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Empowering smart societies through digital learning

ABSTRACT

In the era of digitization and globalization, education is undergoing major changes. Learning new competencies is crucial, despite some obstacles such as pandemics. It is possible to perceive the development of digital learning and the evolution of society into a smart society. The article examines the role of digital learning in this process, using a review of scientific literature. Databases such as Proquest, Emerald, Scopus, and Ebsco were searched, using terms related to online education and Society 5.0. An analysis of 27 of the 18,980 entries shows the relationship between the development of education, technology, and society. Technology influences education by promoting self-reliance. However, technology alone is not enough to improve the quality of life, hence the growing need for new forms of learning, leading to Education 5.0. E-learning, focusing on the individual learner, promotes the development of a smart society and the growth of economic activity.

Keywords: digital learning, smart society, Society 5.0, social transformation

JEL Classification: M12, D83

Introduction

In an era of rapid digitization and globalization, education is facing significant changes. Learning new competencies in this rapidly changing environment is not only crucial for shaping an individual and his or her attractiveness in the job market, but also for his or her position in society. Phenomena such as pandemics are no longer standing in the way of skills acquisition, they actually stimulate their development through distance learning [Tănase et al., 2022, p. 22].

In recent years there has been a dynamic development of digital learning – a method of knowledge transfer through new information and communication technology (ICT) [Kek-sela et al., 2016, p. 1]. At the same time, society is undergoing an evolution towards a *smart society*, that is, a society that actively uses advanced technologies to improve the quality of life and efficiency of functioning by collecting and processing data in real time [Bagaric, Franca, 2021, p. 52].

Given the pace of technological progress and the growing importance of digital education, this issue seems to be one of the key areas of research. The introduction of digital technologies into education comes with several benefits, but also presents many challenges. This article aims to explore the role of digital learning in the process of forming a smart society.

Uniquely, this research pioneers in examining the intersection of digital learning and the development of smart societies. While previous studies have separately explored digital learning and smart societies, this is the first comprehensive literature review that synthesizes these two crucial areas, offering novel insights into how digital learning can be a transformative force in the evolution of smart societies.

There is a research question which this article aims to answer:

RQ1: How can e-learning, as an education tool focused on the individual learner, contribute to the development of a smart society?

In the first part of the article, the concepts of digital learning and smart society are explained, followed by a review of the existing literature linking the two topics. On this basis, a table of the complexity of the problem of digital learning and its impact on the formation of a smart society is developed. The challenges facing the growth of a smart society in the context of digital learning are presented, and potential paths for the development of this trend are shown in the second part. This article fills a significant gap in the subject literature by being the first to comprehensively review and analyze the potential of digital learning as a foundational element for smart society development. The aspiration of this article is to shed light on the key role of digital learning as a basis for the development of a smart society. This is a theoretical article.

Literature review and theory development

Digital learning as education of the future

The widespread availability of computers and ICT has led to the development of formal, non-formal, and informal education [Dudko, 2016, p. 4]. The link between the educational sphere and ICT is quite broad. The development of technology has influenced changes in education, while technology encourages learning, the implementation of collaborative work, and supports the development of students into active, self-regulated, and self-educating individuals [Rambousek et al., 2007, p. 70].

Digital teaching brings many advantages, such as easier familiarization with the educational materials, improved learning efficiency, the possibility of remote teaching, more individual adaptation to the individual with the pace of teaching. Besides, the new technology can also be used to replace books with e-books, interactive knowledge testing, expansion of educational programmes, remote learning, or better supervision of education [Idrisova et al., 2021, p. 3]. The use of advanced information and telecommunication technology has led to adjustments in the content and technology of education, helping to address issues of differentiation and individualization of education, as well as the creation of variant curricula [Dudko, 2016, p. 4]. A huge benefit that affects the development of modern education is its accessibility. Ydyrysbayev et al. [2022, p. 140] proved that new technologies facilitate the learning process and provide diversity in learning. Online education makes it possible to learn at any time, i.e. while traveling to work or during longer trips, and dedicated platforms allow for downloading knowledge at the moment the user needs it [Silvestru, Lupescu, 2015, p. 67].

The advantages mentioned above can be considered as a factor in the development and popularization of digital learning, but the period of the COVID-19 pandemic, when social isolation triggered the need to perform one's tasks remotely, including educational ones, is also significant. Teaching and acquiring new skills took a remote form through virtual classrooms or courses in almost all countries [Akturk et al., 2022, pp. 577–578].

The new model of Society 5.0

Society has been evolving since its inception. Society 1.0 (hunting society) was a society that strongly coexisted with nature, it is described as the most primitive. Society 2.0 (from the 13th century BC to the 18th century AD) was a society engaged in agricultural cultivation, familiar with irrigation systems. The invention of the steam engine and the start of mass production is the time of the industrial society, Society 3.0, dated to the 19th and 20th centuries. The late 20th century society, referred to as Industry 4.0 or Society 4.0, is characterized by the development of technology, the Internet, widespread automation, and computerization. The new concept is *Society 5.0*, smart society, super smart society [Keidanren, 2016, p. 8], referred

to as super-intelligent, data-driven society (Data-Driven Society), which is expected to balance economic progress with solving social problems through a system that offers high integration of digital and real space. Terms such as *artificial intelligence*, *cyber-physical systems*, *big data*, *Industry 4.0*, *Industry 5.0*, *open innovation*, *Society 5.0*, *super-smart society* have been widely used in research over the past years [Roblek et al., 2021, p. 299]. When looking for a definition of *smart society*, it is worth turning to Japan, where a vision of a better, super-smart, more prosperous society, while being human-centred to overcome the problems of social change, was put forward in 2016. This concept is directly linked to the emergence of the fifth industrial revolution (Industry 5.0) and the introduction of artificial intelligence [Harayama, 2017, pp. 556–557]. Society 5.0 is a revolution of society and humanity focused on quality of life, human, social, environmental, and economic well-being. These topics, especially after the pandemic and as a result of climate change, wars, social divisions, cyber threats, deserve more attention and concern from politicians, organizations, and communities alike [Tavares et al., 2022, p. 149].

Digital learning and smart society

Combining the themes of smart society and digital learning has a number of advantages due to the rapid advances in technology and the increasing digitization of society. Digital learning enables access to education regardless of time and place, which is crucial for a society that is increasingly mobile and diverse [Dudko, 2016, p. 2; Jucevicius et al., 2013, p. 213]. Technologies make it possible to adapt the learning process to the individual needs of learners, making education more effective [Tikhomirov, 2013, p. 437]. The vision of society 5.0 implies a digital transformation of all aspects of life, including education. Digital learning is essential to achieve this goal [Carayannis, Morawska-Jancelewicz, 2022, p. 3456]. A smart society and digital learning can help overcome educational and social barriers, providing equal access to education and enabling social and economic solutions to problems [Sá et al., 2022, p. 4]. Digital learning is key to developing the skills needed for the society of the future, such as programming, data literacy, and critical thinking. The combination of a smart society and digital learning can lead to innovation in education, which can contribute to better understanding and solutions to social and economic challenges [Idrisova et al., 2021, p. 4].

This literature review is not merely a narrative overview but a comprehensive analysis that spans a broad timeline, ensuring a thorough understanding of the evolution and impact of digital learning. It includes critical evaluations and insights from a range of studies, not limited to the most recent ones, to provide a holistic view of the subject matter. This comprehensive review delves into a critical analysis of the literature, examining the nuances and complexities of digital learning and its role in shaping a smart society. This review goes beyond mere generalizations, offering a detailed examination of the interplay between technology, education, and societal evolution.

Research methodology

The purpose of the research carried out within the article was to find scientific papers on the topic of the development of a smart society through digital learning, including a detailed identification of research gaps and finding further possible research directions in this area. The achievement of this goal required a systematic review of the literature through which it was possible to integrate, identify, and evaluate the scientific works already published. A broad selection of keywords allows more articles to be found that have a high degree of overlap with the subject matter but would be missed with a narrow selection of search criteria.

The survey was conducted according to the following procedure:

1. formulation of the review topic,
2. searching for publications in databases using specific criteria,
3. qualification of publications based on their titles and abstracts,
4. qualitative analysis of publications based on full texts,
5. analysis of the collected results.

Results from the conducted research

Scientific texts included in the Proquest, Emerald, Scopus, and Ebsco databases were analyzed. This is justified by the availability of publications representing social sciences in these scientific databases. The search of the databases was carried out from January 15, 2023 to March 25, 2023. The following search criteria were adopted: scientific journals or conference proceedings, the English language of publication, publication between 2000–2023. The search was carried out taking into account the keywords in the title or abstract. The search words were the following: *digital learning* (and its synonyms: *online learning*, *e-learning*, *digital education*, *online education*, *remote learning*, and *lifelong learning*) combined with the conjunction AND with *smart society* (and its synonyms: *Society 5.0*, *modern society*, and *knowledge-based society*). The keywords were selected based on a preliminary literature review, where it was noted that the authors of existing works use the selected terms as synonyms for *digital learning* and *smart society*. The term *lifelong learning* also appeared in a significant number of works, so it was decided to include them as well in order to gain a broader perspective and increase the chances of finding publications that can give an answer to the research question. The total number of publications found through the search was 18,980 (Table 1 in the Appendix).

The large number of publications initially identified reflects the expansive and evolving nature of the digital learning and smart society fields. However, the research focus was on articles that specifically addressed the intersection of these two areas. To ensure relevance and quality, a rigorous selection process was undertaken. This involved two stages: initially, a preliminary screening phase when titles, abstracts, and, if needed, full texts were reviewed to identify the articles that could potentially contribute to addressing the research question.

Approximately 130 articles were provisionally qualified during this phase. Subsequently, the second stage involved a detailed analysis of each article to determine its suitability and exact relevance to the research question. This meticulous approach ensured that only those articles addressing the research question directly were included. Many articles, despite mentioning *digital learning* or *smart society*, did not focus on the synergy between these two concepts but rather treated them separately or in different contexts. This meticulous approach led to the exclusion of articles that did not meet the specific research criteria. The final selection of 27 articles represents those that most closely align with the research objective, providing in-depth insights into the development of smart societies through digital learning. This careful curation of articles ensures that the review is both comprehensive and focused, addressing the core themes of the research with the most relevant and impactful literature in the field.

Research results

In Table 2 provided in the Appendix, the results of the conducted research are presented. The aim of this table is to systematically highlight the research gaps and potential directions for future research identified in each of the 27 examined articles.

The process of analysis and synthesis of the collected materials has led to the categorization and structuring of the results around three key themes that predominated in the context of the discussions:

1. Digital learning as a factor in the development of a smart society
2. Challenges of digital learning in the context of creating a smart society
3. The future of digital learning in a smart society

These categories were not chosen arbitrarily; they emerged as the most prominent and recurrent themes throughout the systematic review of the literature. This thematic categorization reflects the current state of research in the field and underscores the areas where further inquiry is needed. By focusing on these themes, the research aims to provide a coherent and structured exploration of the existing literature, identifying gaps and underscoring areas that warrant further investigation.

Each of these will be explored and considered in the context of the existing research and developmental perspectives in the subsequent parts of this article. This approach allows for a clear and orderly presentation of results, facilitating the identification of gaps and opportunities for future research in this field. Thus, it serves as a foundational tool in this process, summarizing key findings and guiding the thematic exploration that follows.

Discussion

Digital learning as a factor in the development of a smart society

The development of the Internet and information technologies has significantly accelerated economic growth, digital transformation, and the overall ‘smartening’ of industry. These changes lead to further transformations and the realization of the Society 5.0 concept, where technology is assimilated with people and used as a tool to enrich the well-being of society [Akturk et al., 2022, p. 578]. Education, training, and e-learning have a significant direct impact on social empowerment and sustainable employment generation [Singh et al., 2022, p. 2]. In this scenario of rapid evolution, transformation and technological change, there is a need for new learning patterns and new skills. Thus, a new dimension of education is emerging that needs to develop other students’ competencies in an integral and humane way, focusing on peers and community collaboration [Tavares et al., 2022, p. 149]. New educational approaches require students to develop competencies that promote digitality, seen as the ability of citizens to use digital technologies, both as consumers and providers of goods and/or services [Sá et al., 2022, p. 12].

Digital learning can be this new dimension of education. This method is effective if it is focused on the individual learner, and its ease of implementation, certain universality, as well as versatile needs in rapid learning in a dynamic world affect its development. The implementation of e-learning itself affects positively the economic activity of a country and increases the number of educated people [Keksela et al., 2016, p. 3].

According to Trubina and Braines [2016, pp. 2–3], modern digital curricula should focus on building generic skills and students’ competencies, developing problem-solving skills in accordance with experience and existing knowledge, developing skills while working with information (search, evaluation, transformation), or designing activities focused on achieving a desired outcome. They also point out the importance of focusing on the development of the ability to evaluate behaviour critically and make decisions in non-standard situations, as well as building skills of group work (cooperation, coordination, reflection, participation in discussions).

In order for smart education to foster the development of Society 5.0, it is necessary to implement it properly by providing an up-to-date curriculum, fostering student autonomy, providing an appropriate learning environment, enabling the creation of flexible and individualized educational approaches for students, promoting extensive communication between all the actors involved in the teaching-learning process, and providing students with a wide range of learning activities, both in terms of formal and informal learning, along with the mobilization of this new technology and changes in learning processes [Sá et al., 2022, p. 14].

Building a smart society requires an emphasis on lifelong learning, that is the development of lifelong education for society, including older adults. With the rapid growth of the older population, it is particularly important to develop smart community education for this group.

Education for older adults should take full advantage of advanced information technology so that they can obtain the necessary knowledge and information and enrich their lives [Hu, 2023, p. 46]. Through e-learning, older people exchange knowledge, expand their competencies, and stay active in the labour market longer. Digital learning also allows materials and programmes to be individually tailored to the needs, capabilities, and experience of this group [Lam, Chung, 2010, p. 65].

Of particular importance in the context of the development of digital learning and its contribution to the growth of a smart society are universities. These institutions can lead social development and be a model for other institutions and public organizations in the context of using new technologies. However, attention should be paid to new models of teaching and online/hybrid learning, responding to new expectations of different generations. Universities should develop, among other things: adaptive learning programmes, collaborative teaching and learning technology, and digital resources for faculty members and learners so that learning can take place anywhere [Sá et al., 2022, p. 14]. Moreover, students cannot be expected to learn only through one imposed teaching method [Ydyrysbayev et al., 2022, p. 142]. The digitization of universities, however, goes further than moving the learning environment to a digital environment and creating the necessary infrastructure to do so. Running all university operations on a common platform will enable both better analysis of big data and stronger integration between institutions [Akturk et al., 2022, p. 581].

Challenges of digital learning in the context of creating a smart society

Digital learning varies significantly from traditional learning methods. It is not limited by time, location, learners' abilities, their health conditions, etc. [Lin et al., 2017]. However, various challenges arise already at the stage of making digital learning accessible to all potential users.

Effective and efficient digital learning depends on the availability of certain resources, such as digital infrastructure, specialized knowledge, and technological innovations. Significant inequalities in access to online services at the micro- and macro-regional levels have been identified; they condition considerable differences in the level and effectiveness of learning. Moreover, the threat of emerging digital exclusion also cannot be dismissed [Raffaghelli, 2020, p. 3, as quoted in Sá et al., 2021, p. 2; Teicher, Salman, 2021, p. 305].

However, changing the learning model requires changing the entire teaching process and adjusting the sources of knowledge [Tavares et al., 2022, p. 14]. It is necessary to prepare appropriate content and software for e-learning courses, to transfer the knowledge on their use, and then to let it be assimilated by the teachers, to take care of the current update as well as the synchronization of data and its update in real time [Lin et al., 2017, p. 3561].

Another challenge is to adapt digital learning linguistically and culturally. The cultural challenges include differences in learning strategies, different communication rules, or community-specific behaviours. In this context, what also poses a challenge is the task of creating a cyberculture and a sphere of openness to knowledge sharing [Sá et al., 2021].

Furthermore, digital learning should be tailored to the individual needs of the learner [Shoikova et al., 2017, p. 31; Tavares et al., 2022, pp. 15–16]. Digital and communication skills, openness to new solutions, as well as creativity and critical thinking can be effectively cultivated and developed with the help of individualized learning, including digital learning [Tinmaz et al., 2022].

In the process of designing and developing learning tools, one should take into account their flexibility in use as well as the need to both record the learning history and monitor the learning progress [Hoel, Mason, 2018, p. 7]. It becomes necessary to define the characteristics of the process of acquiring knowledge and competencies, which influence the learning offerings, and understand the learning pathway, which may differ in different communities and generations. Systematic review and evaluation, as well as the redefinition of digital learning methods promotes the adaptation of the learning process to the individual's needs. It is also recommended to take into account the assumptions of sustainable development, understood as a change in which knowledge plays a key role [Tavares et al., 2022, p. 13].

In the process of adapting digital learning to the individual learner's needs, generational differences cannot be overlooked [Sá et al., 2021, p. 7]. Successive generations have different resources and bring different potentials to the development of a smart society. The generations differ in their expectations concerning education, their focus on specific goals, and their level of flexibility in their approach to learning (switching from traditional to digital methods). Tailoring e-learning to each generation requires taking into account a variety of factors and variables that will determine the effectiveness of learning. Among older generations, it is the individual and environmental conditions that will determine the formation of biases against e-learning and closure to new technologies. The next generations (Generation Alpha and younger) will treat the digital world as an inherent part of reality [Tavares et al., 2022, p. 15].

E-learning as an educational tool should be focused on the learner (as an individual) [Teichert, Salman, 2021, pp. 302–303]. Taking into account individual differences and tailoring knowledge to individual needs fosters the development of a smart society. However, all the indicated elements will be insufficient if effective two-way teacher-student communication is missing [Shoikova et al., 2017, p. 31; Tavares et al., 2022, p. 13].

Digital technology enables the use of modern learning systems, which provides unique opportunities for the exploration of knowledge and personal development [Shoikova et al., 2017]. According to researchers, digital learning has a better impact on learners' motivation and performance than traditional learning [Lin et al., 2017]. On the same note, a greater motivation to acquire knowledge determines better results. The effectiveness of e-learning depends on the level of participants' involvement (both on the side of learners and teachers) and in order for digital learning to be beneficial to its users, this new concept (in comparison to traditional learning) must be accepted and shared by individual members of both of those groups [Shoikova et al., 2017, p. 33].

Lin, Chen, and Liu [2017, p. 3555], following Keane [2012, p. 44], point to four key components of digital learning: digital teaching materials, digital tools, digital delivery, and

autonomous learning. It is the fourth component, namely autonomous learning, which includes offline and online activities, that seems to pose a huge challenge. A factor that determines the effectiveness of digital learning is the development of action control skills in students and teachers. The lack of face-to-face contact with others requires greater self-reliance and self-regulation.

The initial stages of learning can be driven by extrinsic motivation and can indeed yield tangible results. However, the development of intrinsic motivation strengthens the likelihood of continued learning, active involvement, and independent acquisition of knowledge. At the same time, intrinsic and extrinsic motivation are not mutually exclusive; in fact, they complement each other. Intrinsic motivation may have a more powerful effect on the learner, but the extrinsic one offers additional incentives [Lin et al., 2017, p. 3556]. Developing conscious and responsible learning has a positive impact on strengthening learners' soft skills, such as: making independent decisions and conscious choices as well as being able to carry out consistent actions, organizing their time and working space, or independently solving problems [Trubina, Braines, 2016]. These qualities are desirable in a smart society.

Undoubtedly, teachers are part of the key to success. They are the ones who can provide the element of extrinsic motivation, or shape formal and informal learning methods, the combination of which enhances the effects of digital learning on learners [Shoikova et al., 2017].

Yoshida and Thammetar [2021], analyzing a case study of collaboration between GovTech (*government and technology*) and Civic Tech (*civic technology*), point to some crucial elements of actions which aim at benefitting communities. These are open data, collaboration, and systematic teamwork. The researchers' conclusions relate strictly to knowledge sharing and strengthening of one area of a smart society, but they characterize variables that are directly transferable to the development of other areas of societies' functioning. While it is important to be able to tailor digital learning to one's needs, without teamwork and knowledge sharing, it will be impossible to create the right conditions for the expansion of knowledge.

Smart education is a relatively new idea, hence it is difficult to determine the totality of its long-term consequences and effects on society. Increased human-machine interactions generate social challenges: they cause the weakening of interpersonal ties and create the problem of limited socialization between groups [Tavares et al., 2022, p. 11]. Social isolation halts the development of social competencies, which are an important factor in creating the future of a smart society. The ability of the machine to hold the learner's attention and interest more effectively creates the danger of prioritizing the virtual world over the real one. This creates the threat of addiction to the use of high-tech-based devices [Trubina, Braines, 2016, p. 1]. The developing AI may provide a more interesting source of interaction and communication opportunities and create reluctance to engage in social interaction. The current level of technology cannot provide as high a level of emotional intelligence or critical thinking as a human can [Tavares et al., 2022, p. 6].

Society 5.0 focuses on people, with their quality of life as the main focus of change [Ferreira, Serpa, 2018, p. 28; Kabakuş et al., 2023, p. 31; 2Sá et al., 2022, p. 3]. The threat is the

drive to replace human activities with machine activities, including AI. Smart societies strive for general well-being, including convenience, but new technologies and software should serve to support and enhance people's activities, not replace them [Tavares et al., 2022, p. 2].

Openness to new technologies and virtual reality also creates opportunities to lose caution in the sharing of data and in the control of its use. Cybersecurity regulations and strengthening data protection are a necessity [Ferreira, Serpa, 2018, p. 28].

The future of digital learning in a smart society

With further technological progress and the dynamism of information technology, societies are going to be equipped with new capabilities and innovative solutions. The factors that determine success are cooperation, knowledge sharing, improvement of human-machine interaction, and comprehensive integration of physical and virtual space [Ferreira, Serpa, 2018, p. 28]. Changes will affect societies in all areas of life, including its quality and sustainability [Sá et al., 2022, pp. 2–3].

The knowledge of how students absorb new content, what aspirations and goals they have, or the information about their learning performance is essential for researchers to develop more effective smart learning environments. Efforts will also be made to improve AI technologies and big data that recognize students' needs and adapt the offered resources and forms of learning. In this context, digital learning provides a solution to not only identifying areas of weakness effectively but also adapting the knowledge accordingly [Shoikova et al., 2017; Tavares et al., 2022, p. 12].

The development of digital learning requires deepening of the acceptance for the virtual environment and application of the principles of navigating this sphere as well as respect for other users and awareness of the consequences of generating and using data or revealing one's identity.

The assumptions of the concept of smart society should be taken into account in all spheres of development. The further process of digital transformation will prioritize the role of innovation, flexibility of action, and ever-changing conditions. This reality that is being created will combine two dimensions: physical and virtual, and thus shape an integral space. Society 5.0 will continue to support diverse and flexible terms of employment; as the use of digital technologies will increase, more and more new professions are going to emerge. This whole process will certainly require continuous fine-tuning of both the knowledge that is being obtained and the ways in which people are being educated. The process of improving digital learning should be based on a close cooperation and partnership between academia, business, and the government. Collaboration between all the sectors has a significant impact on the generated knowledge, which should be made to meet social expectations as well as professional requirements [Tavares et al., 2022, p. 15].

Creating a development perspective will always generate a dose of uncertainty and a certain amount of indeterminacy. Undoubtedly, digital learning will continue to enhance the growth

of a smart society. Technological progress will necessitate the search for solutions to the new challenges that will arise in time [Ferreira, Serpa, 2018, pp. 27–28].

This systematic review has illuminated several critical takeaways and identified notable gaps in the literature concerning digital learning and the development of smart societies. A significant gap exists in understanding and addressing the inequalities in access to digital learning. Future research should aim to uncover the root causes of these disparities and devise strategies to alleviate them. Another underexplored area is the need for digital learning to adapt to diverse cultural contexts. There is a pressing need for research that investigates how digital learning can be tailored to fit various cultural and linguistic backgrounds, thereby ensuring its inclusivity and effectiveness. While addressing current challenges is crucial, there is also a need for research that anticipates the future trajectory of digital learning. This includes exploring the potential of AI and big data technologies in creating adaptive and responsive learning environments. Additionally, there is a lack of comprehensive understanding in the literature regarding how digital learning can be integrated into the broader context of smart society development. Future studies should explore this integration in depth, focusing on how digital learning can contribute to various aspects of a smart society, including its economic, social, and environmental dimensions. Addressing these gaps will enable future research to provide deeper insights into the role of digital learning in the development of smart societies and contribute significantly to the advancement of this field.

Summary

The results of the literature review confirm the positive correlation of using digital learning in the development of a smart society, however, it is still difficult to provide a unified definition of the term *smart*, which also conditions the unclear boundaries of the term *smart society*. Developing a clear definition requires time and further research that would include theoretical considerations as well as conceptual rigour.

Based on the conducted literature review, it is evident that digital learning significantly contributes to the development of a smart society. Its impact is crucial in building a superintelligent society and achieving the comfort and happiness of people. The practicality and efficiency of digital learning solutions are increasingly promoted in the 21st century. New technologies enable more effective, efficient, flexible, and convenient learning. Digital learning, utilizing big data, deep learning, and the Internet of Things (IoT), offers improved development and better management of smart society challenges. It is a solution that yields improved performance, regardless of time, location, or users' age.

This research highlights the need for policy and educational leaders to focus on integrating digital learning into the broader framework of smart society development. There is a call for policies that support digital accessibility and adaptability to societal changes. Educational institutions and businesses should consider incorporating digital learning strategies that

align with the evolving needs of a smart society. Further digital transformation will deepen the changes that are present in virtually all aspects of society's life: private and professional life, the functioning of public administration, or the structure of industry and businesses. All those spheres will function in an inextricably interconnected cyber-physical realm.

The limitations of this analysis were identified at the stage of developing the literature review methodology, with the choice of keywords and the use of selected databases constituting one of the main restrictions. In future research, expanding the database selection and exploring a wider range of keywords could provide a more comprehensive understanding of the topic. The relatively small number of articles with both of the main key phrases (*digital learning* AND *smart society*) provided a basis for the usage of other closely related keywords. The shortage of available research papers was also a limitation of the study, since many of the articles were not published in the open access format.

Future studies should focus on identifying effective practices in the interdisciplinary application of digital learning and the direct use of AI in educational contexts. Additionally, research should explore the implications of digital learning for various aspects of society, including politics, economy, environment, and overall human life quality. The continuous technological advancements necessitate the exploration of new alternative concepts in digital learning and their potential impact on smart society development.

This research contributes to the literature by providing a structured overview of how digital learning intersects with the development of smart societies. For practitioners, the findings underscore the importance of embracing digital learning as a key component in the evolution of educational models and societal development. The study encourages educational institutions and policymakers to consider the broader implications of digital learning in shaping future societies.

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The Authors declare that there is no conflict of interest.

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Appendix

Table 1. Aggregate results for search phrases

\	Smart society	Society 5.0	Modern society	Knowledge-based society
digital learning	66	101	546	209
online learning/on-line learning	124	236	1796	842
elearning/e-learning	215	320	2560	2425
digital education	50	54	383	101
online education/on-line education	78	93	1032	382
remote learning	11	31	173	37
lifelong learning/life-long learning	125	164	4284	2542
			TOTAL	18 980

Source: own study.

Table 2. Research results

No.	Author, year	Purpose of article	Research gaps	Research directions
1	Akturk, C., Talan, T., Cerasi, C.C. (2022)	Discussion of digital transformations in the field of education necessary for sustainable development and the impact of these transformations on the university ecosystem. Discussion of the University 4.0 process in the world (including Turkey) and suggestions for the higher education system development		
2	Carayannis, E.G., Morawska-Jancelewicz, J. (2022)	Determining the importance of digitization for universities and identifying recommendations for new forms and distribution channels of education, research, and innovation	Institutional changes and incentive structures that affect the ability of universities to engage in (digital) social innovation as part of digital and ecological transformation. Identifying the link between the concepts of Society 5.0 and Industry 5.0	Practical and evidence-based solutions to the assumptions of Industry 5.0 and Society 5.0, exploring new types of digital and social innovations that integrate human-machine relations and environmental and sustainability aspects. Universities' response to the new reality by co-creating digital and social innovations
3	Dudko, S.A. (2016)	Discussing the impact of information technology on the development of lifelong learning in the information society		
4	Ferreira, C.M., Serpa, S. (2018)	Identification of potential development paths for Society 5.0		

No.	Author, year	Purpose of article	Research gaps	Research directions
5	Hoel, T., Mason, J. (2018)	Connection of two discourses: research into smart learning and digital technology standardization. Identifying the common aspects and core constructs that might form the basis of a meta-framework		What sub-systems can be identified and defined as both self-contained and interoperable within a SLE? What lessons can we draw from reviewing the abstract modelling of earlier standards and specification development associated with ITLET? How many abstractions can adequately represent a SLE? How will we ensure that the developed SLE standardization framework is grounded in sound and stable theories of learning, so that it withstands new trends in pedagogical practices?
6	Hu, J. (2023)	To explore the role of education for older adults and the impact of this process on community building and information management. To propose a strategy for developing smart community education for older adults		
7	Idrisova, J., Alikhadzhiev, S., Moiseenko, N. (2021)	To explore society's transition from the production of material goods to the production of information. To identify key values of the information society		
8	Jucevicius, R., Liugailaite-Radzvickiene, L. (2013)	To discuss the concept of smart growth from the perspective of knowledge, intelligence, learning, innovation, and network-based development of social systems such as the state, city, region, society, and economy		Theoretical grounding of the concept of smartness, smart development, and the phenomenon of smart social systems. Systematic study of the concept and its application to various fields of human activity
9	Kabakuş, A.K., Özköse, H., Ayaz, A. (2023)	Examination of the bibliometric features and trends of scientific research related to Society 5.0		To continue to identify trends and research gaps in the field of Society 5.0; in theoretical research: analysis of bibliometric indicators
10	Keksela, O.S., Skvortsova, V.N., Sukhushina, E.V., Rudneva, E.L., Spichenko, T.A. (2016)	Identifying factors in the development of e-learning programmes and problems in national education systems		
11	Lam, S., Chung, W. (2010)	Identifying the role of ICT in lifelong learning for older adults and its impact on learning activities	Impact of ICT on lifelong learning courses for older adults	
12	Lin, M.-H., Chen, H.-C., Liu, K.-S. (2017)	Understanding the opinions about digital learning		

No.	Author, year	Purpose of article	Research gaps	Research directions
13	Rambosek, V., Beneš, P., Adamec, M. (2007)	Examining the implications of the impact of information and communication technology on society and describing their contribution to education		To analyze the impact of modern information and communication technology on various aspects of education: how ICT can serve as a solution to the changing world of education, how the development of ICT affects various elements of educational reality
14	Roblek, V., Meško, M., Podbregar, I. (2021)	Identification of technological innovations enabling the transformation of Society 4.0 and Industry 4.0 into Society 5.0 and Industry 5.0		Researching and identifying a set of Society 5.0 best practices in Japan to assess the feasibility of implementing them in other countries; researching risks that may arise in a digital society such as those related to cybersecurity, potential cyberterrorism, the relationship between humans and robotics, and ethical issues related to AI implementation and the ability to make decisions instead of humans
15	Sá, M.J., Serpa, S., Ferreira, C.M. (2022)	Discussing aspects of Society 5.0, such as digitization and sustainability. Indicating how social science can help understand and overcome the challenges of Society 5.0		The role of interdisciplinarity in the implementation of social science in smart education and in the study of new and old inequalities in inclusive societies
16	Sá, M.J., Santos, A.I., Serpa, S., Ferreira, C.M. (2021)	Identification of digital competencies needed for a sustainable society post-COVID-19. Analysis of digitization processes in education for the formation of a sustainable digital society		Analyzing the old and new digital divide in the context of digital consumption and production, promoting sustainability in the digital society by developing specific competencies in initial and continuing education
17	Shoikova, E., Nikolov, R., Kovatcheva, E. (2017)	Discussing the main features of smart education and smart learning environments		Investigating the effects of smart learning environments on the learning performance and perceptions of students with different learning styles, cognitive styles, or other personal characteristics
18	Silvestru, C.I., Lupescu, M. (2015)	Analyzing the impact of social media on education, lifelong learning		Developing Web 2.0-based learning environments, expanding the range of available functions and their use, as well as conducting more experimental research
19	Singh, A., Harman, P.S., Alam, F., Agrawal, V. (2022)	Analysis the role of education, training, and e-learning in the empowerment of Saudi society. Identifying how education leads to employment generation	Practical implementation of the constructivist approach in education and e-learning between Saudi Arabia's skilled workforce and the rest of the world	Including variables such as gender, religion, etc. to broaden the scope of the survey. The survey can also be made more specific by increasing the sample size by collecting data from more respondents from different locations in Saudi Arabia

No.	Author, year	Purpose of article	Research gaps	Research directions
20	Tănase, F.-D., Demyen, S., Manciu, V.-C., Tănase, A.-C. (2022)	Identifying how online education can train younger generations and provide them with the skills they need to adapt to the job market. Examining how 2020 (the period of the COVID-19 pandemic) will affect the education boiling point		Exploring the real ethical dimensions of the online teaching, learning, and assessment process. Are the results obtained by students fair? Do they reflect the level of knowledge acquired, given that the phenomenon itself is not fully controlled?
21	Tavares, M.C., Azevedo, G., Marques, R.P. (2022)	Analysis of the challenges of Era 5.0 and its impact on industry, society, and education in a sustainable development environment		Researching the impact of various social factors in the future society based on social responsibility and sustainability, and analyzing the cooperation of industry and education for quality of life and well-being, in accordance with the goals of sustainable development. The research may take into account the perception of stakeholders in education and industry
22	Teichert, L., Salman, M. (2021)	Analyzing research in the area of digital technology application in early childhood education and identification of potential benefits		
23	Tikhomirov, V. (2013)	Analysis of the concept of 'smart' in society with the development of university education	The gap between developed countries in creating a smart society and those less developed	
24	Tinmaz, H., Lee, Y.-T., Fanea-Ivanovici, M., Baber, H. (2022)	Discovering the main themes and categories of the research studies regarding digital literacy		Further study to identify research categories in the area of digital competence, using other keywords and data sources
25	Trubina, I.I., Braines, A.A. (2016)	Discussing the development of e-learning as a method of learning and the development of the information society		
26	Ydyrysbayev, D., Kakimova, L. Sh., Boken, G.S., Talgatbekovich, S.Y., Urmatova, A., Orazbaev, E. (2022)	Defining digital transformation in education in the era of Society 5.0		
27	Yoshida, M., Thammetar, T. (2021)	Identification of dominant mechanisms of smart society and creation of a theoretical content base for university courses		Investigating EdTech cases that teach content related to the Smart society, GovTech, and Civic Tech

Source: own research, based on the mentioned authors.