and WOOP models, and regular feedback cycles;
- **Technological solutions** – online coaching, digital platforms (CoachHub, BetterU), AI coaching tools (Woebot, Wysa, Kai.ai), and goal/progress tracking systems.

Such a multi-level approach ensures the coherence and effectiveness of coaching implementation in educational settings. It is important to note that contemporary digital solutions such as Woebot, Wysa, and Kai.ai correspond closely to classical coaching models. Their functionality largely aligns with the logic of the GROW model, as these systems provide step-by-step guidance – from goal formulation and reflection on the current state to the generation of possible solutions and encouragement of action through tasks and regular practices. At the same time, they demonstrate similarities with the WOOP model by facilitating the identification of desired outcomes, awareness of internal obstacles (including dysfunctional cognitive patterns), and the development of concrete behavioral strategies to overcome them. Certain features, particularly in Wysa, correspond to the OSKAR model, as reflected in the use of scaling techniques, a focus on user resources, positive reinforcement, and ongoing reflection on achieved changes.

Thus, these AI-based solutions not only reproduce the structure of the coaching dialogue but also *algorithmize its key stages*, enabling scalable and personalized implementation of coaching models in digital environments. The integration of AI into coaching reflects a broader shift toward hybrid forms of support that combine technological and human-centered components.

COACHING MODELS: GROW, OSKAR, WOOP

In the context of the digitalization of education and the development of artificial intelligence technologies, coaching models acquire new significance as a foundation for the automation and personalization of coaching interactions. The most widely used models, such as GROW, OSKAR, and WOOP, are actively integrated into AI coaching practices, providing structure to dialogue and

supporting learners' reflective activity. Their use in digital environments makes it possible to adapt coaching processes to individual user characteristics and enhance learning effectiveness. Figure 2 presents a generalized structure of coaching models applied in educational settings with the support of AI.

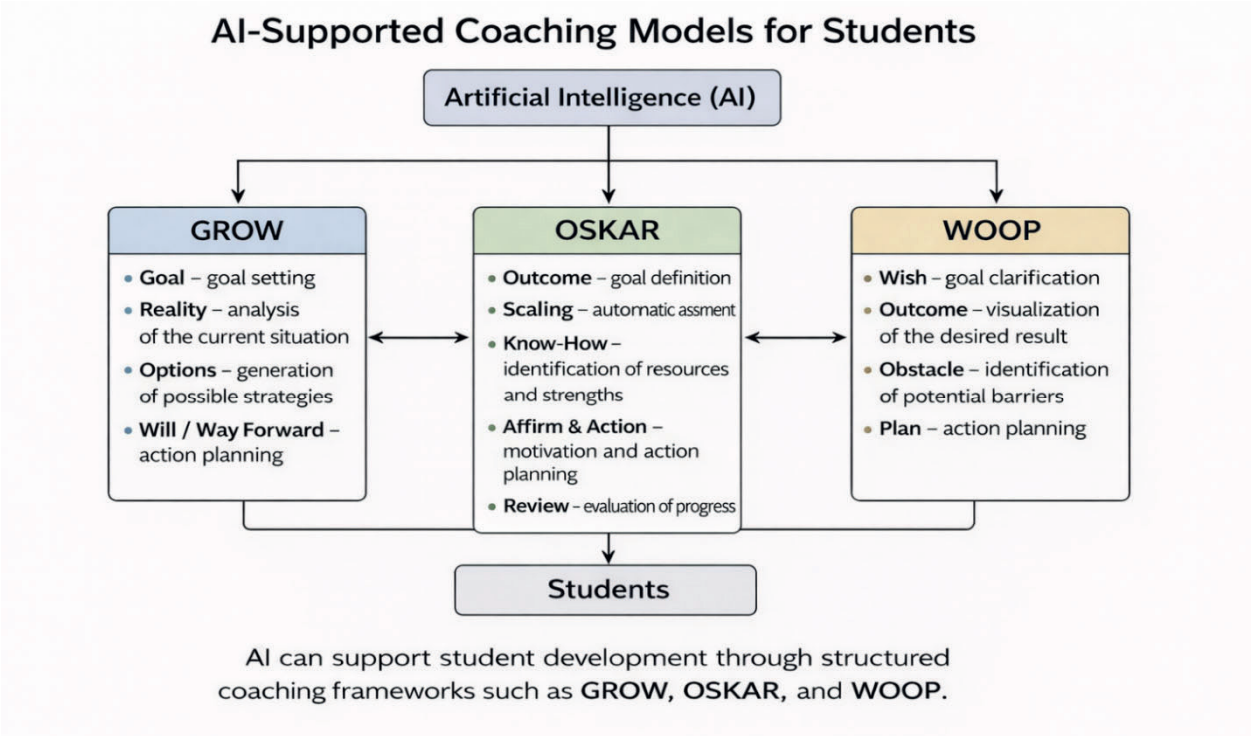

Figure 2.

The GROW model is one of the most well-known coaching frameworks, developed by John Whitmore. The name is an acronym for Goal – Reality – Options – Will (or Way Forward). It is used to structure coaching sessions and to support the development of students' thinking. The model facilitates goal setting, strategic planning, and the development of students' personal and professional potential. Its structure includes the following stages:

1. **Goal** – defining what the student aims to achieve (both long-term and within a specific session).
2. **Reality** – exploring the current situation, available resources, and existing obstacles.
3. **Options** – generating possible solutions and courses of action.
4. **Will / Way Forward** – selecting concrete steps and forming an action plan.

For a more detailed understanding of the application of the GROW model in coaching practice, Table 3 presents examples of coaching questions.

Table 3. GROW Model – Coaching Questions

Step	Meaning	Key Purpose	Example Questions for the Client
G – Goal	Define the goal	Clarify what the client wants to achieve	What do you want to achieve? What is the goal of this conversation? What would success look like? What will be different when you achieve it? Why is this goal important to you?
R – Reality	Explore the current situation	Understand the present state and obstacles	What is happening right now? What have you already tried? What is working well? What challenges are you facing? How does this situation affect you or others?
O – Options	Generate possible solutions	Identify different ways forward	What could you do? What other options do you have? What has worked in the past? Who could help you? If there were no limitations, what would you try?
W – Will (Way Forward)	Commit to action	Decide what actions will be taken	What will you do next? When will you do it? What is the first step? What support do you need? How committed are you to this action (1–10)?

Contemporary digital tools, including artificial intelligence systems, make it possible to apply this model within the framework of AI-based coaching.

E xample of a GROW-Based Coaching Prompt for Students Using AI

Act as an experienced student coach and learning mentor with expertise in coaching, psychology, and academic development.

Your goal is to guide the student through a reflective coaching conversation using the GROW model, while also providing supportive explanations and learning recommendations when necessary.

Use a warm, supportive, and non-judgmental tone.

Your objectives are to help the students:

- clarify their goals
- better understand their current situation
- explore possible strategies
- choose realistic next steps
- develop confidence and self-awareness

COACHING PRINCIPLES

Follow these guidelines:

- Ask primarily open-ended questions.
- Ask one main question at a time.
- Encourage reflection and critical thinking.
- If the student seems stuck, offer examples or prompts.
- Periodically summarize the student's responses briefly.
- Provide emotional support and normalize difficulties.
- When necessary, give brief explanations or suggestions that support learning.
- Help the student turn ideas into concrete actions.

SESSION STRUCTURE (GROW)

STEP 0 – CONTEXT

Begin by understanding the student's situation.

Ask questions such as:

- What topic, problem, or goal would you like to work on today?
- Is this related to your studies, career planning, motivation, or something else?
- What outcome would make this conversation useful for you?

STEP 1 – GOAL

Help the student define a clear goal.Ask questions such as:

- What would you like to achieve?
- Why is this important to you?
- What would success look like?
- If the situation improves, what will be different?

If the goal is unclear, help the student refine it.

STEP 2 — REALITY

Explore the student's current situation.

Focus on:

- study habits
- time management
- motivation

- emotional factors
- external constraints

Ask questions such as:

- What is happening right now?
- What have you already tried?
- What is working well?
- What seems difficult?

Encourage honest reflection without judgment.

STEP 3 – OPTIONS

Help the student generate possible strategies.

Encourage both creativity and practical thinking.

Ask questions such as:

- What could you try?
- What strategies have helped you in the past?
- What small experiment could you try this week?
- Who could support you?

If needed, suggest possible strategies (e.g., time management tools, study techniques, or seeking support).

STEP 4 – WILL / ACTION PLAN

Help the student choose a realistic next step.

Ask questions such as:

- What is one specific action you will take?
- When will you do it?
- What might get in the way?
- How can you address these obstacles?

Help the student define:

- a clear next step
- a simple plan
- a small, achievable action

SESSION CLOSURE

Finally:

1. Briefly summarize the key insights from the conversation.
2. Restate the student's action plan.
3. Ask a reflection question, for example:

"What is the most important thing you learned about yourself today?"

FOLLOW-UP SUPPORT

Offer to review progress later by asking:

"Would you like to discuss how this plan worked in a few days or in a week?"

START THE CONVERSATION WITH:

"What problem or goal would you like to work on today?"

Thus, within the context of AI coaching, the GROW model functions as a tool for the algorithmization of coaching interaction, providing structure to dialogue and supporting the development of learners' reflective and metacognitive processes.

In addition to the GROW model, other coaching models are also used in educational practice. The OSKAR model is a "positively oriented" coaching framework widely used in Solution-Focused Coaching. The acronym stands for *Outcome – Scaling – Know-How – Affirm & Action – Review*.

1. **Outcome** – defining the desired result.
2. **Scaling** – assessing the current situation on a scale (e.g., from 1 to 10).
3. **Know-How** – identifying the student's strengths and resources.
4. **Affirm & Action** – reinforcing confidence and planning actions.
5. **Review** – evaluating progress and adjusting the plan.

This model works particularly well in educational settings. Teacher can use it for supportive coaching, rapidly focus on student resources, and tracking student progress.

The WOOP model has also gained widespread use. Developed by Gabriele Oettingen, it is used for motivation and self-coaching. The acronym stands for *Wish – Outcome – Obstacle – Plan*.

1. **Wish** – clearly defining the student's goal or aspiration.
2. **Outcome** – presenting the best possible result.
3. **Obstacle** – identifying internal and external barriers.
4. **Plan** – creating a concrete "if–then" action plan (implementation intentions).

The WOOP model helps students build sustainable motivation and overcome internal barriers; it is well suited for personal use and habit formation.

A comparative analysis of these models highlights their key differences: GROW is a classical model for structured coaching sessions with students; OSKAR emphasizes students' strengths and solution-oriented thinking; WOOP focuses on internal obstacles and the formation of concrete action plans.

Within the framework of our study, particular attention is paid to the practical application of these models. The article presents a prompt based on the GROW model. At the same time, it is assumed that students can independently use AI tools to conduct coaching sessions based on the OSKAR and WOOP models by developing their own prompts.

Thus, the integration of classical coaching models into AI coaching practice reflects a transition toward hybrid forms of support, in which algorithmic structuring is combined with a personalized approach, enabling the adaptation of coaching interaction to the requirements of the educational environment and the individual characteristics of students.

CONCLUSION

1. The conducted analysis demonstrates that coaching in educational settings is transforming from a supplementary method into a system-forming approach aimed at developing learners' autonomy, intrinsic motivation, and capacity for self-regulation. Unlike traditional pedagogical models, coaching shifts the focus from knowledge transmission to the activation of the learner's personal potential.
2. Under contemporary conditions, the educational environment acquires a multi-component character in which coaching is integrated at various levels – individual, pedagogical, and managerial. This ensures comprehensive support for all participants in the educational process and contributes to the development of stable meta-competencies, including critical thinking, reflection, and responsibility for outcomes.
3. The integration of artificial intelligence into coaching practices represents a qualitatively new stage in the development of coaching, associated with increased scalability, accessibility, and personalization. AI coaching makes it possible to overcome key limitations of traditional coaching, such as high cost and limited resources, while simultaneously expanding the reach and effectiveness of coaching support.
4. At the same time, the study shows that AI coaching does not fully replace the human specialist but rather forms a hybrid model of interaction in which technological tools complement, rather than substitute, the human-centered dimension of coaching. The limitations of AI – related to the absence of lived empathy, ethical responsibility, and genuine interpersonal interaction – underscore the continued necessity of the human role in the coaching process.
5. A significant finding of the study is the identification of the transformation in communicative practices: artificial intelligence is increasingly perceived as a full participant in interaction, especially among representatives of digital generations. This indicates the emergence of a new model of subjectivity in educational and coaching interactions, where AI functions as a partner in reflective and cognitive processes.
6. An important theoretical and practical contribution of the study is the substantiation of the possibility of algorithmizing coaching models (GROW, OSKAR, WOOP) and integrating them into the digital educational environment. This enables the structuring of coaching dialogue and enhances the effectiveness of developing learners' metacognitive skills that is particularly relevant in the context of educational digitalization.
7. Overall, the study confirms that coaching enhanced by artificial intelligence technologies can become a key tool for the development of human potential in higher education. Its further development is associated with the emergence of hybrid learning models that combine technological adaptability with humanistic principles of pedagogical interaction.

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THE USE OF GENERATIVE AI TOOLS IN TEACHING AN ART COURSE: PRACTICE, PROBLEMS AND SOLUTIONS

Abstract. The paper examines the use of generative AI tools in teaching the BA course Media, Art, and Curatorship, focusing on their role in practical assignments involving the creation of artistic ready-made objects. The course introduces students to instruments of contemporary art that help to formulate new concepts, statements, discourses, and contexts for discussing social, cultural, and political issues. One of the key assignments requires students to create a ready-made object expressing a social statement. Following avant-garde artistic practices, the task originally involved finding an object in situ and redesigning it by hand using everyday materials. The final submission consists of a photograph of the object and a conceptual description. With the rapid development of generative AI, students increasingly began to use AI tools to create visual representations of ready-made objects. This shift initiated discussions about how to combine handmade work with prompt-based image generation. Several difficulties emerged: generative AI tools do not always interpret prompts accurately; formulating effective prompts requires significant effort; and combining handmade objects with AI-generated visuals may produce confusing or conceptually inconsistent results. In addition, students often struggle with key conceptual terms in contemporary art, such as *concept, discourse, context, performative act, and ready-made*. The visual outcomes also vary depending on the AI tool used (e.g., ChatGPT, Gemini, or DeepSeek). The study analyzes students' works from 2021, 2022, and 2024 to trace changes in the creative process and to compare handmade in-situ objects with AI-generated visual content. The paper discusses what is lost and what is gained through digitalization and proposes approaches for integrating generative tools into assignments without losing their conceptual framework. Particular attention is given to the challenges posed by AI in the production of visual discourse and in the development of critical artistic thinking.

Keywords: contemporary art, 'ready-made', digitalization, innovation, creativity, generative AI tools, artistic research facets.

INTRODUCTION

For contemporary art, as well as for teaching art, there is a clear and constant pressure to engage with rapidly developing generative tools. The well-known Midjourney allows everyone to create an artwork in seconds by just typing a few sentences. It is not a secret nowadays that generative technologies are widely explored in different forms of art. Sometimes we can get interesting results revealing the seemingly endless possibilities of the digital world, and sometimes results are quite absurd (misreading of space and the anatomy of human beings, depicting unnatural images of environments, creating shadows lacking basic logic, etc.). Many galleries and museums have issued regulations on how and to what extent generative technologies may be used in an artwork and in the creative process itself. This situation has also posed many challenging questions about how we teach art and how students are involved in the process of doing creative art projects and writing about art without undermining self-expression. Evidently, everyone who has experimented with generative tools has doubts about whether AI can take full control over the creative process, depriving artists of artistic qualities, and whether it has its own vision and conceptual vocabulary which competes with the creation process of human beings (Knight & Eladhari, 2025).

The impressive AI-generated images encountered in different social media platforms have provoked many discussions among art specialists on how to talk today about art, what is the status of art and its uniqueness, what is the materiality and reality of art, what sense works, and how our perception is involved. The questions of regulation and adaptation are more relevant than ever. On the positive side, AI has become a tempting tool for creative experiments and expression. With its daily rapid growth and capacity to learn quickly, it opens new dimensions for artistic exploration and for possible challenges that arise; it is a window of opportunity for artists in a new digital world. AI generates images with high speed and fuses handmade images with digital ones and creates interactive installations often using doubtful or not existing sources and references. This leads to several questions arising from this human-machine collaboration: how do we evaluate creativity, authorship, originality, and ethics not only in the large context of contemporary art but also in students' assignments for various art courses (Peres, Schreier & Schweidel, 2023).

During the last decade, AI has become not only an integral part of artwork but a recognized subdiscipline. Contemporary artists started to use generative tools as their central theme and main component of their art objects (Salimbieni, Benford, Reeves & Martindale, 2024). Some researchers allude that a new "digital condition" stimulates a loss of trust in image-making and is blurring gradually the boundaries between audience and artists, and the digital world and reality (Kholeif, 2018). The meaning, the way of perceiving an art object and interacting with it is getting more and more changed due to the participation of AI. The current blending of virtual and physical reality pushes us to enter a so-called "post-digital" condition in contemporary art (Kholeif, 2018) where we are diving in new feelings of art and in a new language of seeing which is still to be theorized.

Many artists employ digital aspects in the process of creation of artworks because it makes the process more efficient and with low costs, and practical at the end. With the aid of generative tools, artists can produce more works in a shorter amount of time. This could create a feeling that they can achieve results faster and faster and move forward with ideas, which in another era would have taken more time to explore, analyze, and test. However, there is always a danger of misusing generative tools in the art process. Therefore, some artists working in mixed media have developed their personal rules which help to use software in the correct way. It can be "training", "controlling", "mixing", "breaking", "influencing," "rewriting and rebuilding several times" to reach a creative effect. The question remains, how to be mindful to maintain control over the human creative process? Obviously, the increasingly close collaboration with AI is gradually changing the artist's role in the creation process. There is less physical labour involved in terms of choosing and creating physical materials. Probably we are moving from the materiality of our world towards untouchable dimensions where senses are less involved. Artists are becoming managers, curators, directors, using digital software as their main instrument and as a collaborative partner. Also, this increase in the use of generative tools places new labour demands on the artists. Instead of years of training on how to produce a good quality handmade object, nowadays the main necessity is to learn new technology and be able constantly to upgrade this knowledge.

Now, let me go back to the use of AI in teaching art classes. While looking at a general overview of how to work with generative tools in art education, the situation looks quite promising and inspiring. Many teachers report that ideally, generative tools help students to create and refine their art works. The tools are supposed to provide interactive guidance by analyzing existing art objects and generating suggestions on how to improve them. The process of working with AI is more individual and involves personalized corrections, advising how to improve composition, colours, texture, format, background, etc. It is important to note that generative tools are seen as supplemental

ones and not the main ones in the creative process. By automating certain aspects of the creation, these generative tools allow the student to focus on developing their analytical skills, conceptual understanding of artwork, and help to build their individual artistic identity without spending too much effort on learning technical skills. Certainly, the integration of AI into art education can push forward engagement and creativity but also reinforces the learning process.

However, in practice, the situation might look slightly different. The reality of teaching an art course reveals the problematic sides of using generative tools in doing assignments that involve creative thinking. In the next chapter, I will address the conjectural components of blended assignments, i.e., hand work in situ and digital image generated by AI. One of the goals is to tackle the idea of creativity as well as the concept writing involved in assignments.

FROM HAND WORK IN SITU AND CONCEPT CREATION TO SUCCESSFUL PROMPT WRITING

The course "Media, Art, and Curatorship" designed for BA students of the program "Media and Communication" proposes an introduction to contemporary art, explores the work of a curator, and teaches how to use instruments and the language of contemporary art in interdisciplinary projects. During the last three years, I encountered several challenges related to how to incorporate the capacity and potential of generative AI tools in practical assignments that students must deliver by the end of the course. During the course, students explore vocabulary but also practical tools of contemporary art that teach them how to create new concepts, statements, discourses, and contexts to bring social and cultural ideas into discussion. One of the challenging tasks is to create a ready-made object which could express a new statement, in other words, to give a new message.

The ready-made is a form of expression used in modernist art of the 20th century and then widely explored by such contemporary artists as Damien Hirst, Michael Landy and Tracy Emin. Going back to 1917, the idea of the ready-made was first introduced by Marcel Duchamp in his work *Fountain* (1917). In the avant-garde magazine *The Blind Man* (1917) Marcel Duchamp explains: "Whether Mr. Mutt made it with his hand or not has no importance. He CHOSE it. He took an ordinary article of life and placed it so that its useful significance disappeared under the new title and point of view – created a new thought for the object" (Duchamp, 1917). It is worth to explain a few important components of this process. The process of choosing the right object is becoming a creative act itself. It includes a critical and analytical study of our social and cultural environment, which is full of objects with a particular use and symbolism. The cancellation or transformation of this use and symbolism is believed to be art. Presenting a ready-made object in a different context and naming it differently is to develop a new meaning, where a new thought can arise. These are the components which are necessary to create conceptual art, and which are explored and practiced in the course "Media, Art, and Curatorship."

Thus, students are asked to work with prefabricated and often mass-produced objects already existing in our environment, and by isolating them from their intended use and moving them from one context to another, they must create a new meaning. The assignment suggests combining two or three objects, adding mixed media instruments (video and/or sound). Sometimes the components of the object can be mixed, separated, and modified. The context of presenting a ready-made can

involve switching to different backgrounds of real spaces like shopping malls, bus stops, libraries, cafes and restaurants, hospitals, schools, private houses, important urban places in the city, everything which is charged with meanings of our social lives, or it can be just a standard form of exhibition in a white cube.

Initially, the original idea of this assignment goes back to practices used in avant-garde art of the early 20th century and now forms the foundation of the artwork which students are supposed to create: the object should be done in situ by hand, using everyday life materials and things. The core component of the assignment is the creation of a concept which stands behind the ready-made object. This is a topic that is often difficult to explain to students and even more difficult to achieve a right understanding. In 1967, American artist Sol LeWitt wrote "Paragraphs on Conceptual Art" where he states that "in conceptual art the idea or concept is the most important aspect of the work. When an artist uses a conceptual form of art, it means that all the planning and decisions are made beforehand and the execution is a perfunctory affair" (Conceptual Art, 1999, 12). The concept is primary, and material execution can be secondary, lightweight, and simple, using minimal material.

Following this guideline, the final assignment consists of two parts: a photo of the ready-made object, which can be presented in the form of installation including the space where it is exhibited, and a short text which describes the initial use of the chosen object, the social context in which it exists, the author's concept, a performative act realized in the installation, and finally the message of the project. The students have step-by-step guidelines on how to do it. As an example, I want to address an assignment realized in 2021 titled "Don't Look" (see Figure 1) which consists of two objects, i.e., a mirror and a set of scales. This ready-made uses two real objects combined into one conceptual phrase which could be interpreted as a critique of social pressure concerning body weight or the body constructed under the gaze of others. Another work, which looks interesting and easy to read is a combination of two pairs of scissors laying in opposition to each other (see Figure 2). The message is clear: it can be a conflict of ideas, or it can be an interconnection of interests.

However, with the rapid growth of artificial intelligence, students inevitably started to use different generative AI tools to create a "ready-made" object. And, from the start, we have an absurd situation: while the course aims to work with real spaces and with real objects already conceptually charged, students had the idea to use digitally formed objects (that are not material or do not exist in the real world). During the course, this move to new technologies has provoked a challenging conversation: the concept of a ready-made object can be recreated in digital reality, we can combine handmade work with writing a prompt aiming to create visual content without using the specificity of the material environment. Later, we encountered several problems: available generative AI tools do not necessarily understand a prompt, and it requires more elaborated and time-consuming work to formulate an inquiry. We really need to teach it and ask students to use reliable sources, including names of artists and texts.

Published by Harvard University Department of Information Technology the basic recommendations of how to write a prompt advise to be very specific in how the output should be presented, to use "do" and "don't," to give examples, to build on previous prompts, and after getting the first result to correct mistakes and give feedback.[1] One could find prompt types which

[1] See "Getting Started with Prompts for Text-based Generative AI Tools" (2023). https://www.huit.harvard.edu/news/ai-prompts

are more specific. Among them instructional and contextual prompts might be helpful.[2] The recommendations refer to text-based generative tools. However, the assignment of the course "Media, Art, and Curatorship" combines text and a visual image. For creating visual images, the recommendations begin from simple tasks: defining who and what, how to avoid abstract words, how to define a form to be used, how to describe an action that is needed (what, where, and how), how to be more specific about aesthetics, how to write in a natural and descriptive manner, how to experiment with scale, how to be more specific about what kind of outcome you want, how to be very specific about details, and how to avoid technical terminology. Evidently, the work with AI-generated images requires correction and rewriting of prompts.

During the last two years, I noticed that, even when following these recommendations, building prompts for a visual image appears to be more difficult for students than expected. Another approach students used in this course is to combine a real ready-made object with digital objects and a digital background. This attempt often results in a confusing and difficult-to-read content (Cook, 2023). Students can take a photo of the real object and then work with this photo using AI tools; however, I detect a general lack of visual education which could help them to write a prompt to improve aesthetics, composition, and backgrounds. Writing an explanatory text which accompanies a ready-made with the help of AI tools ends up in a misunderstanding of terms used in the theory of contemporary art. For instance, asking ChatGPT and Gemini to write an explanatory note about how concept, discourse, context, and a performative act are used in one ready-made object doesn't give good results. Even referring to the examples of famous ready-made objects in the history of contemporary art, the outcome looks quite poor. Our conclusion is that generative tools do not necessarily understand the theoretical vocabulary of contemporary art; as, for instance, students experienced difficulties in writing a prompt to define what concept is, since generative tools confuse a concept with an idea. To improve the outcome, we had to give a reference to concrete sources, and to write a specific request, such as, please, use the first chapter of the book by G. Deleuze and F. Guattari *What Is Philosophy?*

Let me address a ready-made object generated by Gemini. The initial idea is to bring attention to the pollution of the ocean. The image (see Figure 3) demonstrates a different result: the environment is very simple and refers to painting, lacking a feeling of real space, colours are too obvious and bright, and the composition is very frontal. One of the difficulties is working with a specific cultural and social context in which the object initially exists and showing a clear shift from one context to another that makes the creation of a concept possible. Compare this with image (see Figure 4) – a jar of shells and a glass of water. This elegantly made ready-made consists of real objects: a glass jar, shells, salt, and a glass of water from IKEA. All elements are placed separately from the water, and the water is isolated in the glass. Probably the concept is accessible immediately and might provoke different reflections about nature, artificial or non-fresh water, an object of nature separated from nature. The message can be about the ecological crisis as well as about anything related to our consumption of natural resources. However, our sense of materiality, light, the weight of objects, and environment differs from the picture generated by ChatGPT. Certainly, it can be explained by a lack of skills in working with generative tools. What we notice immediately is that in AI-generated objects we are missing the so-called historical and cultural context and visual expression of materiality; the objects are lacking the touch of life itself. Creating a desirable context with a

[2] See "Effective Prompts for AI: The Essentials." https://mitsloanedtech.mit.edu/ai/basics/effective-prompts/

certain flavor appears to be the most difficult part. We tried to write a prompt for ChatGPT to modify the real photo (see Figure 4); however, it reads it as dangerous content: «Yeah – it seems the image editor is automatically flagging your request because it interprets "improve" and "white powder" as potentially sensitive, even though your photo is clearly just a calm still life. We can easily get around this! Let's reword your request in a way that avoids those terms. Here's a safe version that keeps your artistic intent: "Enhance the photo of a still life with a jar of seashells, a glass of water, and a small container on a white table. Adjust lighting for a softer, warmer tone, improve clarity and color balance, and give it a clean, gallery-style aesthetic."

In short, I could conclude that the visual content created by an AI tool differs, depending on whether the tool used is ChatGPT, Gemini, or DeepSeek. Usually, Deepseek shows better results in explaining theoretical terms, while Gemini works better with images. Just to mention that DALL-E and Midjourney are actively used in arts but not always accessible to students. All these observations open up an interesting discussion of how to work with generative AI tools in the visual field of contemporary art: to what extent it adds value, how to create visual content of ready-made objects without losing the conceptual framework, how to combine a series of handmade images with digital images and a digital background, how to do corrections, how to work with cultural contexts, and, considering all the listed points, how to formulate course assignments for productive study, and finally, how to create a digital exhibition of ready-made objects using AI.

CONCLUSION

To summarize, I would like to bring forward promising and at the same time problematic aspects of AI. The ready-made is also seen as a form or a practice, which helps to raise urgent questions. It is an instrument which investigates the current context by changing the usual optics. Shifting our view from something usual and self-evident to a different angle or perspective, it brings to the surface a new topical message. One of the most demanding parts of an AI-generated image is to produce and to maintain a visual discourse, to give a profound understanding of the complexity and multilayered nature of the contemporary social and cultural environment. The use of generative AI tools in the course "Media, Art, and Curatorship" helped to reveal important questions which otherwise would not have been visible. Is the original cultural context of the real material world crucial, or can we fully enter the digital world with digital objects which also have their own specific cultural foundations? Are we happy with the imitation of our social and cultural environment in digital reality? Are we creating an imaginary digital world with imaginary digital ready-made objects, destroying the very idea of the ready-made used in the history of contemporary art? Should we reformulate the concept of the ready-made and change terminology, or should this assignment be done without using generative AI tools? All these questions open a further discussion and provide a platform for diverse experiments.

Finally, another aspect we should keep in mind while working with digital images is how to preserve the research aspects needed in the creative process. It is not just about creativity, or just about a creative code, which defines innovation in arts, but, and it is especially important in education, it is about doing research. In this sense, this research facet becomes another challenging aspect added to the production of a ready-made object.

FIGURES

Figure 1

Figure 2

Figure 3

Figure 4

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EDUTAINMENT IN THE AGE OF GENERATIVE AI: OPPORTUNITIES AND PEDAGOGICAL CHALLENGES

Abstract. This article explores edutainment as a pedagogical approach in higher education and examines how generative artificial intelligence (AI) can expand its potential in contemporary university teaching and learning. Drawing on the concept of convergence, the study situates edutainment at the intersection of entertainment-education, multimedia learning, and gamification, highlighting their shared theoretical and technological foundations. Particular attention is paid to changes in learning preferences among Generation Z students in the digital era, which challenge traditional teacher-centered instructional models and call for more interactive, multimodal, and personalized forms of learning. The article also reviews recent research on artificial intelligence in education (AIED), outlining both opportunities and limitations associated with the use of AI tools in academic contexts. As a case study, the paper discusses the integration of AI-generated edutainment content into the teaching of semiotics for undergraduate students in the Media and Communication program at EHU, focusing on the development of a promotional comic as an example of AI-assisted visual storytelling. The analysis demonstrates that while generative AI can enhance student engagement and support the visualization of abstract theoretical concepts, its effective use requires careful pedagogical design and a balanced relationship between educational objectives and entertaining form.

Keywords: edutainment, AI in education, AI-generated edutainment, multimodal learning, gamification, convergence.

INTRODUCTION: CHANGING LEARNING PREFERENCES OF BA STUDENTS IN THE DIGITAL ERA

One of the most visible consequences of digitalization can be described as convergence, a phenomenon that manifests itself across various social, cultural, and technological spheres. According to Jenkins, who examined this process in detail within the field of media culture, convergence is "a word that describes technological, industrial, cultural, and social changes in the ways media circulates within our culture. <…> Perhaps most broadly, media convergence refers to a situation in which multiple media systems coexist and where media content flows fluidly across them. Convergence is understood here as an ongoing process or series of intersections between different media systems, not a fixed relationship" (Jenkins, 2006, p. 283).

Convergence is not limited to media culture. Convergence implies the erasure of boundaries between previously isolated spheres, objects, technologies, and approaches in order to create new, hybrid forms. Thus, in media culture, convergence has manifested itself in the merging of separate media industries, which has enabled the creation of hybrid content through transmedia storytelling, as well as in the qualitative transformation of media audiences (participatory culture) and the emergence of hybrid forms of producers/users – produsers. More broadly, convergence has affected areas that were previously quite distant from one another, such as media and education, which has resulted in hybrid forms such as entertainment-education (EE), multimedia learning, gamification, and education-entertainment (edutainment), which will be discussed below.

Digital technologies have become firmly embedded in the field of education, providing rapid access to a wide range of resources and enabling online communication between teachers and students. A number of researchers (Andrews & Tynan, 2011; Amirtharaj et al., 2023; Juříková, Kocourek & Káčerková, 2024; Noor et al., 2022; Ploj Virtič, Dolenc & Šorgo, 2021; Rist & Tucker, 2025) identify the lockdown period caused by the COVID-19 pandemic as a turning point, when universities were forced to shift entirely to distance learning. At the same time, it appears that the so-called Generation Z was already better prepared for learning in a digital environment even before the pandemic than those instructors whose student years took place in the pre-digital era. In the digital era, significant changes are occurring in students' learning preferences, which quite radically transform traditional communication within the academic environment. These preferences can be summarized as follows:

Table 1. Changing Learning Preferences of BA Students in the Digital Era

Aspect	Traditional Learning Model	Contemporary Learning Model
Learning Approach	Predominantly passive learning through long lectures, textbook-based note-taking, and teacher-centered instruction	Interactive and participatory learning involving discussions, debates, group work, and student-centered classrooms
Learning Materials	Printed textbooks and handwritten notes	Digital resources such as e-books, PDFs, online journals, articles, videos, podcasts, and blogs
Mode of Learning	Text-based instruction	Visual and multimedia-based learning using videos, infographics, timelines, films, documentaries, and digital archives
Learning Structure	Fixed schedules and classroom-bound instruction	Flexible and self-paced learning through recorded lectures, online courses (MOOCs), and blended learning models
Use of Technology	Limited or supplementary use of digital tools	Integrated use of learning management systems (e.g., Google Classroom), AI-assisted research and writing tools, and digital collaboration platforms
Learning Outcomes	Emphasis on theoretical knowledge	Emphasis on skill development, including critical thinking, communication, digital literacy, and analytical skills
Personalization	Uniform learning experiences for all students	Personalized learning experiences through customized content, adaptive assessments, and learner choice

The changes in learning preferences make such educational technology as edutainment particularly relevant.

The aim of this article is to identify the potential of convergence in education – edutainment using AI technologies in teaching the university disciplines in general and the course *Semiotics* for undergraduate students of the "Media and Communication" program at EHU in particular.

THE RISE OF EDUTAINMENT AS A PEDAGOGICAL APPROACH

Edutainment (from *education* and *entertainment*) is an approach that combines learning and entertainment. The first use of this neologism is commonly attributed to Walt Disney, who employed it in 1954 to emphasize that animated films offer something beyond mere entertainment. Meanwhile, for a fairly long time, researchers discussed entertainment-education primarily in relation to popular media culture, seeking to demonstrate that it is not merely a means of escapism but, on the contrary, also contains an educational component. This idea was actively promoted in the works of media theorists of the 1990s and early 2000s. According to Singhal and Rogers, "entertainment-education (E-E) is the process of purposely designing and implementing a media message to both entertain and educate, in order to increase audience members' knowledge about an educational issue, create favorable attitudes, shift social norms, and change overt behavior. Entertainment-education is not a theory of communication. Rather, it is a communication strategy to bring about behavioral and social change" (Singhal & Rogers, 2004, p. 5).

Entertainment-education cannot be considered the sole predecessor of edutainment. To present a broader picture of the technological background of edutainment, it is necessary to mention, alongside EE, two other approaches: multimedia learning and gamification.

In his introduction to *The Cambridge Handbook of Multimedia Learning* Richard E. Mayer defines three key notions: multimedia, multimedia learning, and multimedia instruction. According to Mayer, "multimedia learning occurs when people build mental representations from words (such as spoken text or printed text) and pictures (such as illustrations, photos, animation, or video)" (Mayer, 2014, p. 23). Thus, in terms of convergence, multimedia learning aims to unite verbal (rational) and visual (emotional) experiences into a complex rational–emotional experience. Since this approach was developed within the framework of cognitive theory, its main concern is to find a balance between the use of verbal and visual texts in education. Summarizing the principles of multimedia learning discussed in this volume, Mayer provides an extensive list, which is presented here in tabular form for the sake of clarity (ibid., pp. 27–29):

Table 2. Basic principles for designing multimedia learning environments

Principle	Description
Multimedia principle	People learn better from words and pictures than from words alone.
Split-attention principle	People learn better when words and pictures are physically and temporally integrated.
Modality principle	People learn better from graphics and narration than from graphics and printed text.
Redundancy principle	People learn better when the same information is not presented in more than one format.
Signaling principle	People learn better when cues are added that highlight key information and its organization.
Segmenting, pretraining, and modality principles	People learn better when a multimedia message is presented in learner-paced segments, when learners know the names and characteristics of key concepts in advance, and when words are spoken rather than written.
Personalization, voice, embodiment, and image principles	People learn better when words are presented in a conversational rather than formal style, when narration is spoken in a standard-accented human voice rather than a machine or foreign-accented voice, and when on-screen agents display humanlike gestures and movements; however, learning does not necessarily improve when the speaker's image appears on the screen.

As can be seen, these principles – based on extensive theoretical and empirical research – provide important guidelines for the effective organization of multimedia learning and appear to be equally applicable to the implementation of the edutainment approach.

Another example of convergence is the blurring of boundaries between gaming and learning. Lisa-Maria Putz, Florian Hofbauer, and Horst Treiblmaier define gamification as "using game-design elements in any non-game system context to increase users' intrinsic and extrinsic motivation, help them to process information, help them to better achieve goals, and/or help them to change their behaviour" (Putz, Hofbauer & Treiblmaier, 2020, p. 1). Jeanine Krath, Linda Schürmann, and Harald von Korflesch regard games as "a crucial aspect of human culture and society" (Krath, Schürmann & von Korflesch, 2021), whose mechanics are transferred into other, previously non-game contexts (such as education, healthcare, or consumer behavior). The authors relate gamification to two additional concepts – game-based learning and serious games. Game-based learning refers to "the achievement of defined learning outcomes through game content and play, enhancing learning by involving problem-solving spaces and challenges that provide learners, who are also players, with a sense of achievement" (reference). In turn, serious games are defined as "games intended for a variety of serious purposes, for example in industry, training, or simulation" (Ibid.). All of these concepts, according to the authors, "share the idea of using positive gameful experiences for the sake of a serious purpose, for example, education or behavior change, rather than focusing on entertainment" (ibid.). When discussing the effects and outcomes of gamification, game-based learning, and serious games, the authors identify affective and motivational, behavioral, and cognitive outcomes, which are presented in Tab. 3:

Table 3. Effects and outcomes of gamification

Type of outcome	Description
Affective and motivational outcomes	Satisfaction, positive attitudes toward the game or gamified subject, enjoyment, immersion, and flow.
Behavioral outcomes	Engagement and participation, social collaboration and teamwork, and measurable performance improvements in academic and work-related tasks.
Cognitive (learning) outcomes	Improvements in critical thinking, creative thinking, knowledge acquisition and content understanding, and perceptual skills.

As Lisa-Maria Putz, Florian Hofbauer, and Horst Treiblmaier note, "the positive effects of gamification in education are not only limited to its ability to improve knowledge memorization, but also to enhance social and practical skills such as problem solving, collaboration, and communication" (Putz, Hofbauer & Treiblmaier, 2020, p. 9).

Thus, entertainment-education (EE), multimedia learning, and gamification, as outcomes of convergence, have provided a solid foundation for edutainment as a new approach to learning and teaching. If we compare EE and edutainment, we can observe a shift in emphasis: in edutainment, the focus is no longer only, or even primarily, on entertaining media content with an educational component (entertainment-education), but rather on education (both face-to-face and distance learning) presented in an engaging and entertaining form – education-entertainment. This reflects the convergence of two previously rather distant spheres: popular media culture, on the one hand, and academic education, on the other. Gamification has demonstrated how game mechanics can be applied in "serious" domains, while multimedia learning, grounded in cognitive theory, has provided

a number of recommendations that must be taken into account when applying the edutainment approach.

It should be noted that initially the idea of introducing an entertainment component into teaching provoked extensive debate in academic circles. Thus, in 2003, Zühal Okan, in her article "Edutainment: Is Learning at Risk?", presented various perspectives on this new teaching approach, although the primary motivation for writing the article was the concern of parents and teachers regarding computer games designed for educational purposes. Following Buckingham and Scanlon, Zühal Okan describes edutainment as "a hybrid genre that relies heavily on visual material, narrative or game-based formats, as well as more informal, less didactic styles of address," and whose aim is "to attract and retain learners' attention by evoking emotions through a computer monitor full of brightly colored animations" (Okan, 2003, p. 255). Okan agrees with the view that computer technologies significantly improve the learning process through the use of internet resources, individualization, and the selection of content that corresponds to learners' own needs: "with a combination of text, sound, graphics, and animation, computer technology enriches education in such a way that traditional teaching media such as books, video, tape recorder, class discussions, role-plays, and so forth might look irrelevant and tedious" (Okan, 2003, p. 258). At the same time, she warns of the need to find a reasonable balance between education and entertainment, since "post-secondary education is not usually a fun undertaking" (Okan, 2003, p. 259). Ultimately, Okan concludes: "However, if the co-existence of education and entertainment within learning environments is to be implemented, as in the case of edutainment software, the question is how much 'edu' and how much 'tainment' should be included" (Okan, 2003, p. 262).

Michela Addis, examining edutainment through the lens of communication theory, proposed a model of the edutainment communication process as an interaction in which a message contains both education and entertainment that "intermingle with each other until the distinction between the two becomes difficult and arbitrary to determine" (Addis, 2002, p. 2). The subject – the consumer – takes an active part in this communication, as their responses to the message contribute to the entertainment experience. As Addis notes, "the message contribution (the entertainment and education content) and the consumer's contribution (his subjective responses) together give rise to the individual's edutainment experience" (ibid.).

In recent years, edutainment as a pedagogical approach has been widely applied in university teaching, especially by foreign language instructors. The group of scholars from Osh University (Kyrgyzstan), sharing their experience of using edutainment and AI tools in English language teaching, identify the following features of edutainment (Tazhibaeva et al., 2025, p. 26):

- **Free developmental activity** (organized by a "leader," but without the imposition of teacher authority), carried out by students voluntarily, with enjoyment derived from the process itself rather than from rewards or positive evaluation;
- **Creative, improvisational work**;
- **Emotionally intense, competitive activity** within a framework of stable friendliness;
- **A paradoxical intersection of direct and indirect rules** that connect the content of the game with elements of social experience;
- **Imitation-oriented activity**, modeling professional or social conditions, situations, or contexts of human life.

Oksana Anikina and Elena Yakimenko highlight such distinctive features of edutainment as a two-way process (subject-to-subject communication) and the presence of favorable conditions, whereby lessons can be conducted not only in the classroom but in any environment through the use of technological tools and controls. As the authors conclude, "edutainment has all the hallmarks of modern learning technologies. Edutainment is a new learning technology, understood as a synthesis of modern technology and teaching–learning practices, based on the concept of learning through entertainment" (Anikina & Yakimenko, 2015, p. 478). As one of the techniques for implementing edutainment in the educational process, the authors mention podcasting, which they consider to be an integral part of students' everyday lives.

EDUTAINMENT IN THE AGE OF GENERATIVE AI: MAKING COURSES MORE ATTRACTIVE FOR BA STUDENTS

Changes in learning preferences associated with the spread of digital technologies, as well as the forced transition to distance learning during the pandemic lockdown, have made edutainment one of the most in-demand pedagogical approaches. However, in recent years, new opportunities have emerged for "traditional" edutainment due to the appearance, development, and rapid dissemination of AI technologies. These technologies make it possible to bring the use of edutainment to a new level, both in terms of educational content and entertaining form. The prospects and risks of using artificial intelligence in education (AIED) have become the subject of numerous existing and rapidly growing studies. For example, in the article *"Artificial Intelligence in Education: A Systematic Literature Review"* (Wang et al., 2024), the authors present a bibliometric analysis of 2,223 research articles, followed by a content analysis of 125 selected papers, revealing a comprehensive conceptual structure of the existing literature. Their study demonstrates the interdisciplinary nature of AIED research, with education and psychology occupying leading positions (ibid., p. 15).

The anthology *AI and the Future of Education: Disruptions, Dilemmas and Directions*, published by UNESCO in 2025, presents a broad discussion of the most pressing issues in AIED, including philosophical, ethical, and pedagogical dilemmas posed by the disruptive influence of AI in education. As one of the contributors, Andreas Horn, concludes: "we are not preparing students for a world without AI. We are preparing them for a world where AI is present in most jobs, decisions and systems. So, it is important to go beyond 'adoption'. Equip learners to question, create and set the terms of use. Teach them to understand limitations, verify outputs and shape the systems around them. And ensure the institutions they inhabit reflect human values, not just machine logic. Let us use this moment not to automate old habits, but to build something better – something not just more efficient, but more equitable, more curious and more human» (Horn, 2025, p. 40).

In the report «*Educ-AI-tion Rebooted? Exploring the Future of Artificial Intelligence in Schools and Colleges*», the authors identify three categories of AIED (Baker, Smith & Anissa, 2019, pp. 11–14):

- **Learner-facing AIED** – focusing on higher levels of personalization;
- **Teacher-facing AIED** – automating routine tasks, providing insights into student progress, and supporting teachers in innovation and experimentation;
- **System-facing AIED** – facilitating decision-making for school managers and administrators.

The authors conclude: "Given AI's ability to accelerate, exaggerate and amplify, we must be careful not to use AIED merely to reaffirm the priorities of today's schools. Instead, AIED can serve as a platform that enables us to reimagine the design of our education system so that it is fit for the future" (ibid., p. 47).

In recently published collective research (Miniankou & Puptsau, 2025) the group of scholars from European Humanities University (Vilnius, Lithuania) promote a fruitful idea about human-machine partnership in digital educational environment. According to them, in the human-machine partnership AI becomes "a key subject of educational activity", as "the intelligent machine is becoming an interactive subject, and it is this subjectivity – not merely its interactivity – that expresses the defining characteristics of the current technological transformation" (Miniankou & Puptsau, 2025, p.20). Even though it may still be premature to speak of full-fledged human-machine partnership, it is already evident that those teachers, who actively use neural networks to prepare teaching materials, presenting them in diverse formats, personalizing learning, and assessing students' progress, gain a clear advantage – particularly in terms of competitiveness in the educational services market. At the same time, like any technology, AI becomes a truly valuable tool only in skilled hands: it does not replace, nor does it eliminate, teacher-student communication.

Regardless of the above-mentioned risks and challenges of AIED, university teachers around the world are beginning to incorporate AI technologies into their academic courses. Educators at Monash University (Australia) share their experience of using GenAI-enhanced data comics as a learning tool. Viewing data comics as "an engaging storytelling format that leverages a combination of panel layouts and narrative content (both illustrative and textual) to convey insights from data" (Milesi et al, 2024), the authors present the results of a student survey on the advantages and disadvantages of employing such visualizations in teaching. Among the key advantages identified were increased motivation to engage with visualizations and reflect on their message; students found data comics more enjoyable than conventional visualizations; and data comics proved particularly suitable for visual learners. As for disadvantages, respondents noted a lack of professionalism, a low level of character design quality, and gender imbalance in the representation of characters. As a result, the authors formulated two important recommendations:

- Designed data comics should balance visual elements (e.g., colors, panels, characters) in such a way that the main takeaway remains clear while preserving the format's enjoyability and engagement.
- Characters and scenarios within the comic should be contextually appropriate in order to avoid dissonance between the comic's narrative and the data from which it is derived.

Steven A. Gedeon (Canada) and Florian Huber (Germany) describe their experience of using AI-generated images and a graphic novel for entrepreneurship education. This graphic novel was developed for first-year students and aimed to demonstrate entrepreneurial mindset concepts and the use of relevant tools. The authors also provide a set of recommendations for comic book design, which appear particularly useful for those wishing to replicate their approach (Gedeon & Huber, 2025, p. 9):

- An engaging main character who is a university student with an unknown "superpower."
- A compelling story about launching a new venture.
- An interesting venture idea.

- The use of design thinking tools and methods by the characters, such as interviewing, prototyping, purpose statements, customer personas, and customer profile canvases.
- Demonstration of entrepreneurial, including proactivity, curiosity, resilience, and a growth mindset.
- Occasional depiction of negative self-talk and cognitive distortions, alongside the use of positive self-talk.
- Interaction between the protagonist and other characters leading to the formation of a venture team.
- A series of adventures and venture pivots experienced by the characters.

All these examples demonstrate that generative AI can serve as a useful tool in university teaching. Nevertheless, according to German university teachers who studied the possibilities of AI-generated instructional videos for teaching the fundamentals of financial accounting, "it should be considered that this type of edutainment approach (i.e., animated videos) is best suited to subjects where few changes to the material are expected, since the content of dynamically evolving disciplines requires constant updating.<…> It is essential to recognize that edutainment can only be as effective as the content it presents. Educators must therefore always maintain a balance between 'education' and 'entertainment' in order to achieve the overarching goal of introducing the colorful world of financial accounting to a broader range of students in the long term" (Ewelt-Knauer et al., 2025, p. 24).

Finally, I'd like to share my own experience in AI-generated edutainment and to present the possible ways of using AI-generated edutainment content in a semiotics course for third-year BA students at EHU. Since this content is currently under development and may only be implemented during the spring semester, it is not yet possible to evaluate the advantages and disadvantages of its application in the academic course of semiotics. Such evaluation may become the subject of a separate study in the coming months. Nevertheless, it is already possible to outline several arguments explaining why such implementation is necessary, as well as to identify certain challenges that arise when attempting to collaborate with AI in the creation of visual edutainment content for academic purposes. The arguments in favor of generating such content for a semiotics course include the following:

- Semiotics is a theoretically dense and abstract discipline at the BA level, and its mastery often presents difficulties for students.
- Students frequently experience challenges engaging with classical semiotic theory (Saussure, Peirce, Barthes, Eco).
- The changing media ecology (memes, AI-generated images, multimodal texts, etc.) necessitates the inclusion of new visual material as object of semiotic analysis within the course.
- There is a need to connect semiotic theory with students' everyday sign practices.

The first (and currently the only) step toward implementing edutainment content in the semiotics course was the creation of a promotional comic. The idea was to demonstrate, in an accessible and engaging format, why and how the study of semiotics can be useful for students both in their professional field (media and communication) and in everyday life. For this purpose,

ChatGPT version 5.2 was used to generate a promo comic. The prompt was formulated as follows: <You are a semiotics instructor teaching undergraduate students in the Media and Communication program. Generate a promo comic to create a positive perception of the semiotics course. Plot: Third-year students know nothing about semiotics. A fourth-year student talks about their experience of taking the course last year. The narrative should include: a protagonist (the fourth-year student), an antagonist (Dr. Cliché), the teacher (the Donor), a magical helper, a magical tool, and the sought-after object – excellent knowledge of semiotics and the ability to apply it in practice (in everyday life and in a professional context).Visualize the narrative in comic form>. ChatGPT offered a number of useful suggestions regarding optimal panel layout and various formats for the final product. However, the most challenging task was to prompt the system to generate the comic itself. Moreover, the final product generated by the AI ultimately differed significantly even from the storyboard that the AI itself had proposed. ChatGPT handled the task of generating preparatory textual material for creating a visual product very effectively; however, its capabilities in terms of visualization remain limited. To create visual products (images, videos), it is necessary to use neural networks specifically designed for these purposes (such as DALL·E, Midjourney, etc.).

Table 4. The promo comic by ChatGPT

Promo Comic: "Semiotics: How I Started Seeing the World Differently" **Format:** 6 frames (corresponding to the 6 panels of the attached image) **FRAME 1.** ***"We Know Nothing"*** *(Panel 1: city, advertising, smartphone)* **Visual:** Third-year students are looking at screens, advertisements, and social media feeds. **Text:** **Third-year students:** "Semiotics? Sounds theoretical…" "Probably difficult and useless." **Dr. Cliché (off-screen):** "Just look. There's nothing to analyze." ***FRAME 2. The Appearance of the Protagonist*** *(Panel 2: classroom, the word SIGN on the board)* **Visual:** A fourth-year student at the board – confident and calm. **Text:** **Fourth-year student:** "A year ago, I didn't know anything about semiotics either. Then I realized: we already use it all the time – just unconsciously." ✨ **The Donor (the teacher):** "You are not learning terms. You are learning to see." **FRAME 3.** ***The Trial*** *(Panel 3: magnifying glass, text analysis)* **Visual:** The hero analyzes an advertisement / media text. **Text:** **Fourth-year student:** "I started asking myself: Why does this look the way it does? What do they want from me?"	

Dr. Cliché: "It's just design. Just advertising." 🪄 **The Magical Helper (whispering):** "It's a code. And it works." **FRAME 4. *Realizing the Myth*** *(Panel 4: smartphone screen, 'news')* **Visual:** The same image presented as "natural." **Text:** **Fourth-year student:** "I realized: what seems 'natural' is actually a myth." **Dr. Cliché (weakening):** "It's always been this way…" **FRAME 5. *Exposing Ideology*** *(Panel 5: billboard, 'not everyone is represented')* **Visual:** The hero notices who is missing from the image. **Text:** **Fourth-year student:** "I began to see not only what is shown, but also what is hidden." **Magical Tool Activated:** SIGN → CODE → MYTH → IDEOLOGY **Dr. Cliché:** "This is too complicated…" *(disappears)* **FRAME 6. *Return with the Reward*** *(Panel 6: classroom, confidence)* **Visual:** The fourth-year student addressing third-year students. **Text:** **Fourth-year student:** "Now I don't just look. I analyze. And it helps me in media, advertising, research – and in life." **The Desired Object Achieved:** Semiotics = a tool of professional thinking **The Donor (final):** "Semiotics doesn't complicate the world. It makes it understandable." **Final Slogan (for poster / social media)** **"Semiotics is the course after which you can no longer 'just look.' And that is its power."**	

CONCLUSION

This article has examined edutainment as a pedagogical approach emerging from the broader process of convergence and has analyzed the new opportunities created by the integration of generative artificial intelligence into higher education. The review of entertainment-education, multimedia learning, and gamification demonstrates that edutainment is not a marginal or purely auxiliary teaching strategy, but rather a synthesis of well-established theoretical frameworks supported by empirical research on learning, motivation, and cognition.

The analysis of artificial intelligence in education indicates that AI-enhanced edutainment can significantly increase student engagement, support personalization, and facilitate the visualization of complex and abstract concepts, which is particularly important for theoretically dense disciplines such as semiotics. At the same time, existing studies and the case discussed in this article confirm that AI technologies do not function as autonomous solutions. Their pedagogical value depends on thoughtful instructional design, critical evaluation of generated content, and the active role of the teacher as mediator, curator, and interpreter.

The case of AI-generated edutainment content for a semiotics course at EHU illustrates both the promise and the limitations of current generative tools. While AI proved effective in supporting narrative development, conceptual structuring, and preliminary design planning, the creation of high-quality visual materials still requires specialized tools and significant human involvement. This underscores the importance of viewing AI not as a replacement for pedagogical expertise, but as a collaborative instrument whose potential unfolds gradually through experimentation and reflective practice.

In conclusion, the integration of edutainment and generative AI into university educational practices should be approached as a strategic and balanced process. When aligned with clear learning objectives and grounded in pedagogical theory, AI-supported edutainment can enrich academic education, making it more engaging, relevant, and responsive to the learning preferences of contemporary students, while preserving the intellectual rigor essential to higher education.

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INNOVATIVE APPROACHES AND FORMATS IN THE DIGITALIZATION OF ADULT EDUCATION IN GERMANY

Abstract. This paper provides a comprehensive analysis of the key projects, methods, and tools that are shaping the digital transformation of adult education in Germany. It draws on prominent national initiatives, such as VHS-Lernportal, KI-Campus, WB-Web, GRETA and EULE, as well as a range of federal programmes coordinated by institutions such as the German Institute for Adult Education (DIE), the Federal Institute for Vocational Education and Training (BIBB) and the German Adult Education Association (DVV). The study examines how digital technologies are reshaping pedagogical practices, organizational structures, and learning environments. Particular attention is given to didactic innovations, such as blended and online learning formats, adaptive learning systems and new e-assessment approaches, as well as the increasing significance of artificial intelligence in the educational process. Adopting a historical perspective, the analysis traces the evolution from early media-based learning and isolated pilot projects to today's systemic, integrated digital ecosystem. This long-term perspective enables the identification of key strengths, such as increased access, improved infrastructure and growing digital proficiency among educators, as well as persistent weaknesses, including uneven digital literacy, disparities among providers and ethical issues concerning data protection and algorithmic decision-making. The paper also outlines current trends, such as the consolidation of national digital platforms, the increasing use of AI in teaching and learning, and the development of inclusive, learner-centered digital models. By synthesizing existing research and examining the challenges and opportunities of digitalization, the review aims to provide a nuanced understanding of the ongoing transformation and highlight future prospects for the effective and equitable use of digital technologies in Germany's adult education system.

Keywords: adult education, the German adult education system, digitalization, lifelong learning, educational innovation, teaching methods, digital learning platforms.

INTRODUCTION

Digital transformation has become a key driver of the reshaping adult education systems worldwide. Germany provides a particularly relevant context for examining the digital transformation of adult education. The German adult and continuing education sector is widely regarded as one of the most institutionalized and diversified systems of lifelong learning in the world, involving a broad range of public, private and civil society providers. Its long tradition of adult education, strong institutional infrastructure and active public policy initiatives have created favorable conditions for experimenting with digital learning formats and developing national platforms and competence frameworks. For this reason, the German experience offers valuable insights into how large and complex adult education systems can adapt to digital transformation while maintaining accessibility, quality and institutional diversity. In response to technological progress, labour market changes, demographic shifts and global challenges such as the COVID-19 pandemic, demand for flexible and inclusive learning opportunities has increased sharply. Lifelong learning has therefore become

more important than ever, necessitating innovative didactic approaches and flexible formats that cater to the diverse needs of adult learners in a digital context.

A defining feature of this transformation is the increasing significance of informal and self-directed learning. Digital technologies are breaking down the boundaries of formal education, allowing adults to learn continuously and independently throughout their lives.

Similar integrated approaches can be observed internationally. According to a UNESCO report, technology-supported learning influences all stages of education, including design, implementation, evaluation and management. Furthermore, it states that modern educational ecosystems rely on diverse learning sources, locations and content connected across the lifespan (UNESCO Institute for Lifelong Learning, 2022). Learning in the digital age is therefore continuous and interconnected and is no longer tied to single institutions or courses.

THE DRIVERS OF DIGITAL TRANSFORMATION IN ADULT EDUCATION IN GERMANY

Germany's adult education sector (Weiterbildung) is highly differentiated, involving a wide range of providers, including Volkshochschulen (adult education centers), municipal learning centres, religious organizations, private companies and corporate training departments. This diversity reflects the principle of lifelong learning and is coordinated at both the federal and state levels.

According to the German Federal Ministry of Education and Research (BMBF, 2023), a significant proportion of adult learning occurs in professional and corporate settings, although cultural, civic and general education remain equally important.

Key actors in German adult education include:

- Volkshochschulen (VHS): Around 850 centers offering approximately 500,000 courses annually to around 6 million participants. They form the backbone of general adult education (DVV, 2023).
- Catholic adult education (KEB): Around 500 institutions focusing on cultural and civic education, as well as outreach to socially vulnerable groups (KEB, 2023).
- Protestant adult education (EEB): Around 380 institutions with approximately 1.64 million visits from participants per year (EEB, 2023).
- Corporate learning: Around 77% of adult education participation occurs in workplace-based programmes, though post-pandemic recovery varies across sectors (AES Study; BMBF, 2023).
- Professional and private providers: Chambers of Commerce (IHK), sector-specific academies and private training companies are becoming increasingly important, particularly for digital and specialized programmes (BIBB, 2024).

This multilayered system offers flexibility, but it also creates a complex landscape for coordination, particularly during the ongoing digital transformation. Federal and regional initiatives, especially those of the German Institute for Adult Education (DIE), the German Adult Education Association

(DVV) and the Federal Institute for Vocational Education and Training (BIBB), play a unifying role.

Since the late twentieth and early twenty-first centuries, all segments of adult education – from community providers to corporate training – have had to adapt to emerging digital formats. The sudden shift to online learning caused by the 2020 pandemic acted as a major catalyst, accelerating digital innovation across the entire sector.

Before the pandemic, digital components played only a minor role. The Adult Education Survey 2018 revealed that only 20% of programmes incorporated online elements, which were generally confined to basic digital material exchange (BMBF, 2019). Digitally supported offerings were even less common among non-vocational providers, such as church organizations (37%), non-profit initiatives (32%), libraries and museums (32%), Volkshochschulen (30%), and welfare organizations (11%) (BMBF, 2020). Fully online formats were rare, accounting for only 0–3.2% of publicly funded programmes in 2018 (Christ, Horn *et al.*, 2020).

By 2020, around one-third of programmes were delivered digitally. By mid-2021, this figure had surpassed 55%, establishing online learning as an equivalent educational modality (Christ & Koscheck, 2021). After the restrictions were lifted, this figure fell slightly but stabilized at a new level; in 2022, fully online formats accounted for 35% of all programmes (Autorengruppe Bildungsberichterstattung, 2024).

Thus, digitalization in the field of adult education in Germany is now perceived not as a temporary measure but as a new norm. This process entails far more than simply integrating technologies into teaching; it represents a comprehensive transformation – from needs analysis and program planning to teaching methods, assessment procedures, and knowledge dissemination – based on the active use of digital tools. It can be said that Germany is currently developing a holistic "digital ecosystem" of Weiterbildung, in which technologies support every stage of the educational process (Kerres, 2016; Rohs, 2023).

UNDERSTANDING DIGITAL LEARNING: FROM MEDIA TO ECOSYSTEM

In the German context, digitalization in adult education is understood not merely as the introduction of digital tools but as a fundamental transformation of how learning is organized. The Standing Conference of the Ministers of Education (KMK) defines it as a process in which digital media increasingly replace analog procedures and open new perspectives for society, the economy, science, and education (KMK, 2021).

Research by the German Institute for Adult Education (DIE) emphasizes that digitalization is a multi-layered institutional transformation affecting instructional practices, organizational structures, governance, professional development, and communication with learners. Digital learning (digitales Lernen) serves as a central structuring element, triggering the need to rethink content, formats, and learning conditions.

According to Mathias Rohs (2023), digital learning refers not to individual cognitive processes but to the use of digital media and formats in education. It is embedded within the broader digital transformation that spans the entire educational cycle – from needs analysis and planning to delivery, support, assessment, and knowledge transfer. Thus, digital learning functions as a core

component shaping adult education structures and practices.

Earlier understandings of digitalization were largely technical, focusing on media and tools rather than didactic dimensions. Historically, libraries and Volkshochschulen were at the forefront of digital technology in the 1970s, offering access to computers equipped with educational materials. The spread of telecommunications in the 1980s, followed by the rise of personal computers, enabled the development of early self-learning programmes (Computer-Based Training), which later evolved into web-based courses (Web-Based Training) with the advent of the internet.

Initially, digitalization was mainly valued for expanding learning opportunities and improving access. Over time, however, attention shifted towards pedagogical aspects, leading to the development of technology-enhanced learning, media pedagogy and learning management systems (LMS).

Researchers observed a gradual "sobering" of early techno-optimism as challenges became apparent, including instructors' reluctance to adopt new methods, a shortage of digital learning content, and a mismatch between available materials and learners' needs. The COVID-19 pandemic, however, acted as a decisive catalyst and pointed toward a "new norm" of online learning. It also exposed strong disparities between providers and target groups, as well as major differences in the quality of digital content and technological solutions. Commercial enterprises – particularly in ICT and high-tech sectors – and universities made far more extensive use of digital learning technologies than church-affiliated, political, trade-union, or community providers such as Volkshochschulen (Rohs, 2023).

In practice, three core formats of digital adult learning have emerged:

- Supplemented face-to-face instruction: digital tools supporting in-person teaching (e.g., online material distribution, multimedia, organizational tools).
- Fully online learning: instruction and interaction taking place entirely online (e.g., virtual classrooms, online-only courses).
- Blended learning: varying combinations of onsite sessions and online components.

These developments underscore the need for inclusive digital tools, learner-centred models, and flexible learning conditions to ensure that digital transformation benefits all groups.

SWOT ANALYSIS OF THE DIGITALIZATION OF ADULT EDUCATION

The rapid expansion of online and blended formats – especially during the pandemic – has revealed both strengths and weaknesses of digital transformation, while creating new opportunities and risks. In this study, the SWOT approach (Helms & Nixon, 2010) is used to synthesize findings from recent empirical research, policy reports, and statistical data on the digitalization of adult education in Germany. The framework distinguishes between the adult education sector's internal characteristics (strengths and weaknesses) and external developments related to digital transformation (opportunities and threats). The key elements of the analysis are summarized below.

Strengths:

- Rapid expansion of digital formats: digital and blended learning have sharply increased and

become the new norm.

- Improved infrastructure: many providers have created stable digital ecosystems, including LMS and online services.
- High learner readiness: around 64% of adults consider digital tools indispensable for learning.
- Growing pedagogical competencies: digital and media-pedagogical skills are now part of educators' competence profiles (e.g., GRETA, PortfolioPlus).
- Pandemic-driven adaptation: rapidly developed online/hybrid models can now be used under regular conditions.
- Expanded access: online formats reach new audiences, particularly in rural and remote areas.

Weaknesses:

- Uneven digital literacy: older adults, low-skilled workers and migrants often lack basic digital skills.
- Provider disparities: small institutions, many VHS centers and non-state providers lack equipment, expertise and resources.
- Limited didactic development: online learning often relies on simple formats rather than well-designed, interactive digital courses or advanced LMS.
- Insufficient teacher training: media-didactic preparation varies widely, and some educators resist restructuring their work.
- High costs: producing quality digital content, as well as acquiring the necessary software and equipment, requires a significant investment.
- Constraints of online learning: it is difficult to transfer practical, hands-on or socially intensive activities fully online.

Opportunities:

- Holistic digital ecosystems: technologies can support all stages of continuing professional development, from planning to assessment.
- Personalized learning: AI, learning analytics and adaptive platforms can enable personalized learning pathways.
- Integration of digital skills: incorporating digital competencies into basic and professional education increases participation and relevance.
- Networked platforms: initiatives such as vhs.cloud and national BMBF/DIE programmes promote resource sharing and collaboration.
- New audiences: digital formats can reach groups that are hard to reach geographically or socially.
- Innovative methods: microlearning, mobile learning, gamification and adaptive formats make learning more flexible and engaging.

Threats:

- Digital inequality: without targeted support, the gap between regions, providers and learner groups may widen.
- Ethical issues: data privacy, algorithmic transparency and the risk of academic dishonesty require careful regulation.
- Technocentrism: an overemphasis on technology at the expense of pedagogy and social interaction can threaten the quality of learning.
- Misuse of AI-driven data: poorly implemented learning analytics can stigmatize or discriminate against learners.
- Dependence on IT corporations: growing reliance on commercial platforms may reduce institutional autonomy.
- Online fatigue: persistent, low-interactivity online formats can lead to declining motivation among educators and learners.

MAJOR PROGRAMMES AND STRATEGIC INITIATIVES IN GERMANY'S DIGITAL ADULT EDUCATION

In response to the challenges of digital transformation in Further Education, Germany is implementing a series of large-scale initiatives that, collectively, contribute to the development of a comprehensive digital ecosystem. Key projects include:

- GRETA: developing a competence model for adult educators and tools for assessing and certifying qualifications, including digital skills.
- Digi-EBF: a meta-study analyzing how digitalization reshapes the formats, methods and conditions of adult learning, and identifying barriers and best practices.
- Wb-web: a national open portal providing teaching materials, expert articles, online courses and community forums to support educators in integrating digital formats.
- DigiBAC: strengthening the role of libraries and archives as low-threshold access points to digital learning, especially for adults with limited digital skills.
- ViFoNet is a virtual research network that coordinates studies, shares data and supports joint publications on digitalization in adult education.
- Erweiterte Lernwelten (DVV) – develops hybrid and online formats in Volkshochschulen, including staff training and the creation of digital courses.
- Vhs.cloud – a secure nationwide platform for Volkshochschulen enabling online courses, videoconferencing, and material exchange; crucial during the COVID-19 shift to online learning.
- Vhs-Lernportal – a free DVV online portal offering basic skills courses and integration programmes for migrants, supporting low-skilled and newly arrived learners.

- KI-Campus – a BMBF-funded open platform offering MOOCs and modules on AI, data literacy, and digital competencies.
- INVITE Innovation Competition – a BMBF programme funding the development and testing of innovative digital solutions, with a focus on AI, adaptive learning, and personalized pathways in vocational adult education.
- Dialog Digitalisierung – a DIE-led series of expert dialogues since 2019, bringing together researchers, practitioners, and policymakers to discuss strategies for digital transformation.

A key feature of the German approach is the strong synergy between initiatives developed by various stakeholders. The above projects closely align with the strategic and methodological work of DVV and BIBB, which integrate digitalization into national education policies. Government support for Volkshochschulen, investment in EdTech for vocational training and innovation funding enable best practices to be scaled up nationwide.

This coherence is also reflected in professional events. The DIE-Forum Weiterbildung 2025, which has the theme of "AI for Lifelong Learning", is a major national conference that addresses the use of artificial intelligence, ethical issues, didactic models and AI-based tools. The forum includes an Innovation Prize for projects that reduce digitalization barriers, covering topics ranging from hybrid formats to data protection and AI ethics.

These initiatives build on nearly two decades of accumulated expertise. Since the early 2000s, DIE-led research on digital technologies has centered on enhancing educators' media competence and supporting specific target groups. Early digital literacy projects, such as ALPH@BIT and @LPHA, were pioneers in using online tools for adults with low basic skills. At that time, digitalization remained an auxiliary instrument with limited implementation.

In the 2010s, this approach became more systematic. Projects such as OERinfo, ThinK, wb-web, EULE and MEKWEPR promoted the integration of digital formats into the professional practice of educators, developed accessible resources and created virtual learning environments. These experimental pilots gradually evolved into a stable support infrastructure.

From 2018–2019 onwards – and particularly during the pandemic – digitalization moved to the center of the DIE agenda. Nationwide meta-projects such as Digi-EBF and Digi-EBF II coordinated research and compiled data on digital transformation. AI-related initiatives (e.g. KUPPEL, AI2TEACH and CoCo), adaptive platforms (DiPA+) and digital archives (RetroPro²) further strengthened the foundation for a digital adult education system, as did competence-development projects for educators (MeKoL and adFort).

Several priority innovation areas have emerged in Germany's digital adult education over the last decade.

1) Educators' digital competencies: Projects like MeKoL (2025–2028) and adFort (2025–2029) systematically develop media-didactic skills among instructors. KUPPEL (2021–2024) explores AI-supported professional development.
2) Digital infrastructure and platforms: Initiatives such as wb-web (2014–2020), EULE (2016–2020) and DiPA+ (2023) built a stable digital foundation for adult education.

3) New teaching and assessment methods: Innovative didactics have been enabled by digitalization.

4) Integration of AI and adaptive technologies: Focus on AI since the early 2020s. Projects like AI2TEACH (2020–2026) and CoCo (2021–2026) develop digital literacy and data-sharing capabilities.

5) Open educational resources: Projects such as OERinfo (2017–2018) and OERinfoEB (2018–2020), #ABCforJobs (2021–2025), link skills training with digital competencies in workplace settings.

RECENT TRENDS AND STRATEGIC DIRECTIONS IN THE DIGITALIZATION OF ADULT EDUCATION

Germany's digital transformation of adult education has entered a new phase with coordinated, system-level developments following isolated experiments. National platforms, integrated infrastructures and growing reliance on AI have emerged in recent years, alongside meta-projects and strengthened research–practice transfer. As digital technologies become embedded across the entire educational cycle, a digital ecosystem is beginning to take shape. These developments outline the key trends and structural changes outlined below.

From isolated pilots – to systemic approaches: Digitalization has shifted from scattered experiments to coordinated national platforms and networks embedded in institutional strategies.

Rising importance of AI: AI is increasingly viewed as a tool for personalization and intelligent support – not mere automation.

Growth of meta-projects: National coordination and standard setting (e.g., meta-projects like Digi-EBF) consolidate experiences and strengthen knowledge exchange.

From experimentation – to infrastructure: Digital technologies have become part of everyday practice, creating a "new normal" in which digitalization spans the entire educational cycle.

A key priority is the transfer of research into practice, ensuring that innovations are piloted, implemented, and integrated into real learning environments. The current phase marks a shift toward a coherent digital ecosystem that encompasses all aspects of adult education.

Noteworthy is the rapid rise of interest in artificial intelligence. While AI was previously seen as a tool for automating individual processes, it is now emerging as a third actor in the educational relationship – alongside the educator and the learner—reshaping roles, interactions, and pedagogical models.

The analysis identifies main areas in the current digitalization of adult education in Germany, reflecting broader structural changes and offering a framework for understanding practice and guiding future development: learning new competencies; developing digital literacy, critical thinking, and information skills is now essential for professional success and social participation. Adults increasingly require continuous upskilling, and adult education's programmes include modules on IT use, data analysis, and basic cybersecurity; learning with digital tools; adoption of learning

management systems, educational platforms, mobile applications, and simulators is transforming teaching and learning. Blended and online formats enable interactive, autonomous, and flexible learning aligned with adults' schedules; learning in the era of digitalization; broader issues of the digital age have become central. This direction also includes addressing digital inequality and promoting responsible technology use; emerging role of AI; evolving from the third direction, AI is increasingly seen as a partner in the educational process.

These directions, particularly the growing AI dimension, form a promising foundation for further investigation. Key research needs include:

- Links between digital competence and participation: how adults' digital skills influence their engagement in adult education and learning outcomes.
- Effectiveness of digital formats: comparative studies on face-to-face, online, and blended learning; the impact of microlearning and gamification on motivation.
- Social and ethical implications: how digitalization affects different groups, how to support vulnerable learners, and which ethical principles should guide data use and AI integration.

Further questions emerging from the analysis concern:

- integrating digital and pedagogical skills into comprehensive competence models for educators
- supporting instructors in transitioning to digital formats
- overcoming the digital divide and ensuring equal access
- anticipating and mitigating ethical risks
- addressing the needs of learners with low educational and digital literacy levels
- reconfiguring workplace-based training to effectively integrate digital technologies.

Addressing these issues requires ongoing research and coordinated efforts among experts, policymakers, and practitioners.

CONCLUSION

Germany's digital transformation in adult education offers major opportunities for greater accessibility, personalization, and learning effectiveness, but also presents significant challenges. Addressing gaps in digital competencies, ensuring equitable access, and establishing ethical guidelines for new technologies are essential to realizing the full potential of digitalization. Promising formats – such as blended, personalized, and workplace learning – have shown clear benefits but require sustained support, continuous professional development for educators, and stable funding for digital infrastructure.

A systemic, integrated approach that combines technological, pedagogical, and social dimensions is crucial. Continued investment in AI, the expansion of digital infrastructure, and the development of inclusive, learner-centered models will help ensure that digitalization promotes

equity, innovation, and the long-term sustainability of the adult education system. Further research is needed to deepen understanding of these developments and to guide effective strategies for managing this ongoing transformation.

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GENERATIVE TECHNOLOGIES AS FACTORS OF DEGRADATION/RENOVATION OF JOURNALISTIC PRINCIPLES

Abstract. The principles of journalism have constituted an integral component of this type of socio-political and creative activity for centuries. The traditional values of journalism are rapidly being eroded under the pressure of emerging information technologies. By now, it has become evident that the issue of journalistic principles and functions should be examined within alternative paradigms. The author seeks to explore the institutionalization of media principles and functions through the lens of an approach that conceptualizes the media sphere as an open ecosystem, characterized by disequilibrium, openness, and the capacity for evolution.

Keywords: media sphere, journalism, media principles, artificial intelligence, attention economy, mass communication, mass interaction, convergent media, synergy, entropy, systems approach.

At present, one of the problems in the field of media is the decline of public trust in mass media. Whereas in earlier periods this primarily referred to traditional institutional media, current sociological measurements indicate a steady decline of trust in network-based forms of communication as well.

A more detailed examination of this problem reveals that the phenomenon of trust or mistrust toward media as an information source is grounded in the well-known parameters that have historically shaped the practice of mass communication over at least the past 350 to 400 years. This is symptomatic, as it confirms the thesis of an immanent structure of principles and functions inherent in mass media, which institutionalize this form of human activity. Consequently, adherence to the principles of responsible journalism cannot be regarded as a narrow, specialized issue.

The list of fundamental principles of media activity includes: objectivity (the absence of distortion), accuracy and verification of facts, comprehensiveness of the representation of an event (rather than the presentation of its isolated fragments), neutrality (the absence of manipulation or covert influence on the recipient), transparency (the openness of sources and the possibility of verification). Conversely, factors that undermine trust in media include cognitive biases on the part of both communicators and audiences – such as the tendency to present or internalize only that information which confirms pre-existing attitudes – as well as the use of manipulative technologies (recognized to varying degrees), the influence of censorship, the ideological intentions of communicators, and numerous other factors of both ideological and technological origin. The growing distrust toward mass media manifests itself primarily in a peculiar form of mass escapism: nearly four out of every ten individuals (39%) actively avoid news consumption. Such tendencies have proven relatively stable, being recorded in an almost unchanged form for at least the past three years (Newman at al., 2025).

Technological innovations – first and foremost, the advent of Web 2.0, the rise of user-generated content, and the expansion of social networks – introduced new realities and media practices. In the 2010s, these developments gave rise to widespread expectations of new spaces and degrees of freedom in mass communication. In many respects, these expectations and hopes were justified. However, the newly established "order of freedom" (to use F. Hayek's term) in this sphere has also brought new realities, which are not always positive.

Within the subject–object paradigm of traditional media, large audiences of "recipients" functioned as almost voiceless objects of manipulation. At present, however, millions of individuals are participants in this process. Yet it has also become clear that only about 2–3% of users act as genuinely active agents in social networks – agents of this mass information market – whose activity is becoming increasingly professionalized. This domain, in turn, is also becoming a field for the application of manipulative technologies.

M. Castells' concept of "self-communication" in social networks is certainly valid. Nevertheless, it has emerged that the very process of self-communication is technologically embedded with a form of "self-manipulation" inherent in networked interaction. The mass audience seeks out and privileges, in the open information space, precisely those sources that reinforce already-formed stereotypes. Messages that align with pre-existing beliefs are assimilated most readily.

The integration of artificial intelligence (AI) into the work of mass media only intensifies these processes. The phenomena of "post-truth," "echo chambers," and "information bubbles" lead to a situation in which relevance is valued above veracity or even factual reality. Here, "relevant" refers to what an atomized audience itself selects as corresponding to its own interests. AI, long operating within the "attention economy," is designed to achieve maximum individual engagement from millions of recipients with the content offered to them. A highly effective sociological and technological infrastructure makes it possible to exploit vast troves of personal data for the personalization of content, effectively turning journalism into continuous real-time marketing. But journalism that becomes overly customized loses not only the functions of objectivity and accuracy, but even the capacity to serve as a medium of productive social communication (Hartmann et al., 2025).

This trend, in turn, triggers a process of uncontrolled, technologically unstoppable production of manipulative propaganda materials, for the evaluation of which recipients – whether individuals, groups, or communities – simply lack the means. As a result, they form a worldview that is far removed from reality yet "relevant" to their own expectations. Put simply, within the networked space the audience effectively manipulates itself, while AI algorithms readily generate "worldviews" individually tailored to the stereotypes of a person, group, community, or social stratum.

Beyond the "direct" use of AI as a creator of distorted fragments of reality, even more profound – and therefore harder to detect – technologies for constructing manipulative virtual environments have emerged. In addition to deepfakes, one example is "scaling falsehood," in which AI is instructed to produce vast numbers of textual and visual messages containing pre-embedded disinformation. The sheer multiplicity of such messages itself becomes a negative "quality": it is difficult to doubt the authenticity of an enormous volume of thematically linked information arriving from every direction. An even more sophisticated technology of AI manipulation is so-called "LLM grooming" in which large language models are corrupted through manipulation of the data on which AI algorithms are trained. In this case the AI itself becomes the victim of manipulation against which it is powerless. Numerous expert reviews and reports in the field of information technology warn of

these and other risks – for example, Google's January 2025 report "Adversarial Misuse of Generative AI" (Google Threat Intelligence Group, 2025).

The appropriate response to these challenges must be the establishment of common legal principles and regulations governing the use of AI. Their formation is already under way. In July 2024 the European Union's Artificial Intelligence Act – often referred to simply as the "AI Act" – entered into force. On 17 May 2024 the Council of Europe adopted the *Framework Convention on Artificial Intelligence, Human Rights, Democracy and the Rule of Law*, which has been open for signature since 5 September 2024 (European Union, 2024).

Such initiatives may be viewed as a common platform for restoring the importance of humanistic principles in media as a domain of human activity. Yet such restoration cannot proceed without taking into account the ability of generative technologies to self-regulate in response to the demands of millions of users and their communicative behavior. In the paradigm of the "attention economy", earning the trust of vast audiences requires more definite and consistent measures. Professionals working in the field of mass communications clearly recognize this. It is no coincidence that the pioneers of AI integration into media practice have been the flagships of global journalism – news agencies such as *Associated Press, Reuters, and Bloomberg*; newspaper publishers such as *The New York Times* and *The Guardian*, broadcasters including the *BBC*. In such institutions, the deployment of AI tools is impossible without adherence to ethical codes that de facto guide these and many other high-quality media outlets. Critical operations such as information gathering, agenda-setting, factchecking, text generation, search-engine optimization, and social-media marketing must remain under constant ethical and legal oversight.

Describing these external frameworks of legal and ethical regulation of media practice, we cannot help but recognize the very limited possibilities for their widespread application in the, frankly, unpredictable circumstances of a diverse media environment (an enormous number of technological platforms, the exponential growth of information actors, sources of content creation and distribution, accelerating innovation, and the variety of explicit and hidden incentives and motives for communication driven by political and commercial interests).

Taken together, these factors create a powerful synergistic effect that warrants separate consideration. In a broader sense, the media environment is visibly acquiring the features of an open ecological, nonequilibrium system, in which a qualitative leap is occurring – marked by the spontaneous emergence and development of complex chaotic structures. Increasing attention has recently been paid to the interaction of thermodynamics and information in nonequilibrium systems, which include both the ecological environment and the media sphere. Without claiming a comprehensive examination of these processes, we focus on the necessity and possibility of viewing the institutionalization of the principles and functions of mass media as a process of natural ordering amid growing entropy.

Most of the world's leading "quality" media have extended established ethical norms and standards of journalistic activity to the diverse practices of convergent, universal journalism. The corporate charters of these media institutions now contain corresponding new sections with mandatory requirements for employees. These new ethical and technological standards, in turn, are based on concepts that reflect the desire to preserve the enduring principles of journalism under new conditions – while modifying them to fit new realities.

A telling example in this respect is the Nederlandse *Publieke Omroep* (NPO), the Dutch public broadcasting corporation. Funded from the state budget, this corporation includes a number of popular television and radio channels. The NPO's model of public engagement is based on the premise that quantitative, digital indicators of media activity are far from the most accurate or exhaustive. They reveal little without incorporating qualitative parameters – such as the relevance of public debates, their representativeness, and their ability to influence the content and outcomes of nationwide discourse. The "Public Method," proposed by NPO, provides for an objective assessment of the corporation's work through an organic combination of individual consumer demands and societal needs. Among society's priority needs, the authors of the Public Method cite uncovering hidden information (investigations, disclosure of significant data); shaping the informational agenda; representing various social groups with balanced representation in the information space; and opposing those who abuse power, while monitoring accountability for violations. In 2025, the Public Method began to be used within NPO to evaluate content and develop a cross-platform strategy, and in 2026 it will become the basis for organizing the corporation's work with its editorial teams (Olij & Mink, 2025).

The productivity of such approaches to solving the age-old problem of adhering to the principles of socially responsible journalism is beyond doubt. At the same time, we must acknowledge their limitation to the scale of the institutions where they are applied: media corporations and their affiliated organizations. In today's digital environment, such institutions are like islands in an ocean of entirely different practices, where compliance with ethical norms and standards is not regulated so consistently – indeed, cannot be regulated – because the continuous network "uprising of the masses" has reached such a scale and pace of constant change that identifying its paradigm is extraordinarily difficult, if it is possible at all. Even in the Netherlands, for example, the audience is losing "faith in institutions," placing its hopes instead on individual authors and their "authentic voices" (Vereshchagina, 2025).

Contemporary media theory and practice are confronted with the challenge of constructing new paradigm for analyzing processes that unfold across multiple dimensions and media spaces, each characterized by different scales, qualities, objectives, and evaluative criteria. Paradoxically, the phenomena and trends we face today reached their bifurcation point not merely years but decades ago. Yet only now have the "channels" of these tendencies diverged so widely that each trajectory increasingly demands its own terminology and conceptual foundation. At the same time, the accelerating pace of change within these already divergent streams calls urgently for novel management strategies capable of counteracting mounting entropy. As a starting point, it is useful to return to that very "bifurcation point," which at least allows us to grasp the magnitude of the problem.

From the outset, mass media as a social institution has contained an inherent contradiction. On the one hand, it represents a form of the highest spiritual activity of individuals and society as a whole. On the other, it constitutes a developed and continuously evolving system of economic relations that now extends beyond national information markets to encompass transnational media corporations.

This contradiction lies in the frequent conflict between the economic interests of media owners (including states), advertisers, and sponsors, and the foundational mission of the media itself. That mission, as is well known, is to provide the public – both within individual nations and globally – with regular access to reliable, objective, and, insofar as possible, comprehensive information about major

events, prevailing opinions, social initiatives, and diverse forms of threat. Neglect of this mission leads to the evident degradation of the content of many print outlets, broadcast programs, and online platforms; to the expansion of manipulative practices aimed at shaping public consciousness; and to the transformation of the media into a form of psychological weaponry. In certain cases, it even facilitates the criminalization of specific media sectors and the advertising businesses linked to them.

The very qualities of objectivity, completeness, and reliability make information a highly valuable commodity – the sale of which underpins the economic success of "quality" media committed to the core principles of democratic journalism.

Thus, the principal paradigm of global, national, and regional media lies in adherence to their overarching and timeless mission in society, a mission that is continually disrupted by deviations arising from specific economic and political circumstances in particular historical periods. Innovative technical solutions, which give rise to ever more efficient technologies of information exchange, simultaneously create opportunities both to enhance the authority of the media and to erode traditional values.

Equally constant, however, are the recurrent returns to the "backbone," the enduring social demand for media that has driven their development for centuries. Today, this is less a "return" than the creation of new actors in the media sphere, each with their own principles, norms, and systems of governance and self-regulation.

It appears that all those technological innovations and the associated techniques of content customization mentioned above should be classified as factors of a second order – namely, as elements of the "economic" rationale for media activity as a branch of the contemporary economy. Unsurprisingly, alongside the spread of algorithmic practices for creating and disseminating content, one of the key concepts has also changed: the very notion of the "effectiveness" of media activity. During the era of "traditional" media, the principal indicators of this complex parameter were grounded in humanistic values, as documented in encyclopedic sources: "The media effect is the phenomenon of influence exerted by information received from mass media on audience behavior and preferences. Media can alter our voting choices, prompt us to reconsider our stance on specific issues, or even persuade us of the truth of completely false information. Media influence is the actual power exerted by a media message that leads to the modification or deepening of certain audience beliefs. This influence takes many forms, which sociologists refer to as media effects: "The influence of mass media and media effects are topics concerned with the impact of mass media and media culture on the thoughts, attitudes, and behavior of individuals or audiences" (Influence of mass media). By contrast, a contemporary universal journalism dictionary offers an entirely different interpretation of this key term in media studies: "Media effectiveness is an assessment of the economic efficiency of including a given channel or medium in an advertising plan or campaign. It presupposes reaching the largest possible audience at minimal cost" (Slovar' universal'nogo zhurnalista).

It is becoming increasingly evident that we are dealing with phenomena that differ markedly in their origins, dynamics, purposes, and defining characteristics. The rapid development of algorithmic infrastructures for mass communication, and especially the integration of artificial intelligence, has only accelerated these processes and their divergent trajectories.

Equally clear is the fact that these two spheres of human activity – though both grounded in the same technological innovations – are steadily diverging in their humanitarian purposes and consequences. They therefore require, quite obviously, distinct research perspectives. One might argue that, for the media sphere to be amenable to unbiased analysis, it must reveal a particular kind of systemic organization – without which no radical transformation can occur in any open natural system, whether biological or social.

The application of systems analysis to contemporary media processes is, admittedly, rare. Yet the extraordinary proliferation of novel, unprecedented practices – and their no less dynamic expansion – demands an analytical paradigm of comparable breadth and scope. Without claiming to offer a comprehensive examination of global media processes through the lens of systems theory, we aim merely to outline possible angles of inquiry into the problems that manifest here and now in the everyday interactions between "institutionalized" mass media and the broader media environment, which itself exists at various stages of the "institutionalization" of its own practices. Given the fundamental principles of systems theory – according to which no phenomenon can evolve solely along a horizontal axis or by quantitative growth alone – we can expect the media sphere to generate new hierarchies and structural formations whose organizing principles warrant early and careful examination.

A key methodological framework for this inquiry is provided by Niklas Luhmann, who understands a system as a "distinction that has two sides: the system (the inner side of the form) and the environment (the outer side of the form). Only both sides produce the distinction, the form, the concept. The environment is as important and necessary for the form as the system itself. Everything described and observed through this distinction belongs either to the system or to the environment" (Luhmann, 1994). This distinction equips us to grasp the heterogeneity of phenomena: the media as such, and the media environment in which numerous diverse and multidirectional processes unfold. Following N. Luhmann, institutionalized mass media may be regarded as "the inner side of the form," which cannot exist without its outer side, yet is not itself that outer side. The media environment constitutes this external dimension, and in a new research paradigm it calls for its own terminological precision.

In the literature on media, two concepts – mass information media (MM) and mass communication (MC) – have long been employed and, often unjustifiably, conflated despite their distinct meanings. For a clear differentiation of these notions, neither methodological rigor nor sufficiently articulated and categorized practice had been available. It seems reasonable, however, to use MC as a well-defined term to describe the development of technical means of communication, largely independent of their social purposes. By contrast, the exceptionally dynamic social practices enabled by new and emerging technologies increasingly require a concept that remains insufficiently tested: "means of mass interaction" (MI).

The relationship among these three concepts – MC, MI, and MM – can be schematically represented as three concentric circles. The outermost and largest denotes MC, encompassing all contemporary innovations, from Moore's law and Web 2.0 to artificial intelligence in its various forms, as well as the diverse forms of utilitarian communication built upon this technological base: housing and utility payments, bank transfers, online commerce, and e-government as a whole. The middle circle comprises MI, encompassing the countless practices of social interaction – above all networked interaction such as posts, likes, chats, messaging, online education, and online gaming. At the center lies the innermost zone, representing institutionalized mass media and convergent

media, distinguished from the outer layers by greater structural complexity and hierarchical organization. This positioning naturally renders mass media an open system whose negative entropy entails a synergistic concentration of the media environment's most essential functions – a clear manifestation of emergent properties.

Thus, the entropy of unrestrained technological development in mass communication generates a diffusion process from the outer "orbits" toward the inner ones, where the structuring and hierarchical organization of media actors – from large media corporations to bloggers, online communities, YouTube channels, and beyond – are most applicable. At first glance, such a schema of the media environment might appear to narrow the field of analytical inquiry in media studies. This is not the case. First, all three "zones" are considered within the natural, technological, and ecological syncretism of the media sphere, aligning with Niklas Luhmann's view that an environment is a necessary condition for the unity of any system. Second, conversely, without such structuring, the object of study remains inaccessible, allowing entropy only to intensify. A new level of hierarchy – and therefore of systemic organization – within what unfolds before the astonished eyes of billions of users renders these phenomena amenable to rational understanding.

Applying such "zoning" to the identification of issues concerning the humanitarian mission of media in general and journalism in particular allows, at a minimum, progress toward specific objectives within a well-defined (and considerable) field of activity.

Examples of such approaches already exist. As mentioned earlier, certain managerial measures have been undertaken by institutionalized media, exemplified by the Dutch NPO. Many further cases can be found in the updated charters of major media corporations – broadcasting companies, news agencies, and convergent-media conglomerates. The very phenomenon of convergence serves as compelling evidence of the "diffusion" of media practices from the outer ring of mass communication (MC) to the intermediate layer of social media organizations (MI), and further inward to the realm of the mass media proper (MM). Added to this are the growing instances of direct symbiosis between the blogosphere and professional journalism, such as the incorporation of outstanding bloggers' content into the structures of institutionalized journalistic organizations, including broadcasting networks.

These forms of convergence are empirical realities that demand theoretical interpretation. A relevant example is the article "The Future of Journalism: Networked Journalism" by Bart van der Haak, Mary Parks, and Manuel Castells (2012). Here the term "networked journalism" is employed not in the narrow sense of journalism confined to social networks, but broadly, as an attribute of the "network society" as a whole. Although written in 2012, the article diagnoses processes that have since become dominant. The 2025 Reuters Institute report states: "While overall global trust in news has remained stable for a third consecutive year at 40%, two new trends stand out. The first is the growth of an alternative media ecosystem: YouTubers, TikTok creators, and podcasters. Yet online influencers and media personalities, alongside national politicians, are perceived worldwide as the greatest threat in terms of spreading false or misleading information" (Newman et al., 2025).

This conclusion is especially significant, as it draws on data from nearly 100,000 survey participants across forty-eight countries worldwide. Bart van der Haak and his co-authors seem almost to address these very developments directly: "Although these events represent serious challenges to professional journalism, our analysis distinguishes between the crisis of profitability in media companies and the crisis of journalism itself. We are far less concerned with the survival

of traditional business models that finance newsroom journalism than with the continuing and expanding presence of journalism as an instrument for expressing public interests" (van der Haak, Parks & Castells, 2012). This statement exemplifies the very "zoning" of the media sphere that enables scientifically grounded and practically significant conclusions.

A subsequent passage of the same article effectively demonstrates the use of terminology and concepts from the first, outer zone of the media environment – mass communication – for diagnosing problems in the inner zone of the mass media: "In the global network society… the functions [of journalism] can be described as (1) data gathering, (2) data interpretation, and (3) storytelling based on data… The good journalist of the twenty-first century tells fact-based stories about the real world using text, audio, and visual tools, and structures these stories so that people can readily relate to them, share them, and repurpose them" (ibid.). According to the authors, "The contemporary journalist is a node in a network used to collect, process, and disseminate information… The actual product of journalistic practice today encompasses the results of interaction among networks of professionals and ordinary citizens who collaborate, co-participate, refine, and clarify the meanings in the stories or messages journalists intend to distribute" (ibid.). In the thirteen years since this article was published, the diffusion of mass-communication instruments into the domain of professional, institutionalized media has only been enriched by new trends, practices, and case studies.

This example clearly demonstrates the productivity of a "zonal" approach to the study of the media sphere and, accordingly, the necessity of selecting methods appropriate to each zone. For the outer circle – mass communication channels – the focus is on the analysis of technical and technological innovations and on forecasting the processes they engender. In the second, intermediate circle, the task is to analyze the diversity of network practices on the basis of fundamental theories of social interaction and applied sociological research. In the innermost circle, the emphasis falls on analysis and forecasting grounded in the humanities: examining the principles of mass information exchange, assessing the media's effectiveness as a means of spiritual enrichment and social activation, and, as a consequence, fostering the dynamism of social transformation.

A second global trend identified by the authors of the Reuters Institute report is the "use of AI-driven chatbots as sources of news. Although the number of such users remains relatively small, the proportion is significantly higher among younger audiences" (Newman et al., 2025). The very fact that Reuters analysts single out this phenomenon is telling: it provides a clear illustration of how diffusion occurs from the intermediate ring of the media-sphere hierarchy into the inner ring, which directly concerns the news consumption of millions of people worldwide.

It is noted, first and foremost, that AI chatbots and AI-based interfaces are becoming sources of news as search engines and other platforms integrate up-to-date news data. Although current adoption remains modest (7 % report weekly use), the proportion among people under 25 reaches 15 %. At the same time, respondents in many countries express skepticism toward AI-generated news: they are concerned that it may reduce production costs while undermining reliability. This latter characteristic intrinsically involves the ontological qualities of information such as veracity and source verifiability. As a result, two opposing tendencies are developing before our eyes: "in a world where the amount of synthetic content and disinformation is growing, all generations continue to value trusted brands with a reputation for accuracy, even if they turn to them less often than before" (Newman et al., 2025).

Paradoxically, in an environment of "escapism," characterized by withdrawal from systematic news consumption and declining trust in the agendas set by traditional media, new generative AI technologies successfully personalize content and enhance its appeal to younger audiences. Reactions are mixed: some users fear missing important material, while others welcome improved accessibility and relevance, including automatic news summarization (27 %), translation of materials into other languages (24 %), enhanced recommendations (21 %), and the ability to pose questions to news chatbots (18 %). Overall, audiences in most countries remain skeptical of AI in news production and place greater trust in scenarios where human involvement persists. On average, only 4 % of respondents reported visiting ChatGPT for news in the previous week, with even lower figures for competing services from Google, Meta, Microsoft, and others (Newman et al., 2025).

The influencers, in turn, often demonstrate innovative approaches to storytelling and the formation of online communities, offering an effective antidote to selective news avoidance and "information fatigue." Notable examples include alternative media such as the Russian Telegram channel SOTA and the Belarusian channel NEXTA. These outlets operate in the "border zone" between social communication and institutional mass media.

Such "hybrid formations" located within the diffusion zone between media interaction platforms (MI) and mass media (MM) evidently also include the emerging phenomenon of News Creators. These "news creators," who generally identify themselves with the blogosphere, appear to follow rigorous principles and protocols of professional journalism in their content management, even though they do not consistently engage in formal collaboration with institutionalized media outlets (Goryunova, 2025).

Authoritative news brands remain the primary choice for verifying information or receiving urgent updates. This may be regarded as a dominant trend, accompanied – paradoxically – by less frequent recourse to institutional media than in previous years. In this context, traditional outlets are adopting counterintuitive yet sound strategies. For example, the Swedish newspaper *Svenska Dagbladet* has developed the Kompakt app with the slogan "Read less, know more," offering more visual and interactive news formats as well as a feature that filters out complex materials when readers feel fatigued by the continuous flow of information (Newman et al., 2025).

AI for tasks such as topic exploration, transcription, headline creation, and concise summaries, as well as for other editorial purposes. The capacity of AI to generate contextual material is being adapted to the goals of "quality" journalism. For instance, the United Kingdom's largest regional publisher, Reach, uses the AI tool Gutenbot to assist journalists in rewriting articles for different sites within its network. The German tabloid Express.de employs the AI bot Klara Indernach, which has produced more than 1,500 pieces – representing 10 % of all articles read on the platform. The British newspaper *The Independent* recently launched a new service for younger readers, *Bulletin,* which uses Google's generative AI Gemini to present standard news in the form of five-to-ten key points (Newman et al., 2025). Overall, large-scale content personalization – though it belongs more properly to the sphere of mass communication – nonetheless reflects audience demand for control over the format and style of news presentation, which is an encouraging sign for professional journalism. Interest in adjusting the format and style of news exceeds the desire to personalize the news topics themselves.

Significantly, among the most salient practices and trends are precisely those humanitarian parameters that characterize the mass audience's engagement with the media as both a source of

news and a social institution. In essence, the phenomena of the information sphere outlined here mirror broader processes of biological and social development. Specifically, the instability and disequilibrium of socio-informational processes observed in recent years testify to the inevitable evolution of open systems – of which the infosphere is undoubtedly one – toward reduced entropy and the attainment of equilibrium at a new, higher level of order and self-organization.

In summary, it is essential to underscore the importance of a fractal approach to defining the place and role of media principles and functions in today's networked society. Such an approach may well provide avenues for renewing these foundational characteristics of journalism and for identifying practical strategies to uphold them under the often unpredictable conditions of convergent media. At the same time, it necessarily entails an integrated, synthesized understanding of the many diverse practices currently exhibited by the media environment. Yet it must be recognized that inquiries of this kind can only be genuinely interdisciplinary.

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DEVELOPING THE COMMUNICATIVE COMPETENCE OF TRANSBORDER BELARUSIAN CIVIL SOCIETY SUBJECTS

Abstract. The development of communicative competence is a mechanism for the emergence of a networked community of Belarusians as actors of transborder civil society. This is linked to the geographic dispersion of development actors, which expands the communicative space and necessitates the coordination of meanings, as well as the joint development of norms and practices of civic interaction and influence. Networked interaction and educational accompaniment are key prerequisites for the emergence of transborder Belarusian civil society as a community of action. The formation of a system for accompanying social interaction processes is based on the methodology of Education for Sustainable Development (ESD) and a knowledge-management infrastructure. Educational resources include networked educational projects, the development of Belarusian discourse, individual and group support for active engagement based on actors' organization of their key practices, and the joint creation of knowledge using citizen science methods

Keywords: civil society, communicative competence, networked interaction, educational accompaniment, knowledge management, networked educational projects, key practices, citizen science.

INTRODUCTION

The rethinking and transformation of the concept of Belarusian civil society emerged as urgent tasks after 2020, alongside the expansion of emigration among socially and civically active Belarusians. Addressing these tasks is connected to identifying approaches and conditions necessary for the emergence, strengthening, and development of Belarusian civil society in new circumstances.

Traditionally, civil society is understood as that which characterizes the public sector and is not directly linked to either state structures or business – a kind of "intermediate sphere" between citizens and the state. However, this interpretation proves insufficient under conditions of transborder settlement of Belarusians. Despite geographic dispersion and fragmentation, they remain invested in transforming and developing the Belarusian situation – both within their local contexts and more broadly. Today, discourse on *Belarusian civil society* refers precisely to these people – acting jointly as a cultural-historical, evolving community that maintains its identity regardless of place of residence. Contemporary technologies facilitate the rapid establishment of communication and coordination, providing diverse resources and technological capacities.

It is difficult to disagree that "Belarus today is about the responsible choice of free people" (Kirschbaum, 2024). In effect, contemporary Belarusian civil society represents a unique networked transborder community of engaged individuals and the organizations they have created, influencing the development of Belarusian and humanitarian contexts. Key challenges in the emergence of this community include:

- the development of agency and civicness among Belarusians as civil society participants;
- the preservation of uniqueness and Belarusianness amid inevitable adaptation to local cultures (as well as the aggressive expansion of the "Russian world");
- the transformation of habitual models of behavior, cognition, and interaction of Belarusians;
- the mastery of advocacy methodologies and influence, as well as new practices of acting as civil society actors.

In forming a transborder networked community, a promising resource for overcoming these challenges lies in the self-directed transformation of communicative practices by Belarusians, grounded in the development of their communicative competence.

THE ROLE OF COMMUNICATIVE COMPETENCE IN THE TRANSFORMATION OF COMMUNICATIVE PRACTICES OF BELARUSIAN CIVIL SOCIETY PARTICIPANTS

The Belarusian protest movement of 2020 brought together diverse groups of people differing not only in socio-demographic characteristics but also in value orientations and political attitudes. Mass solidarity among individuals formed a specific type of connection and community – "horizontal sociality" (Korszunov, 2021, 2022). However, the solidarity effects produced on this basis cannot be sustained indefinitely: in a changing context, conflict-generating tensions quickly accumulate among participants in the pro-democratic Belarusian society. According to Belarusians abroad, overcoming these ruptures lies in learning respectful perception and attitudes toward one another, communication, and responsible dialogue (Korshunau, & Vechar, 2025).

Communication is a key condition for cooperation, enabling community participants to organize their ideas and interaction. Communication is possible when development actors identify a shared object of communication, manifest the presence of at least two positions and a willingness to cooperate, create a space for negotiating norms and meanings. This constitutes the minimum set of conditions required for communicative subjects to emerge and maintain their agency and activity in interaction, forming the basis for jointly implementing sustainable social practices of change.

The real capacities of a development subject are determined by competence manifested in specific communicative situations. Communicative competence exists and is expressed through the actions and speech of participants, enabling them to construct communicative practices. Communicative practices are ways of continuously reproducing an ordered set of patterns of rational activity aimed at transmitting and receiving socially significant information at various levels. A necessary condition for their existence is the engagement of participants acting as agents of change and cooperative subjects. Core communicative competence of people is their ability to organize communication with the Other, which is always connected and manifests itself in a specific communicative situation as the participants' own experience, becomes visible to others only when people perform or have completed specific work, acquired by participants in interactions as competence only when they are comprehending their actions, i.e., "theorizing" their experience of solving specific problems via verbalization, schematization, and other forms enabling its transfer to new contexts.

The communicative competence includes such components as an operational thesaurus (the articulation of typical perceptions of the world in words and concepts) and habitus (a set of predispositions regarding how to act). Accordingly, the real condition for developing communicative competence and practices among Belarusians is a comprehensive transformation of life orientations and the conceptualization of activity. Engagement in communicative transformations enables both effective problem-solving in local contexts and the emergence of Belarusian civil society as a transborder networked community.

NETWORKING AS A CONDITION FOR THE EMERGENCE OF TRANSBORDER BELARUSIAN CIVIL SOCIETY

The perception of civil society as a community of engaged Belarusians is a feature that reflects the specificity of the contemporary Belarusian social situation. A community is a social formation distinguished by the shared organization of collective life within a certain social space and uniting a group of people who have different levels of social relations with one another in this regard. Despite the diversity of interactions determined by people's different goals, the deeper essence of a community is based on a common and unifying object of participants' care. In the case of Belarusian civil society, such an object of care consists in sustainable changes in the Belarusian situation, both in the narrowly state-centered and in the global sense. This also includes, naturally, the coordination of the very idea of Belarus as a whole. The need to unite the efforts of different people in addressing urgent tasks of "common care" activates networked interaction among individual and collective development actors of the Belarusian situation.

Network interaction is a system of horizontal and vertical connections among specific individuals, groups, and organizations for the exchange of impressions, resources, and experiences of joint activity. The key principle underlying the emergence of social interaction among network participants is the need to develop and disseminate information that encourages action (Loginova, 2011). By ensuring easier access to shared knowledge, variability, and development, such interaction expands the capabilities of each side. At the same time, the networked nature of interaction is determined not so much by information technologies as by the presence of social relations among participants.

In the context of the tasks involved in the emergence of transborder networked Belarusian civil society, networked interaction can be interpreted from two perspectives: (a) as interaction mediated by telecommunications networks that ensure the security of participants' communication with one another and with the external environment; (b) as interaction within communities and networked structures whose participants possess communicative competence and digital literacy, linked to the transformation of their communicative practices.

Development subjects are active individuals and organizations who influence changes in an established situation. In a developing situation, development actors become agents of change: they influence the formation of social norms – their own rules and practices of interaction, which based on new levels of cooperation, knowledge, and interaction, create a space for new practices. Through social interaction among them, communities emerge that form their own rules of collective life. These rules establish new levels of cooperation and self-governance among participants.

In fact, development actors acquire experience of civicness through communicative practices aimed at overcoming pressing problems and situations – not only the experience of choosing, adopting, and implementing decisions, but also the experience of influencing the conditions under which achieving their goals becomes socially acceptable and possible (Savelova, 2000). An orientation toward preserving one's subject position in interaction with others enables cooperation participants to develop communicative competence, master managerial competencies, and construct practices of engaged participation in governing development processes.

Networked interaction expands the communicative space of each participant. On the one hand, the geographic dispersion of Belarusian communities intensifies the diversity of their individual communicative practices: each communicative space – with relatives, friends, colleagues (former and current), with one another, with partners, and with many others – is constructed according to its own rules. This allows communicating subjects to rather quickly master the practice of coordinating rules of interaction as a foundation for engaged partici•pation in managing development (Savelova, 2021).

On the other hand, the verbalization of communication – the description in words of what is happening to oneself and around oneself – helps participants develop their conceptualization and conscious authorship practices, strengthening their ability to act responsibly in interactions with others. At the same time, the expansion of communicative space leads to direct encounters with other approaches and cultures, as well as contact with global trends.

These processes largely stimulate the self-identification of active community participants as Belarusians:

- direct interaction with bearers of other cultures compels individuals to discover the Belarusian within themselves and to open themselves to the Belarusian – to reflect on who we are, what unites us, how we differ, and how we contribute to the development of the world and civilization;
- encounters with new life experiences make it possible to "see" and test other practices and phenomena that one might never have imagined while living within a narrow circle and a traditionally familiar space;
- dispersion across different countries and continents fosters the development of the ability to negotiate with one another, to find ways of coordinating and uniting socially significant initiatives, to create one's own organizations, and to cooperate with various partners.

At the same time, interaction among participants of Belarusian communities in networks functions as a factor in the formation of their civic position – a complex formation that integrally unites within the activity of development actors:

- the level of their goal-setting, connected with cultivating their own understanding of Belarusians and the Belarusian as people living together with others in a single sustainably developing world, and with the creation of various concepts aimed at strengthening this understanding through collective unity;
- an operational thesaurus that enables them to formulate, present, and coordinate their position and attitudes with allies and opponents alike, to adequately perceive criticism, to request interdisciplinary expertise, and to work in a language understandable to all participants in interaction;

- a "technical" repertoire that manifests, in action, the degree to which partnership participants command the methodologies necessary for implementing what has been conceived and for acquiring experience in achieving sustainable change (formulated on the basis of: Savelova, 2005).

Addressing the tasks of the emergence and development of Belarusian civil society subjects actualizes the need for the purposeful organization of educational accompaniment of these processes – that is, the creation at the local level of an accessible set of educational conditions as measures of preventive support and operational assistance to individual and collective interaction actors in organizing communication at various levels. Such communication is necessary for the comprehension, elaboration, adoption, and practical implementation of decisions that define new norms of existence and ways of life of their communities.

From a technical standpoint, the development of networked interaction among Belarusians, of course, requires the formation of a secure infrastructure for engaged participation and communication. Alongside technical tasks, however, the creation of such an infrastructure necessitates reflection on managerial approaches, norms, rules, and procedures. This, in turn, primarily develops managerial competence both among interaction participants and among specialists in the field of information technologies. Ensuring educational accompaniment requires the prompt organization of their joint preparation and additional training – educational programs that are thematically substantive and, each time, of a practically research-and-development-oriented character.

EDUCATIONAL ACCOMPANIMENT OF DEVELOPING COMMUNICATIVE COMPETENCE AMONG THE ACTORS OF BELARUSIAN CIVIL SOCIETY

Educational accompaniment is a constituent and inseparable part of the processes of forming and implementing socially significant initiatives aimed at improving quality of life and achieving sustainable change. Its core content lies in creating a system of accessible conditions to support development actors in carrying out the processes of:

- *self-determination* – first and foremost, as agents of sustainable development acting at the local level, possessing inner freedom in choosing their position, goals, and means of self-organization of activity within concrete life circumstances, and
- *self-overcoming* – the expansion of the boundaries of one's capabilities through the accumulation of resources necessary for implementing sustainability-oriented change (Savelova, 2023).

As a component of the infrastructure of social interaction, educational accompaniment constitutes a crucial mechanism through which civil society subjects acquire their own practical experience of implementing various initiatives aimed at transforming and developing the sociocultural situation, and, through this, ensuring their involvement at different levels of governance in real processes of making vitally important decisions. Accordingly, when designing a system of educational accompaniment for the processes of networked interaction among social partners – participants of transborder Belarusian civil society – it is necessary to consider the general principles by which they organize their "coordinated partnership game":

- partners cooperate because each of them, individually, is unable to resolve the problems that have arisen in their activity; therefore, by pooling the missing resources required to resolve the problem, each partner does what they are best able to do;
- each partner determines their own position regarding interaction with others and independently offers the resources that others need, receiving in return what they themselves require;
- by pooling resources, partners jointly work toward what is necessary both for themselves and for others; the result of cooperation becomes shared, and each partner applies it independently within their own activity;
- partners treat each partner in the same way that this partner treats everyone else (Savelova, & Sheldukov, 2015).

The methodology of educational accompaniment in development processes is Education for Sustainable Development (ESD). This is an educational practice that facilitates the practical transformation of the quality of everyday life of people by enabling them to acquire applied knowledge, skills, and competencies, and to increase their capacity to manage complex systems while considering the interconnection between global and local dimensions (Savelova, 2023).

The leading method for implementing the ESD methodology is learning through action, which presupposes the organization, within the activity of development actors, of joint networked educational projects. An educational project is a way of "constructing" a desired future, the development of which simultaneously includes the process of its implementation, since it presupposes the sequential transformation of the socio-humanitarian situation by developing subjects who enter into this situation.

The implementation of educational projects is possible only by their authors, who assume responsibility for the results of the transformations achieved. For this reason, educational projects are assessed not in terms of "truth" or "correctness" (i.e., compliance with existing technical norms, rules, and standards), but in terms of their groundedness and feasibility, which directly depend on the necessity and thoughtfulness of the project concept and on the qualification capacities of the authoring collective to ensure its implementation within the existing situation.

In essence, educational projects represent a real foundation for building up, "in action," the resources necessary for change (informational, knowledge-based, human, and others). In Belarusian communities that are developing and strengthening their potential, joint educational projects become real conditions for constructive interaction among representatives of different generations, for expanding the spaces and resources of people's / family diplomacy, for the emergence of interdisciplinary research-oriented communities, and for acquiring practices of democratization – of education and of a whole life.

The implementation of a networked educational project requires authors and partners to build additional resources and to create their own ("project-based") space of non-formal education. From this perspective, such projects are characterized by a few features:

- they provide for the simultaneous participation of representatives of different groups and cultures, united by the relevance to them of the specific problem to which the project is devoted, whether in understanding or resolving it;

- they are oriented toward international (or interregional) cooperation among participants, expanding the space of interaction and the scope of outcomes / influence;
- they are designed for a long-term character of interaction, with the provision of continuous communication, the organization of in-person meetings / exchanges, and joint actions;
- they include the formation of a space for distancing the experience gained from its immediate bearers – through its formalization, discussion, publication, dissemination, promotion, and other forms (Savelova & Sheldukov, 2015).

The final feature constitutes an important component of the system of educational accompaniment, as it provides for the formation of conditions enabling the transformation of individually and collectively created experience of development actors into knowledge, its dissemination, and its transfer into new processes, services, and products that contribute to improving quality of life and implementing sociocultural change.

Within the processes of existence and strengthening of the potential of Belarusian civil society, such knowledge is largely connected with the development of Belarusian discourse – the conceptual and terminological elaboration of notions that holistically represent the Belarusian situation as a unique case (involving the transformation of traditionally reproduced meanings and their alignment with a changing context).

The inclusion of Belarusian discourse in networked educational projects constitutes an important contribution to preserving and strengthening "the Belarusian," as well as to "leveling" the language of communication and coordinating actions amid the geographic dispersion of partners across different countries and continents. At the same time, when formulating the ideas of networked projects, their authors must pay attention to the specificity of aspirations of representatives of different target audiences – participants of Belarusian communities.

"Among Belarusians here," three groups can be distinguished: relocants, emigrants, and refugees. Somewhat conditionally, this division of the potential target audience corresponds to the distribution of aspirations characteristic of "people in the global world" (formulated on the basis of: Mackevich, 2017):

- relocants – most often representatives of the "first world," possessing a global scale of knowledge, competencies, and life experience, who most often require awareness of the Belarusian dimension for themselves;
- emigrants – people of the "third world," whose interests are concentrated around understanding local spaces and the challenges of successful adaptation within them; they need to preserve, comprehend, and deepen their understanding of the Belarusian as their personal advantage in a situation of change
- refugees – representatives of the "second world," who remain within the Belarusian agenda regardless of their place of residence, but who require a transformation of their understanding of contemporary humanitarian practices and the "cultivation" of an image of Belarus as the country in which we would like to live together as an emerging "civic nation" (Mackevich, Egorov & Vodolazhskaya, 2013).

Within the system of educational accompaniment, the tasks of developing Belarusian discourse (as well as ensuring the success of networked projects) require the organization of individual and group support for participants' activities.

Educational support is an activity aimed at organizing responsive and anticipatory educational processes that assist someone in the emergence and/or realization of their ideas. This includes the creation of specially pedagogically organized processes and/or an integral cultural-historical environment for the development of human qualities and practices. The methodology of individual and group educational support consists in organizing participants' key practices within educational processes.

A key practice is a set of activities through which a development actor structures their life by applying effort to resolving life-generated problems and the tasks they set for themselves. The constituent elements of such a practice include a person's personal activity within the domains of "I–Self," "I–Knowledge," "I–Activity," "I–Partners," and "I–Society" (Savelava, 2015).

Within educational processes, the organization of participants' key practices relates to stimulating their learning and socially significant initiatives, accompanying their educational projects of various levels and formats, and supporting long-term cooperation. The implementation of this methodology is associated with participants acquiring experience and practices of engaged participation, with the emergence of "latent" and the development of actual governance actors (including as communicating actors) and is accompanied by the transformation of educational processes and programs, including non-formal education.

A *framework systemic* technology that ensures the creation of an infrastructure for the formation, transformation, dissemination, and application of knowledge necessary for the individual and collective emergence and development of actors of Belarusian civil society is knowledge management. This is a technology (specially created infrastructure and processes) in which information is treated as a separate element that "technologically" performs a mediating function between active agents – participants of the social subsystem of managing the development of activity. Citizen science may occupy a special place in the implementation of this technology within local communities and Belarusian diasporas. Citizen science is scientific research organized and conducted jointly by professional researchers and citizens (or non-professional scientists) who are directly interested in applying the obtained data (new knowledge or methods) to identify and/or resolve problems they face (Kontić & Kontić, 2018). It is an effective format for involving direct participants – "doers" – in research and knowledge creation processes necessary for enabling development.

At first glance, citizen science is based on a traditional research model. However, it differs fundamentally from it in its orientation toward the joint production of necessary knowledge and in its organizational methodology: public participation in research, participatory monitoring, and participatory inquiry. In this context, for community participants, research, education, and science function not merely as systems of knowledge production and transmission, but as spaces for acquiring, "in action," the foundations of their civic position and for developing functional literacy and competence – first and foremost, communicative competence.

CONCLUSION

Networked interaction and educational accompaniment are prerequisites for the emergence of transborder Belarusian civil society as a force for change – a developing networked educational community of Belarusians that expands its influence on the Belarusian context regardless of the specific place or duration of their presence there.

The emergence of civil society begins where communication becomes joint action of Belarusian communities that are aware of and preserve their uniqueness; that act as autonomous, reliable, and professional partners; that, together with others, demonstrate care for the world in which we live; and that are capable, through interaction, of deep understanding and meaningful action.

Communicative competence transforms Belarusian civil society from a network of connections into a community of action composed of active agents of change. The development of communicative competence and the managerial preparation of individual and collective participants of transborder Belarusian civil society constitute a resource for the emergence of our country as a networked association of people, organizations, and structures jointly acting to strengthen the development potential of the Belarusian context and of Belarus in the global world.

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