Artificial intelligence in student education models

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Abstract. Such student learning models as "face-to-face", "rotation", "flexible learning", "online lab", "mix it yourself or individual choice", "online driver", "flip class", "gamification", "self-study" and "cyclical model". are considered. These models are implemented in various forms of education. The classification of these forms is based on the duration of online activities of students in relation to the total study time. The article describes the use of artificial intelligence in the listed models, in which it implements the methodology of individualization of education in groups of students, carries out adaptive and personalized learning, as well as predictive analysis of each student. The functions of artificial intelligence are investigated, which help the administration of universities in organizing and improving the activities of students.

Keywords: distance learning, online and offline learning, blended and hybrid learning, learning models, artificial intelligence.

The relevance of the study is due to the fact that the epidemic caused by the coronavirus and spread throughout the world in 2020-2021 stimulated the penetration of artificial intelligence into all spheres of human activity, including education. Most of the students around the world have been transferred to distance learning to avoid contracting the coronavirus on the way to universities.

Distance learning is associated with such forms of education as "online" and "offline". Online and offline - words of English origin. *Online learning* – this means that at a given moment in time (here and now) a student is on the Internet at a given address, while he is virtually present at a lecture or participates in a webinar. Using a smartphone or their own computer, students listen to the explanation and/or watch a video broadcast of the teacher explaining a new topic. They chat with a teacher or classmates, sending their message, and you can immediately get a response.

In the word "offline" the preposition "off" means disconnection, therefore, "offline" literally translated from English means "not on the line", that is, to be disconnected from the line at a given moment in time. For students, the offline situation is characterized by disconnection from the Internet or no connection to the line (preset address). *Offline training* – this means that students are absent from a lecture or webinar at a certain (real) point in time when a lecture is being read or a webinar is being held. But it is assumed that students will definitely get

acquainted with the material of the lecture or webinar later in the recording, at a convenient time for them. This recording, at the request of the teacher and the students present or absent for good reason, will be made by the technical staff serving the process of giving a lecture or conducting an online webinar.

However, students, teachers and employers are dissatisfied with the process of studying at universities when it is completely built on online and offline learning. This is due not only to technical issues: laptops, smartphones, the Internet; with possession of information technologies and the ability to work on educational platforms, but also with the tradition of full-time education that has developed since ancient times. Thus, the need arose for a reasonable combination of full-time and distance learning.

Back in 2013, British researchers Brian Tomlinson and Claire Whitteker proposed a *classification of forms of education* that use online technologies [8]. This classification is based on the duration (as a percentage) of student online activity in relation to total study time. Four forms of training have been proposed:

– training in which the Internet is used only to place announcements for student groups about the schedule of classes and exams, about curricula in the subjects studied; this is the so-called web-enhanced technology (or in translation from English - web enhanced learning);

– blended learning or Blended Learning, where online student activities account for up to 45% of all student activities in the classroom;

– Hybrid Learning or Hybrid Learning, where online student activities account for 45% to 80% of all student activities in the classroom;

– distance learning, fully online (completely online, more than 80% is occupied by online activities of students) [8].

The first and second indicated forms of education were not prescribed in detail by the authors B. Tomlinson and K. Wittaker [8]. We believe that web-enhanced technology uses Internet resources for training (Web Facilitated) in a small amount, for example, from 1% to 19% of all students' activities in the classroom. Then the blended learning of students takes from 20% to 44% of the total activity of students in the classroom.

Blended learning – it is a combination of two components of training: full-time and online training, with a slight priority of full-time training. In *hybrid learning*, online learning takes precedence. These forms of learning are actively used in various learning models such as "face-to-face", "rotation", "flexible learning", "online laboratory", "mix it yourself" or "individual choice", "online driver", "flipped classroom", "Gamification", "self-study" and "cyclical model".

In the "*face-to-face*" model, most of the time is spent on face-to-face training in conducting seminars and practical exercises, and in online training, preparation for testing and control works on the topics covered is carried out.

In the "*rotation*" model, there is "alternation of traditional full-time classroom training with independent online training in an individual mode" [2, p. 39].

In the "*flexible learning*" model, the teacher "from time to time works with small groups or with one student individually" [1, p. 39].

The "*online laboratory*" model allows using augmented reality technology to more clearly present the subject of study, and on virtual simulators you can prepare for control testing.

The "*mix it yourself or individual choice*" model assumes that the student is free to choose the way of teaching: he himself decides which part of the course being studied to supplement or replace with online learning.

The "*online driver*" model corresponds to the complete immersion of students in an online environment, for example, when a teacher lectures in a distance format.

In the *"inverted classroom"* model, students study new material independently, for example, using an Internet resource, students find a topic set by the teacher, try to understand it; the next day, in online training, the teacher talks with students on a given topic in order to find out the level of their knowledge (it is possible to have a face-to-face discussion).

The *"gamification"* model is to involve elements of the game in face-to-face or online classes in order to increase the motivation of students, make the educational material more interesting and exciting.

The *"self-study"* model is focused on independent search and detailed acquaintance of students with additional material on the studied subject, recordings of webinars and lectures by leading teachers, for example, on YouTube.

"*The cyclical learning model* consists of three components: 1. Target component: (1) familiarization with the material; (2) working it off; (3) control of the formation of knowledge, skills and abilities. 2. Teaching tools (electronic and non-electronic). 3. Place of study (in the educational institution or outside it)"[1, p. 39].

The application of the presented models for teaching students at universities will be more effective if artificial intelligence (AI) functions are built into them.

The concept of intelligence emerged at the end of the XIX century when psychologists studied the functions of the brain. Psychology professor Philip Rice (USA, Maine State University) wrote: "Intelligence is defined as the innate ability to learn, think, ..., understand and solve problems" [4, p.194]. According to this definition, intelligence is not unique to humans. The adjective "artificial" in relation to intelligence is most often associated as machines created

by man, replacing the human mind, and the phrase "innate abilities" means the ability of machines created by people to learn independently, to the ability to act not only according to the program originally laid down in it.

Technicians under the term "artificial intelligence" understand that this is "the automation of intellectual tasks, usually performed by people" [6, p. 27]. The beginning of research on artificial intelligence can be attributed to 1832, when the Russian researcher S.N. Korsakov (1787-1853) described the actions of intelligent machines that serve to mechanize tasks related to mental activity. "Designers and programmers are interested in the problems of merging biotechnology with information technology in order to achieve a specific task" [5, p.14].

Stephen Duggan says: "Perhaps the most important development in the evolution of AI has been the shift from what is called 'local computing', in which users access a computer or network of computers on a local network, to 'cloud' computing with access to computing resources over the Internet. "[3, p.14].

Quite often, AIs are encased in robots. Robots can be programmed to perform a well-defined task. The use of AI in education is focused on group (including small groups) work with students, as well as on individual work with each student separately and on the implementation of support activities to improve the work of universities.

AI can perform many functions in group models of education:

Firstly, it implements the methodology of individualization of education in groups, namely:

– carries out initial diagnostics of students in order to form study groups with approximately the same level of initial training;

– provides students with adapted (depending on their level of training of the study group) video recordings of lectures and webinars of the best teachers on a special Internet channel at their request, at any time convenient for them;

– allows students to interrupt viewing video recordings anywhere, as well as repeatedly return to watching lectures or webinars that are difficult for students;

– tests students on the topics they study and on selected subjects on special simulators that contain both simple tests and tasks with a free choice of answer for each formed study group;

– forms new study groups based on testing results with the same level of knowledge acquisition to continue training;

– provides digital content of varying degrees of complexity and completeness: electronic textbooks, problem books, reference materials and abstracts, animation and video clips on various academic disciplines, which are addressed at the individual request of the student;

– provides students with the opportunity to independently prepare for group control activities, according to the curriculum for a given training group.

Secondly, it places the content of lesson plans on a mobile phone through a special application for smartphones, with the help of which students can find out the topic of a missed lesson and homework with the identification of the date, group and subject of study.

Thirdly, he consults students in the library of the educational institution, helps them to choose modern literature in book form or on an electronic medium to prepare for writing a term paper or a thesis project.

Fourthly, it checks the provision and implementation by students of home, abstract, term papers and theses.

Matthew Lynch, Ph.D. in educational counseling, has proposed seven options for using AI in the educational process [7], which are aimed at individual work with each student.

Firstly, this is *adaptive learning*, when AI tracks the progress of each student and notifies the teacher about the difficulties that have arisen in understanding the material being studied.

Secondly, this is *personalized learning*, when the AI sets an individual learning rate for the learner, inviting everyone to choose a comfortable pace for presenting material and tasks of increasing complexity.

Thirdly, it is *automatic grading*, where AI mimics the behavior of a teacher checking homework, thereby reducing the teacher's routine. The AI system automatically assesses the learner's knowledge, analyzes his answers, reports almost instantly the assessment results at the level of individual feedback and creates an individual plan to eliminate the backlog in the subject, taking into account the characteristics of the learner.

Fourthly, this is *interval learning*, when the AI determines the moment when the student has forgotten new information, and recommends to repeat it after some time to obtain stable knowledge or competencies.

Fifthly, this is t*he teacher's assessment by students.* To study the opinions of students about their teachers, AI offers chatbots that use an interactive interface and filter out rather rude comments or personal insults.

Sixthly, this is a *smart campus* - a special computer program that allows you to find an answer to any student's request related to study and life in a hostel.

Seventhly, it is the *control of the educational process*, as an obligatory component of it. AI is designed to eliminate deception. He launches control systems that determine the personality of the examiner and his independence in the performance of mandatory tasks [7].

Stephen Duggan notes that because of its potential, AI provides real advantages in collecting initial student data and predictive analytics. He believes: "Predictive analysis: Analyzing both current (real-time or near real-time) and earlier data to predict meaningful issues,

such as dropout rates and identify students who need timely support. in relation to academic performance or with mental health or well-being problems,

as well as assist in forward planning on a systemic, institutional and individual basis "[3, p. 12].

AI support activity:

– consults and answers questions about the organization of the educational process for specific students with the identification of their persons, course and training group;

– collects statistical data on the amount of time spent on preparing and completing assignments, tests for a specific student, and provides this data upon request to the teacher;

– reveals the complexity of specific educational topics for students, counting the time spent by students on their study;

– helps to update the library fund, as well as identifies the need for foreign sources of information and its translation from the original language by analyzing the statistical data of library robot consultants

– determines the rating of teachers based on references to specific lectures of specific teachers,

– improves the organization of the educational process of the educational institution, processing statistical data and those questions that are collected by robot consultants of the educational process;

– searches for the digital footprint of each university student in the Internet communities and in social networks with a terrorist or suicidal orientation to provide them with timely assistance.

The opportunity is being implemented to deliver grocery orders to university food outlets using a courier robot with a built-in AI system, which is able to plan its route itself, monitoring the chosen path and avoiding obstacles.

The AI facial recognition system helps students in the university canteen to receive exactly their order in a contactless way, in which a robot arm selects ready-made meals and drinks from a conveyor belt, puts them in a special cell that opens to a specific student who made an order.

Through student clothing or mobile phones with built-in GPS navigation, the AI tracks the location of junior students at the request of their parents. The statistics of the data of the built-in GPS navigator system can tell the parents of these students a lot about the leisure time of

their children, as well as tell the administration of the universities about this in order to organize and improve the activities of students in their free time.

In conclusion, we note that education in the 21st century should have an ethical dominant as its core. Designed to be creative and innovative, this education with the use of artificial intelligence technologies must be based on the moral and moral values of the person, as well as the society in which he lives.

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