Stages of a Mathematical Model Developing of the Educational Trajectory

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Abstract: The model is based on the use of interactive teaching methods. A characteristic feature of the use of interactive technologies is the organization of training that takes into account the inclusion of all the students of a group without exception in the learning process. Joint activity means that each participant makes his or her own individual contribution, whereby in the course of work there is an exchange of knowledge, ideas, and methods of activity. An environment of educational communication is created that is characterized by openness, interaction of participants, equality of their arguments, accumulation of common knowledge, and the possibility of mutual evaluation and control.

The use of neural networks to study and predict educational assets will provide research and development organizations and teams with innovative and effective ways of conducting research in the field of educational theory, modeling of the cognitive processes related to formation of different student competencies, and devising more appropriate methods for estimating student educational outcomes.

Keywords: mathematical model, machine learning, GlobalLab, educational trajectory, Jupyter Notebook, GNU Octave s

I. INTRODUCTION

Each discipline has different ways of responding to questions and solving problems: for example, research using scientific methods, historical analysis, literature review, and mathematical modeling. Survey methods, knowledge-finding tools, and evidence-based methods are also critical to curriculum development. When students learn to use these research methods, they train their minds differently (which is the initial reason for introducing disciplines) and are more likely to develop disciplinary skills. A form of deep learning. Structural disciplines that can be used in organizing the curriculum to engage students in these basic ideas and research methods also provide means for conveying other ideas, topics, and problems to and from school life [25, 27].

The use of machine learning methods for the formation of personal education pathways due to the whole or part of automation enhances the cost of individual training, which, as many have shown domestic and foreign pedagogical instruction, have a positive impact on the level of educational outcomes [1, 12, 16, 24, 26]

Learning trajectory in mathematics education

The concept of an educational trajectory has a long history of developmental psychology, beginning to recognize that children are not small, non-adult adults; rather, they often build their understanding of the world through their experiences and interactions with others, and their insights into ideas stemming from insanity are much more sophisticated [14, 15]. This recognition has led many scientists to satisfy curiosity to understand how children, in particular, and, to some extent, embarrassed students, perceived events and ideas. Piaget and his colleagues have prepared a global research program to document children's ideas and showcase children's amazing knowledge in building their understanding, which may make a difference from in the more complex point of view of an adult [17-19]. Understanding this and knowing how to put it in teaching is important for teachers, especially for those who are serious about the idea that "you have to start from where the student is". Working from a constructivist point of view, Simon (1995) answers a specific question about how a teacher can provide tools to help students move from their prior ideas to more complex thinking about the target concept. At the same time, he proposes a "hypothetical learning trajectory" (HLT), which includes "the purpose of learning, learning actions, as well as thinking and learning, in which students participate" [13, 20-22]. Based on this, significant research efforts have been made in this area to quantify students 'long-term teaching pathways as a model of the evolution of students' thinking as part of their slow approach to targeted ideas.

The use of machine learning methods for the formation of personal educational paths through full or partial automation will significantly reduce the cost of individualization of training, which, as many domestic and foreign pedagogical studies show, has a positive effect on the level of educational results [6, 23].

II. METHODOLOGY

Arrays of data from the GlobalLab online platform and the electronic diary Diary.ru were used to form a model of the student's educational trajectory.

For mathematical modeling, Jupyter Notebook, GNU Octave software was used.

The analysis of patent documents and computer program registration certificates shows that to date there have been no inventions describing the use of specific machine learning techniques for modeling applications. properties of educational pathways. Usually, the object of protection is not a specific model, but rather the method of its application to a much larger model utility.

Methods based on the use of specific data to input models of educational and student trajectories are also protected.

The direction of the mathematical model of education that makes us possible to compose a list of activities and events

1. The student's educational course of activities was added to the preliminary list.

According to the results of the analysis, such activities were divided into 2 groups. The first group consists of events in the direction of simple steps, and the second, also taking into account the user's success/failure. This division is assigned to the second group of events that can be used to estimate the direction of the entire educational advancement.

2. This list is a combination of several measures to analyze and electronic diary Dnevnik.ru of their information added.

Dnevnik.ru data events on the second group, a rating event has been added. As well as courses GlobalLab platform, reflecting the results of the check on completion of tasks or events with type 2. These activities, to increase the accuracy of the sequence, and then 100 points, the higher the class, the successful actions 65. This additional education in the direction of the mathematical model is considered to be an opportunity to reflect changes in the student's academic, and compliance [1, 7-11].

III. RESULT AND DISCUSSION

The type of events that characterize the trajectory of the Table 1.

Table 1. List of event types taken into account by the mathematical model of the educational trajectory

No.	Event type
Group 1	
1	The user approves the project.
2	The user approves the idea.
3	User approves blog post.
4	User approves comment.
5	The user logged in to the system.
6	The user has activated.
7	User has registered.
8	The user has logged out.
9	The user creates a project.
10	The user creates an idea.
11	The user creates a school or group.
12	The user creates a blog post.
13	User comments on the project (in discussion).
14	The user comments on the idea.
15	The user comments on the blog post (news or project).
16	The user sends the project for moderation.
17	The user saves the questionnaire in the project (does not send).
18	User edits his profile.
19	User edits the project.
20	User is editing a group or school.
21	User edits portfolio.
22	User edits an idea.
23	The user sends the LAN to the user.
24	A user sends an invitation to another user.
Group 2	
25	User has been tested for GlobalLab (success/failure)
26	The user received a rating on the subject (success/failure)
27	The user completed the task as part of the GlobalLab course (success)
28	The user received an award (success).
29	The user sends the questionnaire to the project (success).
30	The user received a certificate (success).
31	The user's project was not approved by the moderator (failure).
32	The user profile was blocked by the moderator (failure).
33	User profile blocked by moderator (failure).

In the four-stage model of interest development, earlier stages of interest are dependent on the social environment. As interests become more deeply connected to values, purpose, meaning, and identity, they become increasingly self-sustaining. Choices to learn might include initiating a new project activity, pursuing opportunities for mentoring, deciding to enroll in a formal class, or using technology to engage in personal learning excursions [27].

Within a specific trajectory, decision-making training is conducted at the level to use the decision-making methodology. To support the solution offers a genuinely rational set of facts and operations aimed at choosing one of these years. At various stages, the student is described independently in their subject. One needs to do the best training while creating a strategy for personalized activity [2, 3, 5].

Studying at this stage requires two stages of student activity.

Stage I. Simultaneous repetition.

Stage II. Setting goals in the process of jointly organized teaching and learning activities.

At this stage, the student chooses a job that can design his jacket.

Individual problems that have specific diagnostic goals are quickly resolved, and each one requires specific questions about the problems that are being used.

It is crucial to master the preparatory process for all, having to inform the student that he can remain the right decision for himself and that he must also see. As a result, the student can offer such a system of indeed (tricks) decision making and individual learning decisions.

1. Create a subjective view of time

The student reads the work, presents a set of mathematical problems, distinguishing their components (academic units). It opens information about perception and its initial processing.

2. Structural information (analysis) to choose from

The student offers to be offered to learn about what the teacher uses, using complexity. For example, one can suggest the following level:

knowledge level, change, supply level, interesting composition, newer problem, creative or reproductive.

3. Analysis of proposed tasks for selected arteries

When choosing arteries, the student always chooses highly essential results.

4. Reduce many alternatives

Comparison of selected components of a student's task and knowledge and skills. The student may reject some options because of the apparent mismatch of their knowledge and those needed to solving problem.

5. Realization of an individual choice of tasks

6. Applying and correcting choices (internalization as the ability of a particular activity based on the most uncomplicated reflective activity).

Students begin to solve the problem. At the same time, it may be that someone has chosen a task that is too easy for themselves and that someone is too complicated. Everyone has the right to choose a different task. In this case, the student should try to understand why he or she chose a task that does not fit his or her abilities.

7. Distinguish problems in different types of activities

When solving a problem, students have some difficulties in their activities, which can be caused by inattention, lack of awareness of the task, lack of theoretical and (or) practical knowledge, and characteristics of the task. Students intuitively highlight new issues and their causes.

8. Problem statement

By selecting a task of a certain level, the student receives certain information about the readiness to study a topic in mathematics classes and chooses the path of his / her further study: at the level of reproduction of knowledge that he consciously observes and records in memory or at the level of comparing existing knowledge with that which one should receive as a result of mental activities or at the level of new knowledge based on what one have learned

Operating. At this stage, the student solves the problem of how to act. Solutions are in the development of ways to manage situations.

The student learning process at this stage involves two stages of student activity.

Stage III Researching, understanding, reviewing information by students

Stage IV Interpreting information and designing a new course of action.

Organizational. At this stage, the student determines the structure of the learned mode of action. It incorporates it into the knowledge system.

Stage V. Incorporating a new mode of action into the knowledge system.

Stage VI Students evaluate their activities [4].

IV. CONCLUSION

The final list of events is formed, which are taken into account by the mathematical model of the educational trajectory. The list of events allows us to increase the adequacy of the mathematical model of the educational trajectory by including in it a wide range of educational activities that are not traditionally included in student models.

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