

Innovations in Education as an Important Factor in Building the Education System

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Abstract

The article talks about the innovations that took place in the institution. Innovations - based on democratization, humanization, individualization, inclusion and other principles, the formation of the student's scientific outlook and personality is justified as an important factor in the establishment of the modern education system, where the formation of the student's scientific outlook and personality is referred to the national ground and universal values, and education is a single purposeful process of education and training with the aim of meeting the needs of the learner.

It is shown by examples that not every innovation is an innovation, that innovations appear as a new product and serve the quality of education. In this sense, the author examines the concept of innovation and evaluates 3 important facts of the potential of innovations - the role of the leader, staff and collective - with reference to international experience. It is also noted that educational innovations are classified according to the intensity of innovative change and grouped in different levels in the research, and educational innovations emphasize the nature and importance of education, training and upbringing with changes aimed at improving and developing the educational system.

Keywords: c innovations in education, research activity, innovative technology, pedagogical innovations, intensive changes, level of innovation

Інновації в освіті як важливий фактор у розбудові системи освіти

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Анотація

У статті йдеться про нововведення, які відбулися в закладі. Інновації – засноване на принципах демократизації, гуманізації, індивідуалізації, інклюзії та інших принципах формування наукового світогляду та особистості студента обґрунтовується як важливий чинник становлення сучасної системи освіти, де формування наукового світогляду та особистості студента є важливим чинником становлення сучасної системи освіти. відносяться до національного ґрунту та загальнолюдських цінностей, а освіта – це єдиний цілеспрямований процес виховання і навчання з метою задоволення потреб особи, яка навчається.

На прикладах показано, що не кожна інновація є інновацією, що інновації виникають як новий продукт і служать якості освіти. У цьому сенсі автор розглядає поняття інновації та оцінює 3 важливі факти потенціалу інновацій – роль лідера, персоналу та колективу – з посиланням на міжнародний досвід. Також зазначається, що освітні інновації класифікуються за інтенсивністю інноваційних змін та згруповані на різних рівнях у дослідженні, а освітні інновації підкреслюють характер і важливість освіти, навчання та виховання зі змінами, спрямованими на вдосконалення та розвиток освітньої системи.

Ключові слова: інновації в освіті, наукова діяльність, інноваційна технологія, педагогічні інновації, інтенсивні зміни, рівень інноваційності

Introduction.

Investigating the role of innovations in education, analyzing the readiness of education for innovations and referring to international experiences, explaining the term innovation in terms of educational reforms, solving problems and solutions in practically important issues related to the creation, processing, and application of innovations is an important issue of the day. In this process, the focus is on confirming the conclusion that the potential of innovations is a response to the challenges of the time and drawing attention to the superiority of digital technologies and solving the problems caused by justifying the role of innovations in the development of education, and turning the idea of managing changes caused by the use of innovations as a product of the new technology era into a research object. Because this process demands the creation of new ideas and the emergence of knowledge more than any other time and requires an innovative approach in the educational process more insistently. The order of the world we live in is shaped by rapid changes, and our living conditions, social relations, workplace, household, social relations, way of thinking, as they say, even each of us, ourselves, adapt to these changes and innovations. All areas in which a person operates are subject to changes. At the same time, the sphere of education cannot avoid these changes, and despite those who say that revolutionary changes in education are impossible, we cannot deny the speed of innovations entering education. In this direction, to build an educated future, to develop education, innovations are indispensable, and progress is nothing more than building new things on top of the old ones. Pedagogical innovations aimed simply at the content of education - organization and management of the educational process, improvement of its quality, renewal and improvement of training, education and evaluation technologies require the application of innovations in education.

Results.

The concept of "innovation" entered the scientific circulation at the beginning of the 20th century, and thanks to the economists I. Schumpeter and G. Mensch (1911) who understood it, it was accepted as a scientific discovery reflected in a new product or technology and permeated all areas of human activity (Ahmed, 1989). Austrian economist I. Schumpeter, who laid the foundation of research on innovation in the 30s of the 20th century, considered innovation as an economic effect of technical change in his work "Economic Development Theory" (Schumpeter, 1934).

I. Schumpeter notes in his work "Economic development theory" that innovation processes are formed as a result of new combinations, use of new techniques, creation of new raw materials, adoption of new products, creation of new supply markets and reorganization of production. The American researcher F. Jansen characterizes innovation as "a highway that ensures the constant growth and prosperity of the company". He

developed the TAMO model, whose innovation trajectory is expressed as follows Figure 1:

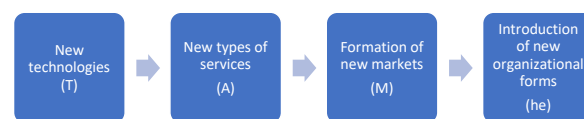


Fig.1. Scheme TAMO model of innovation

Referring to international experience, we can say that in some studies, this model can be expanded by adding an important element - innovation (NR or IR) aimed at the development of human capital. NR, expressing the rise of the intellectual component of the labor force, implies continuous education, improvement of qualifications, transfer of experience, creation of new jobs, as well as the organization of activities that reveal human abilities and help creative work. It is undeniable that technological indicators play a key role in the development of innovations, and the study focused on the indicators of technological development in the second half of the 20th century and the first half of the 21st century. It is known that the VI stage in the development of technological innovations has already taken place, and it will manifest itself within the framework of the 20-50 years of the XXI century, and according to experts, the VI stage will reflect the change of the entire face of the planet. If we look at table 1, this idea is clearly visible in the analysis of stages IV, V, VI.

Table 1.
Phased classification of scientific and technological development (1950-2050).

Stages of technological development	IV	V	VI
Coverage period	1935-1980	1981-2020	2021-2060
Main technical directions	EHM, atomic energy, rocket engines, space research, petrochemical industry	Microelectronics, biotechnology, informatics, oil and gas industry, space technology.	Nanotechnology, genetic engineering, global information network, alternative energy sources.
Leading areas	Device manufacturing, nuclear machinery manufacturing, radio electronics, chemistry, telecommunications	Information and telecommunication technology, oil and gas and chemical industry.	Nanomaterial production, biotechnology, alternative transport and hydrogen fuel
Leading countries	USA, Japan, USSR, Northern Europe.	USA, North Europe, Japan and new industrial countries.	USA, North Europe, China, Japan, India, Brazil, Russia.

It can be seen from Table 1 that the main scientific and technical directions of the VI stage of scientific and technological development are nanotechnology, genetic engineering of plants and animals on biotechnological basis, global information network, environmental safety, discovery of hydrogen and other types of fuel, creation of alternative types of transport (electronic transport). and since these processes are directly related to the education of people, the introduction of innovations in education is inevitable. In this sense, innovations in education are observed with pedagogical innovations, that educational activity, the content, methods and forms of education and upbringing, rules of organization and management are

updated, the potential of innovations is realized thanks to the updated changes (Ahmed, 1989).

Innovations in education have their own way of development and not every innovation is an innovation. If we look at the definitions of innovation, we can consider the ideas "Innovation is a change within the system" (Dictionary of pedagogical terms, 2013) and "Innovation in education is an innovation in the field of improving the pedagogical system of ideas, processes, tools and results adopted in the unity of quality" (State Strategy for the Development of Education, 2020) as different characteristics of innovation. Innovation is actually applied innovation means new ideas, technologies, methods, tools and obtained products-results implemented in order to improve the course of the teaching-learning process and the quality of the obtained results. This product, i.e. results, is revealed by the application of innovations. If we look at the list of innovations obtained, brought to education, theoretically studied and applied in practice over a period of more than ten years, we will witness that they are constantly increasing and renewing. Curriculums, active-interactive learning methods, inclusive education, web technologies, skills of using ICT-digital technologies, project management, socialization of education, risk assessment, management of human resources, formation of corporate culture, professional self-improvement and career advancement methods and dozens of similar innovations.

Innovations in education have already gained relevance and their synergy in education creates new applications and new opportunities. Experts believe that "Innovation is an important element in the development of education, it is expressed in various trends of collection and modification, initiatives and innovations in the educational space are realized thanks to the transformation of education and its content and quality. New formations arising from various initiatives and promising innovations for the evolution of education have a positive effect on the development of education and the formation of a multicultural educational space" (Guliyev, 2005). As an important area where innovation has an impact, education is the best place and a new content, a new look in the classrooms. Today, the 6 technologies leading the changes in the educational sphere prevail:

1. Virtual Reality (VR) in Education. With this technology, learners interact with the 3D world in the application of experiential learning.

2. Artificial intelligence and machine learning. From the lowest to the most advanced levels of technology, AI is being used to automate key activities in schools, such as evaluating subjects and providing feedback on areas that need improvement.

3. Cloud Computing for Education. Thanks to cloud computing technology, educational resources can be accessed from anywhere in the world. Important resources such as written lessons, audio lessons, videos

and video assignments can be stored in the school's cloud terminal.

4. 3D Printing. 3D printers are already popular in the education sector. Content previously taught through textbooks can now be expressed through 3D models.

5. Social media in educational institutions. Educational institutions have not been left behind in taking advantage of the influence of social media. Through these sites, they can organize competitions, meetings, parties. Students from various schools are using social media to share life-changing ideas.

6. Use of Biometrics in Schools. The introduction of biometric systems has already helped simplify education and improve discipline. Facial recognition, fingerprints, voice recognition and eye tracking are some of the biometric methods that schools are using to streamline their operations.

Innovation in pedagogy is based on the application of new methods, methods, tools and creates conditions for the creation of new curricula. First, a person adapts to innovations in his personal and professional development, and as a result, tries to change the educational environment. Innovations in education - innovations in methods, techniques, pedagogical tools, software, technology, etc. It can be seen from the changes that take place under the name that this process is also purposefully implemented, and the innovations that occur due to experience and applications accelerate the process of improving the quality of the educational process, the knowledge and skills, digital technologies, and various competencies required by learners in the 21st century, i.e. if possible, educational innovations make the essence and importance of education, training and upbringing more prominent with changes aimed at improving and developing the educational system.

The passage of time and historical reality show that the IV industrial revolution is based on digitization and makes the application of innovations in this direction inevitable, that is, the way to progress is through their application. And progress is not erasing everything, but grasping innovations and getting more useful ones, developing such new mechanisms of necessary retro-innovations. The actions carried out in the education system of Azerbaijan, the tasks set before the education workers of the "State Strategy for the Development of Education in the Republic of Azerbaijan" (2020) approved by the Decree of the President of Azerbaijan Ilham Aliyev dated October 24, 2013, are new approaches in themselves - continuous education, lifelong education, sustainable education, sustainable development, various forms of education (formal, informal, non-formal), ICT-based learning methodology, rationalization, distance education, inclusive education, education of the elderly, additional education, professional specialization and creation of regional-universal centers, complexes, campuses contains (Lazarev, 2004).

In this sense, innovations in education serve to form a new image of education in response to the challenges of time.

In the studies, educational innovations are classified according to the intensity of the innovative change and grouped at different levels:

- * zero-order innovation is practically considered regeneration (an incomplete result is obtained when old and new coincide) and preserves the characteristics and certain elements of the traditional education system. For example, frontal questioning in the teaching process is a traditional process and is presented as "Intellectual attack" (Veysova, 2007) in modern teaching.

- * first-rate innovations are characterized by their quantity and lead to changes in the system with their unchanging quality. For example, work on tasks has also existed in traditional. However, in innovative education, the format of tasks has changed, and the implementation is carried out collectively in the research phase and concluded with a presentation. Tasks are essentially the same process but implemented in an improved way to fit the new system.

- * secondary innovations are regrouping, system elements and organizational changes (for example, the combination of new and already known pedagogical tools and methods. They are especially applied in the process of working with children with disabilities. The teacher shortens and combines the existing material, tools, resources to the process according to individual needs, includes resources. These changes - combinatorial modification should not prevent children from mastering the necessary material.

- * third-level innovations are adaptive changes, that is, the preservation of educational system models in new conditions without going beyond the old ones. For example, feedback was used in education in the 70s of the 20th century and was updated in the 30s of the 21st century as feedback between learners and teachers. is showing itself. It has components such as responsibility, discussion, analysis, explanation, evaluation, conclusion, recommendation, idea. In this connection, the "Sandwich" model is considered useful.

- * fourth-order innovations include a new solution (often this educational system provides the simplest qualitative changes and a certain expansion-accommodation of individual components. In this case, the nature of training is changed without changing the complexity of the material, and children are encouraged to learn without changing the material.

- * fifth-order innovations are initiatives to create education and include "next-generation" systems (changing all or most of the system's original properties).

- * as a result of the introduction of the sixth-order innovation, a change in the functional properties of the system occurs, while keeping the "new type" educational innovation-backbone with a qualitative change.

- * seventh-order innovations represent the highest, fundamental change in the educational process, during which a change in the basic functional principle of the system is included. For example, today, the use of the flipped classroom model and the highest technology in education is a confirmation of the importance of the role of innovation in education.

It is known that the innovation process is understood as the development of three main stages: idea generation (in some cases scientific discovery), idea application and development, idea implementation. Thanks to the innovative activity, the ideas are applied and have a practical essence, and by adapting to the socio-pedagogical environment, they turn from an idea into an innovation. This process goes through different stages and requires certain actions:

- * identifying the need for innovation
- * data collection and situation analysis;
- * initial selection or independent development of innovation;
- * making decisions on implementation (development);
- * the application itself, including trial use of the innovation;
- * institutionalization or long-term use where the innovation becomes an element of everyday life.

These stages show that innovations in education appear at the expense of specially developed innovations. However, it cannot be denied that the innovations brought about by chance are not absent either. The main issue is the content of innovations, which includes scientific-theoretical knowledge about innovations, the most effective technologies promoted in education (project-based, problem-based training), effective practice projects. (Veysova, 2007). These projects are used in advanced pedagogical practice and lead to new quality in the teaching process. This qualitative achievement belongs to science and education workers and is achieved thanks to them.

The educational space of the modern world is not based only on innovative education, and it should be noted that the traditional branch of education is still ongoing. Admirably, once traditional systems are established, order is firmly maintained, and stability prevails. On the contrary, flexibility and changes are evident in developed systems. These changes-innovative processes are accompanied by the formation of new content of education, the development and application of new pedagogical technologies, and the creation of new types of educational institutions. The honorable and responsible task of the education system before the society is to show flexibility in changes, to be open to innovations, to keep alive the best of the traditional, to create the newest of innovation by looking at the path taken from curricula to the most modern web technologies and digital.

So, innovations in education are systemic changes, the main goal of which is to achieve efficient and stable results. Innovations are followed by large-scale changes

in the education system: unified state exam, electronic diary, application of ICT to education, etc. Also, innovation in teacher education is the change of standard work methods, which allows to improve the performance of students. Such innovations are prepared by the teacher for a certain class team, individual child.

Innovations in the education system are divided into the following groups according to innovation:

- completely new techniques without analogues;
- innovations in which well-known elements are also used.

Depending on the object of education, innovations in education can help:

- renewal of the educational organization;
- socialization of schoolchildren;
- education and teaching process;
- protection of children's mental and physical health.

According to the scale of innovations in education, they can be implemented at preschool, primary, general secondary and upper secondary education levels.

Development activities in preschool educational institutions (creative, playful, musical); methods of eliminating excessive emotional stress; color therapy; story therapy; applied based on innovations such as art therapy.

According to the characteristics of the primary school, innovations help to activate the child's activity and involve him in the educational process. The student argues, analyzes, looks for answers to the questions asked, and the teacher acts as a coordinator.

Problem-based lessons and activities are an effective innovative method familiar to teachers and educators in the learning process. Thanks to it, it is possible to achieve high and stable results in the assimilation of information by children, to maintain interest in development and learning in the younger generation. Problem-based learning (PLT) is widely used by teachers of chemistry, physics, and biology. For example, schoolchildren are given a certain question, to solve it they do practical work independently.

Thanks to the inclusion of information technologies in educational organizations, the "science-innovation-education" relationship has become a reality. ICT-digital is a reliable ally for any teacher. These innovations help teachers to activate children's cognitive interest, develop associative thinking, which has a positive effect on the strength of acquired skills and abilities. With the correct use of multimedia presentations, educational films, educational interactive tools, the teacher fully implements the requirements of the second generation of the Federal State Education Standard for the level of preparation of preschoolers and schoolchildren.

Universal Design and research activities pay particular attention to the analysis of the effectiveness of the application of the project methodology in school education (Veysova, 2007). Involvement of the young generation in research and project activities has become

the main condition of every academic discipline. Thanks to independent experiments, learners acquire the skills of working with scientific information, its processing and selection of necessary information. Hypothesis formation during research is a great opportunity for the development of logical thinking. Any project involves processing and summarizing the results, thanks to which children improve their communication skills. Even libraries use innovative technologies in their professional activities. They use information technologies to instill in the younger generation a love of reading and a careful attitude to literary sources:

- create electronic catalogs;
- preparing thematic evenings;
- make presentations;
- organize exhibitions.

The benefit of innovation in education has had a positive effect even on the activities of libraries. Libraries are now also becoming centers for further development of learners. In cooperation with libraries, classes are offered where children sew soft toys, learn the art of knitting and embroidery, and learn about the traditions and history of their homeland. Libraries prepare a series of lessons for different age groups aimed at early diagnosis of giftedness and development of creative abilities in every child. Local history, theater, craft clubs organized by librarians and other teachers at the base of libraries are a great opportunity to form an active citizenship position in children and help them in their professional work. The purpose of innovations in education is to direct the entire complex of innovations applied in preschool and school state organizations, as well as in the additional education system, to the harmonious development of the young generation. Within the framework of the new standards of preschool, elementary, basic, vocational, higher education, requirements are set for the level of graduate training, and such a "portrait" is a kind of instruction for the work of educators and teachers in the selection of innovative techniques and work methods.

Incorporating ICT-digital technologies into the teaching and learning process is not about having educational success. Serdyukov argues that when we focus more on technology in planning, "we may miss the key players in the process, namely teachers and learners". Sousa (2014) states that extensive use of technology will have both negative and positive effects on students' memory systems and attention. Maurer et al. (2013) noted that the introduction of modern media, especially computers, in education would compromise the ability to think, remember clearly, write, or read with focus, as all these activities required creativity. The purpose of new technologies applied in education is to increase the efficiency of teaching and training, to achieve quality. The only way is effective use. Educators should know that computers do not replace people. The application of ICT simply expands human capabilities and is expected to be balanced with existing guidance, pedagogical

theories, and research in education. The Organization for Economic Co-operation and Development states that even digital technologies cannot change education, but it still has a significant potential impact on the learning and teaching process in schools and creates new opportunities. Considering that OECD unites more than 17 countries of the world, including countries such as the USA, France, England, Germany, according to its report, we agree with the conclusion that the introduction of new technology in schools does not achieve the required result at a low speed. It is emphasized that in most OECD countries, there is no significant improvement in mathematics and literacy achievements using ICT advancement: "This poor performance is due to the fact that the technology potential of schools and the education system has not yet been determined, the limited capabilities of learners and teachers, the difficulty in identifying quality and useful software and resources, the learning objectives due to the lack of clear definition and lack of preparation on how to conduct education" (OESP, 1993). It is now 2023, and during these years, technologies have entered the education system at a changing pace and updated the teaching methodology. During the pandemic period, technologization of education in a short period of time, transition to the TEAMS platform, introduction of distance form and then transition to a hybrid teaching system in online and offline modes are an example of success in the application of innovations. Work methods and forms in teaching have been adapted to the demands of the new era. The teacher uses the possibilities of multimedia when building motivation.

Conclusions.

Innovations applied in education can be accompanied by both negative and positive changes. The history of pedagogy shows that innovations have always existed, but over time they were forgotten, changed, classroom-

lesson systems were adapted to the innovations occurring in each period.

Experiences show that innovations in education should not be spontaneous, but should be applied based on scientific principles, and the potential of innovations should be formed thanks to the precise definition of goals and targets, the definition of quality and useful software and resources that cover the content of education.

Innovations in education, new pedagogical approaches and digital technologies are not capable of changing education, but if used effectively, the problem of quality education, which is the 4th global problem of the world, will be solved thanks to the high development of human thinking. The "bilingual training" method allowed us to use the possibilities of different languages in understanding the subject. "Caravan" or "Learning with Stations" greatly facilitates the mastery of the largest topic by the class. Children work in large and small groups, individually and in pairs, demonstrate their potential, socialize and gain cooperation. The flipped classroom (classroom, 2007) high-tech learning model is based on student-centered collaboration between teacher and student and learns to learn through the teacher's guidance and presents its product as a contribution. For example, we can say that in accordance with this model, organizing a virtual expedition of students to the Rose Plant in order to expand the learning and application opportunities of students ensures the usefulness of the process of teaching aromatic substances from chemistry. In another example, an absentee trip to the German construction materials company "Knauf" "Shadow day" aroused the interest of students and played an important role in forming their interest in professions. The application of innovations in education is a necessary requirement of the modern era and should be purposefully used in the educational process.

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