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Educational Trajectories for Students in Mathematical Specialties

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The paper discusses the role of mathematics in the development of scientific research, the possibility of crafting an individualized educational trajectory for students in the higher education as a mean of creating of the mathematical competence.

Key words and phrases: fundamental mathematics, educational trajectories, mathematical competence.

Science plays a distinct role in modern civilization. Technological progress, responsible for a new standard of quality of life in developed nations, is grounded in applications of scientific breakthroughs. The role of mathematics in modern science and acquisition of knowledge is continually growing. Today's students enrolling to applied mathematics do not appear consider that it is important to study fundamental mathematics. The results are obvious: from the very first session, students in mathematical analysis and other mathematical disciplines lag behind on a massive scale. In addition, a student of mathematics in a higher educational institution should know that without a mathematical description of a whole range of natural phenomena, it is impossible to reach their deeper understanding. The development of physics, linguistics, and other sciences also suggests a widespread application of the mathematical technique, which has played an essential role in the exploration of space and development of computers, which found applications in a great variety of human activities.

Educational reform that started in the XX century has determined evolutionary paths for different educational systems. Today, students can choose an individualized educational trajectory as a mean of creation their mathematical competencies. Educational trajectory is a path of progress for each student in a complicated educational space. The philosophical and anthropological foundations of the "individual educational trajectories" school of thought are the representation "of the person receiving education as a singular source of the semantic field of his progress. The singularity and general characteristics of the source of the semantic field are the appearance to yourself and others of the vision of one's own progress" [1].

Modern-day understanding of mathematics requires examining the history of mathematics, its subject matter, and its relationship with other sciences. At the International Mathematical Congress in Paris in 1900, in the section on teaching and methodology of mathematics, a 38-year-old prominent German mathematician David Hilbert held a presentation. In his report entitled "Mathematical Problems", he formulated the famous 23 mathematical problems that relate to various areas of mathematics and some directly to multiple areas simultaneously. In his view, the solution of these problems would be most significant for mathematics of next centuries. Neither before nor after, had anybody taken on himself such a gigantic task. Hilbert started his report with the words: "Who of us would not be glad to lift the veil behind which the future lies hidden; to cast a glance at the next advances of our science and at the secrets of its development during future centuries? What particular goals will there be toward which the leading mathematical spirits of coming generations will strive? What new methods and new facts in the wide and rich field of mathematical thought will the new centuries disclose?".

The main idea of Hilbert's speech was: Experience is the source of all mathematical problems [2].

Modern mathematics is evolving quite rapidly; new concepts, ideas, methods, and objects of study are emerging within it. The history of knowledge and the level it has reached today serve as a convincing proof of the "inconceivable efficiency" of mathematics, which has become an effective instrument for understanding the world [3]. It has been and continues to be an excellent method of research of various phenomena, up to the most complex — social and spiritual. The efficiency of application of mathematical methods depends on perfecting the mathematical apparatus, enabling to reflect increasingly complex properties and regularities of qualitatively diverse phenomena. For this, the individual engaged in mathematics must have a developed intellect, striving for transformative experiences, spiritual, possessing the need for understanding the surrounding reality, and actively self-perfecting. In the conditions of modernization of the educational system and the mechanisms for the implementation of educational variability, it is possible to create an individualized educational trajectory, which provides for students an individual educational route and develops the way to implement it. Such planning requires from the student the understanding of personal educational goals and a deliberate staging of personal educational objectives. A nation aiming to be at the level of the highest achievements of civilization must acquire quantitative mathematical methods — not only to enhance the effectiveness of scientific research, but also to enhance and improve the daily lives of the people.

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Образовательные траектории студентов математических специальностей

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В статье обсуждается роль математики в развитии познания, возможность выбора обучающимися индивидуальной образовательной траектории для студентов вузов как средства формирования математической компетентности. Ключевые слова: фундаментальная математика, образовательные траектории, математическая компетентность.

Ключевые слова: вариативность, образовательные траектории, историко-методологические знания, история математики.