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Research Article

Digital tools in education

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Abstract – Over the past decades, the demands placed on education systems have changed. Workers in the labour market need certain competences such as technical, methodological, social and personal competences. The aim of education today is to create a new educational paradigm that prepares the workforce of the future for the new challenges. This change is accompanied by the introduction of new didactic concepts such as blended learning, which combines the advantages of face-to-face and online learning with the use of digital teaching tools that can help develop the desired competences. The pandemic has led to a huge and rapid increase in the use of digital tools in education, which has necessitated the development of guidelines for their use. Therefore, the aim of this work is to present the digital tools that have been introduced into education and that require the development of digital competences by students and teachers, thus enabling teachers and managers of educational institutions to take advantage of the use of digital tools in the post-pandemic renewed situation.

Keywords – Digital Technology, Student, Education, Learning

I. INTRODUCTION

Today, online technology is a relevant activity and there has been a significant shift towards digital scientific research. Researchers are encouraged to use digital research tools. As a result, these new tools to exploit ICT for educational purposes are a welcome concept that can help to solve some of the problems associated with the in-depth literature review. Technology permeates everyday life, including the process of education. Thanks to the development of technology, we now have the tools and techniques to make the education process innovative and teaching and learning more interesting.

Traditional classroom teaching does not provide an immediate learning environment, faster assessment and greater engagement. In contrast, digital learning tools and technology fill this gap. Some of the efficiencies that such technologies offer are simply unsurpassed by traditional learning methods. With smartphones and other wireless technology devices becoming increasingly popular among the general

public, it makes sense that schools and educational institutions are making effective use of them by bringing technology into the classroom. Indeed, the adaptability and non-intrusive nature of today's technology is making learning more attractive to the next generation.

Leaders have recognised that digital transformation is necessary for the effectiveness of vital information and services. A global pandemic is transforming society, showing that agility with digital technologies is beneficial. Education leaders and policy makers are under pressure to adopt a systematic approach to the transformation enabled by digital innovation. As a result, a wide range of educationally-oriented digital materials and activities are becoming available, dramatically changing the way education is delivered. Educators who use digital tools, social media, websites and applications in their work can increase the popularity and prestige of the subject they teach. Programmes, websites, extensions, plug-ins and apps are just a few examples of online digital tools that make it easier to do the job. These can be viewed in online browsers and some can be downloaded.

II. THE EMERGENCE OF DIGITAL TECHNOLOGIES IN EDUCATION

Online digital tools are software, applications, technologies, plug-ins, add-ons or websites that are accessible via an internet connection and enhance learners' ability to conduct a thorough literature review and to master the knowledge they need to learn. Online digital tools help learners to learn more effectively, become more aware of language errors and collaborate with their peers. The COVID-19 epidemic has made online digital tools popular and useful in the educational process [3].

The globalisation of education has made the use of digital technologies a necessity. Online platforms were available for teaching lessons, sharing resources, assessment and managing the day-to-day activities of academic institutions. But the use of these platforms was proactive. The COVID-19 epidemic forced institutions to adopt the online mode of teaching in order to maintain the educational system. Developed countries are well prepared to deal with the crisis. However, developing countries have worked hard to meet this requirement. Digital technologies emerged as the saviour of education at this critical time [6].

The use of computers and other devices together with digital tools allows students to play a more productive role and be at the centre of the learning process. The teacher plays a leading role in this process and can validate learning effectiveness. With the myriad of digital resources available, learners can download the information they need or upload their content.

The web allows learners to generate content, collaborate with others, evaluate each other's work and move towards co-learning. Technology is making education more inspiring and meaningful [16, 15].

The qualities and skills learners acquire are essential for their professional success. Educational resources and digital tools help improve the classroom atmosphere and make the teaching-learning process more engaging. They also provide all educational institutions with greater flexibility and the ability to tailor curricula to the needs of individual learners [11].

Education for the 21st century aims to create an educational paradigm that prepares tomorrow's workforce for the challenges of tomorrow. This includes technical, methodological, social and personal competences. To ensure that future employees emerging from the education process are able to use new digital tools and constantly update their knowledge as technology evolves rapidly. Given the increasing complexity of systems, they need analytical skills to identify problems and make appropriate decisions [10, 5].

This section provides an overview of the different digital tools that learners have equal rights to use [4].

• **Learning management systems** are tools that support the management of educational courses. They are also known as virtual learning environments. Most notably, they are known as the primary tools for distance learning. They can also be used as a teaching tool to supplement traditional face-to-face teaching. A learning management system allows teachers to provide digital learning content that students can access at any time via the Internet. This allows students to return to the

learning material in case of difficulties. For learners who can easily cope with the workload, it provides more in-depth information about the course material. Tutors usually have dashboards to monitor progress and get an overview of the progress of all learners. Some systems also offer the possibility to create courses for external people, so-called mass open online courses. These are designed to make learning content and knowledge available to the general public. Mass means accessible to a large number of people, while open means free and public access to online courses. This learning content is available on the platform in different forms, such as recorded learning videos, problem sets and public forums. These forums aim to encourage collaboration and communication where people can support each other's learning process. An example of such a learning platform is EdX, where more than 160 member universities offer a wide variety of learning content from a wide variety of disciplines and a wide variety of curricula [5].

• **Video conferencing tools** allow participants who are geographically distant from each other to connect and communicate via the internet. The equipment records audio and video of users, which the software encrypts and transmits to the participants over the Internet. Over time, however, the range of functions of these systems has expanded dramatically: in addition to pure video calls, it is also possible to communicate with each other via text messages or traditional voice calls. Other popular features of videoconferencing tools include screen sharing, which is useful for presenting content such as presentations, remote control of the other person's computer, data storage and exchange, a calendar application for scheduling and managing videoconferences [2].

• **Digital exam assessment tools** help you create and assess digital exams**.** These can take several forms, including multiple-choice tests and problem solving in the form of games and simulations. They can be assessed in a very short time, in many cases completely independently, and thus provide the learner with immediate feedback on the outcome of the exam. To create an environment that minimises cheating, such programmes sometimes have security features such as disabling the internet browser or recording examiners over the internet. A webcam allows participants to see each other's activities. The teacher can access the student's grades at any time and generate automated reports to assess individual or group performance [5].

• **Data exchange and cloud systems** ensure the secure exchange of all kinds of data. In cloud systems, data is not stored locally on a hard drive, but in logical pools in the so-called cloud. This storage space is distributed over several servers, which may be in different physical locations at the same time. The content can be accessed from anywhere at any time by anyone with the appropriate end devices and can be modified or deleted at any time. To avoid data loss and to guarantee higher reliability, so-called RAID systems ("redundant array of independent disks") are used. Another advantage of cloud systems is that data storage is outsourced. Depending on changing needs, it is possible to own more storage or to switch to a smaller storage package. In addition to the possibility of storing data on these cloud servers, full virtual machines can also be used [9, 14].

• **Document collaboration tools** allow several people to work on the same or different documents at the same time. The goal is to produce a final version of a document or file together. This makes it easier to involve all the people involved in the project or work and shortens decision-making time, as everyone is usually present. All participants can see in real time the changes made by others. It is possible to comment on parts of the document to draw peers' attention to a particular problem. This simultaneous collaboration should allow for the efficient creation of high quality work and thus increase productivity [12].

• **Game-based learning tools** harness the popularity of video games to make learning interactive and motivating for 21st century learners. Learning content is combined with game elements to achieve a didactic effect. This should both motivate the learner to learn and increase interest in the subject. The idea of game-based learning is that learners learn new things through repetition, failure and goal achievement. This is the principle behind most video games. The player starts with little knowledge and skills, then as the game progresses, he gains more experience and is able to handle difficult situations. Game-based learning is expected, especially in interdisciplinary subjects, where multiple skills such as critical thinking, communication, decision-making need to be applied simultaneously by the learner [8].

• **The digital library and database tools** are used to store electronic media centrally on a data server. The stored resources are accessible at any time via the Internet or, in special cases, via the organisation's intranet. These databases may include e-books, digitised books, electronic journals, audio files and films. Access can be obtained by reading the whole work or only part of it. In addition, the system can be set up so that the user can only use the files online or download them to his or her device. The best known electronic databases and libraries that can be accessed are Project Gutenberg and Google Books. In addition to digital libraries, which are electronic storage media, there are also virtual libraries. These are characterised by the fact that they act as an intermediary for the electronic media offered on their web repository [3].

• **Virtual and remote laboratory tools** allow experiments to be carried out remotely. Virtual laboratories are the translation of real-world experiments into the virtual world. In this virtual world, experiments can be carried out and a computer simulation calculates the result of the experiment. This means that experiments can be carried out at any time without the need for the person carrying out the experiment to be present in the laboratory. The virtual laboratory also offers a safe environment in which dangerous experiments can be carried out that would be too dangerous to perform in real life. In addition, no resources other than the electricity needed to run the computer are needed to carry out the experiments [13, 7].

• **Digital whiteboard devices allow you to** transfer the familiar whiteboard used in class into the digital world. On the one hand, a distinction needs to be made between the devices used in e.g. video conferencing software and the physical digital whiteboard/chalkboard used in the classroom. With the first category of devices, people can write notes on a virtual whiteboard. This can be done with appropriate input devices such as a computer mouse or pen and pen touch-sensitive display. To guarantee better collaboration, there are options to allow only one person to write to avoid confusion, or several people to write at the same time to improve collaboration. The user can also insert images and graphs to complement the content [5].

• **Digital notebooks** are used by teachers to record activities in class and to store assignments and their grades. In the digital notebook, users can view their timetable. On the administrative side, the grade is also used to record absences and tardiness of students. Traceability is guaranteed. [18].

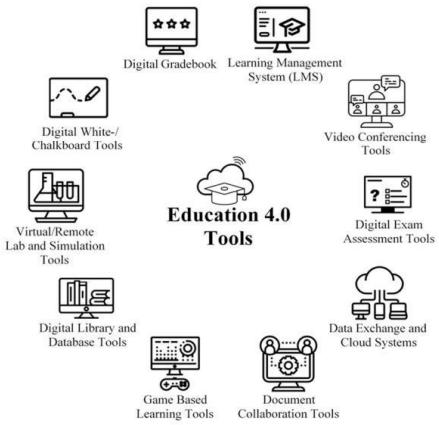

Fig. 1 Categories of digital research tools [5].

III. VIRTUAL TEACHING AND WEBINARS

The COVID epidemic has seen a significant increase in the use of video conferencing tools, including Zoom and Microsoft Teams. These have enabled large local visits, presentations and small group training. To optimise learning in virtual teaching, it is essential to incorporate the basic concepts outlined earlier. Learners reported increased fatigue and anxiety from overuse of these platforms, known as Zoom fatigue. Recent findings in neuroscience explain the cognitive processes that cause these changes. Virtual learning can create a sense of dislocation, which has a direct impact on episodic memory and personal and professional identity. The lack of eye contact and non-verbal cues has been shown to reduce group engagement and performance. these effects can be mitigated by building a strong sense of community within the learning group and by incorporating strategies that promote voice exchange and visual attention [17].

IV. YOUTUBE AND LEARNING CHANNELS

YouTube is an online video-sharing platform with more than a billion monthly users who collectively watch more than 1 billion hours of video every day. It is the second most visited site in the world after Google search. After a recent review of the education literature, it can be concluded that there are a number of educational YouTube videos. It is regrettable that, despite the considerable potential of such material, few studies have evaluated YouTube videos as a learning resource for education.

Although the existing literature is sparse, it suggests that these videos result in high levels of learner satisfaction, confidence and knowledge. With the increasing uptake of YouTube, studies related to the educational process suggest that there is a need to promote the evaluation of video learning at all levels of education to improve future practice [17].

V. THE EDUCATIONAL ROLE OF SOCIAL MEDIA

The use of social media applications in educational activities is still in its infancy. Therefore, exploring issues of acceptance of social media platforms and identifying key areas for improvement requires further investigation. Several review studies have been conducted to analyse studies on social media. The key factors influencing the use of social media need to be identified. In addition, incomplete knowledge of the factors influencing the use of social media platforms obscures their impact on areas outside education. Social media enhance students' knowledge through several mechanisms. First, social media also allows for the widespread acquisition and dissemination of unambiguous information. [1].

For example, Facebook is also a versatile educational platform that can be used for small group instruction and to facilitate synchronous and asynchronous teaching. [17].

VI. SUMMARY

In the future, education systems will face a number of challenges related to digitalisation. In this work, we have sought to provide a comprehensive picture of digital tools in education and how they can be integrated into education. As the use of digital tools is not yet fully integrated into the teaching-learning process, the aim of this study is to draw attention to the fact that the use of these tools can not only make the teaching-learning process successful, but can also have 'side-effects' that can help to continuously improve the competences of learners. The use of different digital tools also provides actively engaged students with skills that improve their problem-solving, speaking and critical thinking abilities. At the same time, the age of the students should be taken into account when using the tools, so that their competences and skills can develop appropriately. The use of digital tools in pedagogy provides a pathway for students to understand the nature of science.

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