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Evaluating Digitalization as a Core Requirement for Future Educational Systems

Evaluación de la digitalización como un requisito fundamental para los sistemas educativos del futuro

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ABSTRACT

Today, the view of modern technologies as mere tools for various purposes in learning and knowledge exchange is being rethought. This reassessment opens up the possibility of new approaches to education that stem from the philosophy of technology and sociology. The interpretation of the latest technologies in the education of the future justifies the need for new educational approaches. The purpose of this paper is to analyse the possibility of integrating new technologies into the processes of learning and education, knowledge production and educational institutions within the framework of digitalisation. Materials and The study examined the latest scientific sources related to this topic using international scientific and metric databases such as Web of Science, Scopus, Google Scholar. The results of the study showed that new technologies are not just tools or external layers added to education. In their social and natural aspects, they mediate almost all human experiences and even influence the formation of people's worldviews. We conclude that the interaction between people and new technologies is a set of inseparable components that cannot exist independently. At the same time, the educational interpretation of the latest technologies considers them as mediators of experience. In particular, these technologies tend to change both the forms and content of future education. Any impact that results from this interaction affects the behaviour of individuals in society, as well as the general perception of the social and natural environment.

Keywords: Educational Innovations; Digital Learning; Technological Integration; Learning Platforms.

RESUMEN

Hoy en día, la visión de las tecnologías modernas como simples herramientas para diversos propósitos en el aprendizaje y el intercambio de conocimientos está siendo replanteada. Esta reevaluación abre la posibilidad de nuevos enfoques educativos que se derivan de la filosofía de la tecnología y la sociología. La interpretación de las últimas tecnologías en la educación del futuro justifica la necesidad de nuevos enfoques educativos. El propósito de este artículo es analizar la posibilidad de integrar nuevas tecnologías en los procesos de aprendizaje y educación, la producción de conocimientos y las instituciones educativas en el marco de la digitalización. El estudio examinó las fuentes científicas más recientes relacionadas con este tema, utilizando bases de datos científicas y métricas internacionales como Web of Science, Scopus y Google Scholar. El estudio mostró que las nuevas tecnologías no son solo herramientas o capas externas añadidas a la educación. En sus aspectos sociales y naturales, median casi todas las experiencias humanas e incluso influyen en la formación de las cosmovisiones de las personas. Se concluye que la interacción entre las personas y las nuevas tecnologías es un conjunto de componentes inseparables que no pueden

existir de forma independiente. Al mismo tiempo, la interpretación educativa de las últimas tecnologías las considera como mediadoras de la experiencia. En particular, estas tecnologías tienden a cambiar tanto las formas como el contenido de la educación futura. Cualquier impacto que resulte de esta interacción afecta el comportamiento de los individuos en la sociedad, así como la percepción general del entorno social y natural.

Palabras clave: Innovaciones Educativas; Aprendizaje Digital; Integración Tecnológica; Plataformas de Aprendizaje.

INTRODUCTION

In the context of future education, digitalisation is a new approach to interaction, where new technologies become active participants in the individual learning process.[1] Instead of being mere tools, they act as equal partners in the interaction with learners. This means that technologies embody intelligence, will, goals and autonomy, and they actively facilitate the learning process, not just provide access to knowledge.[2]

Therefore, the digitalised learning environment creates opportunities for individual learning, as well as for the virtual reproduction of real or imaginary objects, which expands learning opportunities and enhances the cognitive skills of learners.

In the education of the future, digitalisation is embodied in technologies already known to educators and in the new virtual reality, which is the latest product of the latest technologies. The use of virtual reality in education allows for the creation of immersive learning environments where learners can interact with virtual objects and situations, which enhances learning opportunities. In addition, in other forms of virtualisation, such as computer games, people can interact with other users in already virtualised worlds.[3]

This technology can become a key learning tool, allowing for the creation of learning situations that more realistically reproduce the real world and promote active learning. For example, in the field of fiction, virtualisation capabilities can help create new forms of interactive literature where readers can interact with characters and events and influence the development of the plot.[4] Thus, virtual reality opens up broad prospects for transforming the learning process and improving the effectiveness of education.

Assessment of digitalisation as a key requirement for future educational systems is becoming extremely relevant in the context of the insufficient response of modern educational systems to new challenges. Even with advances in technology and improved access to education, educational systems do not always respond to the needs of the modern world. This shortcoming is mainly due to the outdated approaches that dominate formal and non-formal education systems at different levels.[5] In order to meet modern challenges and prepare the younger generation for the digital age, it is necessary to reconsider approaches to education and actively introduce digital technologies into educational processes.[6]

In this paper, the assessment of digitalisation is seen as a key requirement for future educational systems through the prism of educational theory. According to this theory, the educational system acts as a mechanism for the formation of elites, the reformation of rights and the legitimation of the social order through certification and the issuance of diplomas. This approach corresponds to the structure of traditional educational systems aimed at producing knowledge on the industrial model.

However, this perspective is losing its relevance in the context of the development of new technologies that compensate for the traditional structures of society and its centralised means of control.[7] Digitalisation in education can change these dynamics by enabling individual learning and interaction that is not limited by the standardisation of knowledge and values. Thus, digital technologies are becoming a key factor in rethinking educational systems and changing approaches to education and upbringing.

Literature review

In the context of the transformation of education, scholars consider the assessment of digitalisation as a key requirement for future educational systems through the prism of classical ideas about education.[8] According to these ideas, the role of education is to socialise individuals, enabling them to gain a variety of experiences that are useful for life and future social roles. New technologies can create the necessary environment for this model to be realised by allowing individuals to interact in diverse and experience-rich environments.[9]

According to Riyanti[10], assuming that education plays an important role in the socialisation of individuals and is about providing them with new experiences, this means that education systems should integrate new technologies to create an environment that is conducive to educational processes and knowledge production.[11]

These new technologies will allow individuals not only to develop according to their own interests, but also to use them for individual construction, similar to the Enlightenment ideas of achieving autonomy through mental development.[12] In this way, new technologies can reinforce the ideals of education by changing the forms of association and expanding opportunities for individuals' self-realisation.

The digitalisation of educational systems is directly related to the process of globalisation, which is becoming necessary in the modern world. Instead of understanding globalisation as the mere spread of Western culture, the new vision envisages access to and sharing of educational resources on a global scale.[13] This means not only free online access to educational materials and tools, but also the development of digital libraries, platforms, applications and forums.[14] This approach allows us to consider globalisation as the availability of educational resources and tools for knowledge production at the global level, as well as the possibility of full participation in global educational networks.

In this context, Marszalek et al.[15] note that globalisation should contribute to the universalisation of forms and content of education, making them accessible to all people. The ultimate goal is to create a global educational system that provides full access to educational resources and forms a global educational community that unites numerous networks that are variable, flexible and collaborative.[16]

However, for the education of the future, digitalisation opens the way to new forms of education, where virtual reality becomes a key element. According to Kuzminska et al.,[14] virtualisation of experiences can transform human perceptions of reality, both external and internal. This process can change moral values and intellectual capacities, as well as the ways of interacting in virtual worlds.[17] In this light, education can take a leadership role in this process, helping to integrate the challenges that arise from virtual experiences and influencing the formation of new ways of communicating and associating. The future of education is thus already upon us, and humanity needs to have the imagination and courage to lead these changes, seeking the best ways forward.[18]

METHOD

The scientific methods used to conduct the study were: literary analysis, empirical research and analysis of policy documents. To analyse classical ideas about education, as well as to study current trends in the digital transformation of education, the analysis of related literature of scientific sources, publications, studies and articles was used using international scientific and metric databases such as Web of Science, Scopus, Google Scholar.

Empirical research, such as surveys, observations, and analysis of statistical data from the existing literature, was conducted to study the impact of digitalisation and identify future requirements. To study education policy and identify adaptation strategies, we analysed policy documents, laws, and strategic plans.

Additionally, we analysed classical ideas about education, which helped us understand its role in the social and historical context. The impact of digitalisation was also studied and current trends in the digital transformation of education were analysed to determine its impact on future educational systems. Thus, the requirements of the future have been identified and key requirements for future educational systems have been established based on an analysis of current trends and prospects for the development of digital technologies. Based on these data, strategies for adapting higher education institutions to digital transformation were also developed and the development of education policy was highlighted as a key element for the education of the future.

These scientific methods allowed us to systematically research and analyse the processes of digitalisation of education and develop strategies for adapting educational systems to future challenges.

RESULTS AND DISCUSSION

The assessment of digitalisation as a basic requirement for future educational systems highlights the importance of strategic thinking and action in higher education to adapt to the changing environment that is becoming relevant in the context of digitalisation.[19] Digital technologies can be used to analyse and research future scenarios, which helps to identify possible directions for the development of educational systems. This approach requires a thorough study of current reality, historical context and current challenges to understand and adapt to future needs. In this process, policy reflects the goals that determine the direction of education development and its relevance to current and future challenges.[20] This approach contributes to building a future educational system that meets the requirements of the modern digital world.

Policy decisions are based on forecasting the desired outcomes and define the expected shape of the future education system. These policy strategies provide the means to achieve these goals.[21] However, even those policies used to guide strategic plans do not always pay sufficient attention to future risks, such as climate change, digital transformation of society, wars, globalisation, political instability and especially pandemics, which have recently had a negative impact on education.[22] This suggests that most considerations about the future are mainly based on current trends and what will emerge and in what context. In this perspective, Chernenko[23] notes that while trend analysis is useful for distinguishing between sustainable factors, change and ongoing transformations, it is also important to consider possible disruptions that may affect the future of education.

Current knowledge may be insufficient to accurately predict the future, but humanity is always eager to analyse and discuss it.[24] Unfortunately, when educational institutions face instability and crises, they often

focus on temporary solutions and forget about the need for future forecasting. In times of crisis, the importance of strategic thinking and action is often underestimated in order to achieve lasting results in the future. According to Tsekhmister et al.,[25] in times of crisis it is particularly important to focus on the long term and take strategic action to ensure a successful future.

Higher education institutions are at the centre of the transformations taking place in the education system, and they must actively influence these changes to contribute to the economic and social progress of the country, strengthen civic participation, implement education reforms, and promote a culture of peace and non-violence.[26] These institutions play a key role in the accumulation of knowledge and skills, as well as in responding to new competence requirements that require flexible structures. To respond to these new challenges, new resources and governance models are needed to contribute to future sustainability in higher education.[27] In this context, it is very important to consider what higher education may become in the future.

Many studies have already explored possible scenarios and trends that could shape the future of higher education. Governments, especially in developing countries, have commissioned studies on the future of education, while hundreds of individuals have actively contributed to the debate by publishing articles in newspapers, blogs, social media and on various platforms.[28] This indicates that the underlying idea is that higher education must undergo transformation to meet the current and future needs of society. According to Duong et al.,[29] higher education institutions need to adapt and rethink their approach to meet the demographic changes in the student population, the diverse curricula that students will require, and the growing popularity of online learning. Taking all of these factors into account will help to formulate effective policies for the future of higher education that meet current realities and future challenges.[7]

Analysing the characteristics that should be strengthened can contribute to the study of other possible future scenarios, taking into account the evolution of dynamics and uncertainty.[30] As a result, higher education will undoubtedly become more open, digital, and personalised in the future.

The main principle of openness in education is to ensure the fundamental right of access to education proclaimed for every person. In this context, Gumenyuk et al.[31] note that vocational and technical education should be accessible to all. Access to higher education should be open on equal terms to all, regardless of status and wealth. This principle reflects the recognition of the importance of open education in expanding access to quality education, increasing literacy and providing the high-level skills needed to succeed in the knowledge economy.

The term 'openness' encompasses not only access to education, but also the ability of individuals to create, modify and use information and knowledge in ways that meet their needs.[32] Open education is characterised by the removal of barriers to learning, which means no pre-qualification requirements, no discrimination based on gender, age or religion, and access for all. Openness also implies flexible structures that allow access for as many people as possible through different learning pathways, both formal and non-formal.[33,34] Current trends in higher education confirm that the growing popularity of digitalised education, thanks to a more flexible offer and widespread use of open pedagogy, may continue in the future, but this dimension of education poses certain challenges to education (table 1):

Table 1. Challenges that education systems should consider for their future development	
Challenge	**Issues**
Technological transformation	The transition to digital education involves the integration of the latest technologies into the learning process. This means creating interactive learning environments, using online resources and digital tools for teaching and assessment.
Adapting the content	As new technologies emerge, so does the content of curricula. Education systems need to take into account the needs of the modern world, including information technology skills, digital literacy and critical thinking.
Availability	Digital technologies can be a means of reducing disparities in access to education. However, issues of accessibility to digital tools for all segments of the population need to be addressed, including internet connectivity and access to devices.
Human resource potential	The development of digital education requires qualified teachers who know how to use technology effectively in the classroom. This means not only training teachers in digital skills, but also providing them with support and access to professional development.
Cybersecurity and data privacy	The growing use of digital technologies in education creates new challenges in ensuring cybersecurity and protecting the confidentiality of educational data.
Source: Escobar Fandiño et al.[35]	

In this context, technological transformation supports the idea that open education should respond to its challenges. Human resource capacity in many developing countries shows that thousands of people do not have access to quality education, and in this context, open education is seen as a means of addressing this

situation at minimal cost.[36] Therefore, it is important that higher education institutions consider accessibility for social justice, especially in these times when it becomes necessary to reduce inequalities. The social justice mandate, which aims to redress historical institutionalised injustices, should be reflected in the policy actions and strategic documents of the education system, as well as in cybersecurity and data privacy. Thus, the response to the challenges of the education system of the future can be overcome in the following ways:
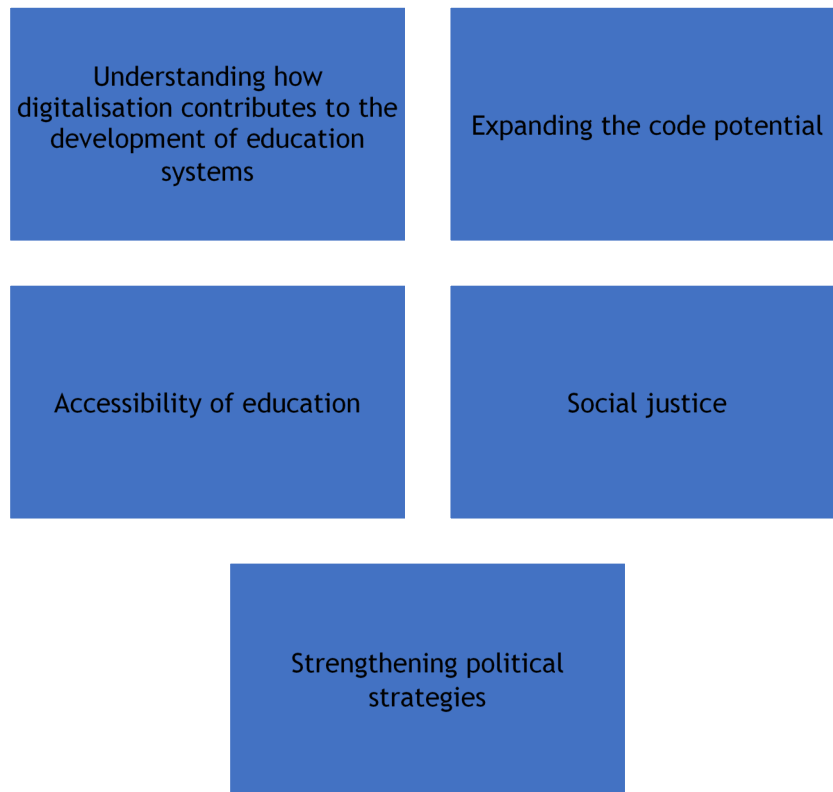

Figure 1. Overcoming the challenges of the future education system
Source: Dudar et al.[37]

Digital Technologies in the Education System

The issue of assessing the digitalisation of education is closely related to the need to develop new methods of assessment and certification of learning, especially as traditional higher education institutions begin to actively implement flexible and large-scale digital learning.[38] The growth of digitalisation of education, especially in the context of the impact of the COVID-19 pandemic, requires universities to quickly adapt to new realities.

The key importance of technology in education is emphasised through the prospect of improving the learning process and access to knowledge. In this way, institutional strategies of higher education institutions become an indicator of improving the educational process. This transformation of higher education involves the development and implementation of new approaches to integrating technology into curricula and practices (table 2):

Table 2. Strategies for integrating technology into curricula and practice	
Use of online learning platforms	Universities can introduce special online platforms that allow students to access learning material from any device, at any time. Such platforms may include lecture recordings, e-textbooks, self-study tasks and interactive exercises.
Use of virtual reality and augmented reality	Universities can use virtual and augmented reality technologies to create immersive learning environments. For example, students can use a virtual classroom to learn complex scientific concepts or complete virtual labs.
Adaptive learning platforms	AI technologies can be used to create adaptive learning platforms that analyse the individual needs and progress of each student. This will allow for personalised learning and individualised recommendations on materials and assignments.
Collaboration with the technology industry	Universities can develop partnerships with high-tech companies to create specialised study programmes that meet the needs of the modern labour market. This could include joint projects, internships and job opportunities for students.
Source: Rome.[39]	

Personalised learning is equally important. This approach to learning provides students with flexible opportunities, which is a prerequisite for the education of the future. The concept of personalisation of learning is based on the use of learning analysis to adapt educational services to each participant. From the perspective of digitalised education, learners will individually choose the best options to personalise and customise their learning experience. The main goal will be to use flexible processes and practices to meet the unique needs of each individual. This approach ensures the inclusion of all students by providing a variety of programmes for different categories of students. The flexible movement of students and teachers is seen as key to expanding access to education and supporting professional collaboration.

In the context of the digital transformation of education, personalisation of learning is becoming an important component to recognise the experiences of adult learners and disadvantaged groups.[40] This opens up opportunities for those who do not meet the typical rules for admission to formal educational institutions. The strategy of promoting lifelong learning creates a favourable environment for learners, providing them with the necessary skills to adapt to the new educational environment.

Thus, the responsibility for creating learning opportunities that meet the potential demands of the future lies with higher education institutions. They are obliged to design development systems and structures that facilitate and support learning and teaching, taking into account the diverse needs and capabilities of students.

Hence, to support this new way of teaching and learning that is open, personalised and digital, higher education institutions need to pool their knowledge of educational and technological resources if they are to facilitate openness in higher education. This will also involve increased cooperation between higher education institutions and industry, government, innovators and civil society. In this context, higher education institutions must cooperate with the private sector and civil society to ensure their future viability and sustainability in a highly competitive environment. If universities are to succeed, they must be able to step outside their comfort zone and explore innovative ways to collaborate with other stakeholders.

CONCLUSIONS

The success of digitalisation in education is inextricably linked to political action and the creation of an enabling policy environment. Education policy plays a key role in shaping the vision to support economic growth, social development and educational reform. Policies developed today should aim to facilitate access to higher education, expand education beyond the formal framework, develop structures and practices that support the digitalisation of education, and expand education equitably for all segments of the population.

It is therefore important that higher education institutions rethink their approaches to teaching and learning, aiming to address deep inequalities and create conditions for sustainable learning environments. This requires a determination to rethink the future of higher education, in particular with a view to making a useful contribution to the learning environment and responding to the social, political and economic needs of the modern world.

In this context, the limitations of the study should be noted. The study focused on analysing the possibilities of integrating new technologies into learning and education processes, considering their impact on knowledge production in higher education in the context of digitalisation. However, some aspects may remain beyond the scope of this study. For example, a more detailed analysis of the interaction between new technologies and social aspects may require further research. In addition, taking into account different cultural, ethnic and gender contexts could broaden the understanding of the impact of digitalisation on educational processes. The study was based on the use of scientific and metric databases such as Web of Science, Scopus, Google Scholar, but there may be limitations in access to some sources or shortcomings in their coverage. It is also important to note that some aspects of digitalisation may not be covered by scientometric databases and require alternative data sources, such as empirical studies or expert opinions.

Thus, it is necessary to take these limitations into account when interpreting the results and conclusions of the study, and to direct further research to address open issues in this area.

For further research, it is important to consider the interaction between people and new technologies as a set of inseparable components. It is also necessary to investigate how new technologies influence the forms and content of future education, as well as their impact on the behaviour and perceptions of society as a whole. These areas of research can help to better understand the impact of digitalisation on educational processes and the development of modern society.

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CONFLICT OF INTEREST
The authors declare that there is no conflict of interest.

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