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AI-BASED SOLUTIONS AND J. DEWEY'S PHILOSOPHY IN TRAINING IT STUDENTS

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Abstract. *The purpose of this research is to explore the correlation between the teaching of IT students with AI technologies in the modern era and John Dewey's model of teaching from the recent past. The study employs a combination of descriptive and qualitative research methods to achieve its aim. The Scopus AI resource is used to explore the existing AI technologies. The study found that experiential learning correlates with the use of realistic simulations powered by AI, and that collaborative learning is linked to AI-powered tools. Critical thinking and problem-solving are closely associated with AI-based platforms, and learning by doing is closely tied to AI models. It has also been demonstrated that reflective thinking correlates with AI-driven feedback systems, lifelong learning is linked to AI-powered continuous learning platforms, and self-learning is closely tied to AI chatbots. The following points of intersection were defined: (1) Dewey delineates student-centered learning, which we see when using AI in education (through project-based learning); (2) Dewey's vision of the educational process as a two-way street echoes AI's ability to provide personalized and individualized education; (3) Dewey supported the idea of lifelong education that mirrors in the availability of AI platforms with a wide range of courses and resources that support lifelong learning and contribute to professional development of IT majors. AI has the potential to individualize instruction, facilitate experiential learning, and promote critical thinking skills among learners. It correlates with Dewey's beliefs in education as a process of active engagement, which can be relevant to the process of imparting knowledge in the AI era.*

Keywords: *IT education, artificial intelligence, J. Dewey's philosophy*

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1. INTRODUCTION

A profound understanding of various educational settings that have existed in the past, exist in the present, and will continue to exist in the future is essential to comprehend the educational process as a whole. Simultaneously, the impact of AI profoundly influences daily teaching and is now present in almost every class, serving as a transformative tool that reshapes teaching practices. Looking back, we refer to Dewey's theory. This theory is the basic tenet of education. This theory supports the practical application of experiential learning and student-centered learning. Given the continuity of education, we examine modern AI capabilities and Dewey's ideas to identify connections between them.

AI offers opportunities in the sphere of education (UNESCO, 2025, 2024a, 2024b). With AI, the boundaries of possibilities in education are being pushed. Today, AI is increasingly at the forefront of research. AI-powered learning is often associated with a personalized approach to training. Unsurprisingly, AI-driven learning platforms, such as Coursera and Duolingo, allow learners to work through the course at their own pace.

The acquisition of English becomes simpler and easier with the aid of AI technology. AI-powered resources offer real-time feedback and provide tasks for effectively acquiring the English language (Shumeiko, 2025; Shumeiko & Spišiaková, 2025; Shumeiko, 2024; Edmett et al., 2023). AI assists in writing and reading by utilizing speech-to-text and text-to-speech technologies, as well as real-time translation. Platforms like Google Translate or AI chatbots help overcome language barriers in real time. Scientists and IT specialists determine the feasibility of using AI in education (Yu & Guo, 2023; Misiuk, 2021; Shumeiko & Osadcha, 2024).

Scholars (Frankford et al., 2024) state that AI-tutoring complements the teacher(human)-supported process in software engineering education. Simultaneously, computer students value the potential of LLM-based AI tools (such as ChatGPT) (Hou et al., 2024). Students utilize GenAI to complete programming tasks across various computing courses (Keuning et al., 2024). Today, students emphasize the need to integrate AI tools into teaching-learning interaction (Vieriu & Petrea, 2025). AI-enhanced LMSs (i.e., Moodle with AI modules, EdApp) have an essential role in blended and online learning contexts. AI features (adaptive content, automated tracking, personalized feedback) improve engagement and support for students, including IT majors (Shumeiko & Osadcha, 2024).

GenAI tools are emerging as a revolutionary tool in education. They bring both positive supportive energy and challenges in the educational plane. To foster responsible GenAI adoption, institutions, in the researchers' view (Krause et al., 2025), should ensure equitable access to GenAI tools, establish clear academic integrity policies, and advocate for global GenAI research initiatives. AI-powered learning assistants are being increasingly integrated into higher education in engineering (Sajja et al., 2025). In computer science education, Iris, an AI-driven virtual tutor integrated into the interactive learning platform Artemis, guides students through completing programming exercises (Bassner et al., 2024).

AI-based solutions are resources that utilize AI to automate tasks, including those in the education sector. The primary components of Generative AI comprise (1) machine learning techniques, (2) deep learning techniques, (3) natural language processing techniques, and (4) image processing techniques (Yu & Guo, 2023). AI assists policymakers

and researchers in activities (Ifenthaler, Yau & Gibson, 2024). The application of AI in higher education institutions contributes to the development of soft skills among future IT specialists (Shumeiko & Osadcha, 2024). AI tools can help develop essential soft skills, including communication, negotiation, problem-solving, intercultural competence, and public speaking, for future IT professionals. AI-supported learning activities (e.g., in humanities subjects) can contextualize and reinforce these soft skills in IT education. IT educators continually improve their performance by utilizing new resources for educating students and incorporating Microsoft Copilot Chat to complete professional tasks, particularly for generating ideas and preparing materials (Osadcha et al., 2024a; Osadcha et al., 2025). Copilot is an AI tool for IT education that is used in the Norwegian higher education sector (Osadcha et al., 2024b). Thus, the development of AI technologies embraces a new era of interactive digital learning. Evidently (based on the authors' own experience), AI technologies are incorporated into the process of preparing students who major in IT. As is known, the meanings of the acronyms IT and AI are on everyone's mind nowadays, as we live through the innovations and technology that were once the stuff of novels. It is the age of information technology and the widespread adoption of AI.

Scientific publications also present a Deweyan standpoint (Mohmmed, 2024; Eitner, 2022; Del Fabbro, 2021; Cloke, 2023). It is also known that Dewey's (1859–1952) work drew the attention of scientists, and it deserves recognition. Consequently, J. Dewey, a prominent American philosopher, made significant contributions to education with his progressive ideas and innovative concepts. Dewey's philosophy confirms the belief that education should be a process that actively engages students in real-world experiences, fostering critical thinking, problem-solving skills, and social awareness. Experiential learning and hands-on exploration, when integrated into traditional classroom practices, are very important. They are integrated into the education system, becoming essential to modern-day life. It is possible to surmise that one day, it will form the basis of one of the modern pedagogic trends. It will result from the examination and the rethinking of Dewey's principles of experiential learning (learning by doing, discussion, interactive classes, interdisciplinary education), student-centered teaching, and the role of technology in the learning process. We aim to comprehensively understand how AI can be integrated into educational practices while staying true to Dewey's vision of education.

Dewey's principles of experiential learning are essential and relevant for training students who will be future professionals in the contemporary IT labor market, as education is "a process of living and not a preparation for future living" (Dewey, 1897). Dewey noted that education is "the scientific method by means of which man studies the world, acquires cumulatively knowledge of meanings and values, these outcomes, however, being data for critical study and intelligent living" (Dewey, 1938, p.10). Education is an essential part of an intelligent individual, and it "may be defined as a process of continuous reconstruction of experience to widen and deepen its social content, while, at the same time, the individual gains control of the methods involved" (in Kadlec, 2007, p. 21). Education, in Dewey's convinced opinion, serves a social function. Dewey wrote: "The deeper and more intimate educative formation of disposition comes, without conscious intent, as the young gradually partake of the activities of the various groups to which they may belong. As a society becomes more complex, however, it becomes necessary to provide a special social

environment that specifically nurtures the capacities of the immature. Three of the more important functions of this special environment are: simplifying and ordering the factors of the disposition it is wished to develop; purifying and idealizing the existing social customs; creating a wider and better balanced environment than that by which the young would be likely, if left to themselves, to be influenced" (Dewey, 1916, p.27).

Dewey's view on education is multifaceted. Education is defined as a direction. This direction is particularly true in the light of young people's education. Dewey holds the opinion that "the basic control resides in the situations in which the young take part. In social situations, the young have to refer their way of acting to what others are doing and make it fit in. This directs their actions toward a common result and provides an understanding shared by the participants. For all mean the same thing, even when performing different acts. This common understanding of the means and ends of action is the essence of social control. It is indirect, or emotional and intellectual, not direct or personal. Moreover, it is intrinsic to the person's disposition, not external and coercive. To achieve this internal control through identity of interest and understanding is the business of education. While books and conversation can do much, these agencies are usually relied upon too exclusively. Schools require for their full efficiency more opportunity for conjoint activities in which those instructed take part, so that they may acquire a social sense of their own powers and of the materials and appliances used" (Dewey, 1916, p.45). The ideal aim of education – "creation of power of self-control" (Dewey, 1938, p.64).

Dewey determines that educators are the primary information providers. They have responsibilities, and "they not only be aware of the general principle of the shaping of experience by environing conditions, but that they also recognize in the concrete what surroundings are conducive to having experiences that lead to growth. Above all, they should know how to utilize the surroundings, physical and social, that exist to extract from them all that they have to contribute to building up worthwhile experiences" (Dewey, 1938, p.40).

Interaction within the educational activity "expresses the second chief principle for interpreting an experience in its educational function and force. It assigns equal rights to both factors in experience – objective and internal conditions. Any normal experience is an interplay of these two sets of conditions. Taken together, or in their interaction, they form what we call a situation" (Dewey, 1938, p.42). It is crucial to consider principles of continuity and interaction. Dewey thought that "they intercept and unite. They are, so to speak, the longitudinal and lateral aspects of experience… Continuity and interaction in their active union with each other provide the measure of the educative significance and value of an experience. The immediate and direct concern of an educator is then with the situations in which interaction takes place" (Dewey, 1938, pp. 44-45). In this context it should be noted that a principle of continuity "means that the future has to be taken into account at the stage of the educational process" (Dewey, 1938, p.47).

Experience is "the actual life-experience of some individual" (Dewey, 1938, p.64). It is worth noting that "experience is not a vein that shuts man off from nature; it is a means of penetrating continually further into the heart of nature. There is in the character of human experience no index finger pointing to agnostic conclusions, but rather a growing, progressive self-disclosure of nature itself. The failures of philosophy have come from lack

of confidence in the directive powers that inhere in experience, if men have but the wit and courage to follow them" (in Kadlec, 2007, p. 22). Dewey holds the opinion that "experience is the result, the sign, and the reward of that interaction of organism and environment which, when it is carried to the full, is a transformation of interaction into participation and communication" (Dewey, 1934, p.22).

Freedom is of particular importance. The nature of freedom is defined such: "the only freedom that is of enduring importance is freedom of intelligence, that is to say, freedom of observation and of judgment exercised in behalf of purposes that are intrinsically worthwhile" (Dewey, 1938, p.61).

Thinking, in Dewey's view, "begins in what may fairly enough be called a forked-road situation, an ambiguous situation, which presents a dilemma, which proposes alternatives. As long as our activity glides smoothly along from one thing to another, or as long as we permit our imagination to entertain fancies at pleasure, there is no call for reflection. Difficulty or obstruction in the way of reaching a belief, however, brings us to a pause. In the suspense of uncertainty, we metaphorically climb a tree; we try to find some standpoint from which we may survey additional facts and, getting a more commanding view of the situation, may decide how the facts stand related to one another" (Dewey, 1910, p.11). IT is worth noting that "Dewey referred to democracy as a modal idea, commentators and critics often segregate Dewey's views on democracy from his moral thoughts on the assumption that views on politics and social thought can be understood on their own" (Pappas, 2008, p.8). The significance of pragmatism should be taken into consideration within the educational landscape, As, "pragmatism has a metaphysical implication. The doctrine of the value of consequences leads us to take the future into consideration. Moreover, this taking into consideration of the future, which takes us to the conception of a universe whose evolution is not finished, of a universe which is still, in James' term, "in the making," "in the process of becoming," of a universe up to a certain point still plastic (in Kadlec, 2007, p. 23).

Consequently, the interim conclusion that can be drawn from the above key quotes is that Dewey's theory is multifaceted, tying together essential aspects in education. Notably, our ideas began with thoughts about AI. Perspectives on AI implementation and its further use have attracted scientific interest (Kondratenko et al., 2023b; Shumeiko, 2024; Shumeiko & Osadcha, 2024). We support the view (UNESCO, 2025, 2024a, 2024b) that AI provides new opportunities in the field of education. It is equally important to emphasize that implementing AI in in-class activities poses challenges and risks (Kondratenko et al., 2023a; Slyusar et al., 2024). AI technology enables the creation of highly personalized learning experiences, expanding access to vast educational resources and automating administrative tasks, promising to transform or change how people teach and learn. However, concerns have been raised about the potential drawbacks of using AI in the educational sphere, including its impact on student-teacher interaction and privacy issues. While concerns regarding the integration of AI in education persist, the question of how AI should be effectively incorporated into the teaching process remains open. Professors and educators are consequently faced with a critical choice: whether to rely exclusively on established pedagogical principles or to explore new frameworks adapted to the realities of AI-supported learning. Although concerns will inevitably remain, the development and

discussion of a solid theoretical basis for teaching in the age of AI represent a necessary and valuable direction for discussion in the academic community.

The study aims to investigate the correlation between the teaching-learning process using AI technologies in preparing future specialists in the IT area and J. Dewey's learning theory. The novelty aligns with the primary goal of the current research, which is to follow an IT educational path in investigation and to determine and describe the intersection points (if they exist) between AI-based solutions and the philosophical thoughts of J. Dewey. The research questions (RQ) are stated:

RQ 1. What AI capacities correlate with J. Dewey's theory?

RQ 2. Are there any points of intersection between AI-powered software solutions and principles of learning-teaching based on Deweyan theory?

RQ 3. How can Dewey's theory help in training IT majors? (If it really can help.)

2. METHODS

This study follows the principles of a literature review "to synthesize a body of evidence on a topic in order to achieve robust and broad conclusions and implications" (Baumeister, 2013; in Siddaway et al., 2019). It is crucial that "review articles have a power and value that no single study can match" (Baumeister & Leary, 1997; Cumming, 2013; Siddaway et al., 2019).

2.1. Search strategy

This study employs a combination of descriptive and qualitative methods, drawing on an analysis of J. Dewey's educational philosophy and a qualitative review of the literature on the potential of AI in educating IT majors. The criteria for selecting articles for the research were as follows. Articles indexed in Scopus related to AI in higher education were considered. Publications explicitly addressing Dewey's education philosophy were analysed. Documents by keywords "John AND Dewey AND artificial AND intelligence AND education" (by years) were considered. The articles on AI in higher education (by the fields of education) and Dewey's philosophy (by the fields of education) were searched.

The Scopus AI resource was used as a supportive tool for literature exploration and synthesis rather than as a method of analysis. Note that Scopus AI is an AI-based tool designed to navigate the rich academic landscape of the Scopus platform. Scopus AI utilizes Scopus content to ask a question and provide an answer in various forms, including a summary, an expanded summary, and a concept map (Scopus AI, 2024). All analytical interpretations were based exclusively on the original peer-reviewed sources indexed in Scopus.

The data collection procedure involves a bibliometric analysis of scientific papers in the Scopus database. The theme for analysis was AI in higher education, encompassing fields such as Computer Science, Engineering, Social Sciences, Psychology, Arts and Humanities, and Multidisciplinary. Then, the philosophy of J. Dewey was considered as a separate analytical corpus. In this case, the search strategy is outlined by restrictions on the fields of education, such as Social Sciences, Psychology, Arts and Humanities, and Multidisciplinary.

The application of the comparison method enabled us to focus on Dewey's theory and AI technologies in IT education, comparing concepts and selecting the most suitable ones for today's education. We compared the critical positions of J. Dewey's philosophy with AI technologies to observe and adhere to these principles in IT education.

Then, by employing a systematic approach, we were able to evaluate and compare the key principles of Dewey's philosophy and AI technologies, thereby grasping the essence of these values and doctrines for IT education.

2.2. Inclusion and exclusion criteria

The inclusion and exclusion criteria in the selection of articles for this study are presented in Table 1. Only peer-reviewed publications were included.

Non-peer-reviewed materials (i.e., notes, newsletters were excluded. The scope of analysis was limited to articles focusing on the use of AI in higher education. Studies outside this domain have been disregarded. Scientific works explicitly referring to Dewey's theory were taken into consideration. Articles without Dewey's theme were excluded.

Table 1. Inclusion and exclusion criteria

Inclusion	***Exclusion***
Peer-reviewed publications on AI in IT education; Dewey's scientific heritage; abstracts of the articles available under the open-access license	Non-peer-reviewed materials (notes, newsletters) that do not correspond to the chosen topic of the research paper
Time frame includes publications from 1935 (in searching for the number of documents related to AI in higher education) to 2023	Time frame does not include publications before 1935
Articles on AI use in higher education	Articles outside the semantic scope of education
Studies explicitly referring to Dewey's theory.	Articles without reference to Dewey's philosophy
English-language articles	Non-English language articles

2.3. Data extraction and synthesis

A structured data extraction form was applied (Kitchenham & Charters, 2007; Petticrew & Roberts, 2006). For each publication under review, the following information was collected: author(s); theoretical framework (regarding Dewey's theory, application of AI technologies in higher education, and reported outcomes. The synthesis of findings followed a thematic analysis approach (Braun & Clarke, 2006), allowing the identification of recurring patterns and themes across the selected research papers.

3. FINDINGS

3.1 The qualitative synthesis

The findings delineate that scholars have analyzed Dewey's thoughts, ideas, recommendations, and concerns about education. Consequently, at the initial stage of the

research, previously published scientific materials (Wieczorek, 2024; Sharafeddin & Samarji, 2023; Eitner, 2022; Fabbro, 2021; Bot et al., 2005) have been reviewed. It made it possible to conclude that Dewey's ideas are a gold mine for science. In confirmation of this, we set our sights on finding the intersection points of Dewey's thoughts and AI-based solutions. First, we turned to what has already been investigated. Wieczorek (2024) explored the questions surrounding the formation of habits using self-tracking technologies. The scholar considered J. Dewey's pragmatist philosophy and its notion of intelligent habit. Sharafeddin and Samarji (2023) explored the facilitation of computing education for graduate students majoring in journalism and public relations, examining the investigated theme through Dewey's lens. Authors wrote: "Prototyping facilitated learning by doing and experimenting and stimulated graduate students' self-directed learning, engagement, and their overall ownership of the learning and teaching process, changing their role from being merely passive recipients of 'strange, awkward and unfamiliar' knowledge to active constructors of 'relevant and exciting' content knowledge" (Sharafeddin & Samarji, 2023). Moreover, they pointed out: "Prototyping also served as an avenue for a 'Deweyian Reflection', where graduate students, after internalizing the acquired computing skills and knowledge, started transferring such skills and knowledge to their professions (journalism and public relations (PR)) and daily practices" (Sharafeddin & Samarji, 2023). This investigation is valuable for the current research as it contributes to understanding the pedagogical role of teachers in developing computing skills and knowledge of students of non-linguistic specialties, particularly those majoring in journalism and public relations.

Eitner (2022) examines whether the Deweyan ideal of education can be achieved through the application of AI, as indicated by the article's title and abstract. The author wrote: "By analyzing how both the aims and means of education, as defined by Dewey, can be understood in the context of learning with artificial intelligence, the inherent differences of both educational approaches are brought out. It becomes apparent that important concepts that characterize successful education for Dewey, such as intrinsic inquiry, experience-based schooling, and thinking as the method for learning, do not go hand in hand with intelligent teaching systems" (Eitner, 2022).

Oliver Del Fabbro's (2021) study can be evaluated based solely on the information provided in the article's abstract. The author questioned how to teach machines in AI. Drawing any conclusion from the abstract is problematic. Still, it is possible to understand that the author positively assesses and supports the relevance of Dewey's idea of learning by doing. In any case, this investigation does not overlap with the objective of our paper. The team of authors (Bot et al., 2005) – Ludovic Bot, Bol-Bernard Gossiaux, Carl-Philippe Rauch, and Safouana Tabiou – also acknowledges, as the authors of the previously analyzed paper (Del Fabbro, 2021), the value of the "learning by doing" method in education. The scholars share their experience of teaching the physical sciences and mathematics to engineers. This study also does not overlap with our research intentions.

It is notable to mention that not all, but the key recent papers have been read. The articles or just the abstracts of the articles available under the open-access license are analyzed in the previous paragraphs of this paper. However, the topic that we raised has not been explored before. To confirm or refute this assertion, we proceed with an analysis of recent studies related to the topic of our investigation. We have examined the quantity

(using the leading international science-scope database, Scopus) and the essence of scientific publications on AI in pedagogy and Dewey's philosophy more closely. As a result, we revealed that scientists considered AI in pedagogy. Researchers also studied Dewey's philosophy. However, only a few attempts have been made to analyze the process of teaching and learning based on AI, considering J. Dewey's philosophical ideas. This paper addresses this research gap. To deepen our understanding of this issue, we focus on Dewey's philosophy, which aims to engage students in real-world experiences that contribute to the development of their critical thinking skills. In doing so, we focused on finding the intersection of Dewey's views and convictions with contemporary education and AI, trying to comprehend the phenomenon of AI in education.

3.2 The quantitative and qualitative bibliometric results

Our bibliometric analysis of scientific works in the bibliographic and world abstract database Scopus on such keywords as "Artificial AND Intelligence AND in High AND education" and "philosophy AND John AND Dewey" was thorough. This analysis yielded a substantial number of articles on AI in higher education (n = 3108 articles) and almost three times fewer (n = 1301 articles) related to J. Dewey's philosophy, providing a solid foundation for our research.

When searching for articles on AI in higher education, we imposed restrictions by the fields of education (Computer Science, Engineering, Social Sciences, Psychology, Arts and Humanities, and Multidisciplinary). The analysis revealed the following quantities of articles on AI in higher education by the fields of education: computer science – 2,327, engineering – 1,234, social sciences – 817, psychology, art, and humanities, and multidisciplinary – no articles. A visual representation of the search outcomes is shown in the chart below (Table 1).

Table 1. Number of articles on AI in higher education (by the fields of education)

The field of education	The number of articles
Computer Science	2 327
Engineering	1 234
Social Sciences	817
Psychology	0
Arts and Humanities	0
Multidisciplinary	0

Since 2015, there has been a growing interest in using AI in higher education. The analysis results of the number of published documents (by years) are presented below (Figure 1).

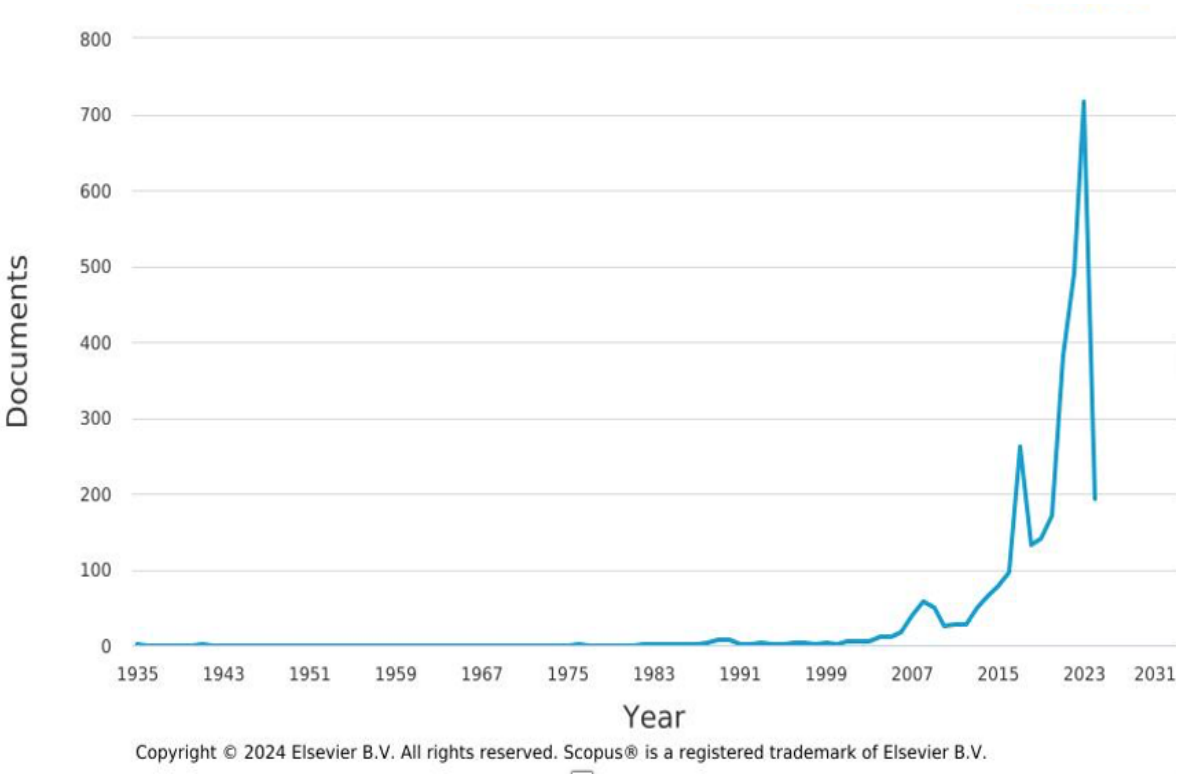

Figure 1: Number of documents related to AI in higher education (by years).

While searching for articles on the philosophy of J. Dewey, we imposed restrictions on the fields of education (Social Sciences, Psychology, Arts and Humanities, Multidisciplinary) (Table 2). The analysis revealed the following quantity of articles on Dewey's philosophy by the fields of education: computer science – 796, psychology – 83, art and humanities – 820, and multidisciplinary – no articles.

Table 2. Number of articles on John Dewey's philosophy (in the field of education)

The field of education	The number of articles
Computer Science	796
Psychology	83
Arts and Humanities	820
Multidisciplinary	0

Since 2000, there has been a growing interest in exploring J. Dewey's educational philosophy. The results of the analysis of the number of published documents (by years) are presented below (Figure 2).

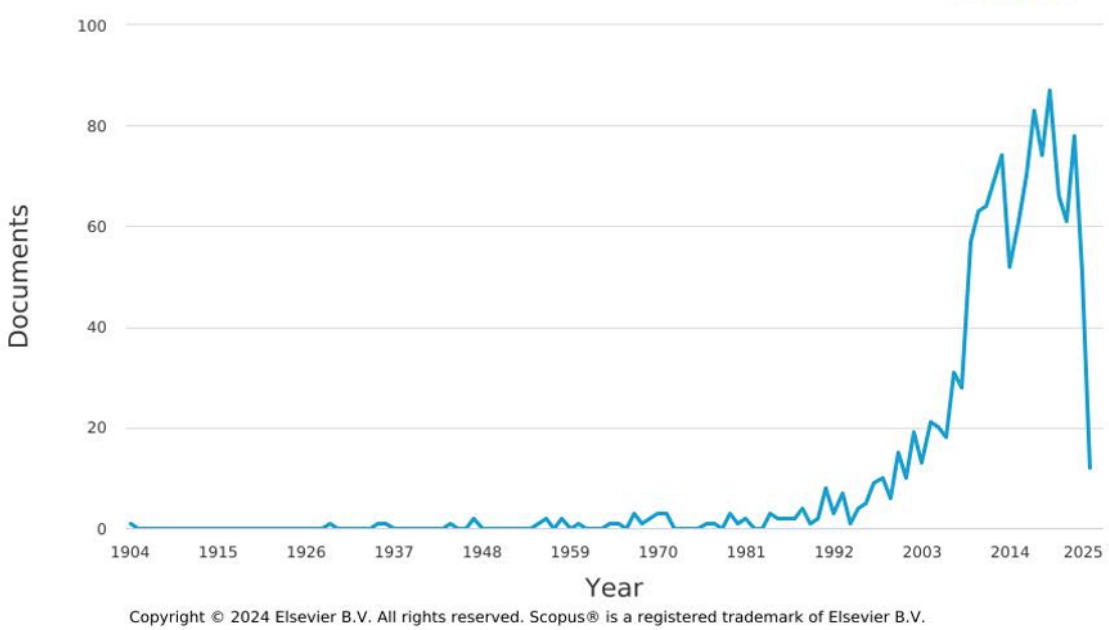

Figure 2: Number of documents related to the education philosophy of J. Dewey (by years)

The results of searching such keywords as “John AND Dewey AND artificial AND intelligence AND education” showed that just a few articles were published (Figure 3). We did not impose restrictions on the fields of education.

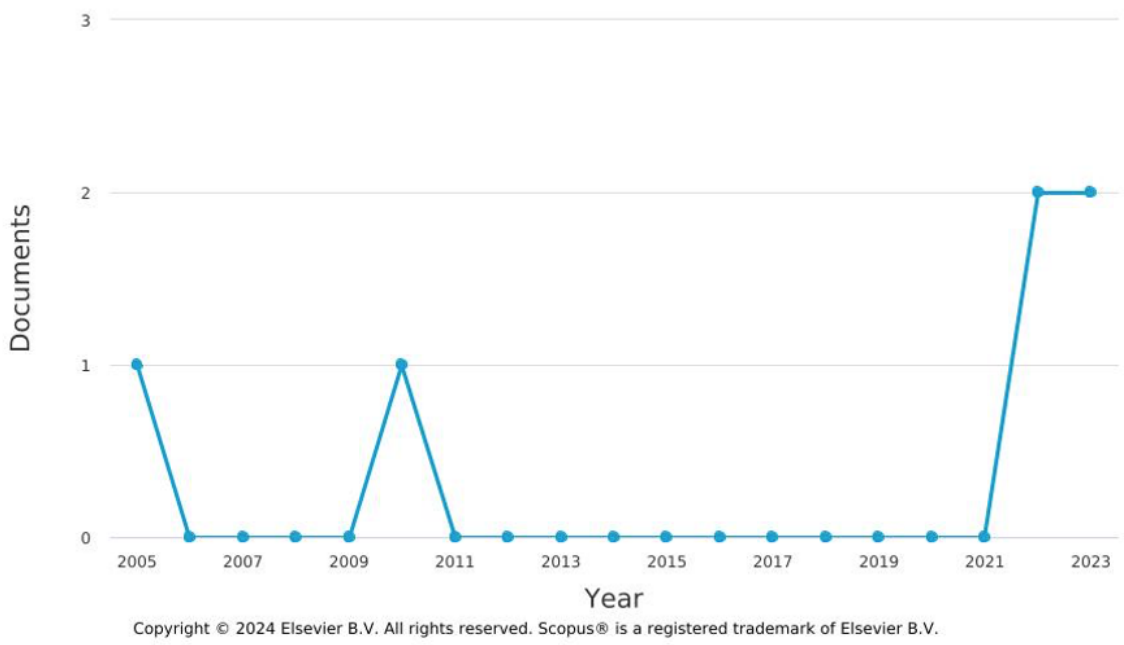

Figure 3: Results of the search for documents by keywords “John AND Dewey AND artificial AND intelligence AND education” (by years)

4. DISCUSSION

4.1 ***RQ1–What AI capacities correlate with J. Dewey's theory?***

In this section, we will address the study's research questions (RQs). To answer RQ1–What AI capacities correlate with J. Dewey's theory? –We intend to compare the key

ideas of J. Dewey's philosophy with the AI technologies that accompany IT education today. To begin with, we defined AI technology as such. Then, we compiled the list of AI technologies. After that, we precisely compared J. Dewey's standpoints with today's AI technologies in IT education. The in-depth analysis of the information yielded the answer: the following AI capabilities correlate with Dewey's ideas – realistic simulations using AI, AI-powered tools, AI-based problem-solving platforms, AI models, AI-driven feedback systems, AI-powered continuous learning platforms, and AI chatbots.

AI technology is a power of the current era. It is undoubtedly beneficial in education, medicine, and emergencies. Through computers or devices with an internet connection, people utilize AI. AI is used in science. The scholars declared: "A traditional image of science is one in which the knowledge landscape is made up of islands – i.e., (sub)-disciplines or scientific fields – where most of this recombination takes place. The islands reflect the structure of nature but also the need for a scientific mind to organize the world's complexity. Seen this way, scientists are sailors whose goal is to navigate from the island, figure out their structure, and explore the surrounding landscape…. AI – the boat or the compass…" (Bianchini et al., 2022).

Considering the aforementioned points, we refer to AI technology support, which enabled us to present the list of AI technologies generated by Scopus AI below (Figure 4).

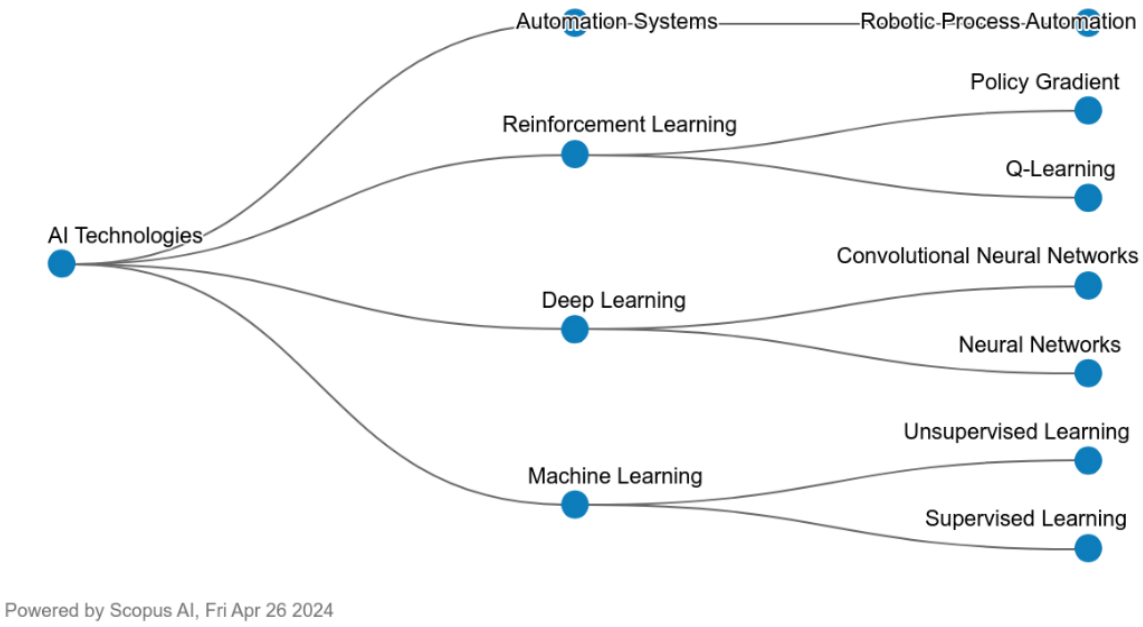

Figure 4: List of AI technologies generated by Scopus AI

Dewey, a philosopher, believed in the transformative power of education. In other words, his philosophy is a dynamic process of active engagement (Dewey, 1900). He questioned the traditional classroom teaching model and supported an educational process where both the teacher and the student learn from each other (Dewey, 1938, 1897). Through involvement in learning activities, learners actively acquire knowledge and gain hands-on experience. J. Dewey's learning theory was too progressive to gain popularity in traditional classroom-based teaching. That is why it can have a foothold in AI-engaged learning. The central tenets of J. Dewey's theory are the following: experience (learning occurs through

experience or by getting "hands-on"), engagement (learning necessitates active engagement), a social context, a democratic process, and reflection (mediated experiences) (Cloke, 2023). In this regard, describing the relationship between experience and learning, as Dewey has stated, is particularly relevant.

Method of comparison (note: the focus of our study is conceptual, as we concentrate on a particular theory, Dewey's theory, and the use of AI technologies in IT education) (Table 3): A systematic approach was used to evaluate and compare the key principles of Dewey's philosophy and AI technologies that help grasp the essence of these values and doctrines for IT education.

Table 3 illustrates the connection between Dewey's pedagogical perspectives and the integration of AI technology in IT education. The table highlights how Dewey's philosophical principles (i.e., experiential learning, collaborative learning, critical thinking, reflective practice, and lifelong education) are applied in AI-driven educational tools and spaces. Each row demonstrates how specific AI technologies, ranging from virtual and augmented reality to intelligent tutoring systems, AI models (Kondratenko et al., 2023), and chatbots (Lan & Giam, 2024), operationalize Dewey's theoretical insights into modern educational techniques.

For example, Dewey's emphasis on learning through experience is reflected in the use of AI-based simulations and virtual environments that enable students to acquire practical skills in a safe and controlled context. Similarly, Dewey's advocacy for collaborative learning aligns with AI-powered platforms that foster communication and teamwork. At the same time, his focus on critical thinking corresponds to AI-based problem-solving systems that provide real-time feedback. Reflective and self-directed learning are further enhanced by AI-driven analytics, continuous learning platforms, and chatbots, which support ongoing student engagement and independent inquiry.

Thus, the table (Table 3) serves as a conceptual bridge between Dewey's educational philosophy and contemporary AI capabilities, demonstrating how the classical pedagogical theory can be adapted to the digital age to enrich IT education.

Table 3. Comparison of the critical positions of philosophy of J. Dewey with AI technologies to adhere to these principles in IT education

John Dewey's standpoints	AI technologies in IT education	Explanation
Experiential learning	Realistic simulations using AI	VR offers immersive learning experiences, enabling IT students to learn by doing. J. Dewey emphasized learning through experience. VR and AR technologies offer virtual environments that allow students to gain hands-on experience without physical limitations or restrictions. Experiential learning is about applying knowledge and skills in real-world scenarios. AI enables you to create realistic simulations that replicate authentic experiences, allowing students to develop a wide range of practical skills. For example, virtual reality (VR) and augmented reality (AR) technologies, based on AI, can transport students to historical

John Dewey's standpoints	AI technologies in IT education	Explanation
		events, scientific experiments, or even professional workplaces. By actively participating in these simulations, students gain hands-on experience, develop problem-solving abilities, and acquire critical thinking skills that are vital to their future success.
Collaborative learning	AI-powered tools	AI-powered tools include AI-driven discussion forums and AI-based LMSs. Dewey believed in the importance of social interaction in the learning process. AI-powered collaboration tools facilitate effective communication and teamwork, and are also essential components of collaborative learning.
Critical thinking and problem-solving	AI-based problem-solving platforms	AI-based platforms (e.g., ChatGPT, MS Copilot) and intelligent tutoring systems (e.g., Algebra Tutor, Mathematics Tutor, eTeacher, REALP, CIRCSIM-tutor, Why2-Atlas, Smart Tutor, and Auto) help develop problem-solving and critical-thinking skills by providing instant feedback and personalized learning support. Dewey's philosophy emphasizes the importance of developing problem-solving skills. AI-based platforms promote a culture of continuous learning by offering assistance in solving complex problems and providing instant feedback, thereby enhancing critical thinking skills.
Learning by doing	AI-models	AI and machine learning systems (MLS) can learn similarly to how humans learn from experience. AI and MLS can achieve this result by absorbing and analyzing large amounts of digital-to-digital data, content, and records that people have created and made available online/digitally over the years. AI models learn from experience, adapt to new inputs, and perform complex tasks, much like humans learn through hands-on experience and reflection. It involves learning from what people have been doing for years and documenting it digitally (Kondratenko et al., 2023).
Reflective thinking	AI-driven feedback systems	These systems track IT students' progress and provide feedback, enabling reflective thinking and resulting in continuous improvement. Dewey emphasized the importance of reflection in the learning process. AI-driven analytics and feedback provide detailed insights, promoting reflection and self-assessment.
Lifelong learning	AI-powered continuous learning platforms	AI platforms provide courses or resources for continuous, ongoing education, enabling students to update their knowledge and develop new skills. Dewey supported the idea of lifelong education. AI platforms provide a wide range of courses and resources that support lifelong learning and contribute to professional development.
Self-Learning	AI chatbots	"AI Chatbot serves as an effective tool in building a virtual assistant, a virtual practice medium that allows students to interact, inquire, and experience 24/7 from anywhere. With an AI Chatbot, students will receive support tailored to their individual needs, desires, and levels of self-awareness. Moreover, AI Chatbot provides a suitable environment for developing self-learning competence for students" (Lan & Giam, 2024).

Another major branch of Dewey's theory is a form of learning by doing. Note that "AI is also a form of learning by doing. It allows machines to learn from experiences, adapt to new inputs, and perform complex tasks, much like the process of learning through hands-on experiences and reflection in humans. It is just learning from what humans have done for years and documented digitally" (O'Byrne, 2024).

A closer look at the fundamental beliefs of Dewey helped us realize that "John Dewey's idea of experimentalism remains relevant to education today… Examining experimentalism through a new lens can help better understand the relationship with experiences, or the lack thereof. Educators should be encouraged and reminded to review curriculum decisions with experimentalism being considered" (Holt, 2020). Dewey emphasized the importance of hands-on experience and the connection of classroom learning to real-world situations. Dewey's philosophy of education is centered on experiential learning and fosters critical thinking.

4.2 RQ2 – Are there any points of intersection between AI-powered software solutions and principles of learning and teaching based on Deweyan theory?

Having analyzed the critical positions of J. Dewey's philosophy in relation to AI technologies and their application in IT education (Table 3), we identified three key intersections between J. Dewey's philosophy and IT education with AI (Figure 7). It is actually the answer to RQ2 – Are there any points of intersection between AI-powered software solutions and principles of learning and teaching based on Deweyan theory? First, we completed a flowchart summarizing J. Dewey's ideas related to education. Then, we compiled another flowchart of the AI solutions for training IT majors. The in-depth analysis of these two flowcharts enabled us to identify the points of intersection between John Dewey's philosophy and IT education, particularly in the context of AI. These points of intersection are the following: Dewey emphasized the value of student-centered learning that resonates with personalized learning provided by AI; Dewey delineated that education is a two-way street that echoes with customized feedback and individualized instructions that AI can provide depending on the student's level of knowledge; Dewey supported the idea of lifelong education. AI platforms offer a wide range of courses and resources that support lifelong learning and contribute to the professional development of IT majors.

To extract these points of intersection, the schematic representation of J. Dewey's philosophy was first developed (Figure 5). The principal components of education and training with AI were then visualized (Figure 6).

Block One (Figure 5) represents major characteristics of J. Dewey's learning theory, his principles related to education, and his professional standpoints. Experience and education – two milestones of J. Dewey's beliefs. It is essential to note that "The history of educational theory is marked by opposition between the idea that education is development from within and that it is formation from without; that it is based upon natural endowments and that education is a process of overcoming natural inclination and substituting in its place habits acquired under external pressure" (Dewey, 1938).

Correspondingly, in Block Two (Figure 6), the visual representation of key characteristics of IT education involving AI technological advancements is shown.

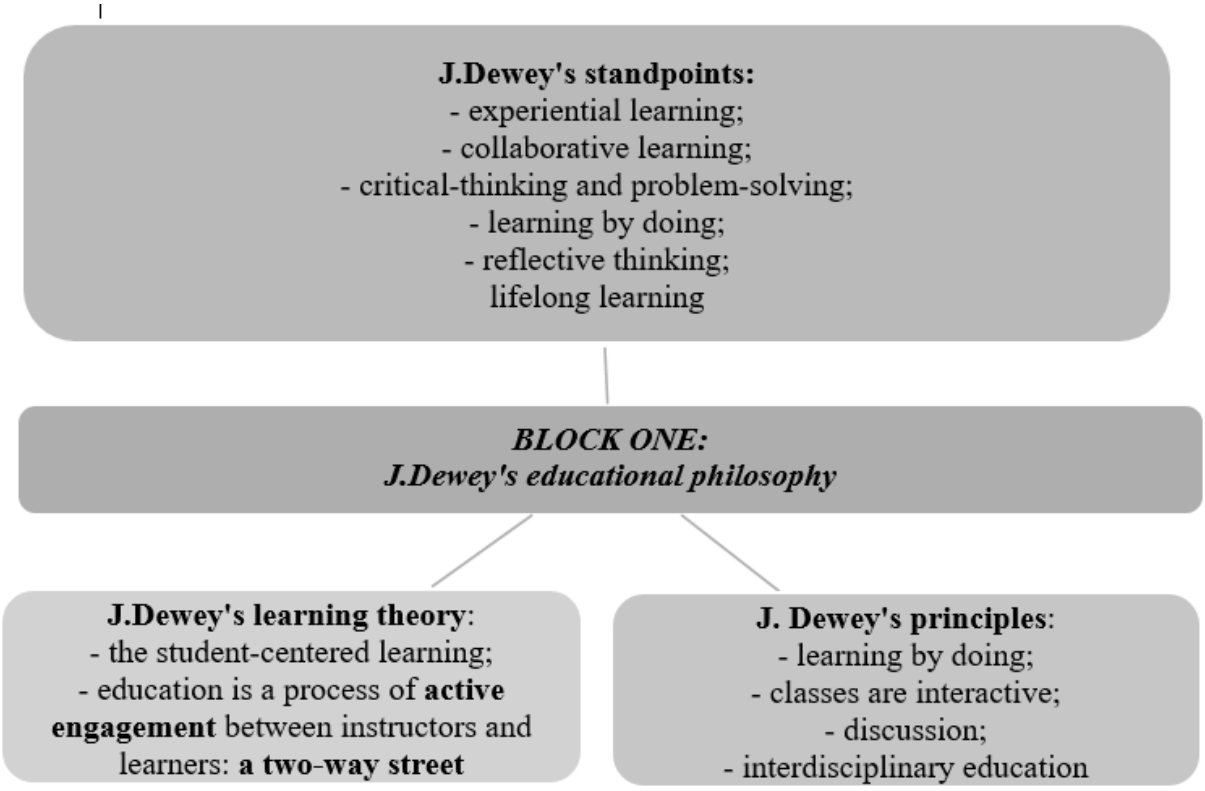

Figure 5: Flowchart: J. Dewey's educational philosophy

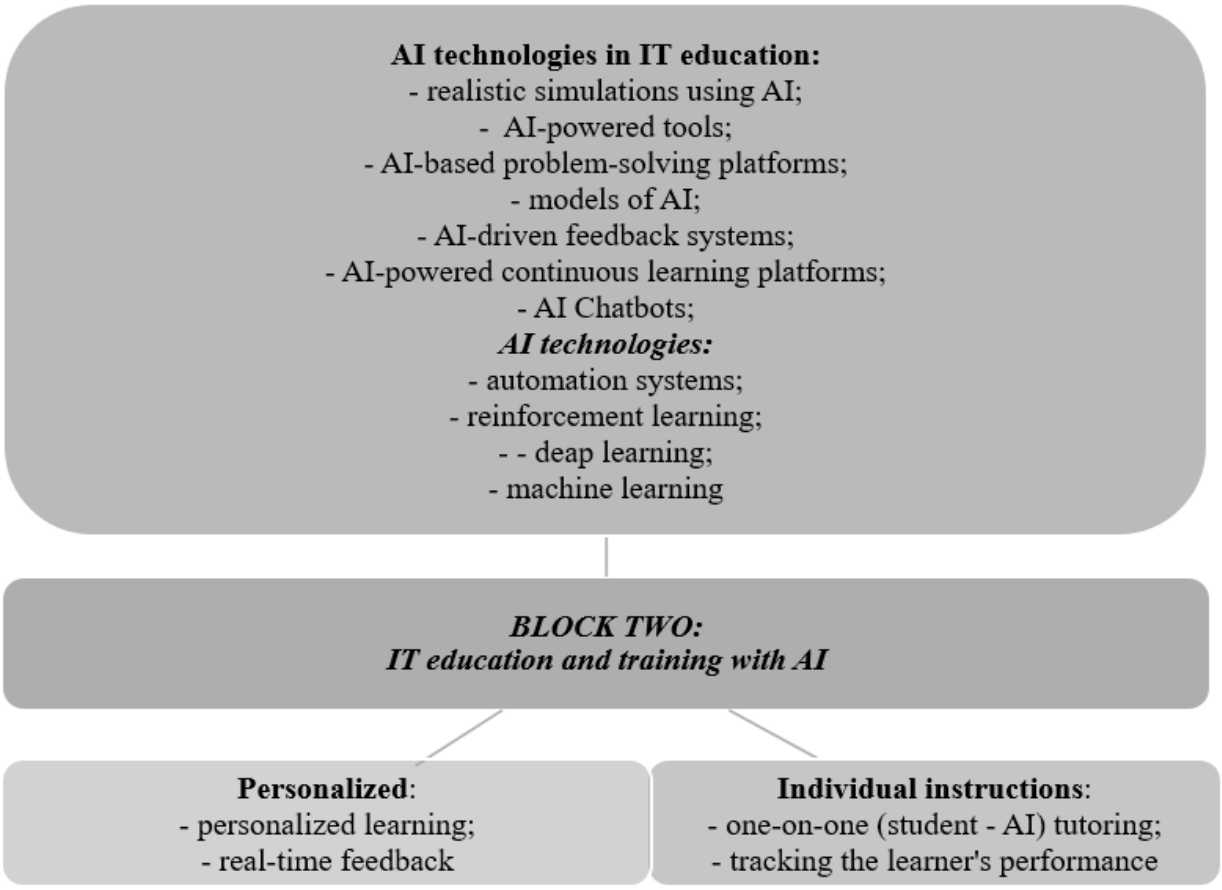

Figure 6: Flowchart: IT education and training with AI

Summarizing Blocks One and Two information, Block Three (Figure 7) represents the intersection points of J. Dewey's philosophy and IT education with AI.

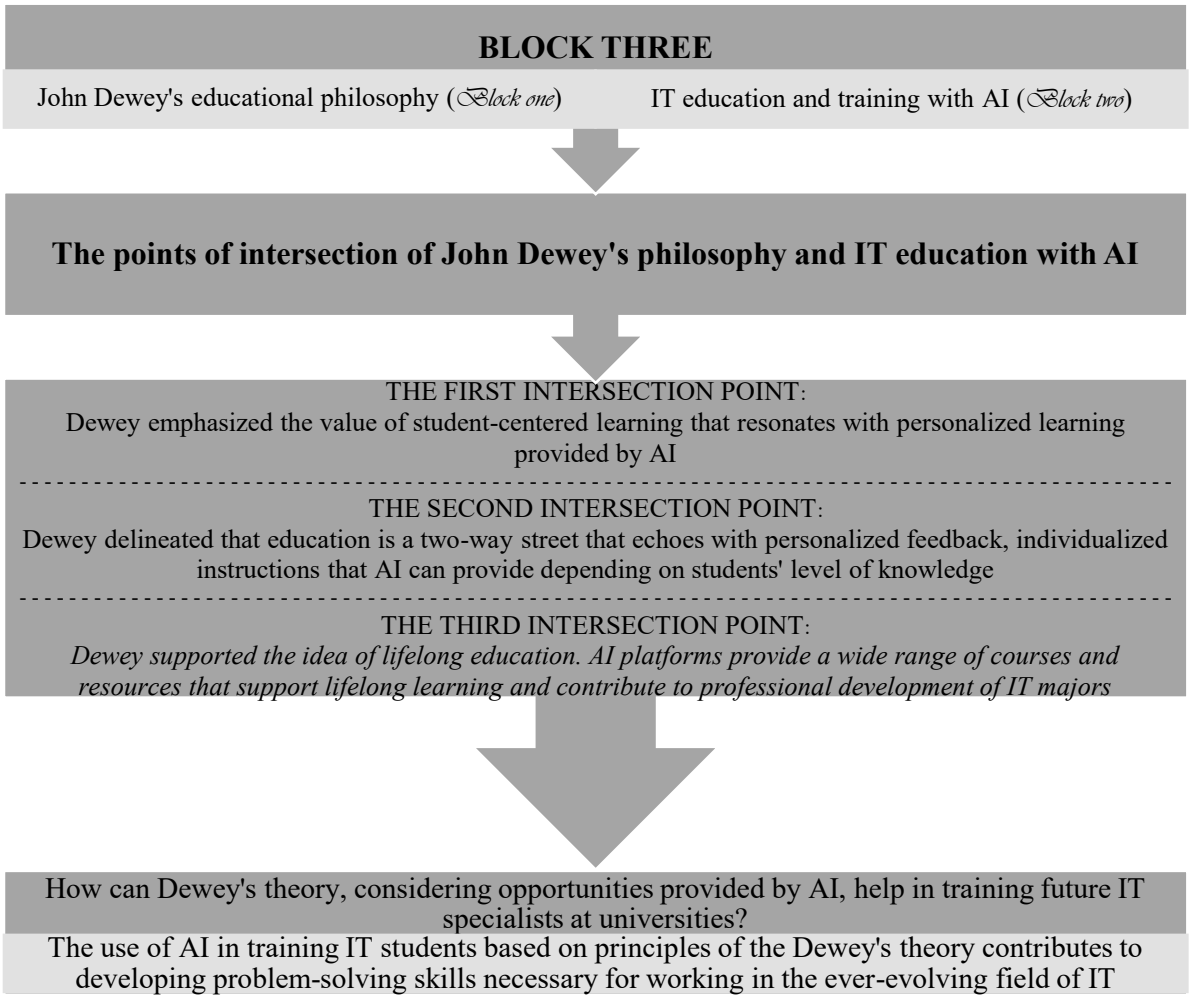

Figure 7: Flowchart: J. Dewey's educational philosophy and training of IT majors with AI use

This flowchart (Figure 7) represents Dewey's educational philosophy, mirroring the fundamental principles (active participation, personalized learning experiences, fostering critical thinking and problem-solving, and student-centered learning).

4.3 The RQ3 – How can Dewey's theory help in training IT majors? (If it really can help)

The RQ3 – How can Dewey's theory help in training IT majors? (If it really can help)– is the conceptual point of the study. The answer is that Dewey's theory comprises a set of principles and instructional concepts (such as experiential learning and collaborative learning) that are described in detail and clearly to understand. These principles emphasize a learner's active role in acquiring knowledge. Conversely, AI has recently emerged but is already being actively used in the education of IT majors. AI is a leading internet-available technology that is incorporated into the professional training of IT specialists. By analyzing and comparing modern AI capabilities with well-known Dewey principles, teachers can receive help in training IT majors. Every AI resource is used deliberately by the teacher.

5. CONCLUSIONS

Concluding the conducted analysis aimed at distinguishing the correlation between (1) providing education for future specialists in the IT area using AI and (2) J. Dewey's ideas, the new results are outlined. This research has important implications for IT educators. Two new research results are valuable.

New result 1.

Study outcomes determine the correlated relationships between (1) and (2). Theoretically substantiated that experimental learning correlates "back and forth" with (hereinafter referred to as ⇿) realistic simulations using AI, collaborative learning ⇿ AI-powered tools, critical thinking and problem-solving ⇿ AI-based problem-solving platforms, learning by doing ⇿ AI-models, reflective thinking ⇿ AI-driven feedback systems, lifelong learning ⇿ AI-powered continuous learning platforms, self-learning ⇿ AI chatbots (Table 3).

New result 2.

This work indicates the intersection points between the value of AI technology in the youth IT path and Dewey's theory. The described "all-embracing" teaching strategy, which integrates Dewey's educational foundation with AI applications for IT majors, cultivates the problem-solving skills essential for success in the rapidly evolving field of IT.

Future research will focus on verifying (by empirical research results) the theoretical conclusions outlined in this research.

6. LIMITATIONS

The study is subject to several limitations, including the database restriction; keywords, their structure, and sensitivity; the time frame and related limitations; bias; a lack of empirical validation; and the process of technological evolution.

The database restriction limits the generalizability of the study's results. The bibliometric analysis relied exclusively on Scopus as the primary database. Although Scopus provides extensive coverage of peer-reviewed literature, relevant publications indexed in other databases (e.g., Web of Science or Google Scholar) might have been overlooked.

Another potential limitation concerns bias. The qualitative comparison between Dewey's theoretical principles and AI technologies in IT education involves a degree of subjective interpretation. However, efforts were made to ensure methodological consistency, transparency, and rigor. Potentially, bias cannot be entirely excluded.

This study is primarily descriptive and analytical in nature. At the same time, it identifies theoretical intersections and proposes conceptual alignments. Given the rapid pace of AI development, the findings may quickly become outdated. New AI-driven tools and pedagogical models could substantially shift the relationship between Dewey's philosophy and the relevance of AI technology in IT education.

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Conflict of interest

There are no conflict giving details thereof.

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ШТУЧНИЙ ІНТЕЛЕКТ ТА ФІЛОСОФІЯ ДЖОНА ДЬЮЇ В ІТ-ОСВІТІ

Анотація. *Метою даного дослідження є з'ясування взаємозв'язку між ІТ-освітою, у якій сьогодні використовується ШІ, та моделлю освіти, запропонованою Джоном Дьюї. У ході наукового дослідження з'ясовано, що навчання через досвід (experiential learning) можливе з використанням інструментів ШІ, а саме – симуляторів із ШІ; спільне навчання (collaborative learning) реалізується за допомогою сучасних інструментів ШІ-комунікації; розвиток критичного мислення, важливість якого підкреслював Д. Дьюї, сьогодні уможливлюється завдяки деяким ШІ-платформам для оптимізації знань; а навчання через діяльність (learning by doing) відбувається у процесі використання ШІ-моделей. Доведено, що формуванню рефлексивного мислення сприяють ШІ-інструменти; навчання протягом життя (lifelong learning) супроводжується сьогодні завданнями на ШІ-платформах для постійного вдосконалення знань; а ефективному самонавчанню сприяють ШІ-чатботи. Було визначено такі точки перетину: (1) Джон Дьюї підкреслює – навчання орієнтоване на студента, застосування ж ШІ в освітньому процесі (зокрема у проєктно-орієнтованому навчанні) уможливлює урізноманітнення завдань та форм подання інформації кожному, хто навчається; (2) бачення Д. Дьюї освітнього процесу як двосторонньої взаємодії перегукується зі здатністю ШІ забезпечувати умови для індивідуалізації освітніх траєкторій; (3) ідея Дьюї про освіту впродовж життя реалізується в існуванні численних ШІ-платформ із широким вибором курсів та ресурсів, що сприяють безперервному професійному розвитку студентів ІТ-спеціальностей. Штучний інтелект (ШІ) має потенціал індивідуалізувати навчання, сприяти експериментальному досвіду та розвитку критичного мислення серед здобувачів освіти. Це узгоджується з переконаннями Джона Дьюї про освіту як процес активної участі у навчально-пізнавальній діяльності, що є релевантним у сучасну епоху ШІ.*

Ключові слова: *штучний інтелект, ІТ-освіта, філософія, Джон Дьюї.*