Can generative AI be used in school project development?

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Abstract: *This article explores the role of generative artificial intelligence (GenAI) in education within the framework of project-based learning (PBL), focusing on its practical application at Uwekind International School. While theoretical discussions often focus on the general risks of artificial intelligence, this study provides a practical perspective by analyzing how students use AI tools across different phases of their project work to navigate the complexities of scientific research and mathematical modeling. The findings demonstrate that when guided by a clear pedagogical structure, artificial intelligence does not replace student effort but rather enables a deeper exploration of complex problems. By analyzing a student-developed project that applies a "Geometric Brownian Motion" model to forecast crude oil prices over a one-year period, the authors illustrate how AI serves as a specialized assistant for high-level data processing and simulation - tasks that exceed the capabilities of traditional classroom technologies. The article concludes with evidence-based recommendations for schools to transition from restrictive AI policies toward an integrated "co-pilot" model that prioritizes human critical thinking, judgment, and informed decision-making.*

Keywords: Generative Artificial Intelligence, GenAI, Education, Project-based learning, PBL, Mathematical modeling, Geometric brownian motion.

1. Introduction

At present, the project method is one of the relevant approaches to working with pupils and students. It has developed particularly rapidly and extensively over the past 10–15 years. During this period, the Ministry of Education and Science (MES) has also provided strong support for this activity. However, the project method has existed for a long time. There are different views on its origins. One widespread opinion is based on a historical study by (Knoll, 1997), which proposes a periodization of the introduction and use of the project method in education. In 1763, instruction at "San Luca" in Rome (an architectural school) was centered on learning through project work.

The prevailing view of the beginnings of the project method, however, is that it is of American origin, with its theoretical development associated with the names of John Dewey (1916), the founder of pragmatism/progressivism in modern American philosophy and pedagogy, and his student William Kilpatrick. The term "project-based learning" was first used by Professor C. Richards of Columbia University (Nikolaeva, 2004). In 1911, the U.S. Bureau of Education legitimized the term "project," thereby universalizing project work in educational practice. In 1918, the concept of the project was redefined and reinterpreted, as reflected in Professor W. Kilpatrick's essay The Project Method (Kilpatrick, 1918).

In the 1920s and 1930s, the project method, as a specific American educational strategy (Poia, 1976), became an attractive focal point for the educational systems of many European countries - Russia, Germany, the United Kingdom, Norway, Switzerland, and others. The period around the Second World War and afterwards was characterized by a certain lull, but in the mid-1960s the project method experienced a revival. The updated perception of the project method took account of its weaknesses, which is why differentiated use in line with the specific features of the curriculum and objectives was recommended (Nikolaeva, 2004).

After 2002, education in Europe has been directed toward mastering the curriculum at a higher theoretical level; developing intellect; fostering critical thinking skills; understanding modern technologies; and cultivating the ability to participate consciously and actively in solving personal and societal problems (Pisareva, 2007). Publications emphasize the positive impact of project-based learning on the development of certain thinking qualities such as reflection, critical and creative thinking; motivation for learning; problem-solving skills, planning, experimentation, and evaluation; teamwork skills, and others.

In Bulgaria, the project method was presented in great detail by G. Piryov, H. Nikolov, D. Pravdolyubov, and others. Its characteristic features were rooted in Dewey's theory. Prior to 1989, Bulgaria had a very successful form of youth creativity development that applied the project approach. Students worked (independently or with a scientific supervisor) on projects that they then presented at the sessions of the "Technical and Scientific Creativity of Youth" (TNTM) movement. Creative developments and those with a practical orientation were encouraged. A number of prominent Bulgarian scholars owe the beginning of their scientific careers precisely to their participation in TNTM. With the collapse of the old political system in 1989, the structures of TNTM also disappeared.

In 2000, High School Student Institute of Mathematics and Informatics, (HSSIMI) was founded at the Institute of Mathematics and Informatics of the Bulgarian Academy of Sciences. Within its framework, students develop projects in mathematics, informatics, and information technologies. Through the organization and implementation of HSSIMI's activities, as well as the development of the "MITE" and "Young Talents" competitions, opportunities have been created for the powerful development of young people's creative potential. Many students and their scientific supervisors from across the country participate

in these competitions with their projects. Today, the project method has become established in the daily work of many teachers nationwide.

In the conceptual framework of the project method, the uniqueness of both the teacher's and the student's personality are emphasized (Polat, 2003). The logic of education is envisaged to be built "from the psychology of the child" toward "the logic of the subject matter." "What comes to the fore are above all the process, the activities, the operations, the skills, the habits" (Andreev, 1987).

By applying the method, a reasonable balance is sought between knowledge and practical skills for each student engaged in research activity (Polat, 2003). Opportunities are created for the effective "implementation of integral links" between scientific and foreign language knowledge and skills (Malcheva, Tsatsova & Tsankov, 2005). The method directs attention toward non-traditional exploration of a problem chosen by the student and requires the creation of a specific educational product reflecting a complete system of knowledge, skills, attitudes, and personal qualities.

Advances in real life provide opportunities for enriching the ideas of project-based learning. A significant share of project development can be dedicated to information technologies and artificial intelligence, whose current growth is exceptionally dynamic.

2. Artificial Intelligence and project-based activities

Artificial Intelligence (AI) is one of the most significant technologies of our time. It represents a set of algorithms and models that enable computer systems to perform tasks traditionally requiring human intelligence (Stoyanov, Tabakova-Komsalova & Dukovska, 2023). This includes image and speech recognition, natural language processing, decision-making, planning, problem-solving, and even creativity. Artificial intelligence (AI) is a technology that increasingly defines our daily lives. It changes the way we work, learn, and interact with the world around us. The development of AI is closely tied to the concept of machine learning - a technology that allows computers to "learn" from data and experience without being explicitly programmed for each task. At the core of this progress lies the growing power of computers, the collection of vast amounts of data, and advanced algorithms capable of analyzing this data in ways impossible for humans.

Artificial intelligence is no longer just a futuristic concept - it has already been integrated into numerous aspects of modern society. AI-based systems are used to automate tasks that require processing large volumes of information, recognizing complex patterns, and making real-time decisions. With the advancement of AI, it becomes clear that we are only at the beginning of a technological evolution that will transform the way we live, work, and interact with the world. Artificial intelligence is already influencing many aspects of our lives, and its role will only continue to grow. The question is not whether AI will change the world, but how we will adapt to these changes and how responsibly we will use this technology.

Education is one of the fields undergoing profound transformation under the influence of technology, with artificial intelligence playing an increasingly important role in this process (Tabakova-Komsalova, 2023). From personalized learning programs to the automation of administrative tasks, AI has the potential to make education more effective, accessible, and engaging. Personalized learning through AI is expected to help students learn according to their individual needs. It provides numerous tools and resources that facilitate learning and improve outcomes. The authors are deeply convinced that AI technology will become as commonplace as calculators, computers, and phones, as well as software for spell-checking, among others.

In our country, precise standards and conditions for the use of AI in education - whether in lessons, project work, coursework, theses, and so forth - have not yet been established. The question of its admissibility, scope, and application still lies ahead. Most concerns of teachers, university lecturers, and other actors in the educational system are related to the improper use of AI, the accuracy of assessing students' work and justifying grades, as well as the risk of slowing down young people's development (Finkel, 2023), (Heersmink, 2024). The International Baccalaureate Organization (IBO) – an international body setting standards in education – allows the reasonable use of AI in schools. "The IB is not going to ban the use of such software but will work with schools to help them support their students on how to use these tools ethically in line with our principles of academic integrity. Work produced by artificial intelligence tools (even only in part) will not be considered as a student's own." (Glanville, 2025).

Thus, the question arises: in which specific activities of pupils and students can we accept the application of AI, and what constitutes its permissible use in schools and higher education? To explore this, we turned to students, focusing mainly on project-based work.

We conducted a survey with 42 students from UWEKIND International School in Sofia, allowing open-ended responses. The questions are presented in Figure 1.

From this, we learned that the main products used by students are ChatGPT (various versions) and GitHub Copilot. "These versions of ChatGPT 3 and 4 are distinguished by an improved ability to understand and generate human language, which makes them extremely useful for different learning activities," according to some students. B. S. shared: "GPT-3 was the first tool I encountered, and I quickly realized how useful it could be in my everyday study work. With the transition to GPT-4, I noticed a significant improvement in the accuracy and richness of the responses generated. The new version provides more structured and in-depth answers, making it even more useful for academic purposes.".

Other products mentioned include NerdAI, PhotoMath, Wolfram Mathematica, GitHub and OpenAI, Copilot, Gemini, Midjourney, and DALL·E 3. *"Midjourney and DALL·E 3 are interesting products, but personally I do not find any application for them,"* one student remarked. "Grammarly" was noted as an application that automatically checks a given text.

Describe your knowledge and skills in using artificial intelligence in the learning process
1. Describe which versions of artificial intelligence you use - Chat GPT (which version), Copilot, etc.
2. Do you have preferences on which platforms to use them - personal computer or mobile device (tablet, phone, watch, etc.)?
3. What activities does it help you with - when writing essays, when solving tasks, when preparing IA, reports and other developments?
4. In which subjects do you most often use artificial intelligence?
5. In what way does it help you?
6. Reflect your personal experience - do you have problems, do you like the software products, do you have preferences for some of them.
7. Share your personal opinion regarding the advantages and disadvantages of artificial intelligence.

Figure 1. Contest of survey

Students use AI across various platforms. Here are some excepts from the survey:

- *"Personal computer, since it provides me with a larger screen and a more convenient working environment, along with a larger keyboard."*

- *"In my opinion, the most convenient way is to use it on a laptop. I access it through the browser because it takes up no space."*

- *"When I am on the move or need to make a quick information check, I use my mobile phone. This gives me flexibility and the ability to work from anywhere."* Conversely, another opinion was: *"I have opened it on my phone, but the options there are very limited and the screen is too small. I don't like it."*

- *"I often use mobile devices such as tablets and phones when I am on the move or do not have access to a computer. This allows me to continue my work anywhere and anytime, which is extremely useful in the dynamic learning process."*

- *"The software tools I use are easy to work with. I prefer using them on a tablet, as this gives me greater freedom and the ability for multitasking. However, when I am on the go, I use the ChatGPT mobile app on my phone, which is also quite convenient."*

Initially, students used AI cautiously and in a limited way. Gradually, they gained confidence, and two years later they shared that they now know exactly how to formulate the tasks they give to AI in order to obtain the responses they want.

What do students use AI for when working on projects? From their answers, we can summarize that:

- ChatGPT is most often used to gather and analyze information from various sources, providing access to scientific articles and resources,

saving considerable time and effort. *"I use AI primarily as a search engine that surpasses the ones we know in terms of accuracy, comprehensiveness, and speed of providing information. This is especially valuable when preparing projects, essays, and presentations, as it allows me to quickly navigate the sea of information and find the most suitable sources I need,"* one student shared.

- Students compile bibliographies and identify reliable sources.

- They use AI as an idea generator but develop their own ideas independently.

- They rely on suggested structures for essays and projects, which they then adapt and develop.

- *"Copilot accelerates project development by automatically generating templates and code snippets that can be adapted to the specific needs of the project."*

- *"It helps with editing and formulating arguments, creating hypotheses, analyzing experimental data, and drafting conclusions based on the results obtained."*

- *"It provides explanations of complex concepts and offers step-by-step solutions to problems." "It proposes ready-made solutions and examples." "It provides clear explanations and methods of solving." "It helps me understand the material better and apply what I've learned in practice."*

An interesting conclusion was made by one student regarding the scope of AI usage: *"But ultimately, I mostly use artificial intelligence for subjects that I do not understand or in areas that do not interest me. In such cases, I seek a basic understanding rather than an in-depth critical view, and therefore, what ChatGPT offers is completely sufficient for me."*

And yet another opinion: *"I use Artificial Intelligence most in the initial phase of group projects, as it allows me to synthesize ideas and summarize resources easily and efficiently – so that together with the other project participants we can quickly discuss and move forward at a moderate pace, giving everyone time to fulfill their responsibilities. Since I started doing this, I feel more confident in my teamwork, because I do not waste time and I contribute to reaching the final goal – without delays or lost time."*

The students also pointed out other areas where they use AI, though these are not the subject of the present article. Some of the students noted problems they had personally encountered while using AI:

- One is the dependence on internet connectivity. Without access to quality internet, the use of these technologies becomes impossible.

- Sometimes AI provides solutions that are not entirely correct or applicable to the task at hand. Despite the use of advanced algorithms

and vast databases, ChatGPT may produce translations or interpretations lacking context or proper language usage.

- *"Artificial Intelligence has information, but not the ability to process it in order to reach meaningful conclusions and new ideas. The models it uses are not unique, but based on frequently applied algorithms in the online space."* Therefore, it can support learning, but not replace it.

- Lack of human interaction: although AI can simulate conversation, it cannot fully replace human interaction and feedback from teachers.

The students themselves diagnose and highlight an important aspect that concerns all educators: the potential loss of skills for independent problem-solving and critical thinking. Excessive use of AI may reduce motivation for acquiring knowledge and skills in the traditional way, which in the long term can negatively affect students' and learners' development. *"One aspect I dislike,"* shared one student, *"is how some students, including my classmates, rely entirely on artificial intelligence and complete almost all of their school assignments with its help. This is happening not only in my school but everywhere in the world. The truth is that in this way these students harm not only themselves but also society as a whole, because when they become official members of this society, they will have very little to contribute."* Attempts to use outside help are not new to the education system. Copying, using so-called "essay mills" for writing theses and coursework, or relying excessively on external assistance are practices that have been known for many years. The emergence of AI tools for writing projects, coursework, theses, essays, and more creates greater opportunities for some students to attempt achieving success without their own effort, knowledge, or skills. Of course, the new technologies differ significantly in terms of speed, ease of access, and scale, but the problem of students outsourcing their work to others has existed for many years. The new technologies, however, create new challenges for teachers and educators when assessing students' work. This is where the importance of the teacher's role as a corrective factor grows: since teachers know their students' development and abilities best, they are in the strongest position to judge whether and to what extent AI has been used, and to provide recommendations, guidance, and support that are appropriate to each student's level.

Violation of Academic Integrity: the use of AI for cheating can constitute a serious breach of academic ethics. Many educational institutions have strict rules against plagiarism and academic dishonesty, which may lead to severe penalties, including disqualification.

Equally important are the serious ethical issues related to the privacy and security of personal data, as well as the potential misuse of AI technologies. AI systems collect vast amounts of data about students, how they study, how much time they spend on a given task, what their weaknesses and strengths are. This raises questions concerning the protection of personal data, its storage, and its use by companies and institutions.

There are also significant ethical concerns regarding the use of AI for academic purposes, including issues of copyright and ownership of generated content. Misuses of AI are also noted in the field of art creation.

There is already a significant number of alarming studies on the negative impact of AI on people, particularly on the young human organism (Yatawara, 2025). A large portion of the publications reflect adverse effects on children. At this stage, there are only warnings from doctors and specialists, and no unified opinion has yet been formed in the public sphere.

Given the advantages and drawbacks of AI in project development, we can point to the growing role of the teacher. The teacher is the one who knows the students. They observe how the students work, are familiar with their progress at every stage, and understand the development of their work. In this way, the teacher can assess whether and how a student has used AI. Teachers can assign tasks that help students learn to use AI creatively and critically. Teachers themselves can also employ AI tools in their preparation.

Teachers must support their students in using AI, which is possible only if they are more advanced and competent themselves. *"Teachers should role model best practice when using AI, as students learn by observing the respected adults in their lives far more than by listening to them."* (Glanville, 2025).

The teacher's most immediate task is to teach students the ethical use of artificial intelligence.

3. In what form is it best to use AI in education?

AI should serve as an auxiliary tool rather than a substitute for teachers. The best application of AI in education is as an interactive assistant that facilitates learning without eliminating the human factor. *"Artificial intelligence should be a support, not a replacement"* (Yatawara, 2025).

Combining AI technologies with traditional teaching methods will help capture the advantages of both systems. AI has the potential to revolutionize education, but its implementation must be carefully planned in order to preserve best practices in teaching and human interaction.

An interesting example of AI use in education is given by the student V. K., who developed a project on the topic *"Modeling oil price using Geometric Brownian Motion."*. He applied the Geometric Brownian Motion model to forecast the crude oil price per barrel one year ahead. The student treated the oil price as a stochastic process, with the price being the random variable. Geometric Brownian Motion is described by a stochastic differential equation, which the student solved. The next step is to simulate Brownian motion. Its implementation in differential equation is what makes the mathematical model account for the random fluctuation in oil prices.

It would be meaningless to use only one simulation of Brownian motion to calculate the final oil price, since Brownian motion is random. Performing multiple

simulations covers a wide range of potential outcomes, reflecting market uncertainty. The student set up a simulation of 1,000 Brownian motion functions, because the greater the number of simulations, the more accurate the estimate of the final oil price. Generating such large amounts of data is not possible with simpler software such as Google Sheets or Excel. Each simulated path consisted of 252 cumulative random variables, corresponding to the 252 trading days in a year. To accomplish this, V. K. instructed ChatGPT-4 with a series of prompts. The student used 1,000 simulations, each recursively linked to the previous one.

Thus, in order to perform the calculations and obtain the final result, the student employed AI.

4. Conclusions

It is important to note that this study is based on a relatively small and context-specific sample of 42 students from one international school, representing the entire graduating class of 2025. Therefore, the information and analyses provided should be interpreted as indicative and not as globally generalizable. Future research should expand both in size, across education systems, and examine the long-term impact.

Artificial intelligence has the potential to transform education in a positive way, providing students with new and exciting ways to learn and explore.

This shift in perspective is also highlighted by students themselves. As one respondent aptly noted, using AI is like seeking a *"second opinion"* on a matter, emphasizing that while technology provides information, it remains *"just an opinion, not a head on the shoulders"*. Ultimately, the goal is to foster collaborative relationships in which human activity and judgment remain the primary driver of knowledge acquisition.

Schools should develop clear policies and guidelines for the use of AI in education. These policies should specify what types of AI tools can be used, for what purposes, and under what conditions.

AI should become an integral part of the learning process, not be dismissed or stigmatized as something harmful or useless, and all students should be constantly and purposefully supported to realize their own role in interacting with AI – *"It helps me because I chose it to!"*, as one respondent noted.

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