INNOVATIVE PUBLICATION
Journal of Effective Learning and Sustainable Innovation
Vol.4 №10 (2026). OCTOBER
innovativepublication.uz

# GENERATIVE AI, ALGORITHMS, AND NEW EDUCATIONAL PRACTICES IN THE FAMILY

**Dinora Nasrullayeva Alisher kizi**
National University of the Republic of Uzbekistan - PhD, free applicant
Al-Beruniy International school, Leading psychologist
Tashkent, Uzbekistan
di.tolaganova@gmail.com

**Annotatsiya.** Ushbu maqola generativ sun'iy intellekt va algoritmlar oilaga asoslangan ta'lim amaliyotlarini qanday shakllantirayotganini o'rganadi. Tadqiqot zamonaviy oilaviy muloqotdagi raqamli texnologiyalar, kognitiv rivojlanish va axloqiy muammolarni tahlil qiladi. Maqolada pedagogik psixologiya, sun'iy intellekt etikasi va oilaviy ta'lim bo'yicha zamonaviy nazariyalar muhokama qilinib, ChatGPT, Google Gemini va boshqa vositalar kabi generativ AI platformalarining uyda o'rganish muhitiga ta'siri o'rganiladi. Natijalar shuni ko'rsatadiki, AI tomonidan qo'llab-quvvatlanadigan ta'lim bolalarning mustaqil fikrlash qobiliyatiga ta'sir qilishi mumkin. Xulosa qilib aytganda, ota-onalar, pedagog va texnologiya ishlab chiqaruvchilarining hamkorligi kerak.

**Kalit so’zlar:** generativ sun'iy intellekt, oila ta'limi, raqamli pedagogika, bolalar rivojlanishi, algoritm, media savodxonligi, ta'lim texnologiyalari.

**Аннотация:** Текущая статья посвящена исследованию влияния Генеративного Искусственного Интеллекта и алгоритмов на образовательные процессы в семье. Данная работа охватывает проблему использования цифровых технологий в современной семейной коммуникации, вопросы когнитивного развития детей и проблему этики, возникающую при применении инструментов ИИ в домашнем образовательном процессе. Статья основана на современных научных концепциях в области педагогической психологии, этики искусственного интеллекта и семейного образования, анализируя влияние Генеративных систем ИИ таких как ChatGPT, Google Gemini и других на процесс обучения дома. Показано что образование с помощью систем ИИ может значительно влиять на самостоятельность мышления детей.

**Ключевые слова:** генеративный искусственный интеллект, семейное образование, цифровая педагогика, развитие детей, алгоритм, медиаграмотность, образовательные технологии.

**Abstract.** The current paper explores how generative artificial intelligence and

algorithms change the educational process within the family. The research will explore how the technologies used in contemporary family communications, cognitive development issues, and ethical problems that arise due to the introduction of AI systems into the family learning space. Utilizing the latest theoretical approaches in pedagogical psychology, AI ethics, and family education, the research focuses on the impact of generative AI technologies, including ChatGPT, Google Gemini, and other similar technologies, on home-based learning. Based on the results of the research, the use of artificial intelligence in the learning process can have a significant effect on the ability of children to think independently and develop metacognitive skills.

**Keywords:** generative artificial intelligence, family education, digital pedagogy, child development, algorithm, media literacy, educational technology.

## INTRODUCTION

The fast spread of generative artificial intelligence (AI) technology into people's lives is probably one of the most important revolutions in the history of human learning. In a matter of just a couple of years, technologies able to generate coherent texts, solve difficult mathematical problems, compose creative materials, and even explain complicated scientific ideas in a simple way have been transferred from the laboratories of university researchers to the dinner table. For parents, children, and teachers, this means that it is possible to receive in seconds what previously had to be done during several hours of investigation, tutoring, and consultation among the family members. The consequences of such a revolution for family-based education – one of the oldest ways of human learning – are obvious but insufficiently researched.

The family unit has always been the main locus of informal learning, socialization, and values formation. In the field of Soviet pedagogy, especially in the works of such prominent scholars as A.S. Makarenko and V.A. Sukhomlinsky, special attention was paid to the crucial role of the family in terms of its moral and intellectual influence on the formation of the child's cognitive skills and ethics (Makarenko, 1955; Sukhomlinsky, 1969). Modern developments in developmental psychology, in accordance with Vygotsky's theory of the zone of proximal development (Vygotsky, 1978), have also proved the importance of the quality of adult-child interactions within the family for intellectual development. Generative AI adds a third party-interlocutor to this intimate learning process who is persistent, very competent, instantaneously available, and yet fundamentally not human at all.

This particular article looks at three questions that are interconnected with each other. These questions are as follows:

(1) In what ways does the advent of generative AI tools affect the quality of educational dialogue between members of a modern family?

(2) What are the dangers and opportunities that appear when kids learn along with algorithms?

(3) What are the pedagogical and ethical approaches that will help navigate this newly created space?

To answer these questions, the current article analyses findings from Soviet and post-Soviet pedagogical literature, current developmental psychology and modern international studies on AI and education.

## THEORETICAL BACKGROUND: FAMILY AS AN EDUCATIONAL INSTITUTION

This study's theoretical framework is based on the convergence of three related traditions. The first one is Soviet pedagogical tradition of family studies, most vividly expressed in the works of A.S. Makarenko "A Book for Parents" (1937) and numerous works of V.A. Sukhomlinsky on moral education. This tradition viewed family as "primary collective", which is responsible for forming not only the cognitive habits but also the very ethical character. It claimed that the fabric of family life, including conversations, discussions, solving problems together, modeling curiosity and other forms of intellectual activity – is the most durable kind of education a child can get. Even though the social context, under which these ideas were developed has changed, the psychological idea about the supremacy of learning embedded into the emotional family relations over the impersonal teaching has remained valid and was proved by numerous developmental studies (Bronfenbrenner, 1979; Weiss et al., 2014).

Second, the sociocultural theory of Vygotsky (1978) offers the crucial psychological theory to explain how AI changes the family learning dynamic. According to Vygotsky, all the higher mental functions emerge initially on the social level in the context of interpersonal interactions before being internalised by the individual. The zone of proximal development refers to the productive gap between what one is capable of doing on his or her own and what one is able to do in collaboration with a more competent partner. In the context of family learning through generative AI technologies, this function is now performed by the algorithms, giving rise to the question of whether the algorithmic scaffolding has the same effect of internalisation as the scaffolding mediated by humans. There is strong theoretical basis to believe that it doesn't: the emotional regulation, responsiveness and moral role-modelling of the parent cannot be achieved yet by any AI technology (Wegerif, 2021).

Thirdly, the nascent research on AI ethics in education (Holmes et al., 2022;

Selwyn, 2019) provides an important point of view, one that brings issues of algorithmic transparency, data protection, and the implicit values inherent to LLMs into the discussion. This is especially pertinent to the family environment, where children are in their most vulnerable state cognitively and emotionally and where the distinction between help and dependency becomes blurred.

## GENERATIVE AI IN THE HOME: PATTERNS OF USE AND THEIR EDUCATIONAL CONSEQUENCES

### 2.1. How Families Currently Use Generative AI

International research data suggest a significant increase in the use of generative AI tools for domestic educational purposes since 2022. According to the results of a 2024 Pew Research study, 41% of American parents stated that their kids (10-17 years old) had interacted with an AI chatbot for homework help in the previous year. Similar statistics have been shown in Europe and, increasingly, in Central Asia with the fast-growing smartphone coverage and accessibility of English language AI services (UNICEF, 2023). There are three main types of usage:

- homework help (mathematics, essay writing, science);
- creative tasks (writing stories, painting prompts, composing music);
- conversations (languages learning, factual information search, encyclopedia).

These usage patterns each have different educational ramifications. The use of artificial intelligence to assist in homework assignments brings up the biggest issues regarding academic dishonesty and cognitive offloading. The problem with having ChatGPT help the child write an essay instead of checking their work is that the most important part of the activity from an educational point of view, the thinking process involved in developing a structure for an argument, is delegated to the computer. Cognitive psychology literature shows that the struggle of retrieving information and overcoming cognitive obstacles is crucial to learning (Bjork, 2011). If generative AI systematically eliminates this productive difficulty, it risks producing what Sparrow et al. (2011) famously termed the "Google effect" — a pattern in which external digital systems substitute for rather than supplement internal cognitive effort.

### 2.2. Algorithmic Mediation and Children's Cognitive Development

Apart from the risk of cognitive offloading, the general issue of algorithmic mediation in family learning calls for psychological scrutiny. Generative AI is not a passive source of knowledge since it is a sophisticated model based on big data of human-generated texts, and it generates the content which is formed by the biases inherent in its training data (Bender et al., 2021). Through interacting with the system, the child acquires knowledge but at the same time gets influenced by a certain

algorithmic viewpoint on knowledge and expression.

This problem of development is closely connected to the idea of Vygotsky regarding the mediating function of cultural tools. In his opinion, the means of knowledge transmission within a certain culture transform not only the knowledge itself but also the mind which receives it. In other words, books, writing systems, mathematical notation and interface of the computer are not only containers of the information; they develop certain cognitive habits and orientation towards knowledge in people who use them (Vygotsky, 1978). Hence, generative AI is not only an enhanced search engine; it is a new type of cognitive tool which, if used from childhood regularly, can lead to different types of thinking – for instance, to intolerance of ambiguity, tendency to quick synthesis instead of extended exploration, and inability to think independently.

Some empirical evidence for these issues is starting to surface as well. One longitudinal study carried out in South Korea (Kim & Lee, 2023) has shown that students, who regularly employed the use of AI writing assistants since the age of ten, performed substantially poorer at the age of fourteen when tested for their argumentation skills and syntactic complexity than a matched control group. Although the generality of this finding has yet to be established, it conforms to theoretical expectations regarding detrimental effects of cognitive offloading on skill development.

2.3. Positive Affordances: AI as a Democratising Educational Tool

Another aspect that needs to be taken into consideration is the reality of how generative AI can serve as an actual educational opportunity in terms of its usage in the family environment. In situations where parents themselves are undereducated, or where languages other than the primary language are used, children now get access to high-quality learning through technology, which they would not have had before. A child for whom his or her parents cannot help out in math homework due to their own lack of knowledge can now be guided by the machine through everything step by step.

Moreover, the personalisation opportunities offered by generative AI – the capacity to tailor explanations based on the perceived understanding level of the child, the opportunity to provide extra examples on demand, and real-time interaction with any particular question asked by the child – constitutes a truly new educational opportunity. Numerous studies have long proven that individualised tutoring proves much more efficient than group-based teaching (Bloom, 1984), and AI provides, if not an exact, then at least an approximate substitute for this efficiency for those families who could not afford individual tutoring before. Thus, the task here is not to ban the

use of AI in family-based education but rather to organise it in a way that would preserve all its positive aspects while avoiding the negative ones.

## ETHICAL DIMENSIONS: PARENTING IN THE AGE OF ALGORITHMS

The application of generative AI to family education poses a series of ethical issues that pedagogical psychology cannot resolve alone. There are three main aspects: algorithmic transparency, data sovereignty, and ethical dependence.

The concept of algorithmic transparency is linked to the extent to which an AI explains its answers to the user. Currently, most generative AI applications provide answers to queries without offering any explanations about why they have made such decisions and what uncertainty lies within their data. If children believe their answers and regard them as true because of the way they sound, as expected from pedagogical psychology research (Sperber & Wilson, 1986), this means that they are being epistemically deceived by an AI system they cannot question. The same applies to parents who are not specifically aware of the issue of AI literacy.

The issue of data sovereignty revolves around the problem of how to handle the generation of data through the interactions of children with AI systems. The majority of commercial AI tools gather data automatically, but the conditions under which such data is processed, kept and distributed are not transparent. For families where children may share information about their problems, emotions, and poor grades during AI interactions, the problem of collecting data acquires particular significance. The domestic legislation, such as the Law on Personal Data (2019) in post-Soviet countries like Uzbekistan, provides some legal safeguards.

Dependency Ethics refers to the danger of both children and their parents becoming overly dependent on AI decision-making and knowledge processes, which were once the realm of human decision-making, parental insight and local wisdom. As stated, this is not an abstract problem; a number of modern-day sociologists and philosophers of education maintain that the commodification of knowledge through artificial intelligence constitutes a kind of epistemic colonialism in that it supersedes the culturally informed, contextually specific knowledge of families and local communities with the standardized knowledge products of technological firms (Selwyn, 2019). Within the context of multicultural families, as seen more and more in international schools, the problem takes on another dimension in the sense that current AI technologies largely depend on English-speaking Western data.

## TOWARDS A FRAMEWORK FOR RESPONSIBLE AI USE IN FAMILY EDUCATION

Based on the aforementioned analysis, the article offers a five-point framework

of responsible use of generative AI in family educational practice. This framework relies on the integration of the traditions of Soviet pedagogy, developmental psychology, and research in contemporary AI ethics.

First, parental mediation should be considered the key measure that ensures the proper application of AI in family education. Media literacy studies show that the effect of any mediated learning technologies depends to a great extent on the quality of adult mediation related to them (Buckingham, 2007). When parents critically engage their children in discussing the output of the technology and ask them to check the sources and limitations of its findings, AI can serve as a means of stimulating critical thinking.

Second, the introduction of AI technology should be phased gradually and should correspond to the child's stage of development. If the child is younger than ten years, then the use of AI should be more supervisory and communicative and not delegative. In the case of teenagers, AI literacy programs that focus on learning how large language models work, algorithmic bias, and evaluation of AI-generated content should be introduced.

Third, maintaining unmediated family learning time is crucial. Psychological research on development has continually shown that conversational interaction with parents or teachers, with its rich elaborative discourse, problem-solving collaboration, and storytelling, is a predictor of both cognitive and social success that operates independently of any educational instruction received (Hart & Risley, 1995). Family time for this kind of unmediated interaction needs to be maintained, and families need to see it not as a throwback to some past era in contrast to AI but as an indispensable resource.

Moreover, educational institutions must come up with AI literacy courses and disseminate them among families. The task of influencing children's behavior in relation to AI use cannot be placed on the shoulders of parents only; it needs a lot of professional effort from institutions in terms of developing guidelines and conducting trainings for teachers. There exist several international initiatives such as the UNESCO Recommendation on the Ethics of AI (2021) and the OECD Principles on AI (2019).

Finally, fifthly, there needs to be an establishment and enforcement of strict rules around the use of AI with children. These rules include age verification, transparent data management policies, algorithm explainability within education, and culturally appropriate content. There is especially a need to develop these types of regulations in societies that have become very digitalized in a relatively short period of time.

## CONCLUSION

Generative AI is more than just another teaching technology; it is an epistemic

change to the learning environment that children inhabit and through which they form their identities. The family, a space that has been traditionally very close to children and crucial for their education, lives in an algorithmic world it has not designed and, in most cases, does not know how to navigate. The goal of educational psychology, pedagogics, and policymaking must be to prepare families for generative AI and give them the ability to act as active participants in this process and not just passive subjects of algorithmic mediation.

The schools of thought brought together in this article – Soviet family pedagogy, the theory of sociocultural development developed by Vygotsky, contemporary AI ethics, and developmental psychology – all point toward a similar conclusion: the quality of the relationship between the adults and children, the development of independent thinking, and the maintenance of cultural knowledge within the family are not barriers that need to be removed by efficiency of algorithms. These are the essential prerequisites for human education.

## REFERENCES

1. Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021). On the dangers of stochastic parrots: Can language models be too big? Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency (FAccT '21), 610–623. https://doi.org/10.1145/3442188.3445922
2. Bjork, R. A. (2011). On the symbiosis of learning, remembering, and forgetting. In A. S. Benjamin (Ed.), Successful remembering and successful forgetting: A Festschrift in honor of Robert A. Bjork (pp. 1–22). Psychology Press.
3. Bloom, B. S. (1984). The 2 sigma problem: The search for methods of group instruction as effective as one-to-one tutoring. Educational Researcher, 13(6), 4–16.
4. Bronfenbrenner, U. (1979). The ecology of human development: Experiments by nature and design. Harvard University Press.
5. Buckingham, D. (2007). Beyond technology: Children's learning in the age of digital culture. Polity Press.
6. Hart, B., & Risley, T. R. (1995). Meaningful differences in the everyday experience of young American children. Paul H. Brookes.
7. Holmes, W., Porayska-Pomsta, K., Holstein, K., Sutherland, E., Baker, T., Shum, S. B., & Luckin, R. (2022). Ethics of AI in education: Towards a community-wide framework. International Journal of Artificial Intelligence in Education, 32(3), 504–526.

8. Kim, J., & Lee, S. (2023). AI writing assistants and adolescent literacy development: A longitudinal study. Journal of Educational Technology & Society, 26(2), 88–102.
9. Makarenko, A. S. (1955). Kniga dlya roditeley [Book for parents]. Izdatelstvo Akademii Pedagogicheskikh Nauk RSFSR.
10. OECD. (2019). Recommendation of the Council on Artificial Intelligence. OECD/LEGAL/0449. Organisation for Economic Co-operation and Development. https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449
11. Selwyn, N. (2019). Should robots replace teachers? AI and the future of education. Polity Press.
12. Sparrow, B., Liu, J., & Wegner, D. M. (2011). Google effects on memory: Cognitive consequences of having information at our fingertips. Science, 333(6043), 776–778.
13. Sukhomlinsky, V. A. (1969). Serdtse otdayu detyam [I give my heart to children]. Radyans'ka shkola.
14. UNESCO. (2021). Recommendation on the ethics of artificial intelligence. United Nations Educational, Scientific and Cultural Organization.
15. UNICEF. (2023). Children in a digital world: What children and young people think and experience. UNICEF.
16. Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.
17. Wegerif, R. (2021). Towards a dialogic theory of how children learn to think. Thinking Skills and Creativity, 39, 100751.
18. Weiss, H. B., Bouffard, S. M., Bridglall, B. L., & Gordon, E. W. (2014). Reframing family engagement in education: From partners to participants. Teachers College Press.