Innovative Modes of Distance Education in the Context of 5G Digital Technologies Implementation

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Abstract **– This article delves into the complexities of adapting distance education to the advancements brought forth by the implementation of 5G digital technologies. The primary objective of the study is to elucidate the influence of 5G digital technologies on the adaptation of distance education models. With a hypothesis positing that the integration of 5G will catalyze the evolution of distance education towards more innovative and comprehensive educational models, the study employs a mixed-methods approach. The findings shed light on the significant impact of 5G digital technologies on distance education, facilitating the introduction of novel educational approaches that leverage enhanced connectivity and multimedia-rich learning experiences.**

Keywords **– Distance education, innovative forms, digitalisation, educational environment, ICT, modernisation of education.**

1. Introduction

The significance of investigating the impact of digitalization is pivotal in the realm of distance education.

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Over recent decades, there has been a notable transformation in open and distance education systems, marked by a transition from traditional distance learning to encompass online, mobile, and ubiquitous learning modalities. The increasing emphasis placed by nations on distance education is driven by several factors, including the advent of technologies enabling widespread remote education delivery and the imperative to continuously update skills and retrain the workforce. Schwab's [10] observation regarding the intertwining of technology and society across the four industrial revolutions underscores how these dynamics have fundamentally reshaped both technology itself and societal structures, including education. Digitalizing education stands as a crucial component of national informatization efforts. Enhancing the incorporation of technology in education, especially through initiatives aimed at updating and expanding computer networks and satellite educational infrastructures, will create numerous opportunities for growth and innovation in schools and educational institutions at all levels. The advent of the networked and information age presents favorable conditions for educational institutions to assume the role of knowledge dissemination centers. In light of technological advancements and societal shifts, distance education is experiencing a surge in popularity, evolving into a multifaceted approach to learning. Digitalizing education is pivotal in modernizing and enhancing contemporary learning and educational systems through ICT (Information and Communication Technology). Similar to information technology, ICT facilitates access to information and emphasizes communication, encompassing wireless networks, the Internet, and telecommunications.

The ICT market offers a plethora of tools, including computing devices, electronic displays, and telecommunications equipment, impacting our lives both positively and negatively.

Online or distance learning leverages electronic media and ICT in education, enabling individuals to pursue education anytime and anywhere with an Internet connection. The author asserts that modern distance education stands at a critical juncture, transitioning from a focus on infrastructure development to software and hardware integration.

Strategizing and policymaking for distance education at this juncture serve as crucial foundations for digital innovation adoption, which drives the evolution of distance learning and catalyzes digital transformation. Therefore, the implementation of a digital strategy is imperative to facilitate the introduction and integration of digital innovations in distance education effectively [1].

Research Topic: The focus of this research is on the development of innovative forms of distance education within the context of digitalization.

Research Objectives:

1. To identify the various types, content, and characteristics of innovative forms of distance education.
2. To assess the advantages and disadvantages of different types and forms of distance education in adapting to new technological means of digitalization.
3. To propose directions for enhancing the forms and methods of distance education.

2. Literature Review

In examining foreign experiences in integrating digital technologies into distance education, particularly drawing from European e-learning practices, the study references the monograph [1], which delineates the European trajectory of development. Additionally, the analysis of literature highlights the overarching trends in the evolution of digital technologies from the 4G to 5G era amidst the challenges posed by digital globalization, as elucidated in the author's work [2]. The intensification of globalization has augmented the Internet accessibility and speed, facilitating online resource access, remote work capabilities, and the emergence of interactive learning environments.

The transition to 5G technology fosters the evolution of smart classrooms, the integration of virtual and augmented reality into education, and the adoption of other innovative technologies. Moreover, 5G enables seamless real-time interaction between teachers and students in remote education settings, transcending communication barriers.

The advent of 5G presents new avenues for delivering education to remote or underserved regions, thereby reshaping educational technologies and transforming learning and collaboration approaches in the online sphere.

However, as emphasized by the authors [3], organizations face mounting pressure to leverage digital technologies for revitalization, necessitating a transformation of their models to cultivate new knowledge. This transformation requires an adapted theoretical model encompassing initiation, development, implementation, operation, and considering the role of both the external competitive environment and the internal organizational environment, along with process results. The adoption of a systemic information approach to learning is essential for constructing a comprehensive, multi-level model of distance education, facilitating the identification of areas for enhancing educational quality and implementation based on content and procedural components. The integration of cutting-edge teaching methods and technologies should be geared towards fostering intellectual and personal growth [4].

Despite the evident advantages of online learning in higher education, transitioning educational processes to a distance format poses challenges for both students and educators. The advent of 5G digital technologies facilitates extensive distance education and fosters the development of innovative forms within the digitalization context. Leveraging 5G technologies enables the collection of substantial data to enhance educational processes effectively and tailor them to student needs. The monograph [5], notable for its innovative approach to education, underscores the significance of information transfer and information and communication technologies in shaping Industry 4.0. It lays the scientific and methodological groundwork for constructing a modern information system within the educational sphere and offers practical tools for studying the impact of digitalization on global educational development.

Building on our own research [6], which focuses on modeling societal cognitive development as a catalyst for digital transformation, we highlight the network effect enabled by the technological revolution, enabling real-time connectivity for all individuals. In the literature review, attention was drawn to the article [7], where the authors endeavor to establish a new theory necessitating the integration of innovative technologies crucial for innovative distance education.

We explore the primary trends in distance education and new learning technologies in Ukraine, leveraging modern information and telecommunication tools to manipulate educational information effectively and anticipate further development prospects. The principles of modeling distance learning processes, facilitating the creation of tailored learning environments regardless of geographical location while addressing higher education didactic goals, are elucidated.

Despite the advantages of online learning in higher education, the transition to electronic educational processes entails addressing various challenges for both students and educators. However, a literature review on online education development reveals the unresolved issue of developing specialized strategies for innovative forms of distance education aimed at enhancing the learning experience, diversifying student educational activities, and fostering interest in education and its innovative forms. In the contemporary landscape, numerous innovative forms of distance education leverage new technologies and methodologies to enhance learning quality and broaden educational access. Therefore, it becomes imperative to draw from the experiences of pioneering educational institutions and investigate technologies employed by leading universities and organizations. Virtual and augmented reality, in particular, fosters immersive learning environments wherein students engage with virtual objects and scenarios in real-time through specialized platforms and communication tools. This approach incorporates adaptive technologies, mobile education, interactive video courses, and collaborations with high-tech enterprises, thereby fostering more effective and accessible online learning experiences.

The literature review serves as a conduit for harnessing the amassed experiences of world-renowned universities and facilitating the introduction of innovative distance education formats in the era of 5G digital technologies.

3. Research Methodology

The methodology for implementing innovative forms of distance education within the realm of 5G digital technologies hinges on several foundational principles, ideas, and approaches:

1. Individualized learning flexibility: Leveraging 5G technologies enables the creation of personalized learning programs tailored to each student's unique characteristics, acknowledging diverse learning styles and needs, with digital tools facilitating individualization.
2. Virtual community creation: Utilizing 5G technologies fosters the establishment of virtual communities where students collaborate, share ideas, and solve problems collectively, aligning with contemporary learning paradigms emphasizing communication and teamwork skills development.
3. Transformation of student roles: 5G technologies can shift students from passive listeners to active participants through interactive methods, virtual tools, and gamification elements, thereby fostering deeper engagement in the learning process.
4. Educational analytics: Employing analytical methods to gather and analyze learning data, facilitated by 5G technologies, enables effective enhancement of learning processes and customization to student needs, bridging educational requirements and technological capabilities.
5. Socio-cultural approach: Recognizing the importance of socio-cultural context, curricula should promote active interaction and deep learning, facilitated by real-time virtual classrooms with high-quality video and audio connections enabled by 5G technologies, fostering teacher-student interaction and remote expert participation.
6. Agile methodology: Aimed at enhancing flexibility and accessibility, particularly for students in remote or inaccessible regions, 5G technologies support the creation of virtual communities, promoting social interaction and collaborative learning.

Additionally, data analytics aids in monitoring student progress and fostering active engagement, leveraging the high-speed and reliability of 5G communications to facilitate global knowledge sharing and cooperation across borders. Ethical and legal considerations, such as data protection and equitable access, must underpin the design and implementation of these innovations. Overall, innovations in distance education, augmented by 5G technologies, hold the potential to reshape the learning paradigm and equip students for the challenges of the modern world.

4. Results and Discussion

The study yielded insightful findings regarding the types, content, and characteristics of innovative forms of distance education, as well as delineated the advantages and disadvantages of different modalities in adapting to new technological means of digitalization. Additionally, it provided substantiation for enhancing the forms and methods of distance education.

4.1. Types, Content, and Characteristics of Distance Education

The advent of Information and Communication Technologies (ICTs) has revolutionized education, profoundly influencing the design and implementation of teaching and learning activities in open and distance learning. [9] This paradigm shift is chiefly attributed to the development of the Internet and innovative tools and technologies, empowering educators with novel approaches to curriculum planning, instructional design, implementation, and assessment. The practice of leveraging technology to foster innovation in education digitalization aims to reshape the educational landscape, promoting comprehensive human development and facilitating smart education initiatives.

The expansion of technological capabilities can optimize basic education digitization, bridge the digital divide, enhance the quality and balance of basic education digitalization, and modernize education through the integration of educational data, ultimately leading to the individualization of learning experiences. Furthermore, the digitalization of education via technology is poised to restructure traditional educational models, transforming learning spaces, instructional methods, assessment systems, and education management to cater to personalized learning needs. Enhanced by technology, digitalization of education will also diversify educational service delivery channels and personalize learning experiences, thereby broadening access to high-quality educational resources.

1. Advantages of ICTs in education: ICTs offer increased access to services and information, facilitating the development of educational platforms, personalized learning plans, multidimensional data processing, outcome prediction, and knowledge acquisition processes. Moreover, ICT provides swift access to affordable and improved communication tools, such as instant messaging and VoIP telephony, enriching communication experiences. It also offers innovative avenues for entertainment, networking, and sourcing services and products. Notably, ICT enables expanded access to education through online classes, distance learning, virtual reality, and interactive multimedia, catering to diverse learning preferences and needs. Additionally, the integration of digital technologies in teaching and learning fosters continuous enrichment of digital resources, facilitating lifelong learning opportunities and adapting distance education systems to meet scalability demands.

Overall, the study underscores the real potential for further development of modern distance education, advocating for its strengthening and advancement through enhanced scientific and technical support, legislative measures, strategic positioning, and ongoing pursuit of innovative breakthroughs.

The educational community and governmental bodies must collaborate to establish a robust framework for the advancement of distance education, continually fostering its growth and positioning it as a pivotal tool in promoting lifelong learning opportunities tailored to individual needs. It is imperative to identify and address key factors and obstacles constraining the development of modern distance education effectively. Addressing these challenges requires a strategic approach that leverages macro-level opportunities while enhancing the potential of distance education at the micro level to accelerate its growth rate.

To navigate the complexities inherent in modern distance education, it is crucial to capitalize on favorable macro-level factors while enhancing the capabilities of distance education at the micro level. This entails addressing bottlenecks and adapting to evolving macro and meso environments to maximize opportunities for personal development within new contextual conditions.

Emphasizing research and technical support for the teaching and learning processes is paramount. Recognizing that distance education fundamentally revolves around facilitating learning experiences, the shift towards prioritizing the provision of high-quality educational services over tangible product delivery is not only a matter requiring extensive research but also aligns with the global trend emphasizing pedagogical research. This shift underscores the importance of focusing on the efficacy and impact of educational services, reflecting an international emphasis on enhancing pedagogical practices [3].

Table 1. Types, content and characteristics of distance education

Types	Content and Characteristics of Distance Education
Electronic learning (e-learning)	Utilizing online resources or digital platforms to obtain learning materials, enroll in courses, and participate in educational programs.
Videoconferencing	Facilitating virtual meetings or classes through live video conferencing and interactive communication among participants.
Webinars	Live online lectures allowing for real-time interaction and discussion between instructors and students.
Asynchronous learning	Asynchronous learning, where students engage with materials and coursework at their own pace, without the requirement of real-time participation.
Mobile learning (m-learning)	Mobile learning, also known as m-learning, involves utilizing portable electronic devices like smartphones and tablets to access educational content, communicate, and engage in distance learning activities. It offers flexibility, convenience, and mobility for both students and educators, allowing learning to occur anytime and anywhere.
Gaming technologies	Gaming technologies refer to the use of interactive and immersive gaming elements in educational contexts to enhance learning experiences. These technologies leverage game design principles, mechanics, and simulations to engage learners, promote active participation, and reinforce learning objectives.
Online platforms for social interaction and discussion	Use of platforms for communication and exchange of opinions, ideas and resources between students and teachers.
Online educational platforms	Specialized platforms designed for managing, distributing, and overseeing the learning process, like MOODLE, facilitate course management, assignment handling, assessment, and communication for both educators and learners.
Cloud technologies	Using cloud services and applications to store, share and collaborate on learning materials, allowing students and teachers to easily access resources from any device with an Internet connection.
Artificial intelligence (AI) and adaptive learning:	Utilizing intelligent algorithms and systems to analyze students' learning processes, customize learning materials, and tailor resources to individual needs and abilities enhances the quality of learning by personalizing the educational experience for each student.
Virtual classrooms	Creating a virtual environment that simulates a traditional classroom, allowing students and teachers to interact in real time.
Online libraries and resources	Providing access to e-books, journals, articles and other academic resources via the Internet.
Collaborative tools	Using programmes and platforms that facilitate collaboration between students, teachers and researchers (such as Google Docs, Trello and others).
Online testing and assessment	Leveraging ICT (Information and Communication Technology) to develop, manage, and assess tests and various forms of knowledge evaluation in distance education.
Virtual laboratories	Developing digital simulations and virtual platforms for conducting research, experiments, and practical training, granting students access to essential tools and resources.
Blogs and Wikis	Utilizing blogs and wiki platforms for collaborative efforts, knowledge dissemination, idea exchange, and the documentation of research findings and project outcomes.
Podcasts and videos	Using audio and video materials as additional learning resources that can be listened to or viewed by students on their own schedule.
Electronic portfolios	Compiling digital portfolios showcasing students' work to illustrate their knowledge, abilities, and accomplishments throughout their learning journey.
Online mentoring and coaching	Leveraging ICTs to facilitate collaboration between students and mentors or coaches, enabling them to receive personalized guidance and support throughout the learning process.

(compiled by the authors)

These and other ICTs play an important role in distance learning, helping students and teachers to collaborate, learn, share ideas and resources, and provide access to learning materials and research from a variety of sources.

4.2. Advantages and Disadvantages of Different Types and Forms of Distance Education as a Factor of Adaptation to New Technological Means of Digitalization

The solution to these problems can only be truly achieved through in-depth research into the teaching and learning process, the identification of specific contradictions in secondary school and the learning process of modern distance education, and the adoption of practical technical support (not only logistical, but also systematic methods and other technologies). Only by improving quality can educational institutions truly make distance education a voluntary choice for lifelong learning in the context of national policy. ICTs or information and communication technologies play an important role in modifying and modernising modern learning and education systems. Similar to information technology, ICT is another technology that helps people access information. ICT focuses on communication, including wireless networks, the Internet, and telecommunications. The market is full of various ICT tools, including computing, electronic displays and telecommunications. ICTs affect our lives in both positive and negative ways.

The positive impact of ICTs is aimed at

- to increase access to Internet services and provide new tools and opportunities;
- to strengthen organisational activities;
- to help people to overcome disabilities; screen reader or magnification software helps people with low vision to work with plain text instead of Braille;
- to strengthen organisational activities that affect the three main areas of an organisation - communication, security and information management;
- mobile working, flexible working hours, virtual offices, etc. help people to get better opportunities to work in the field of communication;
- innovations in teaching methods - distance education stimulates the development of new teaching methods, such as interactive videos, virtual laboratories and gaming technologies, which can make learning more interesting and meaningful;
- organisations that implement ICTs ensure good communication, which means they can respond quickly and easily to changes;
- organisations benefit greatly from ICT information management, as they can make better decisions by keeping information up to date;
- ICT can improve data security, its encryption method helps protect data from malicious attacks. This technology uses encryption to store and send data electronically. This allows keeping trade secrets within the organization [4].

The negative impact of ICT in the process of distance education:

- is the occurrence of unemployment, as technology is able to automate common operations in organisations so that people are no longer required to perform these tasks. Manual operations are being replaced by automation, and this has become the single largest cause of unemployment. The use of ICTs can lead to adverse economic consequences, social consequences, loss of income, loss of self-esteem and status in society;
- a person loses contact with people due to reduced social interaction, which makes a person feel unhappy and isolated;
- health problems - long hours in front of a screen can lead to health problems such as eye fatigue, reduced positive physical activity and posture problems;
- challenges for teachers - distance educators need to adapt their teaching methods to the online environment, which may require skills in the use of technology and e-learning tools;
- assessment and honesty - the possibility of using illegally acquired knowledge in tests and quizzes can be a problem in distance learning;
- psychological aspect - some students may feel a lack of motivation or social isolation due to the distance from the learning community;
- constant updating and adaptation - the rapid development of technology requires constant updating of learning platforms, tools and materials to meet modern requirements. Given the dynamics of distance education development, it is important to keep in mind that this approach can be used as a standalone alternative to traditional learning or as part of hybrid models.

In general, distance education is an important area of development in the education sector, but it is not a one-size-fits-all solution for all students and study programmes. The effectiveness of distance education depends on many factors, including learning objectives, technological level, student support, and the quality of teachers.

The main benefit of ICTs for people is the increased access to services and information that accompany the development of the Internet. ICT provides quick access to affordable and better forms of communication in the form of instant messaging and VoIP telephony. It offers exciting ways to enjoy entertainment, leisure, networking and finding services and products from suppliers.

Technology is helping to expand access to education through online classes and distance learning.

Table 2. Advantages and disadvantages of types and forms of distance education as a factor of adaptation to new technological means of digitalisation

Content of the ICT function	Advantages	Disadvantages
Flexibility and accessibility	Students can study from anywhere with internet access. This is especially useful for those who have limited opportunities for traditional learning due to geographical distance or other circumstances	Lack of personal contact: lack of physical interaction between teachers and students can lead to feelings of alienation, impair comprehension and reduce opportunities for discussion
Independence and responsibility	Distance education requires students to be more self-disciplined and organised. They learn to manage their time and set priorities.	Poor motivation and self-discipline: some students find it difficult to maintain a high level of motivation and discipline without regular supervision from the teacher
Enhanced access to resources	Online courses provide students with the opportunity to use a variety of learning resources, including video lectures, e-textbooks and interactive assignments. Distance education allows students to choose from a wider range of courses and programmes, regardless of their geographical location	Technical and technological challenges: the need for access to a computer, a stable internet connection and technical knowledge may pose difficulties for some students
Learning through experience	Students can learn at their own pace and level of understanding.	Lack of social interaction: distance education can limit opportunities for communication and cooperation with fellow students, which can affect the development of social skills
Reducing travel and accommodation costs	Distance education can help save time and money that would otherwise be spent on travelling to a university and staying at another city.	Lack of practical skills: some subjects require hands-on skills and interaction with equipment or tools, which can be difficult to implement in an online environment
Distance education as a trade-off between flexibility and the challenges it can present	Its success depends on the ability of students to adapt to new technological tools, self-discipline and responsibility, as well as on the support and effectiveness of learning programmes and platforms.	Lack of interpersonal skills: importance of learning to communicate, collaborate and develop interpersonal skills in the real world can be underestimated in distance learning
	The effectiveness of distance education depends on the individual preferences and abilities of students, as well as the quality of organisation and support from educational institutions	Limited access to the practical part: some disciplines require practical skills that are difficult to replicate in an online environment, such as laboratory work or medical practice, and the lack of physical presence in the classroom can lead to less motivation to learn the material, especially in hard-to-reach places or uninteresting subjects.

(compiled by the authors)

Distance education is a learning process that takes place remotely, using Internet technologies and other means of communication. It has its pros and cons that can affect students, teachers and the overall educational process.

4.3. Directions for Improvement of Forms and Methods of Distance Education

In general, distance education has its advantages and limitations. The choice between traditional and distance education depends on the individual needs, abilities and circumstances of the student.

Distance education is driven by Big Data and learning analytics, which can help educational institutions identify "crisis" students in a timely manner, making learning more personalised. Artificial intelligence, which consists of intelligent tools such as feedback information, student status analysis, learning information retrieval, and intelligent system recommendations, is very promising. At the same time, it can also be used in conventional laboratories, intelligent distance education systems based on artificial immune systems.

Due to the promotion of online learning and blended learning and the widespread use of technology in classroom teaching, the Internet of Things will rapidly develop in the field of education Big Data; Learning Analytics; Mobile Learning; Internet of Things. An IoT system that collects all the data related to students' learning activities from enrolment to graduation. Although blockchain is considered to be one of the most important developments in educational technology, it has not yet been truly used in the educational process. The use of blockchain covers both academic and management aspects, which helps to optimise processes and increase efficiency. The prospect of using virtual and augmented reality in the educational process is also expected. Various online needs create a surge in network traffic, generating massive data that can reveal user habits and preferences. Personal development, interpersonal communication, socialisation and identity cannot be outsourced to "technology". The challenges faced by the quality and balanced development of informatisation of basic education are phenomena such as the digital divide, data islands, technology and education [5].

Table 3. Advantages and disadvantages of distance education methods

Content of the methods	Advantages	Disadvantages
Flexibility	Students can study from any location with Internet access, allowing them to adjust their study schedule to their own schedule.	Lack of personal contact: Distance education can lead to a lack of direct interaction between students and teachers, which can affect the quality of understanding of the material and the ability to ask questions.
Availability	Distance education allows people from different geographical areas to access high quality education even if they cannot physically travel to an educational institution.	The need for self-discipline: successful distance learning requires a lot of self-discipline and time management skills.
Variety of materials	Distance education can be used in a variety of learning formats, including video lectures, text materials, interactive tasks, etc.	Limited social interaction: students may experience a lack of social interaction and opportunities to exchange ideas with fellow students.
Save time and money	Students do not need to spend time travelling to the educational institution, and they can also avoid additional accommodation costs.	High dependence on technology: distance learning requires a stable internet connection and the ability to use various technical tools.

(compiled by the authors)

Though distance education in the world is developing rapidly, and practice has already proved the real effect of distance education and its unique advantages, distance education is still in the process of transition from traditional to online learning. The use of technology and new forms of learning is becoming more and more common. There are different opinions among the education community and all sides of society as to whether distance education can become an important part of the education system. However, the decisions and measures taken by the government to firmly promote modern distance education are contributing to the rapid development of distance education in urban and rural areas, across the country and in combination with national conditions.

The mechanism for expanding the capabilities of information technology is to address the digital divide and other problems in the development of informatisation of basic education in the era of informatisation of education 2.0. From the perspective of technology, education will be transformed from technological support and application of technology to empowerment of technology. According to the four elements of information education dissemination: educators, educational information, educational media, and the educated, we believe that technology-enhanced education should be analysed from these four aspects: digital competence, educational change management ability, and system risk monitoring ability can adapt to teaching and learning in the intelligent era; second, technological educational information mainly refers to the construction of a new ecosystem of intelligent learning resource aggregation services.

The integration of Big Education Data in the development of basic education informatisation is of great significance for students' independent learning, for public services, for accurate teaching and research, and for basic education decision-making. It can realise personalised and selective learning for students and create a future personalised learning system.

On the one hand, distance education as adaptive learning, which requires the implementation of adaptive methodology in the educational process, is personalised and allows learning platforms to tailor learning material to the needs and level of knowledge of students. Students can focus more on the aspects of the subject where they have problems, and therefore their performance can be improved. The possibility of using more diverse learning methods, as online communities are created where students can discuss topics and collaborate on projects, adaptive systems can use game play and other methods to enhance teaching. On the other hand, adaptive systems require powerful technical resources and a large amount of data, which requires the development of 5G infrastructure, there may be technical limitations and a low margin for error in determining student needs, as it is not always possible to accurately determine the needs of each student. However, there are more advantages to introducing distance education, as this type of education promotes the exchange of experience and mutual support between students, strengthening the community, greater engagement with the material; interaction with classmates and teachers, which can increase interest in learning. We have argued in our previous work that the main principles and ideas associated with the concept of differentiated instruction include individualisation, where the teacher creates learning tasks that take into account the individual strengths and weaknesses of each student, allowing each student to learn at their own level and pace; can create different groups of students based on their needs and abilities (each group is provided with tasks and materials that are appropriate to their level); the teacher uses a variety of learning resources to meet the needs of the students. These may include textbooks, interactive videos, web resources, games, and other tools. It is important to continuously monitor students' progress and provide them with feedback, which helps to adapt learning based on each student's achievements. Differentiated instruction also helps to address the needs of learners with different characteristics and abilities, including children with special needs. When learners feel that learning is relevant and interesting to them, it helps to increase their motivation and interest in learning. The concept of differentiated instruction involves flexibility and an individual approach to each student to ensure quality education and support their development. It responds to different learning styles and needs of students and can contribute to better learning outcomes. However, differentiated education can be a challenge for teachers, as it requires more preparation and lesson planning, as well as the creation of different learning materials for each student.

Nevertheless, this concept allows for better consideration of each student's individuality and contributes to more effective learning [6], [8].

Our previous research on distance education has shown that along with these benefits, there are challenges, such as ensuring data security, protecting against cyber-attacks, and making equipment and internet connectivity accessible to all. For the successful implementation of 5G-based distance education, it is necessary to develop infrastructure, ensure reliable network access, and develop appropriate educational programmes and platforms. There are also disadvantages of distance education: lack of direct communication with the teacher and classmates can lead to a sense of isolation and loss of motivation; students may have problems using technology or insufficient Internet access; distance learning may be less controlled, which can lead to plagiarism and other violations of academic integrity; without formal assessment and supervision, students may be less motivated to complete the course; there may be a lack of active communication and discussion with the instructor.

It should be noted that theories and paradigm concepts were important in the context of the discussions: 1) The idea of constructivism emphasizes the importance of student activity in their own learning process. The use of 5G technologies can help in the creation of virtual environments where students can actively build their understanding of the material. 2) The approach of combines traditional methods with the use of technology. The introduction of 5G digital technologies can improve access to online resources and promote effective flipped learning. 4) The direction of connectionism emphasizes the importance of creating connections between different elements of learning.

With the use of 5G technologies, it is possible to improve the communication and exchange of information between students and resources. 5) The aspect of socio-cultural learning: noted the influence of the social environment on the learning process. The use of 5G technologies can support virtual communities to promote social interaction and learning. 6) Instructional design thinking sets the task of creating effective learning materials. The use of 5G technologies can help in the development of interactive and individualized learning resources. The application of these theories in the context of distance education using 5G digital technologies requires a comprehensive approach and integration of knowledge in learning psychology, information technology and pedagogy. 7) The principle of game-based learning (Gamification) uses game elements to stimulate student motivation and engagement.

In the context of 5G digital technologies, it is possible to create high-quality game interactions with high data rates. 8) Open Education vie emphasizes the accessibility and openness of educational resources. 5G technologies can provide quick access to a large amount of open materials. 9) Cooperative Learning strategy emphasizes the importance of collaboration and interaction between students to achieve learning goals. The use of 5G technologies can support virtual collective learning initiatives. 10) The system of global education is designed to prepare students to understand and interact in a global community. Using 5G technologies, it is possible to effectively ensure the virtual exchange of experience and knowledge between students from different countries. These concepts of theory and paradigm interact to form a comprehensive approach to the development of distance education using advanced digital technologies. Their implementation requires a deep understanding of the needs of a modern student, an effective pedagogical strategy, and technical expertise. It is important to keep in mind that this problem faces challenges and opportunities, and its solution requires joint efforts of representatives of various industries to create an integrated and effective approach to the development of distance education using 5G digital technologies.

In conclusion, the introduction of 5G digital technologies in distance education can significantly improve the quality and accessibility of education, make it more interactive and contribute to the global availability of knowledge [7].

4. Conclusions

The creation of online learning platforms supports and facilitates the implementation of distance education. Some applications, concepts, and models have been adopted that can highlight the benefits of distance education, such as learning self-assessment management, online homework submission, homework grade management, online course selection, and subject and course questions and answers.

In this way, networked learning not only makes full use of the advantages of information technology in knowledge dissemination, such as accuracy, speed, strong interactivity and easy storage, but also makes full use of the advantages of information technology in knowledge organisation and management, and continuously improves the quality of networked learning education and creates conditions for expanding the openness of distance education. Distance education requires a professional team combined with staff to form a modern network of distance education knowledge organisation, knowledge management and dissemination network, called a "human network".

Research combined with reality has become an important part of the promotion of distance education. Various contradictions and conflicts between the development of modern distance education and national education systems strongly require modification and improvement of relevant policies, regulations, and systems.

When analysing the degree of popularisation of the infrastructure and societal acceptance of distance education, two main points should be taken into account: first, these factors are closely related to the three provisions of acceptability, quality and cost of distance education; second, it is impossible to completely eliminate the constraints and the impact of these factors on distance education either through the development of state-of-the-art distance education or through strengthening internal capacity building in education.

In order to expand the practice of distance education, it is necessary to increase the information literacy of teachers, which will facilitate the widespread and in-depth use of information technology in the further improvement of distance education.

The digitalisation of education 2.0 is supported by new ideas, new methods and new technologies, which will contribute to the reform of education in all aspects. The main direction of education modernisation through digitalisation of education shows that information technology is becoming an important driving force for education reform. We believe that technology-enhanced informatisation of basic education is two-way, meaning that a new method or tool is shaped by information technology to facilitate the transformation of teaching methods, learning methods and forms of learning organisation. Education promotes the evolution and innovation of information technology, so technology-enhanced basic education is a two-way process of empowerment.

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