

Effect of the Digital Student Cabinet on Pedagogical Support and Learning Motivation in Higher Education Institutions

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Abstract

Purpose. The purpose of the study is to empirically substantiate the pedagogical effectiveness of using a digital student account as an innovative tool of pedagogical support and motivation in the context of the digitalization of the educational process in higher education institutions, as well as to identify the relationship between the intensity of use of digital services and indicators of student engagement and academic success.

Results. The study analyzes the functional capabilities of the digital student account within the structure of the electronic information and education system of the private higher education institution "European University" and conducts a comparative analysis of the learning activities of students in the experimental and control groups. The results showed an increase in the level of academic engagement, activity, and satisfaction with the educational process among students who used the digital student account. A positive correlation was found between the intensity of use of the digital student account and the increase in academic performance, which has a nonlinear cumulative nature. It has been proven that the integration of digital services and a digital teacher avatar helps to reduce barriers to seeking pedagogical support, increase learning self-regulation, and stabilize educational outcomes.

Scientific novelty. The scientific novelty of the study lies in the empirical modeling of the pedagogical effect of using a digital student account through quantitative analysis of the relationship between the intensity of digital activity and the academic performance of higher education students, as well as in the conceptualization of the digital student account as an innovative pedagogical tool, rather than just an information and organizational service.

Practical value. The practical significance of the study lies in the possibility of using the results obtained for the design and improvement of electronic information and educational systems in higher education institutions, increasing the effectiveness of pedagogical support and student motivation, as well as for substantiating management decisions

regarding the introduction of digital innovations into the educational process.

Keywords: Digital Student Account, Digitalization of Education, Digital University, Digital Avatar, Digitalization, Innovative Activity in Higher Education.

Introduction

The current stage of higher education development is characterized by a profound digital transformation that encompasses not only the technological aspects of organizing the educational process but also changes in pedagogical approaches, models of interaction between learning participants, and tools for supporting learning activities. In these conditions, the formation of an electronic information and educational system of a higher education institution as a holistic digital environment capable of ensuring the accessibility, continuity, and personalization of learning becomes particularly relevant. Digital platforms, student accounts, adaptive educational services, and learning analytics tools are gradually transforming from auxiliary tools into key elements of the pedagogical infrastructure that directly affect the quality of the educational process and learning outcomes.

Innovative activities in the field of education and pedagogy are increasingly associated with the introduction of digital solutions aimed at supporting students' learning autonomy, developing their motivation, and increasing their involvement in the educational process. In this context, the digital student account is seen as a tool that combines organizational, communication, and pedagogical functions, creating conditions for systematic feedback, transparent assessment, and individualization of educational trajectories. At the same time, the digitization of education is not limited to the automation of management processes, but involves rethinking the role of teachers, students, and digital tools in the structure of educational interaction.

These processes are particularly important in higher education institutions, which operate in a competitive educational environment and must respond quickly to student requests, the demands of the educational services market, and trends in the European educational space. In such conditions, the introduction of a digital student

account is not only a technological innovation but also a tool for improving the quality of pedagogical support, strengthening motivational mechanisms for learning, and forming a positive educational experience. However, despite the active spread of digital solutions in higher education, the question of their real pedagogical effectiveness, in particular their impact on student engagement, academic performance, and learning behavior, requires empirical confirmation.

In this regard, it is particularly relevant to study the effects of using a digital student account as an innovative tool for pedagogical support and motivation in the context of the digitalization of the educational process.

The purpose of the study is to empirically substantiate the impact of digital student accounts on the academic performance of higher education students through an analysis of their level of engagement, academic activity, and academic success at the private higher education institution "European University."

Theoretical framework and Research Hypotheses

Contemporary scientific research in the field of education and pedagogy confirms the growing role of digital technologies as a factor in the transformation of educational processes and models of educational interaction. The works of Lysenko, Korsunova, and co-authors emphasize the potential of artificial intelligence as a tool for automating complex processes, which creates conditions for its application not only in cybersecurity but also in digital educational environments, particularly for personalizing user support and processing large volumes of data (Lysenko et al., 2024). Researchers highlight that the integration of intelligent algorithms changes the nature of human interaction with digital systems, increasing their adaptability and efficiency.

The issue of digital transformations in modern management and organizational models is also reflected in the research of Krap, Bataiev, and co-authors, who argue that digital innovations affect not only the technological aspects of organizational activity but also management approaches, decision-making culture, and interaction between entities

(Krap et al., 2024). These conclusions are especially relevant for higher education institutions, where digital platforms are increasingly becoming tools for strategic management of the educational process.

A separate line of research is devoted directly to the digitalization of higher education institutions. In the works of Tymoshenko and Yahodzinskyi, university digitalization is considered a response to contemporary challenges, particularly the need to ensure learning flexibility, personalization of educational trajectories, and increased competitiveness of higher education institutions (Tymoshenko & Yahodzinskyi, 2024). The authors emphasize that digital services should be integrated into the pedagogical logic of learning rather than limited to purely technical support functions.

Issues related to innovation potential and digital development in the European context are highlighted in studies by Kubiv, Lopushnyak, and co-authors, which demonstrate that digital innovations are a key factor in the sustainable development of institutions and in enhancing their adaptability to change (Kubiv et al., 2020; Bobro, 2024). These findings are methodologically important for analyzing digital innovations in higher education institutions, especially private ones operating in a competitive educational environment.

Empirical studies on students' choices of learning formats in the post-pandemic period show a growing preference for hybrid and digital models of education. Research by Kortemeyer, Dittmann-Domenichini, and Merki indicates that students increasingly choose flexible learning formats that allow them to combine education with other activities, while learning outcomes largely depend on the quality of digital support and the organization of the learning environment rather than on the learning format itself (Kortemeyer et al., 2025).

The conceptual foundations of digital transformation and its impact on educational practices are also presented in the works of Verina and Titko, who consider digital transformation as a systemic process of changing institutional and pedagogical models (Verina & Titko, 2019). Further research by Williamson, Eynon, and Potter emphasizes that the COVID-19 pandemic became a

catalyst for rethinking digital pedagogy and distance learning practices, while simultaneously raising questions about the quality of digital interaction and pedagogical support for students (Williamson et al., 2020). An analysis of scientific sources shows that despite a significant number of studies devoted to the digitalization of education and universities, questions about the pedagogical effectiveness of specific digital tools, in particular the digital student account, in the context of their impact on engagement, motivation, and academic performance, remain insufficiently empirically substantiated. This necessitates further research aimed at quantitatively assessing the pedagogical effects of digital innovations in higher education institutions.

Based on the theoretical analysis of digital transformation in higher education and the identified research gap regarding the empirical assessment of the pedagogical effectiveness of specific digital tools, this study assumes that the digital student account functions as an integrated pedagogical instrument that influences learning behavior, motivation, and academic outcomes.

Within this framework, the following research hypotheses were formulated:

H1. The implementation of a digital student account has a positive effect on students' academic engagement and satisfaction with pedagogical support, manifested through increased learning activity, higher levels of motivation, and improved perceptions of the educational process.

H2. There is a positive and cumulative relationship between the intensity of using the digital student account and students' academic performance, whereby higher levels of digital engagement lead to greater improvements in learning outcomes.

Research Methodology

The methodological approach of the study is aimed at empirically substantiating the pedagogical effectiveness of using a digital student account as an innovative tool for support and motivation in the context of the digitalization of the educational process. To achieve this purpose, the following tasks were set: to analyze the features of the digital student account in the structure of the electronic

information and educational system of a private higher education institution; to conduct a comparative assessment of the indicators of students' learning activities under conditions of using digital tools and in traditional learning settings; to identify the relationship between the intensity of use of the digital student account and the level of engagement, motivation, and academic performance; to model the pedagogical effects of digital support using graphical methods of visualizing results.

The empirical part of the study was conducted in September–October 2025 at the private higher education institution “European University.” The study involved 120 students from various educational programs, who were divided into an experimental group (60 people) that studied using a digital student account, and a control group (60 people) in which the educational process was carried out using traditional organizational and communication approaches. The groups were formed taking into account comparability by year of study and overall level of academic preparation.

Quantitative and qualitative research methods were used to collect empirical data. The main tools were analysis of user activity logs in the digital student account (frequency of logins, duration of use, participation in digital communications), results of current and final assessment of academic achievements, as well as student surveys on their level of satisfaction with the educational process and the quality of pedagogical support. The survey was conducted using digital forms and contained sections aimed at assessing learning motivation, the ease of use of the digital student account, and subjective perceptions of its impact on the organization of learning activities.

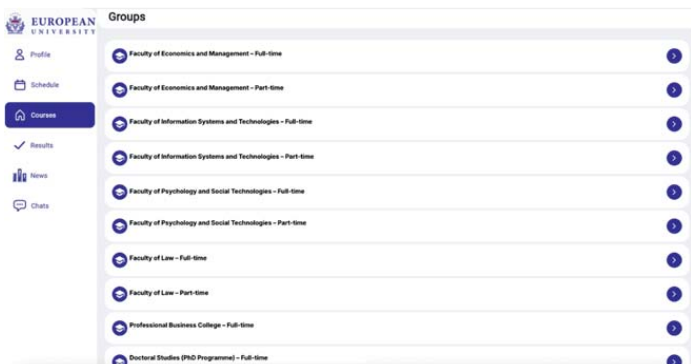
In the process of processing the results, methods of comparative analysis, generalization, and systematization of data were used. Elements of correlation analysis and graphical modeling were used to identify dependencies between the intensity of using the digital student account and the indicators of academic performance. The construction of graphs and growth curves made it possible to visualize the pedagogical effects of digital support and interpret them in the context of innovative activities in the field of education and pedagogy.

Results and Discussion The electronic information and educational system (EIES) of a higher education institution is a basic element of the digital university architecture, as it ensures the integration of electronic information and educational resources and a set of information and telecommunication technologies and technological means necessary for the full mastery of educational programs regardless of the location of the student [6, p. 94]. Within this logic, the EIES performs not only a service function, but also a pedagogical one: it creates conditions for personalized access to educational materials, ensures the continuity of “student-teacher-administration” communication, supports formative assessment, and accumulates data for educational analytics, which strengthens the motivational component of the educational process.

At the private higher education institution “European University,” the development of digital infrastructure is based on a holistic approach to the formation of the EIES as a single digital environment, the core of which is a digital student account in the form of a web/mobile application. Its architecture is based on the “single window” principle and includes authentication modules (login/registration), interface language selection, access to personal profiles, schedules, courses, groups, learning outcomes, news, and communication services (chats). This structure meets the requirements of a digital university in terms of accessibility and manageability of educational processes: students get centralized access to data and services that directly affect the planning of learning activities, ongoing progress monitoring, and support for academic interaction [4, p. 132].

Considering the interface visualization decisions presented in the application file, the European University's digital student account provides a consistent usage scenario that begins with authentication and registration, involves creating and updating a personal profile, and further interaction is implemented through navigation between the educational modules of the side menu (Profile, Schedule, Courses/Groups, Results, News, Chats) (see Figure 1).

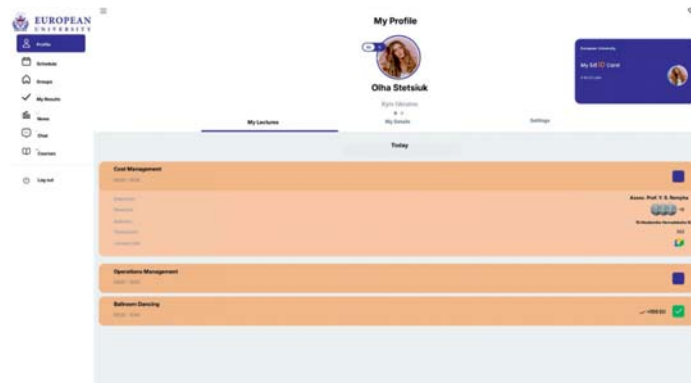
Figure 1. Interface of the module for selecting study groups and faculties in the EUni digital student account



Source: compiled by the author independently.

It is important that the “profile” in the application displays both personal data and current learning activities for the day (classes/lectures with indication of time, teacher, classroom, and link/access channel), which institutionally establishes the standard of transparency and predictability of the educational process (see Figure 2).

Figure 2. Interface of the student's personal profile and class schedule in the EUni digital student account

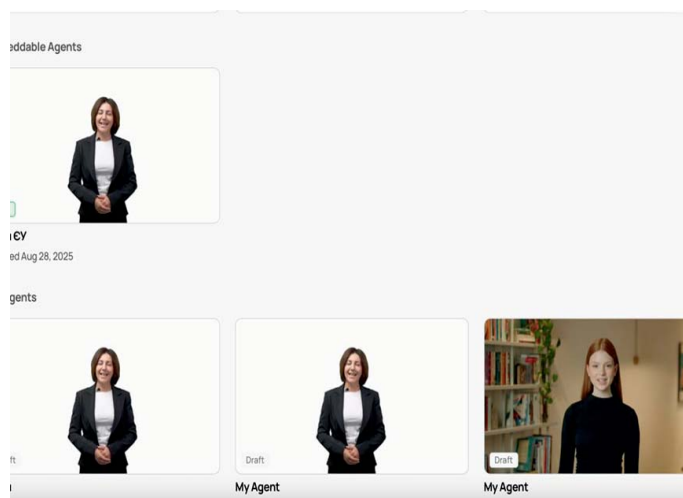


Source: compiled by the author independently.

The “Results” and “News” modules perform an additional motivational function: the first provides students with a point of self-control over their results and progress, while the second creates a sense of involvement in the university community through regular updates on events and achievements.

One of the innovative features of the EUni system is the digital teacher avatar – a virtual teaching assistant based on artificial intelligence (see Figure 3).

Figure 3. An example of a student interacting with a digital teacher avatar on the EUni platform



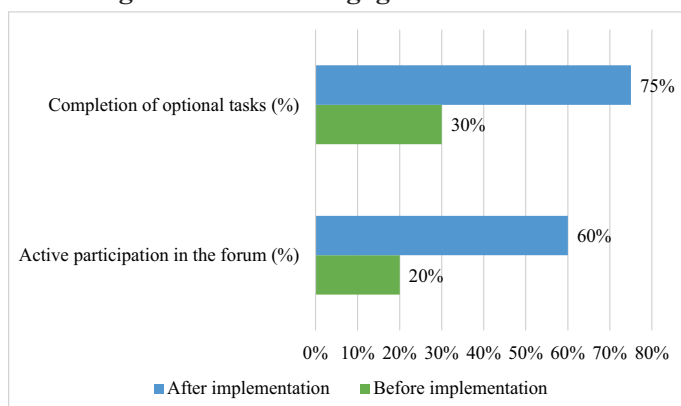
Source: created on the platform (D-ID, 2025).

This avatar can provide students with real-time consultations: answer typical questions, offer additional explanations on complex topics, and provide guidance in case of difficulties with the material. The virtual assistant works continuously, providing support at any time, which reduces dependence on the physical presence of the teacher and encourages students to actively resolve issues immediately after they arise.

To empirically confirm the effectiveness of such an innovative pedagogical tool, a study was conducted in September–October 2025 at the private higher education institution “European University,” the results of which demonstrated the positive impact of using the digital student account on key indicators of learning activity. A comparative analysis of the experimental and control groups revealed changes in the level of engagement, learning activity, and organization of the educational process, which creates a basis for further quantitative analysis of individual components of the pedagogical effect of digital tools.

The most noticeable results were obtained regarding the increase in students' engagement in the learning process (see Figure 4).

Figure 4. Student engagement indicators

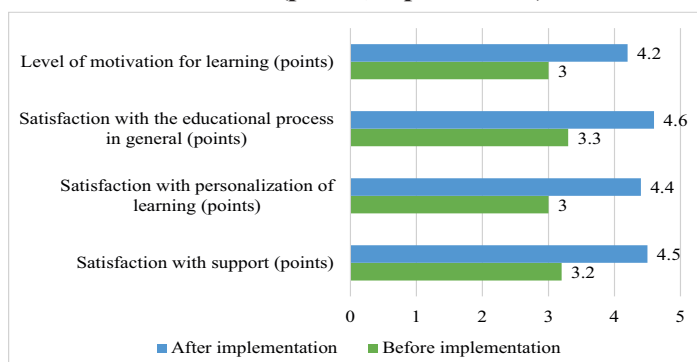


Source: results of a survey conducted by the authors.

As we can see from Figure 4, students' extracurricular learning activity has increased significantly. The average time students spent working with online learning materials increased from ~1.5 hours to ~3.8 hours per week after the implementation of the digital student account. The proportion of students who regularly participated in online forums and discussions increased from 20% to 60%. In addition, the completion of optional (additional) tasks became much more common: the proportion of students who completed such tasks rose from 30% to 75%. The data obtained during the study indicate that the introduction of digital tools stimulated students to interact more actively with learning content during out-of-class time.

In addition, a student survey on satisfaction with learning confirmed positive changes in their assessments of educational experience and motivation. Average satisfaction indicators for various aspects of the learning process increased significantly after the implementation of the digital student account (see Figure 5).

Figure 5. Student satisfaction and motivation indicators (points, 5-point scale)

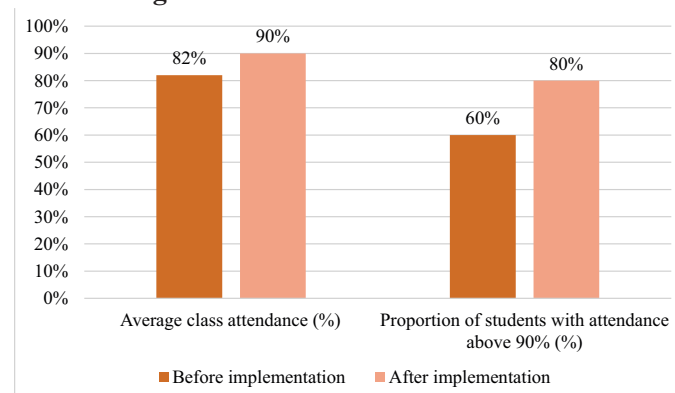


Source: results of a survey conducted by the authors.

In particular, the level of satisfaction with the support provided by the university rose from 3.2 to 4.5 points (on a 5-point scale), and satisfaction with the personalization of learning rose from 3.0 to 4.4. Similarly, the average score for overall satisfaction with the educational process increased from 3.3 to 4.6. Importantly, students' self-assessed level of learning motivation also increased (from 3.0 to 4.2), indicating a strengthening of internal motivation for learning in a digital environment.

In addition, there was an improvement in class attendance rates. During the experiment, the average attendance rate increased from 82% to 90%, and the proportion of students with attendance rates above 90% increased from 60% to 80% (see Figure 6).

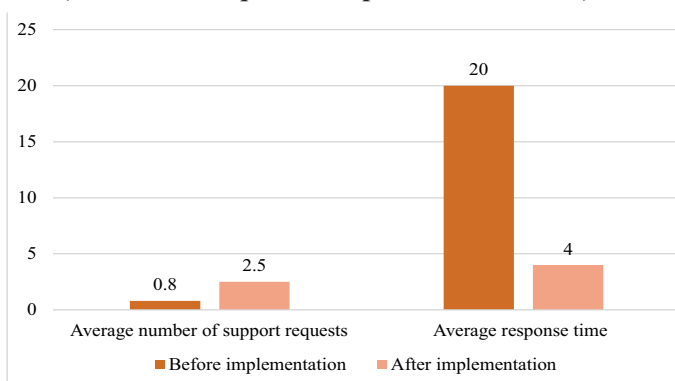
Figure 6. Class attendance rates



Source: results of a survey conducted by the authors.

The dynamics of student requests for assistance deserve special attention. As shown in Figure 7, after the implementation of the digital student account, students began to initiate support requests much more frequently: the average number of requests increased from ~0.8 to ~2.5 per student per semester.

Figure 7. Students' support requests (number of requests, response time, hours)



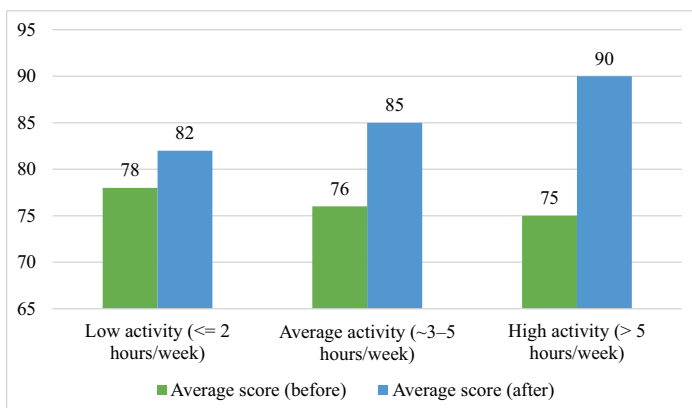
Source: results of a survey conducted by the authors.

This trend indicates that psychological barriers to receiving help have decreased. Due to the round-the-clock availability of the virtual assistant, students no longer hesitated to ask questions – they were not afraid of appearing uncertain or disturbing the teacher. At the same time, the response time to such requests has increased significantly. The average response time has been reduced from ~20 hours to ~4 hours. Automated prompts and request routing algorithms played a key role in speeding up this process, ensuring a quick initial response and redirecting more complex questions to the appropriate teachers. In other words, the digital student account ensured more timely feedback: students received answers almost immediately, which had a positive impact on their academic performance and satisfaction with their studies.

This result is consistent with the findings of contemporary researchers, who note that removing barriers to seeking help and providing timely support contribute to improving students' academic performance [1;2;3;5].

The nature of the impact of digital tools is closely related to the level of their use by students. The analysis data show a clear correlation between the intensity of work with the platform and the progress achieved in learning (see Figure 8).

Figure 8. Dependence of learning outcomes on the intensity of using the digital student account

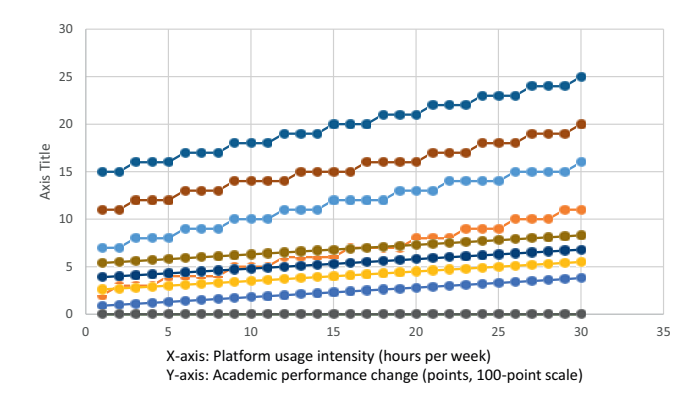


Source: results of a survey conducted by the authors.

Thus, students who actively used the digital student account (more than 5 hours/week online) increased their average score by approximately 15 points, while those with low

activity (less than 2 hours/week) increased their score by only ~4 points (on a 100-point scale). The group with average activity (about 3–5 hours/week) showed an intermediate result, improving their grades by an average of ~9 points. This trend indicates that the mere existence of the tool does not guarantee maximum effect – the decisive factor is the degree of student engagement. In other words, the more intensively the student used digital opportunities, the more significant the improvement in their academic results. Figure 9 illustrates this relationship graphically: the curve of academic performance growth rises steadily with an increase in the amount of time spent on the platform.

Figure 9. The relationship between the intensity of using the digital student account and improved academic performance



Source: results of a survey conducted by the authors.

The curve of academic performance growth demonstrates a stable positive correlation between the intensity of using the digital student account and learning outcomes. With an average platform usage time of 1.5 hours/week, the increase was 4 points, with 4.0 hours/week – 9 points, while with high intensity (6.5 hours/week), the maximum increase was recorded at 15 points. The obtained dependence is nonlinear and indicates the cumulative effect of digital pedagogical support.

The results obtained in this study provide empirical confirmation of the pedagogical effectiveness of implementing a digital student account as an integrated tool for pedagogical support and learning motivation in higher education institutions. In general, the findings support both research hypotheses formulated in the theoretical framework. In particular, the observed increase in student

engagement, learning activity, satisfaction with pedagogical support, and motivation confirms Hypothesis H1, while the identified positive cumulative relationship between the intensity of using the digital student account and academic performance improvement substantiates Hypothesis H2.

The obtained results are largely consistent with the conclusions of previous studies on the digitalization of higher education and digital pedagogy. Similar to the findings of Verina and Titko (2019), as well as Williamson, Eynon, and Potter (2020), this study confirms that digital transformation should be understood not merely as a technological shift, but as a systemic change in pedagogical models and educational interaction. The growth of student engagement and satisfaction identified in this research aligns with post-pandemic studies on hybrid and digital learning formats, which emphasize the importance of well-organized digital support environments for ensuring positive learning outcomes (Kortemeyer, Dittmann-Domenichini, & Merki, 2025).

At the same time, this study extends existing research by providing a more detailed empirical explanation of why such effects occur. The positive outcomes can be explained by several interrelated factors. First, the digital student account ensures continuous and transparent access to learning resources, schedules, assessment results, and communication channels, which enhances students' sense of control over their learning process and supports self-regulated learning behavior. Second, the integration of a digital teacher avatar reduces psychological barriers to seeking help, which explains the increase in the number of support requests accompanied by a significant reduction in response time. These findings are consistent with studies that highlight the role of timely feedback and reduced communication barriers in improving academic performance and motivation (Lysenko et al., 2024; Krap et al., 2024; Tymoshenko & Yahodzinskyi, 2024; Bobro, 2024).

A distinctive feature and key advantage of the proposed solution compared to similar digital platforms discussed in the literature lies in its pedagogical integration. Unlike many digital tools that primarily perform organizational or

administrative functions, the digital student account analyzed in this study operates as a pedagogically meaningful environment that combines support, motivation, feedback, and learning analytics within a single system. This integrated design explains the cumulative, nonlinear effect identified in the relationship between platform usage intensity and academic performance. The results indicate that learning gains are not simply proportional to usage time, but increase more rapidly at higher levels of engagement, which suggests a synergistic pedagogical effect rather than a purely technological one.

Importantly, the results of this study directly address the research gap identified in the literature review (Section 2). While previous studies have highlighted the general benefits of digitalization and digital learning environments, empirical evidence regarding the pedagogical effectiveness of specific digital tools, such as digital student accounts, has remained limited (Kubiv et al., 2020; Verina & Titko, 2019). This study partially closes this gap by quantitatively demonstrating how the intensity of digital engagement mediates the relationship between digital infrastructure and learning outcomes, thereby providing empirical support for the conceptualization of the digital student account as an innovative pedagogical tool rather than a technical service.

The theoretical implications of the study lie in refining the understanding of digital pedagogical support as a cumulative and engagement-dependent process. The findings contribute to the development of digital pedagogy theories by emphasizing the role of integrated digital environments and intelligent support mechanisms in shaping learning behavior and academic success. From a practical perspective, the results provide evidence-based justification for management decisions related to the implementation of digital student accounts in higher education institutions, particularly in competitive and resource-constrained environments. The demonstrated reduction in teachers' routine workload, combined with improved feedback quality, highlights the potential of such solutions for scaling personalized learning without compromising pedagogical quality.

At the same time, the study has several limitations that should be acknowledged. The empirical data were collected at a single private higher education institution, which may

limit the generalizability of the results to institutions with different organizational models or levels of digital maturity. In addition, some indicators were based on students' self-assessment, which may introduce subjective bias. The relatively short observation period also does not allow for an assessment of long-term pedagogical effects.

Future research should focus on expanding the empirical base through multi-institutional and longitudinal studies, as well as on analyzing differentiated effects of digital student accounts across academic disciplines, levels of digital competence, and learning formats. Particular attention should be paid to the long-term impact of digital teacher avatars and adaptive algorithms on learning self-regulation, inclusiveness, and sustainable academic achievement. Such research would further strengthen the theoretical and practical foundations for the effective integration of digital innovations into higher education pedagogy.

Conclusion

This study empirically substantiates the pedagogical effectiveness of the digital student account as an innovative tool for pedagogical support and learning motivation in higher education institutions. The findings demonstrate that the integration of digital services into a unified electronic information and educational system contributes not only to the technological modernization of the educational process but also to meaningful changes in students' learning behavior, engagement, and academic outcomes.

The results confirm that the implementation of the digital student account leads to a significant increase in students' academic engagement, extracurricular learning activity, and satisfaction with pedagogical support and learning personalization. These outcomes validate the assumption that digital tools, when pedagogically integrated rather than used solely for organizational purposes, can strengthen students' internal motivation and improve their overall educational experience.

A key contribution of this study is the empirical identification of a positive cumulative relationship between the intensity of digital student account usage and academic performance improvement. The revealed nonlinear pattern indicates that higher levels of digital engagement are

associated with disproportionately greater learning gains, highlighting the importance of sustained and active interaction with digital educational environments. This finding confirms that the pedagogical impact of digital tools depends not only on their availability but also on the degree to which students actively use their functional capabilities.

The study also demonstrates that the integration of intelligent support elements, particularly the digital teacher avatar, reduces psychological barriers to seeking help and significantly improves the timeliness and quality of feedback. As a result, students receive pedagogical support more promptly, which positively affects their academic performance, self-regulation, and learning satisfaction, while simultaneously reducing the routine workload of teaching staff.

From a theoretical perspective, the findings contribute to the development of digital pedagogy by conceptualizing the digital student account as a pedagogical instrument with cumulative and engagement-dependent effects rather than as a purely technical service. From a practical standpoint, the results provide evidence-based justification for managerial and strategic decisions related to the implementation of digital student accounts in higher education institutions, particularly in competitive and resource-constrained educational environments.

Overall, the study confirms that the digital student account represents an effective and scalable solution for enhancing pedagogical support, strengthening student motivation, and improving learning outcomes in the context of higher education digital transformation.

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