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Digital Transformation in Secondary Education in Greece: A Pedagogical Proposal Combining Flipped Learning, Artificial Intelligence, and Collaborative Inclusive Teaching

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Abstract

The rapid evolution of digital technologies has brought about significant changes in the contemporary educational landscape, creating new opportunities for the implementation of innovative pedagogical approaches. This study proposes a comprehensive teaching framework that combines flipped learning, collaborative teaching, and the use of artificial intelligence tools within the context of secondary education in Greece. Emphasis is placed on strengthening student-centered learning, developing digital literacy, and promoting inclusive education through differentiated teaching practices. The proposed approach aligns with contemporary educational trends that highlight the importance of active participation, critical thinking, and the effective use of digital environments. Artificial intelligence is examined as a tool to support personalized learning and accessibility, particularly for students with diverse learning profiles. At the same time, collaborative learning promotes social interaction and knowledge construction. This study contributes to the scholarly discourse on the digital transformation of education in Greece by proposing a theoretically grounded and pedagogically applicable teaching model. The study introduces an "AI-Enhanced Inclusive Flipped Learning Model" as a flexible and scalable framework for the digital transformation of secondary education.

Keywords: Flipped learning; Artificial intelligence; Digital literacy; Inclusive education; Collaborative learning; Secondary education.

1. Introduction

Education in the 21st century is undergoing a period of intense transformation, as rapid technological advancements and the proliferation of digital media are having a decisive impact on teaching practices and learning environments (Redecker, 2020; Selwyn, 2021; Engeness, 2021).). In this context, the concept of the digital transformation of education is not limited to the simple integration of technological tools, but is linked to deeper changes in the way knowledge is structured, skills are developed, and learning experiences are constructed (Bond et al., 2020; OECD, 2019). In the Greek educational context, the need to upgrade teaching approaches is becoming increasingly urgent, especially following the experience of distance learning during the pandemic, which highlighted both the strengths and weaknesses of the education system regarding the use of digital technologies (Pokhrel & Chhetri, 2021; Karalis & Raikou, 2020). The transition to more flexible and student-centered learning models requires the adoption of innovative pedagogical practices that enhance student engagement, autonomy, and critical thinking (Voogt et al., 2021; Chan et al., 2021).

In this context, the flipped classroom emerges as one of the most promising approaches, as it shifts the basic transmission of knowledge outside the classroom and utilizes class time for higher-order cognitive activities, such as analysis, synthesis, and collaboration (Akçayır & Akçayır, 2018; Lo & Hew, 2020). At the same time, collaborative

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learning strengthens the social dimension of education by promoting interaction, knowledge negotiation, and the development of communication skills (Johnson & Johnson, 2020; Gillies, 2020; Cabero-Almenara et al., 2023). The dimension of inclusive education is also of particular importance, as it seeks to create learning environments that meet the needs of all students, regardless of learning difficulties or diverse characteristics (Florian, 2021; Ainscow, 2020). Differentiated instruction and the use of multiple modes of presenting and expressing knowledge are essential prerequisites for achieving educational inclusion (Tomlinson, 2021; Simos et al., 2025; Simos & Katsiampoura, 2025; Simos, 2025).

At the same time, the integration of artificial intelligence (AI) into education creates new possibilities for personalizing learning and supporting students with different learning profiles (Holmes et al., 2022; Zawacki-Richter et al., 2019). AI applications, such as adaptive learning systems and creative support tools, can serve as catalysts for enhancing digital literacy and active participation (Luckin et al., 2022; Drigas & Karyotaki, 2021). The concept of digital literacy, moreover, is a core 21st-century skill, linking the ability to critically evaluate information with the creative use of digital tools (Ng, 2021; Ferrari, 2020). In the Greek educational context, strengthening digital literacy is a strategic goal, as it is directly linked to preparing students to participate in a digitally shaped society (European Commission, 2021; Suzer et al., 2024).

Based on the above, it is clear that the need to combine pedagogical approaches and technological tools is imperative. This study proposes a comprehensive teaching model that integrates flipped learning, collaborative teaching, and artificial intelligence, with the aim of enhancing active learning, inclusion, and digital literacy in secondary education in Greece. More specifically, the present study seeks to explore how flipped learning can support student engagement, how collaborative practices can contribute to inclusive education, and how artificial intelligence tools can facilitate differentiated instruction and personalized learning (Falloon, 2020)..

2. Theoretical Framework

2.1. Flipped Learning and Student-Centered Teaching

Flipped learning (flipped classroom) is one of the most dynamic pedagogical approaches in contemporary education, as it reshapes the structure of the teaching process, by moving the initial engagement with the subject matter outside the classroom and utilizing class time for active learning activities (Lo & Hew, 2020; Bond, 2020). This approach falls within the broader framework of student-centered teaching, where the student takes an active role in the learning process and knowledge is constructed through interaction, inquiry, and experience (Voogt et al., 2021).

According to recent research, flipped learning significantly contributes to enhancing student engagement, as it allows the pace of learning to be adapted to individual needs and promotes student autonomy (Akçayır & Akçayır, 2018; Strelan et al., 2020). The ability to access educational materials outside the classroom via digital platforms creates a flexible learning environment that supports personalized learning and knowledge reinforcement (Chen et al., 2021). At the same time, utilizing classroom time for higher-order cognitive activities, such as analysis, problem-solving, and collaborative inquiry, enhances the development of critical thinking and metacognitive skills (Lo et al., 2021; Tang et al., 2020; Dede, 2014; Roll & Wylie, 2016).). This shift from passive knowledge acquisition to active participation is directly linked to the principles of constructivist learning, according to which knowledge is not transmitted but constructed through student activity.

Flipped learning also enhances the potential for differentiated instruction, as it enables teachers to design multiple learning pathways and cater to different learning profiles (Bishop & Verleger, 2013; Lo & Hew, 2020). In this context, the use of multimedia materials, interactive applications, and digital tools contributes to enhancing the accessibility and understanding of knowledge (Bond et al., 2020; Khademi-Vidra, 2025). Of particular importance is the contribution of flipped learning to the development of self-regulation skills, as students are called upon to organize their time, manage learning materials, and take responsibility for their own learning (Zimmerman, 2020; Lai & Hwang, 2021). This process enhances metacognitive awareness and strategic learning skills, elements considered critical for lifelong learning.

In the Greek educational context, the implementation of flipped learning is of particular interest, as it can serve as a tool for modernizing teaching practices and enhancing students' active participation (Karalis & Raikou, 2020). The use of digital platforms and tools, combined with appropriately designed in-class activities, can contribute to the creation of a more flexible and dynamic learning environment.

In summary, flipped learning is not merely a technique for reorganizing instruction, but a comprehensive pedagogical model that promotes a student-centered approach, active learning, and the development of 21st-century skills. Its

integration into modern teaching practices, combined with digital tools and collaborative activities, creates the conditions for a substantial transformation of the educational process (Dewey, 1938; Bruner, 1966; Piaget, 1972).

2.2. Collaborative Learning and Inclusive Education

Collaborative learning is a cornerstone of contemporary pedagogical approaches, as it promotes students' active participation and the social construction of knowledge through interactive learning processes (Gillies, 2020; Johnson & Johnson, 2020). In this context, learning is not viewed as an individual activity, but as a social process in which students interact, exchange ideas, and co-construct knowledge (Vygotsky, 1978; Dillenbourg, 1999).

Recent research confirms that collaborative learning contributes significantly to the development of cognitive, social, and emotional skills, such as communication, empathy, problem-solving, and critical thinking (Laal & Ghodsi, 2012; Gillies, 2020). Furthermore, working in groups fosters responsibility and a sense of belonging, creating a positive learning environment that encourages the participation of all students (Slavin, 2014; OECD, 2023a).

Collaborative learning is directly linked to the philosophy of inclusive education, which seeks to ensure equal learning opportunities for all students, regardless of their learning differences (Ainscow, 2020; Florian, 2021). Inclusion is not limited to the mere physical presence of students in the classroom, but requires the creation of pedagogical practices that enable the participation and success of all (UNESCO, 2020; UNESCO, 2021). In this context, collaborative learning serves as a key mechanism for promoting inclusion, as it enables mutual support among students and differentiated participation in the learning process (Gillies, 2020; Tomlinson, 2021). Mixed-ability groups, in which students with different ability levels coexist, create opportunities for peer-to-peer support and the development of social skills (Johnson & Johnson, 2020).

Differentiated instruction is also a critical component of inclusive education, as it allows for the adaptation of instructional content, activities, and resources to students' needs (Tomlinson, 2021). The use of multiple modes of presenting knowledge (visual, verbal, digital) and expressing learning enhances understanding and engagement (Rose & Meyer, 2002; CAST, 2021).Digital tools also play a significant role in contemporary inclusive education, facilitating access to knowledge and supporting differentiated instruction (European Commission, 2022). The use of digital platforms, interactive applications, and collaboration tools enables the active participation of all students and enhances learning engagement (Bond et al., 2020).

In the Greek educational context, promoting inclusive education is a key priority; however, challenges remain regarding adequate student support and teacher training (Ainscow, 2020; Florian, 2021). The integration of collaborative practices and the use of digital tools can contribute significantly to addressing these challenges by creating more flexible and adaptive learning environments.

Overall, collaborative learning and inclusive education are interrelated concepts that enhance the learning process and promote the creation of a fair and effective educational system. Their combined application, in conjunction with the capabilities of digital technologies, can lead to a substantial improvement in educational practice in secondary education in Greece (UNESCO, 2023).

2.3. Artificial Intelligence and Digital Literacy in Education

The rapid development of artificial intelligence (AI) in recent years has brought about significant changes in the field of education, creating new opportunities to support learning and improve teaching practices (Holmes et al., 2022; Zawacki-Richter et al., 2019; Simos et al., 2026a; Simos et al., 2026b; Simos et al., 2026; Drigas et al., 2023). The integration of AI tools into learning environments is not limited to the automation of processes, but extends to the personalization of learning, the adaptation of educational content, and the enhancement of student engagement (Luckin et al., 2022; Kirkwood & Price, 2014; Siemens, 2005; Bates, 2019). According to recent studies, artificial intelligence systems can serve as support mechanisms for the development of adaptive learning environments that respond to the needs and abilities of each student (Chen et al., 2020; Holmes et al., 2022; Holmes et al., 2023a). The ability to provide immediate feedback, the analysis of learning data, and the personalization of instruction are key advantages of utilizing artificial intelligence in the educational process (Zawacki-Richter et al., 2019; Leaton, 2020).

Particular emphasis is placed on the contribution of artificial intelligence to inclusive education, as it can support students with diverse learning profiles by offering personalized learning pathways and adapted educational materials (Drigas & Karyotaki, 2021; Holmes et al., 2022; Politi-Georgousi et al., 2020; Drigas et al., 2016; Kefalis et al., 2025). Applications of artificial intelligence, such as intelligent teaching systems and creative support tools, help reduce

learning inequalities and enhance accessibility (Luckin et al., 2022; Simos et al., 2026d; Simos et al., 2026e; Simos, 2025b).

In this context, the contribution of Drigas and his colleagues is particularly significant, as they have highlighted the importance of artificial intelligence and digital technologies in the development of cognitive and metacognitive skills, as well as in improving the learning process (Drigas & Karyotaki, 2021; Drigas & Mitsea, 2020). Their studies underscore the role of digital tools as catalysts for enhancing self-regulation, emotional intelligence, and active learning. At the same time, the concept of digital literacy is a fundamental skill of the 21st century, as it is linked to students' ability to search for, evaluate, and utilize information in digital environments (Ng, 2021; Ferrari, 2020; Potyrała & Tomczyk, 2021).

Digital literacy is not limited to technical skills in using technologies, but also includes the development of critical thinking, creativity, and responsible digital behavior (European Commission, 2021). The integration of artificial intelligence into education contributes significantly to enhancing digital literacy, as students are encouraged to interact with advanced digital tools and develop skills related to information management and solving complex problems (Redecker, 2020; Luckin et al., 2022). Furthermore, the use of artificial intelligence tools enhances creativity and collaboration, offering new possibilities for shaping innovative learning experiences.In the Greek educational context, the integration of artificial intelligence and the development of digital literacy are strategic priorities, as they are linked to the broader goal of the digital transformation of education (European Commission, 2021).

However, the effective use of these technologies requires appropriate training for teachers and the design of pedagogically sound instructional interventions. In summary, artificial intelligence and digital literacy are critical factors in shaping the contemporary educational landscape. Their combined use, in conjunction with pedagogical approaches such as flipped learning and collaborative teaching, creates the conditions for the development of a flexible, dynamic, and inclusive learning environment in secondary education in Greece.

3. Pedagogical Approach and Instructional Design

The present study adopts a conceptual and pedagogical design approach. Rather than focusing on empirical data collection, it aims to develop a theoretically grounded and practically applicable teaching model. The proposed framework is based on a synthesis of contemporary research findings and educational theories, with the goal of offering a structured approach that can be adapted to real classroom conditions. Emphasis is placed on the coherence between pedagogical principles and the use of digital technologies, as well as on the potential for inclusive and differentiated teaching practices (Zainuddin et al., 2020).

3.1. Structure of the Pedagogical Approach

The proposed pedagogical approach is based on a synthetic pedagogical model that integrates flipped learning, collaborative teaching, and the use of digital technologies, with the aim of enhancing active learning and inclusive education within the context of secondary education in Greece (Lo & Hew, 2020; Bond et al., 2020). The model's structure is organized into three basic phases, which reflect the principles of student-centered teaching and differentiated learning (Tomlinson, 2021; Voogt et al., 2021). The proposed model, hereafter referred to as the "AI-Enhanced Inclusive Flipped Learning Model", integrates flipped learning, collaborative teaching, and artificial intelligence within a unified pedagogical framework (Guillén-Gámez et al., 2022; Popenici & Kerr, 2017).).

The first phase involves pre-class preparation (pre-class phase), during which students are initially introduced to the subject matter through digital materials such as videos, interactive presentations, or multimedia environments (Chen et al., 2021; Tang et al., 2020). This process allows for personalized learning, as students can engage with the content at their own pace, enhancing their autonomy and self-regulation in learning (Zimmerman, 2020; Lai & Hwang, 2021). At the same time, a shared knowledge base is created, which is then utilized during in-class instruction (Lo et al., 2021).

The second phase involves the in-class learning process (in-class phase), where instructional time is devoted to higher-order cognitive activities, such as analysis, synthesis, and collaborative inquiry (Gillies, 2020; Johnson & Johnson, 2020). Students are organized into small, heterogeneous groups and participate in collaborative activities that foster critical thinking and social interaction (Slavin, 2014; OECD, 2019). This process aligns with the principles of constructivist learning, according to which knowledge is constructed through active participation.

Particular emphasis is placed on designing activities that allow for multiple modes of participation in order to support diverse learning profiles (CAST, 2021; Tomlinson, 2021; Drigas & Sideraki, 2021; Chaidi & Drigas, 2022). The use of diverse forms of educational materials and digital tools enhances understanding and learning engagement (Bond et al.,

2020). At the same time, the collaborative aspect of learning serves as a support mechanism for students with learning difficulties, promoting inclusion (Florian, 2021).

The third phase concerns feedback and reflection (post-class phase), where students are asked to process the learning experience and evaluate the learning process (Hattie, 2018). Feedback can take various forms, such as reflective activities, collaborative discussions, or digital recordings, enhancing metacognitive development and a deeper understanding of knowledge (Zimmerman, 2020;Mitsea et al., 2022; Mitsea et al., 2023; Fullan & Langworthy, 2014).

Overall, the structure of the proposed instructional approach combines contemporary pedagogical principles with the use of digital technologies, creating a flexible and dynamic learning environment that meets the needs of modern education (Redecker, 2020; European Commission, 2023).

As an example of how this model can be applied, students may initially engage with digital learning material at home, such as short videos or interactive presentations, in order to become familiar with the basic concepts of a lesson. During classroom time, they can work collaboratively in small groups to analyze, discuss, and apply this knowledge through guided activities. At the same time, digital tools and artificial intelligence applications can be used to provide feedback, support understanding, and adapt the learning process to different needs. Finally, students may reflect on their learning through short written or digital responses, strengthening their metacognitive skills (Anderson, 2008; Laurillard, 2012; Biggs & Tang, 2011).This structured approach allows for the systematic integration of pedagogical principles and digital technologies, ensuring coherence between instructional design, student engagement, and inclusive learning practices.

3.2. Integration of Digital Tools and Artificial Intelligence

The integration of digital tools and artificial intelligence applications into the teaching process is a key element of the proposed pedagogical model, as it enhances student engagement, personalizes learning, and diversifies instruction (Bond et al., 2020; Redecker, 2020). Modern digital learning environments offer the possibility of creating interactive and dynamic learning experiences that meet the demands of the digital age (European Commission, 2021).Within the proposed approach, digital tools are utilized as means to enhance collaboration and active student participation (Chaidi et al., 2021; Moraiti et al., 2022). Collaborative learning platforms, such as digital content-sharing and organization environments, enable the collective construction of knowledge and the development of communication and collaboration skills (Dillenbourg, 1999; Gillies, 2020). The use of such tools contributes to the creation of an open learning ecosystem, where students actively participate in the learning process.

Particular emphasis is placed on the use of artificial intelligence tools, which serve as support mechanisms for differentiated instruction and personalized learning (Holmes et al., 2019; Holmes et al., 2022; Luckin et al., 2022). These applications can provide immediate feedback, adapt learning content to students' needs, and support the creation of educational materials in simplified or enriched formats (Zawacki-Richter et al., 2019).The contribution of artificial intelligence is particularly significant in inclusive education, as it facilitates access to knowledge for students with diverse learning profiles (Drigas & Karyotaki, 2021; Holmes et al., 2022; Holmes et al., 2023b). By adapting content and providing alternative learning methods, artificial intelligence tools help reduce learning inequalities and strengthen educational inclusion (Luckin et al., 2022).Furthermore, the use of artificial intelligence is directly linked to the development of digital literacy skills, as students are called upon to interact with technologically advanced environments and develop abilities related to searching, evaluating, and creating digital information (Ng, 2021; Ferrari, 2020). This process enhances not only technical skills but also critical thinking and creativity.Digital tools also play a significant role in providing immediate and formative feedback, which is a key component of effective learning (Hattie, 2018). This feedback can be personalized, allowing students to identify their mistakes and improve their performance in real time.

In the Greek educational context, the use of digital tools and artificial intelligence is linked to the broader goal of the digital transformation of education; however, appropriate training for teachers and the development of pedagogically grounded practices are required (European Commission, 2021; Redecker, 2020). The successful integration of these technologies depends on designing activities that leverage their capabilities in a meaningful and pedagogically grounded way. Overall, the integration of digital tools and artificial intelligence into the proposed teaching model is not merely a technological addition, but a key element of a modern pedagogical framework that promotes active learning, differentiation, and inclusive education. In this sense, artificial intelligence does not replace the teacher but acts as a complementary tool that enhances pedagogical decision-making and supports more effective and inclusive learning environments.

3.3. Inclusive and Differentiated Teaching Practices

Inclusive education is a fundamental principle of modern pedagogy, as it aims to create learning environments that meet the needs of all students, regardless of cognitive, social, or emotional differences (Ainscow, 2020; Florian, 2021). In this context, differentiated instruction emerges as a key tool for supporting educational inclusion, allowing for the adaptation of content, process, and learning outcomes to students' specific needs (Tomlinson, 2021).The proposed instructional approach incorporates principles of differentiated instruction, providing multiple learning pathways and alternative modes of engagement. The use of diverse forms of instructional materials, such as multimedia content, visual representations, and interactive applications, enhances understanding of the content and allows students to engage with the material in ways that align with their learning characteristics (CAST, 2021; Rose & Meyer, 2002).

Of particular importance is the principle of Universal Design for Learning (UDL), which advocates for the creation of flexible learning environments that offer multiple modes of representation, expression, and engagement (CAST, 2021). The application of UDL principles helps reduce barriers to learning and enhances the participation of all students in the teaching process. Collaborative learning complements differentiation, as it allows for peer support among students and their active participation in mixed-ability groups (Gillies, 2020; Johnson & Johnson, 2020). Through collaboration, students have the opportunity to exchange ideas, negotiate knowledge, and develop social skills, while simultaneously boosting their self-confidence and sense of belonging (OECD, 2023b).The use of artificial intelligence further enhances differentiated instruction, as it allows for the adaptation of learning content in real time, depending on students' needs and performance (Drigas & Karyotaki, 2021; Holmes et al., 2022). These tools can support students with learning difficulties by providing simplified material, guided activities, and personalized feedback (Luckin et al., 2022).

Of equal importance is the development of a positive and supportive learning environment that encourages the participation of all students and promotes respect for diversity (Florian, 2021). The role of the teacher is shifting from a knowledge transmitter to a facilitator and supporter of the learning process, ensuring that every student has the opportunity to participate actively and meaningfully. The implementation of inclusive and differentiated practices is linked to the need to modernize teaching and promote equity in education (Ainscow, 2020; European Commission, 2021). The integration of pedagogical approaches that leverage collaboration, differentiation, and digital technologies can contribute significantly to the creation of a more equitable and effective educational system.

In summary, inclusive and differentiated teaching practices are a key component of the proposed model, enhancing learning engagement, understanding, and skill development for all students. The combined application of the principles of differentiation, collaborative learning, and artificial intelligence creates the conditions for a substantial transformation of the educational process.

4. Discussion

4.1. Pedagogical Benefits and Educational Impact

The proposed teaching approach, which combines flipped learning, collaborative teaching, and the use of artificial intelligence, appears to align with current trends in educational research and offer significant pedagogical benefits (Pergantis & Drigas, 2024; Pergantis et al., 2025). According to recent studies, the integration of student-centered and technology-supported approaches enhances learning engagement, active participation, and the development of high-level skills (Bond et al., 2020; Voogt et al., 2021; Ng, 2021).

One of the key advantages of flipped learning is its ability to transform the student's role from a passive recipient of knowledge to an active co-creator of the learning process (Lo & Hew, 2020). Utilizing classroom time for collaborative inquiry and problem-solving activities significantly contributes to the development of critical thinking and creativity (Strelan et al., 2020; Tang et al., 2020). These findings are also confirmed by international research, which shows that flipped classroom models lead to improved academic performance and student engagement (Chen et al., 2021).

Collaborative learning enhances students' cognitive and social development by promoting interaction, the exchange of ideas, and the collective construction of knowledge (Gillies, 2020; Johnson & Johnson, 2020). Working in mixed-ability groups helps develop communication and empathy skills, while also boosting students' self-confidence and sense of belonging (OECD, 2023a). This aspect is particularly important for creating a positive and supportive learning environment.

The integration of artificial intelligence offers additional pedagogical benefits, as it enables personalized learning and the provision of tailored feedback (Holmes et al., 2022; Luckin et al., 2022). AI tools can serve as support mechanisms

for students with diverse learning profiles, helping to reduce learning inequalities and promote educational inclusion (Drigas & Karyotaki, 2021). Furthermore, their use enhances the development of digital literacy and critical thinking skills, which are considered essential for modern society (Ng, 2021; Redecker, 2020). Of particular importance is the contribution of the proposed model to the promotion of inclusive education. The combined use of collaborative learning, differentiation, and digital tools creates a learning environment that meets the needs of all students (Florian, 2021; Tomlinson, 2021). The ability to adapt content and activities enhances the engagement and success of students with learning difficulties.

In the Greek educational context, the implementation of such a model can contribute significantly to the modernization of teaching practices and the enhancement of educational quality (Karalis & Raikou, 2020). The integration of digital technologies and innovative pedagogical approaches responds to the needs of contemporary educational reality and prepares students to participate in a digitally shaped society (European Commission, 2021).

Overall, the proposed teaching approach offers significant advantages in terms of enhancing student engagement, developing 21st-century skills, and promoting inclusive education. Its alignment with contemporary research findings suggests that it can serve as an effective and practical model for secondary education in Greece.

4.2. Challenges and Future Prospects in the Greek Educational Context

Despite the significant pedagogical benefits arising from the integration of innovative teaching approaches and digital technologies, their implementation in the Greek educational system is accompanied by a series of challenges. These challenges relate both to structural constraints and to issues of pedagogical adaptation and teacher training (OECD, 2019; European Commission, 2021).One of the key obstacles concerns the adequate training of teachers in the use of digital tools and artificial intelligence applications. Despite the growing importance of digital pedagogy, many teachers continue to face difficulties in integrating these technologies into their teaching practice (Redecker, 2020; Selwyn, 2021).

The lack of systematic training and support limits the effective use of the opportunities offered by digital media. Furthermore, issues related to infrastructure and access to technological equipment are significant factors affecting the implementation of such approaches. Although improvements have been made in recent years, inequalities in access to digital resources persist, a fact that may exacerbate existing educational inequalities (OECD, 2023b). A particular challenge is the integration of artificial intelligence into education in a pedagogically sound manner. The use of AI tools requires not only technical knowledge but also a critical understanding of their capabilities and limitations (Holmes et al., 2022; Luckin et al., 2022).

At the same time, ethical and deontological issues arise, such as the protection of personal data and ensuring transparency in the use of algorithms (Zawacki-Richter et al., 2019). However, despite the challenges, the prospects for utilizing such instructional models in the Greek educational context are particularly positive. The growing emphasis on the digital transformation of education and the integration of relevant policies at the European level create a favorable environment for the implementation of innovative practices (European Commission, 2021).Systematic teacher training, the strengthening of digital infrastructure, and the development of pedagogically grounded teaching models are key prerequisites for the successful integration of technologies into the educational process (Redecker, 2020). At the same time, collaboration between research institutions and educational organizations can contribute to the dissemination of best practices and the development of innovative educational applications.

In this context, the proposed teaching approach can serve as a model for integrating technology and contemporary pedagogical practices into secondary education in Greece. Its flexibility and adaptability allow for its application in different learning environments, while simultaneously enhancing student engagement and inclusion(Simos, 2025c; Simos &Karabatzaki, 2025; Simos, 2026).In conclusion, although the implementation of innovative teaching approaches in the Greek educational system presents challenges, the opportunities they offer for improving the quality of education are significant. The use of digital technologies and artificial intelligence, combined with modern pedagogical practices, can contribute substantially to the development of a modern and effective educational system.

5. Conclusion

This study highlighted the importance of integrating modern pedagogical approaches and digital technologies into the context of secondary education in Greece, proposing a synthetic teaching model that combines flipped learning, collaborative teaching, and the use of artificial intelligence. The need to transform the educational process is becoming

increasingly urgent, as the demands of modern society require the development of skills such as critical thinking, creativity, collaboration, and digital literacy (Redecker, 2020; European Commission, 2021).

The study's findings suggest that the combined use of the above approaches can significantly contribute to enhancing students' engagement and active participation. Flipped learning shifts the focus of teaching from the transmission of knowledge to its exploration and application, while collaborative learning enhances the collective construction of knowledge and the development of social skills (Lo & Hew, 2020; Gillies, 2020). At the same time, the use of artificial intelligence creates new opportunities for personalizing learning and supporting students with different learning profiles (Holmes et al., 2022; Drigas & Karyotaki, 2021).

Of particular importance is the contribution of the proposed model to the promotion of inclusive education. The integration of differentiated teaching practices and the use of digital tools help create a learning environment that meets the needs of all students, enhancing engagement and academic success (Florian, 2021; Tomlinson, 2021). This approach aligns with contemporary educational policies that promote equity and accessibility in education. Despite the challenges associated with implementing such innovative approaches, such as the need for teacher training and the strengthening of digital infrastructure, the emerging prospects are particularly positive. The gradual integration of technology into teaching and the development of pedagogically grounded models can contribute to the modernization of educational practice and the improvement of the quality of education in Greece (OECD, 2023a).

Overall, this proposal highlights the potential for creating a flexible, dynamic, and inclusive learning environment that meets the needs of modern education. The use of artificial intelligence, combined with pedagogical approaches that promote active learning and collaboration, can serve as a key pillar for transforming the educational process in secondary education in Greece.

Compliance with ethical standards

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Disclosure of conflict of interest

The Authors proclaim no conflict of interest.

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