Application of digital educational resources and methods in inclusive education

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Abstract

Currently, inclusive education system in our country (Republic of Kazakhstan) faces one of the main challenges. Inclusive education is a process of teaching aimed at including all students who require special support and access to quality education into the mainstream environment, where an accessible and supportive atmosphere is created without barriers to learning. The article examines the importance of digitalization in education and the development of the teaching process to enhance teachers' pedagogical competencies. Attention is drawn to the peculiarities of using information and communication technologies for children with special educational needs. Various digital educational technologies are employed to integrate the subject of computer science and create necessary technological tools. Based on international experience in inclusive education, key approaches and modern computer technologies are applied to ensure a comfortable and relevant learning environment and address situational resolutions. Research findings indicate that the use of modern technology and multimedia resources in inclusive classrooms contributes to the development of students' independence and the creation of accessible educational opportunities.

Key words

inclusive education, digital resources, accessible environment, information and communication technologies, multimedia, educational platforms

JEL classification

I20, I24

1   Introduction

Currently, the attention of the global community is focused on the issue of full inclusion of children with special needs and disabilities in the educational process with the involvement of society and families - inclusive education. Therefore, this is one of the main challenges in Kazakhstan. In this regard, opportunities are being developed to implement education for all children in mainstream educational institutions, vocational colleges, and higher education institutions.

In Kazakhstan, inclusive education started to actively develop as a new orientation since 2011. The fundamental principles of state policy in the field of education, enshrined in the Law "On Education," guarantee equal rights to quality education and take into account the

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individual development, psycho-physiological, and specific characteristics of each person, ensuring accessibility of education for all segments of the population.

2   General overview

The main goal of teaching computer science in inclusive education is to provide equal opportunities for all students to acquire computer skills, develop digital literacy, technological knowledge, and skills, as well as increase their confidence in using technology. Teaching computer science in inclusive education aims to create an inclusive learning environment where diverse students, including those with special educational needs or disabilities, can successfully learn and develop in the field of information technology. Within the framework of inclusive education, teaching computer science should be adapted to the diverse educational needs of students. This may involve using various methods and approaches, as well as accessible and adapted instructional materials and software. Additionally, teaching computer science in inclusive education aims to develop students' collaboration, communication, and problem-solving skills through technology. This helps students develop critical thinking, creative abilities, and enhances their level of participation in the digital society. Thus, the main goal of teaching computer science in inclusive education is to provide all students with equal opportunities to acquire knowledge and skills in the field of information technology, adapted to their individual needs, and promote their full integration into the digital society.

Inclusive education is an educational process aimed at social adaptation of all students who need special training in the learning process, in order to include and ensure equal access to quality education, i.e. learning without barriers of the environment and public consciousness, with the creation of an accessible and friendly atmosphere everywhere.

An inclusive approach involves understanding the different educational needs of children and providing services in accordance with these needs through full participation in the educational process, public involvement and the elimination of segregation and discrimination in education. In a broad sense, integration (Latin integratio – connection) is a process of development, the result of which is the achievement of unity and integrity within a system based on the interdependence of individual specialized elements (Movkebaeva and Denisova, 2013).

The idea of digital transformation is becoming a global trend, yet it is essential for the learners. We cannot do without traditional education and modern learning. Let's consider this concept through the following factors: creating a virtual environment in education, virtualizing learning, and using digital technologies in education. It contributes to the holistic development and self-learning of the students. Education is based on contemporary methods, tools, and communication technologies, all of which together form a flexible and effective education system. In this regard, if we explore perspectives that involve digital transformation in inclusive education, we can develop new programs, conduct quality research, automate educational resources and platforms for educational development.

2.1   Activities provided within inclusive educational process

Currently, there are many international research centers that study students ' achievements in the field of literacy to solve applied problems in real life for each industry as a whole. In particular, PISA-D extracurricular assessments share valuable information as a result of analyzing data on their effectiveness and the success of policies aimed at ensuring inclusive knowledge of equal quality for all (Yersultanova & Karelkhan, 2022).

The main content of the inclusive education policy is formulated to ensure that children with special educational needs receive education on an equal basis with normal children.

Inclusive education is a process that ensures equal access to education for all students, taking into account special educational needs and individual opportunities.

The organization of the educational process for children with disabilities in foreign countries first began to be considered in the 1970s, and inclusive educational programs were fully implemented in educational policies in the United States and European countries (Lebedev, 2020).

The formation and implementation of an inclusive educational process in the Republic of Kazakhstan is reflected in the first official education development program for 2010-2020.

For the first time, the development of inclusive education has become a leading educational policy guideline in the United States, Great Britain, Denmark, Spain, Finland, Germany, Italy and Australia. In general education institutions where appropriate psychological and pedagogical conditions for the development and social adaptation of children are created in the above-mentioned countries, children with mental and physical disabilities, with developmental disabilities, are successfully trained together with normally developed peers.

Taking into account the international experience of inclusive education, the project "Integration of children with Disabilities" was launched in Russia in 1991. The main concepts of inclusive education in the Russian Federation are described in the textbook "Inclusive education: key concepts"by N. V. Borisova and S. A. Prushinsky. As a result of the project, experimental platforms for integrated education of children with disabilities were created in eleven regions (Voltz et al., 2001).

In Sweden, children with special needs are placed in simple classes, and the necessary conditions are created for them. Each class is taught with the help of a special teacher or assistant and with the help of auxiliary special tools. Children with hearing, vision, and thinking disabilities are taught in special schools distributed according to anomalies, and can be taught in them up to 21-23 years. Special schools are now the center of child support resources embedded in classrooms in a comprehensive school. Special schools for children with retarded thinking are located by combining classes in buildings of general education schools (Ryndak et al., 2000).

3   Results

The computer science lesson using new technologies facilitates the completion of various didactic tasks, structuring of educational material, increasing students' interest in learning, and activating the use of modern educational platforms and tools. Additionally, multimedia educational resources are widely utilized, enabling the adaptation of texts presented in an online format by incorporating visual effects, audio and video fragments, statistical and dynamic models, virtual and interactive objects, and more. These programs contribute to enhancing students' engagement in the lesson and facilitating knowledge acquisition.

Hand animation – is a technique of digital recording using a hand-drawn animation style that provides new opportunities in education. The main feature of the program is the creation of new animation-like materials on new topics for students.

Padlet board – is a free online platform for creating interactive boards. It is a convenient tool for in-depth exploration of a topic, as well as for use in distance learning. In this case, students can use the electronic board to collaboratively gather their own assignments and materials on the topic, consolidating all resources in one place and preventing loss.

QR codes – with the help of this addition, any information such as text, website links, images, and various tasks can be encoded and accessed.

Creating a video program allows for the illustration of any materials related to the topic. It enables the addition of various photos and videos. It can be used in open lessons, seminars, and various forms of education. This is made possible through the Memoris program (available for free download from Google Play).

Plickers is a modern internet service that provides the opportunity to assess students' work and view survey results on the screen in a question-answer format in the feedback section.

Flippity technology offers automatic grouping and distribution of students during the organization of the educational process. Additionally, worldwall is a new platform that enables interactive creation of assignments to enhance lesson clarity.

The application of these aforementioned digital technologies in teaching informatics not only provides new opportunities for students but also gives teachers new tools and perspectives.

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In our time, technologies provide numerous opportunities and allow their utilization for the development of educational methods, skills, communication, and nourishment in children. By using digital resources, students have the possibility to access scientific and technical aspects during the process of learning, counseling, and growth. They support students through available literature, videos, interactive platforms, websites, electronic textbooks, and methods. These resources assist students in developing skills such as information literacy, independence, creative thinking, information retrieval, experimentation, expression, tool utilization, and technological proficiency.

The use of digital resources enables students to familiarize themselves with aspects of information technology, analyze information, and structure topics correctly. Familiarization with information technology: Through the use of digital resources, students can become acquainted with information technology (computer programs, online resources, electronic textbooks, etc.) and gain an understanding of their characteristics. They help in understanding new technologies, programming, and tools, comprehending information aspects, contemplating and employing methods of representing and utilizing information, such as interactive engagement. Information analysis: By utilizing digital resources, students develop information analysis skills. They can grasp the subject matter, search for information, analyze data, select relevant information, determine information resources, and solve problems related to identification and information retrieval.

Through the use. Of digital resources, students receive assistance in studying and designing their topics in presentations and design. They effectively present informational content using images, diagrams, visual effects, presentations, and other graphical elements. This contributes to expanding students' knowledge, organizing their information, and presenting their own data and ideas.

Information and source searching: Digital resources provide students with the ability to properly structure information and search for sources on a topic. They enable students to gather, explore, and structure information using electronic textbooks, websites, blogs, cultural wikis, e-books, and other online resources.

Tools and informational resources: Digital resources offer students opportunities to appropriately format and structure topics using informational tools and resources.

The use of various informational sources and resources through computer technologies allows students to find the necessary information and develop their professional skills.

Currently, there is a need in education to use effective teaching tools for working with typical children and we can mention some of them. Modern requirements involve the use of digital platforms in lessons and various pedagogical methods. However, there are also methods that can be used in conjunction with children with specific needs. One of these

methods is called BOPPPS. BOPPPS is a model that can be used for effective learning in various environments, including robotics in an inclusive classroom. It consists of the following main aspects (Hundey, 2015):

- Bridge-In,
- Outcomes,
- Pre-assessment,
- Participatory,
- Post-assessment,
- Summary.

Bridge-In (Introduction): The aim of the instructor or lecturer is to gain attention of the student, to build his or her motivation and to point out the importance of the lecture. The student shall find out why he or she should learn about the topic, why does it matter and what´s in it for him or her. During this phase, the teacher shall pay attention also to the individual learning needs of all students in an inclusive classroom. The teacher shall focus on building a common starting point and prepare students for the new topic and various learning materials.

Outcomes (Purpose): This phase defines the specific, measurable, and achievable goals of the lesson. For example, in the case of robotics in an inclusive classroom, the goals may include developing programming skills through the implementation of specific robot programs, collaborative tasks, and specific assignments. The goal-setting process takes into consideration the individual attention required for each student and their specific needs and abilities.

Pre-assessment (Preliminary assessment): During this phase, the teacher assesses what the students already know about the topic and they recall their prior knowledge. He or she shall find out what are the students interested in. For example, in the case of robotics, the prior knowledge and skills of students regarding robotics needs to be assessed. The assessment can be done using a quiz, survey or a poll at the beginning of the lesson. Pre-assessment helps in determining readiness levels and understanding which aspects may require additional attention or customization for inclusive instruction. For example, the teacher may conduct a test or questionnaire to assess the familiarity of certain robotics terminology among students and their preparedness for specific learning outcomes.

Participatory: In this phase the instructor shall plan a participatory learning activity that allows students to engage with the learning outcomes specified before. The instructor shall communicate his or her expectations clearly and the students shall be actively involved in achieving the outcomes of the lesson as much as possible. They shall improve their understanding and deepen learning by connecting with, testing, exploring, and mentally manipulating ideas.

Post-Assessment: in this phase, the instructor finds out what did the students learn and if the desired outcomes were accomplished. He or she shall determine if there are any gaps in understanding the topic among the students. The students shall find out if they are understanding the topic well and what do they need to work on.

Summary: the teacher concludes and wraps up learning experience and provides a sense of closure and completion, or sets up learner for future lessons. The students appreciate how the lessons ties in with the course, or the bigger picture (their discipline, their experience, etc.). They can also reflect on whether the desired outcomes were met.

4   Conclusion

The use of modern digital educational resources is necessary not only in computer science lessons, but also in all subject areas to increase the effectiveness of teaching and the development of the educational process. The introduction of innovative technologies in classes not only contributes to the achievement of good results, but also contributes to cooperation and interaction between students. Effective use of modern experience-based learning tools is a decisive factor in improving the quality of education received and improving the quality of life as a whole.

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