

Creating a Professional Development Program to Enhance General Education Teachers' Skills in Applying Digital Learning Platforms for Teaching and Learning

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Abstract—This study aims to develop a comprehensive professional development program to help general education teachers integrate digital learning platforms into the teaching and learning process using the ADDIE instructional design model. The program is structured around the five key phases of the ADDIE model - Analysis, Design, Development, Implementation, and Evaluation - providing a systematic framework for effective digital platform integration. The training program focuses on equipping teachers with the necessary skills to select, implement, and evaluate digital tools in various instructional contexts. The program development process considers best practices in instructional design and technology-enhanced learning while addressing teachers' pedagogical needs. Special emphasis is placed on fostering engagement, adaptability, and practical application of digital resources in blended and online learning environments. By aligning professional development with the ADDIE model, this study provides a structured approach to supporting teachers in effectively utilizing digital platforms for instructional purposes. Future research will focus on piloting the program and assessing its impact on teachers' digital competencies and classroom practices.

Keywords— Digital learning platforms, instructional design, ADDIE model, teacher professional development, technology integration in education.

I. INTRODUCTION

In the 21st century, digital learning platforms have become an integral part of modern education, offering new possibilities for student-centred, collaborative, and knowledge-building learning approaches [1], [2], [3]. These platforms support deeper learning by providing features such as learning process management, integrated content creation, communication scaffolding, community-building tools, and learning analytics [4], [5]. When effectively implemented, they enhance teaching and learning practices, making education more interactive, engaging, and adaptable to individual student needs [3].

Digital learning platforms come in various forms, including e-learning systems, learning management systems (LMS), virtual learning environments (VLE), specialized educational tools, and mobile applications designed to enhance learning [6], [7], [3]. As advancements in educational technology (EdTech) continue to evolve,

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strategic European policies such as the Digital Education Action Plan (2021–2027) and the Policies for the Digital Transformation of School Education (2023) emphasize the need for innovative, research-based technologies that add pedagogical value to the teaching and learning process [3], [2]. Our research primarily focuses on the most advanced digital learning solutions, which we categorize as Learning Experience Platforms (LXP) such as Eduten Playground, LearnLab and similar technologies [6]. These platforms as well as other LXP based educational technologies create a foundation for innovative pedagogical strategies rooted in constructivist learning theories.

Since 2019, our research team has actively collaborated with schools and educators to implement digital learning platforms in practice, leveraging insights from the DIMA_LT project (<https://di-ma.lt>). The integration of Learning Experience Platforms (LXP) has been a key focus in our international research collaborations, including efforts between Germany and Lithuania [8]. As part of these initiatives, researchers have investigated the impact of Bettermarks (Germany) and Eduten Playground (Lithuania) - two LXP-based platforms designed for mathematics education on K-12 learning environments. Findings from case studies [8] in German and Lithuanian schools suggest that LXP-based platforms offer significant pedagogical benefits, such as increasing student engagement, supporting differentiated instruction, and improving learning outcomes. Teachers reported that these platforms allowed them to monitor student progress more effectively and provide real-time formative feedback. However, challenges remain, including teacher training gaps, the need for structured instructional design models, and the integration of these platforms into existing curricula.

International research also indicates that, despite the potential benefits of digital learning platforms, educators face a range of challenges in their implementation, particularly when adopting constructivist methodologies [9], [3]. These challenges include: adapting to constructivist teaching approaches [10], [5]; implementing new pedagogical strategies [11]; creating and curating digital educational content [12], [2], [13]; designing and managing the learning process effectively [14], [15]; monitoring student progress, evaluating learning outcomes, and providing meaningful feedback [16], [15], [17]; facilitating and managing student collaboration in digital environments [18].

Therefore, in order to have these platforms successfully integrated into general education, teachers must possess the necessary skills to utilize them effectively [2], [3]. Higher education institutions, particularly those responsible for teacher training and professional development, play a vital role in preparing educators to navigate and implement technology-driven instruction. Consequently, these institutions are actively seeking effective models to equip teachers with the competencies required for modern educational environments [19], [20]. Professional development programs are essential in this regard, enabling

teachers to design, implement, and assess instructional strategies that incorporate digital tools effectively.

Instructional design models provide a structured approach to designing, developing, implementing, and evaluating technology-supported learning experiences. By applying these models, teachers can systematically enhance their ability to create engaging, pedagogically sound, and technology-integrated instructional strategies that meet the demands of modern education. The concept of instructional design supports learner-centered, technology-enhanced pedagogy, enabling teachers to make informed decisions about technology use and develop structured lesson plans that effectively integrate digital tools [19], [20]. Additionally, instructional design helps educators justify their choice of technology and create well-planned scenarios for implementing and managing effective lessons and learning activities [20]. Several instructional design models, such as TPACK [21], ADDIE [22], 4C/ID [23], CAFE [24], and ELED [25], are widely analyzed in the scientific literature and serve as foundational frameworks for developing professional development programs.

This study employs a theoretical and conceptual research approach to develop a professional training program designed to enhance general education teachers' competencies in integrating digital learning platforms. The study is structured around the ADDIE instructional design model, which serves as the foundational framework for program development. This model is widely recognized for its systematic and iterative nature, ensuring that training programs are effectively designed, implemented, and evaluated. The ADDIE model consists of five essential phases: Analysis, Design, Development, Implementation, and Evaluation. Each phase is systematically examined and contextualized to align with best practices in digital learning integration and teacher professional development. A systematic literature review on existing frameworks in teacher training and digital education was conducted to inform the program design. The primary sources used in this theoretical analysis include research on teacher training models and digital competency frameworks [21]; studies on instructional design and technology-enhanced learning (e.g., [24], empirical findings on the effectiveness of digital learning tools and platforms in K-12 education, and best practices in online and blended learning methodologies. The study utilized a structured review of peer-reviewed academic sources, books, and policy reports to ensure a comprehensive theoretical foundation. The literature review process involved systematic searches in databases such as APA PsycInfo, ERIC, JSTOR, Google Scholar, and ScienceDirect. The search terms included “digital learning platforms,” “teacher professional development,” “instructional technology,” “blended learning,” and “ADDIE model in education.” The selection criteria for sources included publications from 2005 onwards, ensuring relevance to modern educational technology practices, studies focusing on K-12 teacher training and digital pedagogy, and empirical and theoretical research articles that examine instructional design models in teacher education. Based on the synthesized literature and

theoretical models, a structured training program was conceptualized.

In line with this, the present article aims to present a comprehensive professional development program that helps general education teachers integrate digital learning platforms into the teaching-learning process. The program focuses on equipping teachers with the necessary skills to select, implement, and evaluate digital tools in various instructional contexts while addressing their pedagogical needs. Special emphasis is placed on engagement, adaptability, and the practical application of digital resources in blended and online learning environments. By aligning professional development with the ADDIE model, this program provides a structured approach to supporting teachers in effectively utilizing digital platforms for instructional purposes. The findings serve as a foundational guide for educators, policymakers, and instructional designers seeking to enhance digital competency among general education teachers. However, there are some limitations, as a theoretical study, this article does not include empirical testing or direct implementation of the training program. Moreover, future research should focus on piloting the program in educational settings and assessing its impact through qualitative and quantitative methodologies.

II. MATERIALS AND METHODS

This section of the article explores the development and implementation process of the professional development program for teachers, along with its content, based on the ADDIE model.

The ADDIE model is a widely used framework for instructional design and training development [26], [27]. It consists of five key phases: Analysis, Design, Development, Implementation, and Evaluation [28]. Originally developed in 1967 by Reiser and Mollanda, the model provides a structured and systematic approach to creating instructional materials and learning experiences. The primary goal of the ADDIE model is to facilitate the design of effective and efficient educational programs by structuring the development of teaching strategies, instructional methods, media, and learning materials [29], [30]. The process follows a sequential order, ensuring that each phase builds upon the previous one. However, a core feature of this model is its iterative nature, allowing for continuous feedback and improvement at each stage.

The Analysis phase serves as the foundation of the instructional design process, focusing on determining what learners need to learn. This involves conducting a needs assessment, identifying learning gaps and challenges, and performing a task analysis to define the necessary skills and knowledge required for the learning process. At this stage, the key outcomes include learner profiles, identification of specific learning needs, and an in-depth analysis of tasks based on these needs [31]. By systematically gathering and evaluating this information, instructional designers can ensure that the learning objectives align with the actual requirements of the target audience.

In the Analysis phase, teachers participating in the program learn how to assess the diversity and needs of their students to effectively implement digital learning platforms. This analysis is particularly important when integrating digital tools into teaching and learning, as research suggests that technology-enhanced learning environments can significantly increase student engagement and participation. By understanding their students' technological skills, learning preferences, and potential challenges, teachers can select and adapt digital learning platforms that best meet these needs.

Additionally, participants explore a variety of digital learning platforms and their capabilities. It is essential to align learning objectives with platform capabilities to ensure that the chosen digital tools effectively support instructional goals. Studies indicate that when using digital learning platforms, teachers should base their pedagogical decisions on students' prior experiences, motivation, and self-regulation abilities. This knowledge allows teachers to create personalized, engaging, and effective learning experiences, ultimately enhancing student outcomes while also developing their own competencies in utilizing digital tools for educational purposes.

Based on their assessment of learner diversity and needs, as well as an analysis of technological diversity, teachers progress to the next stage—instructional content design. The Design phase plays a fundamental role in the development of learning materials. During this stage, the structure and specifics of the materials are outlined, guided by the overall development and implementation process [32]. This phase requires meticulous planning and a thorough understanding of the educational goals to be achieved, along with strategies for designing materials that effectively meet these objectives. Key outputs of this phase include the syllabus and lesson plan, which serve as essential blueprints for crafting suitable teaching and learning materials.

Effective instructional content planning for teaching and learning with digital learning platforms involves four interconnected levels: course, module, lesson, and activity. At the course level, teachers learn to develop a comprehensive annual plan that aligns with national curriculum requirements, ensuring that both standard and self-developed materials meet educational guidelines. This stage also involves strategizing the integration of various learning formats - traditional, distance, blended, and hybrid - to create a flexible and cohesive learning experience. Moving to the module level, teachers learn how to divide courses into structured modules that are often organized on a weekly basis, with each module assigned a specific title and clearly defined learning objectives. This modular approach allows for efficient content delivery, student progress tracking, and optimized use of digital platforms for resource sharing and interaction. Within each module, the lesson level focuses on structuring learning content around specific topics. Teachers learn how to establish learning outcomes, determine the most effective delivery methods and allocate appropriate time for each lesson, ensuring seamless integration of digital platforms to

enhance instruction. Finally, at the activity level, teachers curate and organize learning materials such as textbook excerpts, digital resources, and interactive assignments. Step-by-step guidance is provided for project-based tasks and collaborative activities, with the careful selection of educational technologies like interactive quizzes, virtual labs, or shared documents to maximize student engagement. Maintaining a consistent structure in weekly instructional plans helps create a predictable learning environment, fostering effective study habits, increasing engagement, and leveraging the full potential of digital learning platforms.

The third stage, Development, involves transforming the instructional design into practical, functional learning activities. During this phase, the planned blueprint is brought to life by creating educational materials and resources. At this stage, digital learning platforms are integrated into the teaching and learning process, ensuring they align with the instructional goals and enhance the learning experience [33].

After completing the instructional content planning phase, teachers move on to designing engaging and purposeful learning activities that support students in achieving their learning objectives. These activities can take various forms, including collaborative projects, individual assignments, quizzes, discussions, problem-solving tasks, research initiatives, presentations, case studies, and role-playing exercises. The process of organizing these activities typically follows three stages: preparation, engagement, and reflection. During the preparation stage, teachers set clear expectations, prepare materials, and provide guidance on the task objectives and processes. This stage also involves learning how to familiarize students with any digital tools that will be used to ensure they feel confident in navigating the learning platform. The engagement stage focuses on active participation, where students collaborate and interact while teachers facilitate the process, offering support and ensuring that the chosen digital tools enhance the learning experience. The final stage, reflection and evaluation, involves encouraging students to reflect on their performance, analyze their learning, and receive constructive feedback. Teachers can use these insights to adjust future activities and improve the overall learning experience. When selecting or designing activities, teachers should consider their students' specific needs, including those with special educational requirements. If using online resources, activities should be adapted to fit the classroom context. Teachers can also test their instructions with a student to ensure clarity and accessibility. When introducing new educational technologies, such as Canvas or Google Classroom, it is essential to provide clear demonstrations and conduct pre-tests to confirm functionality and accessibility. Digital learning platforms offer diverse activity options, including reflective tasks like online discussions and summaries, productive activities such as content creation and project collaboration, synchronous interactions through live polls and webinars, and asynchronous activities like forum

discussions and independent tasks. By thoughtfully designing and implementing these activities, teachers can create more engaging, accessible, and effective learning experiences for their students.

The Implementation phase involves putting the developed learning system into practical use within the educational setting [34], [35]. This stage focuses on applying the instructional strategies, tools, and materials designed during earlier phases to facilitate actual learning experiences.

To ensure effective student engagement and active participation in instructional interactions, it is crucial to provide appropriate support and feedback, offer clear instructions, and carefully select educational technologies that facilitate communication and learning. Interaction between learners and learning content requires the use of accessible and well-structured materials in diverse formats. While this may seem straightforward, implementing it effectively in digital environments can be challenging. Students should be encouraged to explore learning materials in ways that suit their preferences, and whenever possible, teachers should offer multiple content formats to accommodate different learning needs, particularly for students with special educational requirements. In teacher-learner interaction, maintaining consistent communication through text, audio, and video messages is essential. Virtual communication tools should be leveraged to provide timely responses, ongoing support, and structured check-ins to track student progress, deliver feedback, and foster motivation. Using diverse communication strategies - such as one-on-one meetings, small group discussions, and whole-class interactions - can further enhance engagement. Additionally, incorporating a mix of text-based and multimedia messages helps strengthen social, cognitive, and emotional connections in the learning process. Peer interaction is equally important, and teachers should facilitate collaborative opportunities by forming learning groups and encouraging teamwork. Recognizing students' differences and assigning leadership roles can promote peer learning and support. Learner-content engagement should also serve as preparation for meaningful collaboration, ensuring that students review materials before engaging in discussions and group work. While peer interaction happens primarily among students, teachers should oversee the process, offering guidance and support when needed, as it closely aligns with teacher-learner engagement.

In general education, parental involvement plays a significant role in student success. Providing parents with guidance, practical tips, and resources can help them support their children's learning at home. Organizing training sessions or informational workshops can further equip parents with strategies to assist their children in working with digital learning platforms effectively. Choosing the right educational technologies is crucial in fostering successful collaboration and pedagogical interaction in digital learning. In this context, technology acts as a mediator that facilitates engagement across all interaction types. Teachers are encouraged to refer to educational technology classifications and carefully

evaluate which tools best align with instructional goals, learning content, and planned activities. Thoughtful selection and integration of these tools can significantly enhance the learning experience, improve engagement, and create a more effective and interactive digital learning environment.

The Evaluation phase in this learning process continues until the formative evaluation is completed, with the primary objective of identifying areas that require revisions and improvements [31], [36].

Assessing student performance in digital learning platforms can present various challenges, and teachers are encouraged to apply both summative and formative assessment strategies to achieve a comprehensive understanding of student progress. One effective approach is to use multiple data sources, going beyond traditional summative methods like tests and exams to consider formative indicators such as students' contributions to discussions, the frequency with which they lead group projects, share learning resources, or assist peers. Additionally, teachers should make use of the features offered by educational technologies, as many digital learning platforms automatically track performance data and provide learning analytics that can deliver valuable insights into student engagement and achievement. Peer assessment can also be a useful strategy, especially during collaborative projects, as it helps students develop a sense of accountability and learn from each other's strengths. Self-assessment strategies further support this process by encouraging learners to reflect on their progress and identify areas for improvement. Involving parents in the assessment process, particularly by seeking their feedback on their children's online learning activities at home, can also provide important context about a student's learning experience. Importantly, assessments should not only measure content mastery but also serve as tools to promote reflective thinking and independent learning skills. By encouraging students to evaluate their own performance, teachers help foster self-directed learning habits that are crucial for success in online and hybrid educational settings.

Figure 1. provides the overall structure of the developed program.

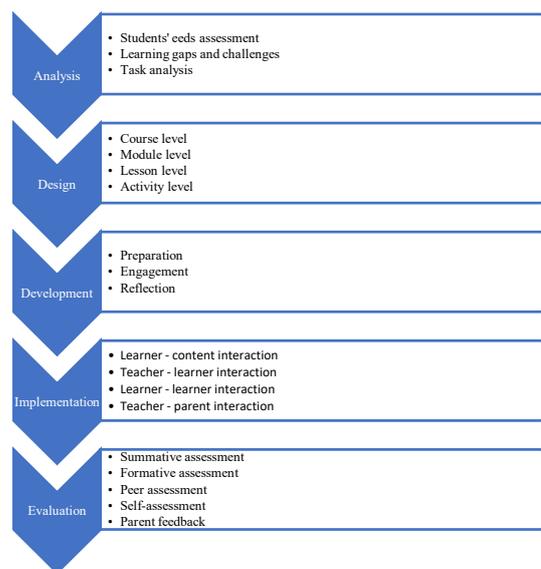


Fig. 1. The structure of the professional development program for teachers.

III.RESULTS AND DISCUSSION

This study highlights the importance of structured professional development programs in equipping teachers with the necessary skills to effectively integrate digital learning platforms into their teaching practices. By following the ADDIE instructional design model, the program developed provided a systematic approach to training teachers, ensuring that they could assess their students' needs, select appropriate digital tools, and implement engaging, technology-enhanced instructional strategies.

The piloting of the program involved 61 in-service teachers, with 37 participants from Lithuania and 24 from Germany. The participants were general education school teachers, who taught a variety of subjects, including mathematics, science, and English language studies, and worked with students ranging from primary education to gymnasium level.

The professional development program comprised 40 academic hours and was delivered through four separate training sessions via ZOOM platform held on different dates between March and May 2024. Each session lasted six academic hours. In addition to the online sessions, participants were assigned homework tasks and engaged in self-paced learning through the Moodle e-learning system, where they studied relevant topics asynchronously.

Before the training began, the researchers, who also served as trainers, provided a detailed explanation of the study procedures and obtained informed consent from all participants. They were assured that their identities would remain confidential, with names replaced by numerical identifiers during data analysis.

To evaluate the impact of the training, pre- and post-training self-assessment questionnaires were administered, measuring teachers' competencies in ADDIE-based

instructional skills within the context of digital learning platforms. Additionally, open-ended questionnaires were used to collect qualitative insights regarding teachers' expectations and perceptions of the training experience. Future research works will discuss data and findings on piloting the program and assessing its impact on teachers' digital competencies and classroom practices.

The pilot results in general revealed that participants greatly appreciated the structured nature of the training program. The thoughtful combination of live instruction and self-paced tasks effectively supported both skill acquisition and reflective learning. Teachers reported a noticeable improvement in their ability to assess learners' needs, design instruction grounded in the ADDIE model, and select digital tools that aligned with pedagogical goals. The program's emphasis on learner-centered pedagogy and technological adaptability further contributed to an increase in teachers' confidence and efficacy in integrating digital platforms into their teaching. Additionally, the implementation of strong ethical and confidentiality protocols fostered a sense of trust among participants and reinforced the integrity of the research process.

Moreover, the study reinforced the idea that effective technology integration in education requires more than just access to digital tools. It necessitates comprehensive teacher training that aligns with pedagogical goals and technological affordances. The confidentiality measures and ethical considerations ensured that participants felt comfortable engaging in the research, thereby strengthening the validity of the study's findings.

Future research should focus on evaluating the long-term impact of the program by assessing teachers' classroom practices, student engagement, and learning outcomes. Additionally, expanding the study to include a broader and more diverse group of educators could provide further insights into the scalability and adaptability of the ADDIE-based professional development model.

VI. CONCLUSIONS

This study confirms the relevance and applicability of the ADDIE instructional design model as a systematic and iterative framework for developing professional development programs aimed at enhancing teachers' digital competencies. Each phase of the model, namely Analysis, Design, Development, Implementation, and Evaluation, was effectively contextualized to address pedagogical needs in technology-enhanced learning environments. The model's structure ensured that professional development was grounded in evidence-based instructional strategies and could be adapted for diverse educational settings.

The study demonstrates that well-structured professional development programs, particularly those designed with the ADDIE model, can comprehensively address the pedagogical and technological challenges faced by teachers in integrating digital learning platforms. The program not only introduced educators to various digital tools but also enabled them to align these tools with specific instructional goals, student needs, and learning contexts. This alignment

is critical for promoting learner-centered teaching practices and personalized instruction in digital and hybrid environments.

The findings highlight the need for structured, evidence-based teacher training frameworks in response to growing digital transformation demands in education. The program serves as a replicable model for teacher education institutions and policy makers, especially in light of European digital education strategies. It demonstrates how instructional design models can bridge the gap between technological innovation and practical classroom application.

While the theoretical model and pilot implementation yielded promising results, the study acknowledges its limitations due to the lack of long-term, large-scale empirical evaluation. Future research should examine the sustained impact of the training on classroom practices, student engagement, and academic outcomes. Longitudinal and comparative studies could further validate the scalability and adaptability of the ADDIE-based professional development approach across different educational contexts and systems.

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