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Subject agency in the context of digital childhood: Possibilities for its emergence and suppression

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Abstract

Context and relevance. The main challenge posed by the digitalization of education, which involves the use of neural networks and artificial intelligence, is the need to restore the student's own subject agency when solving educational tasks. Subject agency in activity is the most important condition for organizing the processes of developing the intellectual abilities of students and teachers. **Objective.** Determine the conditions under which AI is used by students as a means of solving tasks that ensure the initiation of subject agency in educational and project-based activities. **Hypothesis.** The initiation of students' subject agency will be brought about by a special reconstruction of the digital systems used by master's students – search engines, AI systems – in order to transform them into a means of organizing their own activity for solving specially posed tasks. Such tasks, implemented in the process of students' learning, will make it impossible for master's students to directly handle digital system. **Results** The authors associate the solution of the research tasks formulated by them with a change in the forms of teaching in their specific work with master's students based on the creation of special educational tasks. The most important type of task is the task that initiates subject agency in educational work. **Conclusions.** The most important condition for restoring students' subject agency when using AI is the use of tasks in which students themselves identify the limitations of the answers offered by AI systems. In this case, the student is faced with the need to justify their new solution, which does not coincide with the answers offered by the AI.

Keywords: digital childhood, artificial intelligence (AI), cultural-historical psychology, means, intellectual abilities, mediation, subject agency

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Субъектность в условиях цифрового детства: ВОЗМОЖНОСТИ ЕЕ ИНИЦИАЦИИ И ПОДАВЛЕНИЯ

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Резюме

Контекст и актуальность. Основным вызов, который создает цифровизация образования, связанная с использованием нейросетей и искусственного интеллекта, состоит в необходимости восстановления собственной субъектности учащегося при решении образовательных задач. Субъектность деятельности является важнейшим условием организации процессов развития интеллектуальных способностей учащихся и педагогов. **Цель.** Определить условия, при которых ИИ используется учащимися как средство решения задач, обеспечивающих инициацию субъектности в образовательно-проектной деятельности. **Гипотеза.** К инициации субъектности учащихся будет приводить специальная реконструкция используемых магистрантами цифровых систем — поисковиков, систем ИИ — для превращения их в средство организации своей деятельности для решения специально поставленных задач. Подобные задачи, реализуемые в процессе обучения учащихся, сделают невозможным для студентов непосредственное обращение с цифровыми системами, автоматизированно предоставляющими ответ на поставленный вопрос в готовой форме. **Результаты.** Авторы связывают решение сформулированных ими исследовательских задач с изменением форм преподавания в их конкретной работе с магистрантами на основе создания специальных учебных заданий. Важнейшим типом заданий являются задачи, которые иницируют субъектность в учебной работе. **Выводы.** Важнейшим условием восстановления субъектности у студентов при использовании ИИ становятся задания, при которых сами студенты выявляют ограниченность ответов, предлагаемых системами ИИ. Студент в этом случае ставится перед необходимостью обосновать свое новое решение, не совпадающее с ответами, предложенными ИИ.

Ключевые слова: цифровое детство, искусственный интеллект (ИИ), культурно-историческая психология, средство, интеллектуальные способности, опосредствование, субъектность

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Introduction

The looming, under-researched prospect of the element (rather than deliberately designed form) of the so-called “digital childhood” in education represents a serious challenge for the Russian psychological and pedagogical community, and more broadly, the educational community. This prospect is largely not Russian and is mostly based on copying the “advanced” solutions of the West, with which we are in a state of, if not open confrontation, then competing rivalry (Desai, 2025).

It is highly indicative that among the voices of digi-evangelists (staunch defenders of educational digitalization who seek to allow children to become digitalized) (Chan, Colloton, 2024; Hussaini, 2024; Keene, 2025; Voysey, La Greca, 2025) and digi-luddites (advocates for banning smartphones, social networks, and artificial intelligence, at least for the time being) (Shvabauer, 2025; Tachmamedova, 2025), the voices of digital realists have become increasingly audible (Smirnov, 2021a; Gromyko, Rubtsov, 2021; Skobelev, Gromyko, 2022; Gromyko, 2023). Digital realists strive to understand in what way the use of the Internet, social networks, digital

platforms, search engines, virtual reality, and AI in education is an unconditionally new public good and a tool of mandatory intellectual work for everyone.

However, the second question from digital realists is more important: what is happening to intellectual processes and complex abilities, the basis of which is formed by a mode of activity rather than just a verbal name — understanding, conceptual thinking, categorical thinking, reflective thinking, mutual understanding, communication, reflection, self-determination, schematization, but also reading, writing, solving arithmetic problems, skills of retelling texts, expressing thoughts in words, problematizing false statements, and the ability to decline an offer to perform an imposed behavioral action?

In our view, this is the subject of the most serious comprehensive psychological and pedagogical research, the reliability of which is determined not so much by the statistical validity of ready-made methodologies or large samples ensuring the reliability of conclusions, but by a special conceptual strategy and a new formulation of questions that remain outside the field of attention of the psychological and pedagogical community. It is fundamentally important that questions concerning the analysis of the impact of digitalization on intellectual processes and the diagnosis of students' intellectual development be formulated not in the language of academic school subjects, not in the language of information received in lessons, but in the language of the development of intellectual abilities and mastered general methods for solving various tasks.

In today's situation, the myth that the rising generation, whose acquaintance with digital games, smartphones, and computers begins earlier than with books, is smarter and more intelligent than previous generations who first mastered the alphabet, learned to read and write, and only then moved on to mastering computer literacy, information and communication technologies, multimedia, digital platforms, and artificial intelligence is finally being debunked. The advantage of these digital generations was explained by the fact that they master digital devices earlier than literacy (Gromyko, 2023; Haidt, 2024).

The amazing ease of use of a digital gadget, despite the complexity of its creation, is specifically ensured by designing an overly “user-friendly interface”. Designers and engineers strive to ensure that button-pressing activity causing changes on the interface is accessible even to the sensorimotor intelligence of a chimpanzee or baboon. This procedure led to the creation of the myth that the younger generation using computers and gadgets is

smarter than the previous one. Subsequently, this myth formed the basis of very peculiar recommendations, which at one time suggested allowing teenagers to consult teachers on conducting digital-electronic lessons using computers and the Internet.

But the real research question lies in determining the level of development of intellectual processes, the manifestation of cognitive interests, and the formed ability to learn in generations subjected to total digitalization. For it may turn out that digitalization not only fails to raise the level of organization of intellectual processes but extinguishes cognitive interest, replacing it with watching meaningless videos and playing primitive “clickers”, and the ability to learn on the spot by isolating concepts of fundamentally new action is reduced to mastering ever-new automatable skills based on a copied and memorized sample.

Some consequences of digitalization associated with de-intellectualization, and by no means with an increase in the development level of new generations, have finally begun to be noticed.

It is no coincidence that the third most significant word of 2024, according to the Oxford Dictionary, was defined as “brain rot”¹. It denotes a decline in intelligence due to the excessive consumption of meaningless content. It refers to the deterioration of a person's mental or intellectual state as a result of excessive consumption of materials (currently especially online content) that are considered banal or uninteresting. It also includes what can lead to such deterioration. Foreign experts noted that in 2024, the term “brain rot” began to be used more frequently to denote concerns about the consequences of excessive consumption of low-quality online content, especially on social media. Overall, from 2023 to 2024, the frequency of this term's usage increased by 230%².

It is illuminating that the first recorded use of the expression “brain rot” occurred back in 1854 in Henry David Thoreau's book “Walden, or Life in the Woods”, but in the digital age, it has acquired a new meaning. In his conclusions in this book, Thoreau criticizes society's tendency to devalue complex ideas or those that can be interpreted in various ways in favor of simple statements. In his opinion, this testifies to a general decline in mental and intellectual efforts: “While England tries to cure the potato disease, is it not time for someone to try to cure the brain disease, which spreads much wider and more destructively?”³.

Thus, digitalization, through the appeal to this term, began to be attributed with the devaluation of complex ideas. However, this term acquired a new meaning in 2024. First, it became popular on social media, especially

¹ Billions of people watch stupid, meaningless videos and memes for hours. Why can't they stop and is it dangerous? 29.08.2025. Lenta.ru: electronic media: website. URL: <https://lenta.ru/brief/2025/08/29/brainrot> (accessed 24.09.2026).

² Brain rot' named Oxford Word of the Year 2024: <https://corp.oup.com/news/brain-rot-named-oxford-word-of-the-year-2024/>

³ Lenta.ru: electronic media: website. URL: <https://lenta.ru/brief/2025/08/29/brainrot> (accessed 24.09.2026).

on TikTok among Generation Z and Generation Alpha⁴, and now the term “brain rot” is used in mass journalism against the background of public concern about the negative impact of excessive consumption of online content. In 2024, the term “brain rot” is used to describe both the cause and the consequence of this phenomenon. It refers to low-quality and useless content on social media and the Internet, as well as the subsequent negative impact of such content on a person or society. In other words, it refers to purposefully replicated nonsense that has no content. Strangely, a person, understanding and acknowledging the low quality of the content, continues to consume it. Experts see the reason for this phenomenon in how the format of information acquisition has changed. Modern teenagers (who are the primary audience for brain rot content) watch a large number of short video memes. This leads to a noticeable decrease in concentration time — the content is no longer able to hold users' attention for longer than one minute. Entire generations are becoming susceptible to the detachment from concentrated, stable intentionality (direction of consciousness). A person who has started consuming “brain rot” content completely turns off their attention concentration. They listen but purposefully do not hear; they look but purposefully do not see. Thus, the ability to disconnect from the perception of information during its reception is formed⁵.

If in 2004, users' concentration was enough for two and a half minutes, in twenty years this indicator reached forty-seven seconds (Mark, 2024). Consuming brain rot content does not require concentration — and therefore, it is easy to watch in unlimited quantities. Meanwhile, the time a person spends on viewing content is constantly increasing. In 2024, users spent an average of six hours and forty minutes online per day. First of all, the arbitrary consumption of brain rot content negatively affects memory and decision-making ability.

American researchers, as usual, try to provide neurophysiological explanations for this problem (Lembke, 2021)⁶. Scrolling (flipping through) can lead to changes in the gray matter of the brain — because of this, it begins to encode and store information differently, and acquired knowledge is assimilated much worse. Constant content consumption also leads to a decrease in attention concentration — this happens due to information overload. “Brain rot content” also worsens the functioning of the brain area that is believed to be responsible for decision-making. Watching short videos almost completely blocks the motivation to try something else, so

it is very difficult to tear oneself away from such content. Furthermore, brain rot content is one of the main sources of fast dopamine. This hormone affects a person's mood and behavior, is responsible for the feeling of satisfaction and joy. Fast dopamine, produced in the body at the moment of watching short videos, gives an instant burst of pleasure; moreover, people can develop an addiction that requires consuming more and more content for emotional saturation without concentrating on it⁷.

The Report of the Karolinska Institutet has been translated into English, the authors of which (Lisa Thorell, Torkel Klingberg, Agneta Herlitz, Andreas Olsson, et al.) in their research prove “...that the digitalization of schools, to the extent that it has already occurred in Sweden, entails many disadvantages and that further digitalization may have other negative consequences” (Thorell et al., 2023). “The digitalization of schools, for example, can have a significant negative impact on students' knowledge acquisition” (ibid.), — is explained in the report of the World Health Council from August 2023⁸, which is becoming increasingly relevant.

The authors explain: digital tools contain many distractions that interfere with concentration and working memory, which, in turn, worsens learning (Klingberg, 2023).

In the recently published results of the international PISA study for 2025 (OECD, 2026), which found a very noticeable decline in results, especially in reading and mathematics, the use of digital devices that distract students from schoolwork is directly indicated as a cause of the deterioration. According to the international study results, OECD countries with widespread AI usage lead in the largest decline. The uncritical use of AI is indicated as one of the reasons for the decline in educational results.

In our view, the problem is sociocultural rather than dopamine-neurohumoral. In conditions of enormous uncertainty of social processes in society, a person strives to do something defiantly meaningless: perform the simplest operations in video games with primitive gameplay, watch meaningless, content-free meme videos to calm down and turn off the processes of understanding and reflection that cause anxiety — just to do something and not think. At the same time, society began to be permeated by the freelance labor preparing for digitalization — “mass digital workers”, short-term “jobbers” (gig workers) who mark up all kinds of materials for subsequent digitalization according to strict rules. Due to the monotony and large volumes of such labor, these workers are cut off from the possibility of developing high-level

⁴ <https://corp.oup.com/news/brain-rot-named-oxford-word-of-the-year-2024/>

⁵ ibid

⁶ “Digital Drugs Have Us Hooked. Dr. Anna Lembke Sees a Way Out”. The New York Times Podcasts. 2025-02-01. Retrieved 2025-03-24.

⁷ ibid

⁸ <https://presskit.it/ru/2025/09/15/scuola-la-digitalizzazione-abbassa-lapprendimento-uno-studio-svedese-ne-spiega-il-perche/>

abilities, from fundamental knowledge; they have no professional prospects.

How can such dependencies be overcome and how can one become a subject agency of activity within the processes of digitalization? For this, a child, thanks to the special activity of an adult, must be brought into a distinctive relationship with everyday digital systems. The spontaneously forming digital childhood is associated with one extremely important circumstance: digital systems are perceived, first of all, by a child who has never known life without a computer, as something naturally given and immediate. For a child included in the digital environment, a different existence cannot even be thought of. Digital devices and gadgets do not become the subject of the most serious instrumental reconstruction for the creation of a specially constructed mock-up of a digital device, a kind of subject-material distorted copy — an educational artifact in the form of a computer and smartphone with their insides turned inside out, a search engine in reverse, which will not facilitate obtaining a stimulus result but will hinder it. This is necessary to demonstrate how these “predatory things of the century” (Strugatsky) function, with the discovery of the means, signs, symbols, schemes, models, concepts, and knowledge embedded in them. By themselves, without the specified reconstruction, neither the numerous devices nor artificial intelligence are cultural means for organizing educational activity (Smirnov, 2023).

All these formations — organizations, cultural things, artifacts — are embedded either in the digital device itself or in the situation of its use by an individual or a group communicating around and based on the digital device (various social networks, including banned ones). However, such a digital-means-mediated disobjectivation of digital devices with the creation of completely new “gutted” dissected gadgets in the form of peculiar educational aids showing how they work is the purposeful creation of educational-activity digital objectivity that ensures the development of cultural functions — thinking, speech, mutual understanding, understanding, reflection. After all, from the point of view of the cultural-historical psychology of Vygotsky and the activity approach of A.N. Leontiev, V.V. Davydov, G.P. Shchedrovitsky, we must do exactly this (Gromyko, Rubtsov, 2021; Smirnov, 2021b).

It is the adult and the teacher who must explain to the child what a digital gadget is, what its cultural function is, and what limitations it imposes on the possibilities of understanding, mutual understanding, thinking, and action. What opportunities a digital device provides,

and what it forever takes away from a person (Fedoseev, 2025). And to remain a person possessing intellectual abilities, these abilities must be specifically compensated for in other forms of communication, action, and collective thinking. Only in this case will artificial intelligence not “stick” to the body in the form of a kind of exoskeleton, will not become an impenetrable shell and “new skin”. It must not be allowed for a child to develop a spontaneous, fantastical, in the bad sense, and direct perception of an electronic device.

The student must understand how human communication and complex multi-meaning communication are structured in order to experience and understand to what level of purely signal contact communication and interaction are reduced by digital bots or the exchange of likes on social media. It is precisely the lack of skills in real social communication and interpersonal interaction that makes teenagers vulnerable to the actions of scammers involving them in criminal behavior on digital devices.

It is necessary to show the teenager and young person what capabilities collective problem-solving thinking in a project team possesses, which is not reducible to the limiting “exoskeleton prosthesis” of an AI chat like ChatGPT or DeepSeek. A user relying exclusively on the “exoskeletons” of AI turns into an intellectual cognitive cripple, but the teenager and young person must experience this imposed disability to realize the boundaries of the reduction of the thought process and want to break out of it. This is what the teacher and mentor must help them do.

The teenager, the young person must experience the insurmountable difficulty of translating thought into words in order to understand that artificial intelligence is constantly slipping them the wrong words for their thoughts, words that do not correspond to what they consider and think, what they want to say. For this, the teenager and the teacher must work in the field of difficult-to-express new meanings and therefore strive to create new means of expressing thought. Only in this case is an independently thinking person formed, rather than a cognitive cripple.

A separate point is the creation of profiles of non-existent people and ways of relating to them, which change the forms of identifying a person with heroes one wants to resemble. One must not strive to resemble constructed, invented characters of the Marvel cinematic universe⁹, as there are no real samples of behavior in given situations behind them, but a constructed phantasm that has no and could not have a real prototype. But a person

⁹ List of characters of the Marvel Cinematic Universe — The Marvel Cinematic Universe (MCU) is an American media franchise and a shared universe centered on superhero films and other series featuring various superheroes produced by Marvel Studios, based on characters that appear in American comics from the Marvel Comics publishing house. The shared universe, very similar to the original Marvel Universe from the comics, was created by intersecting common plot elements, settings, cast, and characters.

encountering such artificially constructed characters must themselves determine that before them is a chime-*ra*, a construct, not a living concrete person. And for this, they must understand how a constructed role model of human behavior differs from a real person.

The most important moment of the mediated and instrument-mediated (connected with the use of special tools and means) attitude to digital influences is determined by the possibility of considering the work of artificial intelligence in obtaining communicative responses to a given request, as well as controlling a chatbot or a robot as a modeling of communication, thought-action, and thinking by artificial operational systems. And then it is necessary to compare the boundaries and measures of the model's distortion of real processes: real communication — the answers of ChatGPT, DeepSeek, and chatbots; situational action under conditions of uncertainty — algorithmic control of a unit-artifact in a game; ideal action in space — the robot performing assigned tasks (Fedoseev, 2025).

The task of the teacher and mentor is for the student to understand that artificial intelligence imperfectly models live human collective thinking, thought-action, and thought-communication, so that they constantly fix the difference between the modeled and the modeling capabilities of AI. In fact, through educational-project activity, the student must constantly realize the boundary of what AI cannot do and where, in fact, the student's zone of freedom lies.

Identifying this boundary in the context of the digitalization of education and all spheres of activity must be associated with the development of educational-project metasubjects "Subject agency" (Glazunova, Glebova, 2024) and "Model", in which the child's occupation of the subject position in game, educational, and project activities in the context of digitalization is specifically tracked, as well as the irreducibility of the modeled processes of research, industrial, managerial, and project thought-activity — thinking, thought-communication, thought-action — to self-moving digital models of these processes based on algorithms.

Results. Discussion of Results

The version of the project-based metasubject "Subject agency" with its conceptual structure was developed by us at the request of the Association of Participants of Technological Circles of the RF (President — A.I. Fedoseev), but we clearly understand that to reveal the consequences of digitalization processes for education and changes in intellectual processes, it must be supplemented by the metasubject "Model", which reveals to the student in project activity the boundary between the modeled and modeling language, and the very relationship between the modeled and the modeling (Gro-

myko, Prosekin, 2025). It seems to us that one of the very interesting areas for forming the subjectivity of research activity in a digital environment is working with search engines. Very often, the required information is expressed in words entirely different from those in which the assigned task is formulated and the search query is made. A student conducting a search in a "scroller" (Internet browser) must establish an acceptable level of rephrasing their question and achieve the desired answer, or establish why it is impossible to obtain an answer to the question posed in its original form.

It is precisely when working with search engines that we encounter the well-known paradox described by Plato: if we know what we are looking for, why are we looking for it? And if we do not know what we are looking for, how do we search for something incomprehensible? The use of search engines on the Internet presupposes the recognition of objects of analysis expressed in a language somewhat different from the originally formulated search query. This possible transition from one set of terms, from one means of expression to another, is precisely what a person solving a task with the help of a search engine must hold onto. The measure of the admissibility of such rephrasings is determined by the person using the search engine. In this case, by rephrasing, a person reveals how the search engine reacts to the words and terms they input and, in essence, launches "language games" in the sense of Wittgenstein (Wittgenstein, 2011), revealing for themselves the implicit rules of working with the search engine.

The second very important area for forming subjectivity in students (schoolchildren, students, master's students) is the use of AI (ChatGPT, "Alisa", DeepSeek, etc.) for formulating the research problem in the project being developed (Gromyko, Yu.V., 1997; Gromyko, N.V., 2023). We conducted a preliminary experiment on second-year master's students of the "Psychology and Pedagogy of Project Activity" program performing the following task: "Formulate, using AI, the problem of your research. Substantiate in detail your agreement or disagreement with the problem formulations proposed by AI". Initially, the prompt requests from master's students to AI with various modifications sounded like this: "The topic of the final qualifying work is such, how is the research problem formulated in the case of such a topic?". The master's students were not satisfied with the arbitrary answers they received to their queries.

As a result of discussions with teachers regarding the answers received from AI, it was proposed to change the working method. Master's students were supposed to formulate the problem and the hypothesis of its solution themselves, and only then turn to AI with a prompt request to evaluate the formulations of their hypotheses for solving the problem of the final qualifying work. In this case, the AI began to suggest

including the proposed hypotheses in a certain context of educational-pedagogical research, linking the key-words in the hypothesis formulations with specific conceptual terms of various authors and traditions. In such cases, the master's students were required to confirm or refute such correlations and identifications, as well as justify their decisions. In the event of refuting the proposed answers from AI, it was required to rephrase the hypothesis and the problem itself in such a way that the correlations and attributions proposed by the AI would become impossible. Several such iterations were carried out in interaction with AI, followed by a discussion of the results obtained during group discussions with teachers.

Based on the analysis of the experience gained, it is proposed to construct a special educational-project game offering such terminologically verified strictly scientific formulations of the hypothesis regarding the problem that the AI would refuse to evaluate, thereby revealing the absolute novelty of the proposed formulation. It is precisely when performing this game task that the student is able to realize, based on the material of their research, the fundamental limitation of AI by the arrays of texts existing on the Internet on which the machine learning of the AI was carried out. This experience of restoring subjectivity in interaction with AI can become the basis for teachers conducting project activities to develop special tasks for restoring subjectivity in schoolchildren in the context of the digitalization of education.

Conclusion

1. The spontaneous use of neural networks and artificial intelligence in student education leads to a decline in educational results and a drop in the ability to concentrate, which may hinder the development of intellectual functions associated with carrying out a targeted search when completing a task.

2. By making chaotic, non-targeted appeals to artificial intelligence and search engines to obtain ready-made answers to task questions, students are unable to take the position of a subject of educational activity.

3. Restoring students' subjectivity when working with artificial intelligence requires the development of a special type of task that requires students to avoid blind trust in the results of AI work.

4. The most important condition for restoring subjectivity in students when using AI is tasks in which students themselves identify the limitations of the answers offered by AI systems. In this case, the student is faced with the need to justify their new solution, which does not coincide with the answers proposed by AI.

Limitations. The principles presented in the article for organizing project-based educational activity using AI to clarify the formulation of the problem and hypotheses for solving the problem of the final course paper need further verification and specification during the training of master's students in the program "Pedagogy and Psychology of Project Activities" organized by the authors.

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Contribution of the authors

Yuriy V. Gromyko — research ideas and organization of master's students' training; abstract writing, writing, and formatting of the manuscript; research planning; and research supervision.

Sergey P. Pudenko — analysis of sources; proposing original conceptual definitions; conducting the formative (teaching) experiment; and collecting and analyzing data.

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