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Perceived Benefits of Learning Analytics and Artificial Intelligence-Based Online Learning Platforms: Case of Lithuanian General Education Schools

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Abstract

Online learning platforms with integrated tools of learning analytics (LA) and artificial intelligence (AI) are growing in popularity in general education in Lithuania. Such platforms have a number of advantages in terms of the teaching-learning process, however, there is a lack of research about such advantages after direct use of the platforms in general education schools. Thus, the purpose of the current study is to find out the perceived benefits of online learning platforms with LA and AI tools. The research was conducted in 11 schools in Lithuania. The students at these schools tested the LearnLab and Eduten Playground online learning platforms for almost three months. Descriptive statistics methods and chi-square ($\chi 2$) criteria were applied. Results showed that students claim that their learning achievements have improved thanks to the platforms. Moreover, research results showed, that when working with platforms, it is appropriate to pay attention and, in parallel, to teach students computer literacy from the elementary grades, to develop a relationship with the computer as a work tool. It is also appropriate to start working with LA and AI platforms from the primary grades, which would positively stimulate the growth of digital competence, as well as the

interest of students in the educational subject(s) and the positive growth of learning achievements.

Keywords: Learning analytics, artificial intelligence online learning platforms, general education schools

Introduction

Digital technologies are changing people's communication, social life structure, and cooperation opportunities, and are forming new life habits. These changes have implications for education. Already in 2014 studies have predicted that in a decade, approximately two-thirds of students in general education schools will be fully or partially learning in a technology-based learning environment (Wang, Decker, 2014). Researchers assume that portable computing devices and developing educational technologies (e.g.: Smart Classrooms; Smart Learning Environments, etc.) will further promote the digitization of education (Har Carmel, 2016). In addition, technology is widely used by students, parents, teachers, and school leaders for a variety of educational purposes, such as reporting on student achievement in an electronic diary environment (Carpenter, Krutka 2014; Martin, 2018). The fact that digital technologies have become an important part of the learning environment and their integration into education is necessary to ensure a better education for students has been confirmed by research studies (Hollman et al., 2019). Moreover, the situation of the COVID-19 pandemic has especially encouraged the digitization of education (Kalim, 2021).

Currently, education is experiencing fast integration of learning analytics and artificial intelligence-based online learning platforms into the learning and teaching process. Data collected during the learning process is the domain of learning analytics. The academic literature defines learning analytics as “the collection, analysis, and reporting of data about students and their contexts to understand and optimize learning and the environment in which it occurs” (Long et al., 2011). Such a definition emphasizes the aspiration of learning analytics to use data with the goal of comprehensively understanding and improving education (SoLAR Society for Learning Analytics Research, n.d). As stated by Vincent-Lancrin in the 2021 OECD report, learning analytics is one of the new disciplines of Data Science, which studies how to use data mining, machine learning, natural language processing, visualization, and Human and Computer Interaction methods, so that educators and learners get insights that can improve teaching/learning practices.

Learning analytics is used in education for a variety of purposes, such as predictions to identify which students are at risk of failing a course; personalization and adaptation, when a student chooses a personally adapted

learning path; learning outcomes assessment; interventions where the teacher is given information and the teacher can help a student a targeted way; information visualization, when the learning dashboard provides an overview of learning data (using various charts, graphs and tables) (Mayer-Schönberger, Cukier, 2014, Mangaroska et al., 2019, Ifenthaler et al., 2020). Modern research and practice of learning analytics in countries such as Australia, the United States of America, the United Kingdom, Norway, and Finland prove its importance in solving issues related to the quality of education, identifying students at risk, and reducing exclusion (Sclater, Mullan, 2017, Kurvinen et al., 2020, Mangaroska and Giannakos, 2018). Learning analytics also proves to be a tool for monitoring and improving the performance of the school as an organization, monitoring and developing the organizational capacity of the school (Ifenthaler et al., 2020). The relevance and benefit of the application of learning analytics for education is also evidenced by the fact that in recent years, an increasing number of digital tools, both commercial, such as MS Teams, Google Classroom, iSpring Learning, etc., and open source, such as Moodle, etc., intended for various educational sectors, include data analysis technologies.

Artificial intelligence technological solutions can also be integrated into online learning environments. AI technologies can also collect a wide variety of information, e.g. visual, auditory, and physiological data about students. This type of data about students and their learning could be used to further design the teaching-learning process and better understand how the learning takes place in real time. The data could help teachers and students choose the most effective teaching-learning strategies and methods (Luckin et al., 2016). The goal of AI in educational technology is to enable more personalized, flexible, inclusive, and engaging learning, as well as to automate everyday learning tasks through automated assessment and feedback capabilities (Gulson et al., 2018; Luckin et al., 2016). AI tools could be also designed to help address students' dropout or burnout (Coccoli, Maresa, & Stanganelli, 2016) and could contribute to overcoming students' learning gaps that arise from individual or social differences. However, despite decades of research in this area (du Boulay, 2016), current AI tools do not fully exploit the technology's potential and seem to fall short of expectations (Stone et al., 2016).

Scientific research reveals the advantages of learning analytics and artificial intelligence for the teaching-learning process: for its organizers, these are artificial intelligence-based ways of monitoring and managing learning (Williamson, 2016); for learners - smart, adaptive, personalized, predictive learning opportunities (Williamson, 2016; Maseleno et al., 2018). In addition, the teaching-learning process based on learning analytics and artificial intelligence enables students' engagement and motivation (Peng et

al., 2021), and encourages the use of effective learning strategies (Lemay et al., 2021). However, despite the potential of learning analytics and artificial intelligence in education, there is still considerable hesitation and skepticism about its use, as well as challenges and unanswered questions (Meyers, 2016). One of the target groups of learning analytics is students, however, the question is how to ensure that students effectively use learning analytics and artificial intelligence technological solutions to improve their learning process (Ferguson et al., 2019).

The main goals of learning analytics and artificial intelligence are to improve academic achievement rates and help students develop greater responsibility for their own learning activities (Siemens, 2013). Learning analytics and artificial intelligence tools can direct students to their individual learning paths (Hylen, 2015), provide students with information about the gap between their current and desired learning outcomes (Admiraal et al., 2017), encourage students to learn (Abo et al., 2016), assess each student's level of competence and provide feedback in a compact and clearly laid out manner (Ebner, Schön 2013). Learning analytics and artificial intelligence tools allow students to take control of their learning by informing them of their engagement in learning activities and helping them determine what they need to do to achieve their educational goals (Dehler et al. 2011; Davis et al. 2018). Learning analysis and artificial intelligence tools support self-regulated learning and help students self-assess and adjust learning strategies in order to increase the achievement of goals (Papamitsiou, Economides 2015). In this way, learning analytics and artificial intelligence tools can expand and improve learner achievement, motivation, and confidence by providing students with timely information about their and their peers' performance, as well as suggestions for activities and content that could help address identified knowledge gaps (Siemens, 2013).

Incorporating learning analytics and artificial intelligence into the educational system in a responsible and ethical manner can significantly enhance the learning experience and improve pedagogical practices for students, ultimately contributing to their academic success and overall development. In the scientific literature, there is a lack of more detailed research on students‘ perceived usefulness of such platforms, especially in the context of the COVID-19 pandemic. As a result, the purpose of the study is to find out the opportunities, options and perceived usefulness of platforms with LA and AI components.

Methods

The study was conducted in Lithuanian general education schools in 2021-2022. Data were collected by means of an electronic survey, mediated

by schools. The questionnaire consisted of 4 blocks: opportunities to use platforms at home; opportunities to use platforms at school; ability to use the platforms and student perceived usefulness. To achieve the goal, the following tasks were set:

1. Determine what opportunities and conditions students have in order to use the platforms at home;
2. Determine what opportunities and conditions students have in order to use the platforms at school;
3. Determine what abilities students should have to successfully use the platforms;
4. Determine the factors of students' satisfaction and perceived benefits when using the platforms.

The current article includes only results on students' perceived benefits when using the platforms. The current block of questions has been compiled after adapting the questionnaire for students used in Selevičienė's (2020) dissertation on the application of second-generation web technologies in foreign language lectures. Students were asked to evaluate: whether they learned more when learning via online learning platforms than without it; whether their achievements improved when learning via online learning platforms; have their learning abilities improved when using a computer/tablet; is learning via online learning platforms was better than traditional (contact) learning and would students like to see such or similar platforms used in other educational subjects as well.

Data were collected in the Google Forms system and processed with Google Excel Sheets programs. Descriptive statistics methods and chi-square ($\chi 2$) criteria were applied to the analysis of the data obtained during the research in order to determine the relationship between sociodemographics and students' satisfaction and perceived benefits from using the platforms. Important to mention, that 424 Eduten Playground licenses and 550 LearnLab licenses were allocated to schools that participated in the study Some students had licenses for both platforms. Both of these platforms have LA and AI elements. In total the questionnaire was filled out by 397 students from 1-8 grades from 10 schools who worked with Eduten Playground and/or Learnlab platforms: 245 students answered about Eduten Playground and 152 about LearnLab. Students from grades 1-8 participated in the study, and the largest part of participants was from grades 5 and 6, accounting for 19.90 % , respectively, and 19.14 %. Seventh-graders participated the least - 5.29 %. In terms of gender distribution, students were nearly evenly distributed, with 48.11% being boys and 51.89% being girls.

Results

Regarding the satisfaction and perceived benefits when using the Eduten Playground and LearnLab platforms, the majority of surveyed students positively evaluated learning via the platforms (Figure 1). 71.54% of students agreed (totally agree and agree) with the statement *I think I learn more when learning on the platform than without it* while only 20.40% answered *neither yes nor no,* and just 8.06% of participants *totally disagreed.*

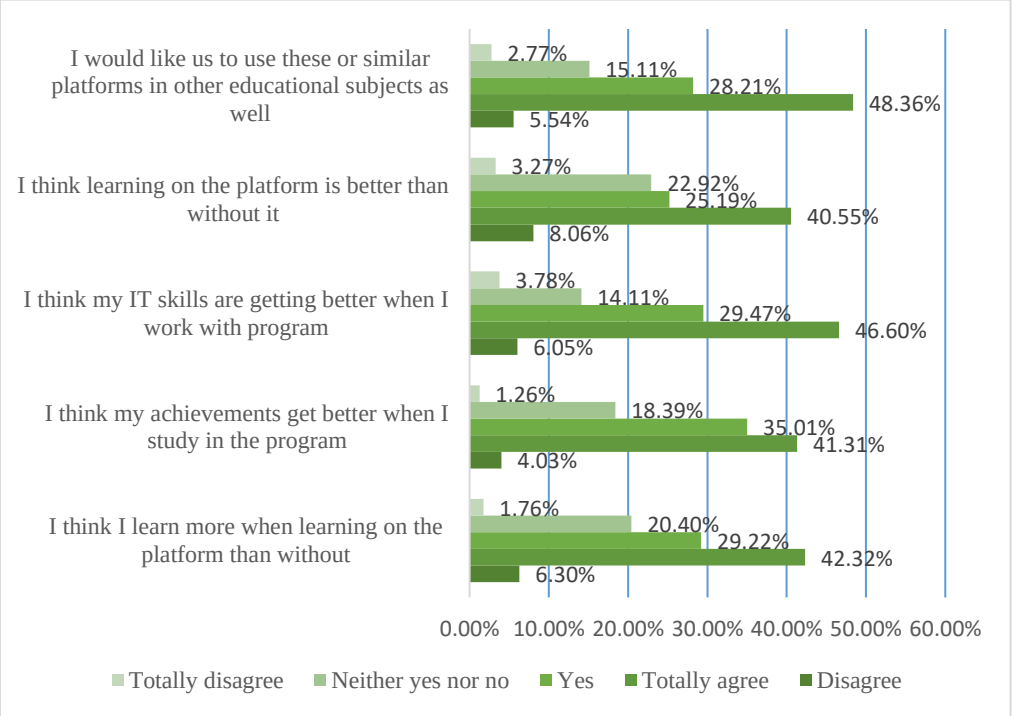

Figure 1. Perceived benefits when using the Eduten Playground and LearnLab platforms

There was a statistically significant difference in the distribution of answers by grade ($\chi^2 = 25.203$, df = NA, p = 0.0115): 3rd-4th grade students gave the most positive answers - 79.62 % (answered Agree and Totally agree). Indeed, 72.22% of 1st-2nd grade students also chose these answers, while 61,22 % of 5th-6th grade students said the same.

The 5-8 grade students who participated in the study also answered disagree and totally disagree in 14.28 % of cases. There was no statistically significant difference in responses in relationship to the particular platform.

The responses of the students who participated in the study were similarly divided when evaluating the statement *I think my achievements get better when learning on the platform.* 76.32 % of the respondents agreed with the statement, 18.39% answered neither yes nor no and 5.29% disagreed. In this case, the answers differed according to classes (χ^2 =

28.673, df = NA, p= 0.0055). Students from grades 3-6 gave the most positive answers, and students from grades 1-2 and 7-8 responded somewhat less positively. The distribution of responses by platform did not differ statistically significantly.

In the study, students were asked to rate whether learning via the platforms improved their ability to use a computer/tablet (IT skills). In total, 76.07 % of the surveyed students said that their abilities had improved. There was a significant difference (χ^2 = 47.779, df = NA, p = 0.0005) in the distribution of answers by class - the abilities of 1-6 grades students improved the most, and students of 7-8 grades improved only by 32.65 %. 16.3 % answered *Neither yes nor no* and *Definitely not.* There was no statistically significant difference in responses by platform.

Students also rated whether learning via the platforms was better than without it. A total of 65.75 % of students agreed with this statement, 22.92 % of students, answered Neither yes nor No, and 11.33 % disagreed. The answers differed significantly (χ^2 = 52.685, df = NA, p-value = 0.0005) depending on the grade: the statement was evaluated most positively by students in 3-4 grades (75.73%) and students in grades 5-6 (71 .62%), less positively - students in 7-8 grades (61.22%) and grades 1-2 (46.16%). When comparing the platforms, the responses did not statistically differ.

76.57 % of respondents agreed with the statement *I would like to use such or similar platforms in other educational subjects*, while 15.11 % chose *Neither yes nor no*, 8.37% disagreed with the statement. There was a significant difference in the answers when comparing the grades (χ^2 = 47.093, df = NA, p = 0.0005).

The students in grades 1-2 who participated in the study were the most unsure about whether they would like to use learning platforms in other educational subjects: slightly more than half of them (58.89%) answered that they would, 27.78%. answered Neither yes nor no, 13.33 %. answered that he/she would rather not. The students of 3-4 grades who participated in the study expressed the greatest desire: 87.38 %. answered that they would like to use learning platforms in other educational subjects, 8.74 % answered Neither yes nor no, 3.88 %. answered that he would not. When comparing the platforms, the responses did not statistically differ.

Discussion

The outcomes of the present research affirm findings from earlier studies indicating that, even after a short duration of utilizing these platforms, students demonstrate significantly improved learning outcomes (Christopoulos, Kajasilta, Salakoski, Laakso, 2020). They become more engaged in the learning process, leading to heightened motivation and eagerness to learn (Kaila, Rajala, Laakso, Lindén, Kurvinen, Karavirta,

Salakoski, 2015). Moreover, their satisfaction with the learning process is positively rated (Youssef, Schelhorn, Jobst, Hörnlein, Puppe, Pauli, Mühlberger, 2015). Similar results were found in research conducted in Lithuania, indicating that students exhibit greater engagement in the learning process through the use of digital learning games (Petrušauskaitė, 2021). Additionally, utilizing a virtual learning environment in the learning process enhances their academic achievements (Taujanskienė, Skripkienė, & Klizienė, 2020; Kliziene, Taujanskienė, Augustiniene, Simonaitiene, & Cibulskas, 2021), while such learning environments offer opportunities for task individualization and differentiation (Kondratavičienė, 2018).

Conclusion

The study revealed that a majority of the participating students provided favorable feedback regarding the benefits they derived from using the Eduten Playground and LearnLab online learning platforms. Over 75 percent of the students reported that they learned more effectively with the assistance of these platforms compared to traditional methods and expressed a desire to utilize similar platforms in other subjects. One-third of the students believed that their learning achievements had improved, along with a notable enhancement in their computer/tablet skills while using the platforms. A significant portion of the students preferred studying via Eduten Playground and LearnLab platforms over traditional classroom learning, with only one in four students expressing disagreement with this perspective.

The study suggests the appropriateness of implementing digital online learning platforms powered by artificial intelligence and integrated with learning analytics from the first grade onwards. This approach is expected to positively influence the development of digital competencies, spark students' interest in educational subjects, and contribute to enhanced learning achievements and knowledge.

Human Studies:

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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Conflict of Interest: The authors reported no conflict of interest.

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