

PEDAGOGICAL SCIENCES

EDUCATIONAL ANALYTICS AS AN EDUCATIONAL MANAGEMENT TOOL

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Abstract

Over the past decade, education has seen dramatic changes in the way data is collected and used to support high-stakes decision-making. Using big data as a meaningful objective to inform teaching and learning can enhance academic success. Data-driven research has been conducted to understand the effectiveness of student learning, such as student forecasting from the risk group at an early stage and recommendations of individual interventions to support services. However, few studies in the field of education have adopted Learning Analytics. Over the past decade, education has seen dramatic changes in the way data is collected and used to support high-stakes decision-making. Using big data as a meaningful lens to inform teaching and learning can enhance academic success. Data-based studies have been conducted to understand the effectiveness of student learning, such as predicting at-risk students at an early stage and recommending individual interventions to support services. However, few educational studies have adopted Learning Analytics.

Keywords: learning analytics, predictive modeling, learning formats , higher education, academic performance forecasting

Introduction

In the context of the forced rapid restructuring of the education system, the active introduction of methods of blended learning and learning using distance learning technologies, it is especially important to rely not only on the pedagogical experience and intuition of teachers and course developers, but also on the maximum amount of analytical data that allows you to objectively evaluate the effectiveness of courses, lessons, individual tasks and adjust the created educational materials. The proposed article discusses the use of educational analytics at the level of an educational organization, the use of a data-driven approach in education of the Skyeng online school cases and the use of educational analytics in the work of the "product team" — developers of educational materials.

The modern world and the student challenge the classical educational system. It is extremely difficult for her to move from the standard format of teaching — lessons, classes, studying materials sequentially according to the textbook in the classroom and at home — to gaining the skills necessary for tomorrow, and understanding that the student is the customer of training, the client. He comes to the teacher with certain tasks, and it is already difficult to bring all the students to the same denominator. The speed of market change is so

high these days that, when entering a university, one cannot be sure that at the time of graduation the specialty will be in demand. The age of 20-25 ceases to be associated with the completion of education, which saturates the necessary skills for many years to come. As a result, more and more students, parents and employers prefer short-term courses rather than long-term training programs, which provide an applied profession that is relevant at the moment and/or the opportunity to add missing skills to the current one.

Higher education in the usual format of study at a university may lose its attractiveness for today's schoolchildren if it is not able to develop future students in close connection with the goals and objectives of students and employers. It is obvious that changes are inevitable in school education: more and more schools are trying to switch to individual educational trajectories, ensuring the comprehensive development of the student to realize his potential and achieve his goals. And this goal is not just to study the information in accordance with the program and textbooks and pass the Unified National Testing, but to get the necessary skills for life.

Learning is a lifelong activity, starting with education, which can lead to graduation and beyond. A student can leave at any stage to pursue a career of their

choice [1]. Well-developed critical thinking skills are important for solving the multidimensional nature of engineering problems, which are structured on complex thought processes that require evaluation [2]. But each program has pre-defined goals and the OBE determines the way to accomplish them.

Success for each student is the only goal and is measured by the student's ability to meet predetermined outcomes [3].

Pedagogy and andragogy face a challenge: to ensure the flexibility of the educational process and not lose all the knowledge and proven approaches and techniques of past eras, to rethink these approaches and adapt them to modern needs. And often the task is even more radical — to understand how all these techniques work today [4] and whether they work at all. Any research is time-consuming. This is especially true for education: it takes a decade, and sometimes more than one, for methodologists to develop a new approach, validate it and prove its importance, so that society recognizes it and adopts it. But now the speed of change in the world does not allow us to work on the scale of decades. Often a year is a lot. The educational system, which is still developing by inertia, risks increasingly moving away from reality, where there is already a demand for perfect other products and approaches. This was the case in the automotive industry, where electric cars and Elon Musk were not recognized for a long time, and now, according to a number of economists, Tesla is on its way to being more expensive than all the combined giants of the automotive industry. This was the case in retail, and we see Jeff Bezos, the richest man in the world, and his company Amazon storming the lists of the most expensive companies in the world according to Forbes. And even medicine gave up during the pandemic — doctors began to discuss diagnoses remotely more actively, although telemedicine was legitimized in Kazakhstan back in 2020.

Education is an inert sphere, where approaches from the middle of the last century are successfully working, and many public schools and universities were extremely conservative towards the "figure" until March 2020, the beginning of quarantines. And after March, people are also looking in this direction with caution. And even if private schools are conservative, what can we say about public schools, where students come voluntarily and forcibly and which can often be threatened only by demographic pits. We believe that educational analytics and a data driven approach to education can become a tool that will provide completely

different principles and approaches in education, provide an evidence base for decision-making and scaling approaches: when the product is not "storing" a child during the school day, but personalized and adaptive learning, receiving and the elaboration of skills, the relevance of which is dictated by their practical application, time, current educational standards, aimed at developing the potential of the student, and often the student's own ideas about the goals of learning.

The transition to online and the rapid development of educational technologies, the emergence of new types of educational formats, such as blended learning (BL), leave behind a trail of data for potential study from a variety of sources in different formats and with different levels of detail [5]. All these systems produce a huge amount of information of high educational value, but it cannot be analyzed manually, despite the fact that the results can be useful to students, teachers and administrative staff [6].

LEARNING ANALYTICS

Learning Analytics has interdisciplinary historical roots in its development, such as social network analysis, education/cognitive modeling, predictive modeling, and data mining technology. In the early 2000s, academic analytics was proposed as a means of applying the principles and tools of the "business intelligentsia" to the academic field [7]. The aim of academic analytics was to improve institutional management, decision-making and resource allocation. Shortly thereafter, Action Analytics shifted academic focus to the action phase, "to create actionable intelligence, service-oriented architectures, information/content and service mashups, proven course/curriculum reinvention models, and changes in faculty practice that improve productivity and reduce costs." [8]

Educational Analytics (LA) can be defined as measuring, collecting, analyzing and presenting data about students, materials, programs, teachers and their context in order to understand and optimize learning and the environment in which it takes place [9]. This definition includes three important elements: data, analysis, and actions.

In parallel with LA, the intellectual analysis of educational data is also developing — Educational Data Mining (EDM), which develops methods for studying data obtained from the educational environment [10] and their use in the interests of education and learning science. Figure 1 shows one of the options for working with educational data.

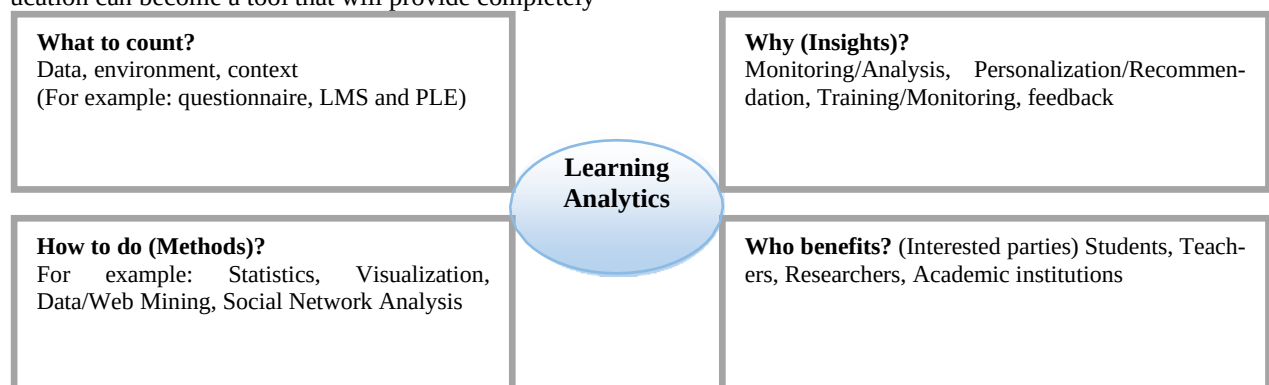


Figure 1. A variant of the outline for working with educational data

Domain Overview In our research, we focus on the following objects of educational analytics data collection.

- **The student.** By collecting data on the learning process of a particular student, we can understand his weaknesses and strengths, topics with which he copes worse. Knowing the goals and characteristics of the student, we will be able to build and change his educational trajectory in the current mode (understanding students' learning process).

- **Content.** By understanding how students and teachers react to the material, we will be able to "reassemble" the content units, providing the student with the necessary materials to bring him to the desired result, personalize the content to suit his interests, level and characteristics. If at the same time we understand that the student has a choice of what, how and where to study, then the content and navigation in it, the format of self-study (self-study) become even more important.

- **Teacher.** By understanding the specifics of a teacher's work, we can better create student—teacher, student—mentor pairs and personalize learning, not only focusing on the teacher's expertise and empathy level, but also using automated recommendations. We can understand the teacher's growth points and provide effective feedback for the development of his competencies [11].

- **A quasi—object** is an educational environment where a student, teacher, and content interact. This includes the user experience, student's experience and customer experience of the student and teacher. There is a place for offline, online and blended formats; metrics of the educational environment are also important within the framework of educational analytics[12].

When implementing LA to understand the effectiveness of student learning and improve student learning processes, number studies have used predictive analytics to predict learning success and student retention. These predictions can be made in various types of learning environments such as fully online or blended learning [13]. Previous studies have successfully predicted the perforation of the first year of study for students [14]. According to the literature [15], the following data can be used in predicting student learning effectiveness: (i) historical student records and relevant information such as high school grades and parent education, and (ii) student log data from learning management systems and other learning environments [16]. In veterinary education, some studies claim [17] that GRE scores are important for predicting student success in veterinary programs. Other possible significant indicators include previous academic performance [18], psychosocial factors, self-efficacy, personality, and demographic information. Data collected from students' studies [19] can also be used as predictors for student academic performance [20].

Conclusion

Research work on learning analytics is now growing rapidly compared to recent decades. Educational institutions should be attentive to its improvements and future use, cooperation with regular methods in order to achieve real growth in the work of education. This

article focused on predictive learning analytics, existing models and algorithms also provided an overview of the type of prediction using a number of input fields and a dataset. The introduction described the differences between analysis and analytics, related areas and problems of learning analytics, and explained the life cycle models of learning analytics, and this article was used mainly for those who focus on the proposed models and want to know the type of predictions that can be made in the field of education.

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