

# THE DESIGN AND DEVELOPMENT OF PLATFORMS AND EDUCATIONAL APPLICATIONS. NEW PERSPECTIVES IN DISTANCE EDUCATION

## Ο ΣΧΕΔΙΑΣΜΟΣ ΚΑΙ Η ΑΝΑΠΤΥΞΗ ΠΛΑΤΦΟΡΜΩΝ ΚΑΙ ΕΚΠΑΙΔΕΥΤΙΚΩΝ ΕΦΑΡΜΟΓΩΝ. ΝΕΕΣ ΠΡΟΟΠΤΙΚΕΣ ΣΤΗΝ ΕΞ ΑΠΟΣΤΑΣΕΩΣ ΕΚΠΑΙΔΕΥΣΗ

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### Abstract

The rapid evolution of New Technologies in the first decade of the 21st century creates new data in the field of distance education, contributes to significant changes in the learning, communication, and interactive environment with the introduction of Open Educational Resources (OERs), Massive Open Online Courses (MOOCs) of Learning Analytics-LA and Educational Data Mining-EDM, mainly in higher education. The purpose of this work is to investigate the use of new technologies in e-learning and the explosion of ICT that creates new data in the field of Open and Distance Learning. Learning Management Systems and how they are used in e-learning, as well as the video conferencing platforms developed and used extensively with the new data brought by the Covid-19 pandemic, are another topic we are dealing with in this research. The results of the research show that despite the progress made in the technologies used today for the design and development of platforms and educational applications, there is room for improvement since their widespread use due to the pandemic brought to the surface problems that had not been addressed until now.

**Key words:** *Information and Communication Technologies, distance education, e-learning, digital platforms*

### Περίληψη

Σκοπός της παρούσας εργασίας, είναι η διερεύνηση της χρησιμοποίησης των νέων τεχνολογιών στην ηλεκτρονική ή εξ αποστάσεως εκπαίδευση (e-learning) και η έκρηξη των ΤΠΕ που δημιουργούν νέα δεδομένα στον χώρο της ΑεξΑΕ. Τα Συστήματα Διαχείρισης Μάθησης και πώς αυτά αξιοποιούνται στην ηλεκτρονική εκπαίδευση, καθώς και οι πλατφόρμες τηλεδιάσκεψης που αναπτύχθηκαν και χρησιμοποιήθηκαν εκτενώς με τα νέα δεδομένα που έφερε η πανδημία του Covid-19 είναι ένα ακόμη θέμα με το οποίο ασχολούμαστε στην συγκεκριμένη έρευνα. Τα αποτελέσματα της έρευνας δείχνουν ότι παρόλη την πρόοδο που έχει σημειωθεί στις τεχνολογίες που χρησιμοποιούνται σήμερα για τον σχεδιασμό και την ανάπτυξη πλατφορμών και εκπαιδευτικών εφαρμογών, υπάρχει χώρος βελτίωσης μιας και η μαζική χρησιμοποίησή τους λόγω της εμφάνισης της πανδημίας έφερε στην επιφάνεια προβλήματα που δεν είχαν αντιμετωπιστεί έως τώρα.

**Λέξεις Κλειδιά:** *τεχνολογίες της πληροφορικής και των επικοινωνιών, εξ αποστάσεως εκπαίδευση, ηλεκτρονική μάθηση, ψηφιακές πλατφόρμες*

### INTRODUCTION

The education system (Cavus, 2015) is at the top of the systems that are affected by technological developments and undergo fundamental changes: a) Learning needs increase and become more diverse, while at the same time the education system becomes a service that individuals can seek throughout their lives, b) Students require

more flexible, personalized, and easily accessible learning methods, c) Students do not want to be dependent on a particular learning method, d) There is a need for student-centered education, rather than traditional teacher-centered education, e) The teacher has become the person who guides the students in how to reach the knowledge instead of giving the knowledge himself, f) Students are increasingly demanding to learn at the time and place of their choice, following their own learning rhythms.

The transition from d-learning to e-learning and m-learning, which was in progress at the end of the 20th century (Keegan, 2001) is now complete. The outbreak of the COVID-19 pandemic in the first months of 2020 was an unprecedented health crisis, followed by a lockdown with serious social, economic and educational consequences.

The critics of Open and Distance Learning, directly challenge the old 3rd generation models that are mainly based on printed material and asynchronous forms of communication and have as their main argument the essential lack of communication, interactivity, metadata, and metacognition (Karoulis, 2007).

## **1 NEW TECHNOLOGIES AND NEW PERSPECTIVES**

The explosion of ICT and the Internet create new data in the field of ODL (Open and Distance Learning), significantly changing the environment of communication and interaction with the use of modern and asynchronous learning environments (Anastasiades, 2005; Paulsen, 2003).

New technologies and the Internet enable access to high-quality telecommunication links and create the conditions to overcome the main disadvantages of ODL of the older versions. Innovative teaching methods are therefore being developed in e-learning, such as Blended e-learning, which is defined as a distance learning method that uses high technology, such as television and the internet, or low-tech, such as voice mail, and conference calls combined with traditional education and training (Smith, 2001).

If we want to refer to what the researchers of the field define, then we could define ODL as the form of education that separates the teacher from the learner by space and/or time (Perraton, 1988), allows the student to identify the place, time and rhythm of his study (Lionarakis, 1999), gives the learning control more to the learner than to the distance learner (Jonassen, 1992) and establishes discontinuous communication between the learner and the learner, which is implemented in printed form material and/or some forms of technology (Gkelameris, 2015).

According to the U.S. Distance Learning Association, distance learning is defined as the acquisition of knowledge and skills through indirect information and guidance that includes all technologies and other forms of distance learning. The model of distance education can also be understood as a system for the required delivery of an educational subject or object (Moore & Kearsley, 2004).

Of course, the advent of the Covid-19 pandemic, which is still ongoing, has redefined the role of education and the use of New Technologies, by learners of all levels and trainers. According to a report by the Unesco International Institute for Higher Education in Latin America and the Caribbean (IESALC), the pandemic had not only immediate effects but also medium- and long-term effects on higher education "for both institutions and the system as a whole" (UNESCO-IESALC, 2020). Some of the serious direct effects reported by the report concern students and the "temporary cessation of personal teaching in universities" which brought them face to face with a completely

new situation, with consequences in daily life, costs and financial burdens, the cessation of learning and international mobility. Relevant are the consequences for teachers, who were influenced in the workplace and in the way they practice their profession, while “the most obvious impact on teachers is the expectation, if not the requirement, of continuing the teaching activity using a virtual form”.

According to research (Charissi, Tympa & Karavida, 2020) on the Greek data during the outbreak of the pandemic, the skills that the students claimed to have helped mainly in dealing with the crisis created by the pandemic were the use of new technologies and open online learning. Specifically, as shown in the table below, most students (82.7%) rated the "use of information technologies" as the most important skill to respond more effectively to the new reality. Their preferences were followed by "open and online learning" (57.5%), "flexibility and adaptability" (53.5%), "creativity" (51.2%), "critical thinking" (47.2%), "emotional intelligence" (39.4%), and "continuing education" (37.0%). The final preference of students refers to the "development of coping strategies" (22.0%).

**Table 1 Important skills for effective response to the new reality.**

Skills/ stressful events coping strategies	Frequency	Percentage
Use of Information Technologies	105	82.7%
Continuing Education	47	37.0%
Open & Online Learning	73	57.5%
Flexibility & Adaptability	68	53.5%
Emotional Intelligence	50	39.4%
Creativity	65	51.2%
Critical Thinking	60	47.2%
Development of Coping Strategies	28	22.0%

**Source: (Charissi, Tympa & Karavida, 2020).**

Certainly, in this new age of things, shaped by the advent of Covid-19, we should not fail to mention that in addition to shaping the new perspective, there is also the shaping of a parallel reality in which students from poor and/or degraded areas do not have access to technology and are thus excluded from the educational process in the short or long term. A study conducted by an interdisciplinary research team consisting of the University of Naples, Parthenope University and Bournemouth showed that when schools were forced to operate solely based on distance learning strategies with little or no experience on the subject, students were forced to new distance learning strategies through digital communication software (such as CISCO, Zoom, Skype and Microsoft TEAMS), about 20% of students, especially in the southern regions of Italy, did not have access to any device and were excluded from learning, causing immediate risk of delinquent behavior and juvenile delinquency (Ferraro et. al., 2020).

According to research by (Langford & Damşa, 2020), the software that was most used during the period of confinement in Norway (12/3/2020, closing of Universities due to COVID-19 in Norway), was Zoom. Despite the minimal experience, academics in Norway quickly embraced online teaching. Only 30% said they had previous teaching experience online, but 80% said they now use video-based Zoom software. Other programs used include Microsoft Teams, Skype, YouTube, and PowerPoint. Canvas, despite being the "official digital platform" in most higher education institutions in Norway, similar to Cisco WebEx in Greece for primary and secondary education, did not have the same impact as Zoom.

The platforms used mainly for distance education during the pandemic in most countries are Cisco WebEx, Microsoft Teams, and Zoom.

Zoom is an online video conferencing tool that brings together several features that make it unique to the small, medium, and large groups of people who want to communicate. Zoom offers many free features, such as online meetings either video or audio, or both for a maximum of 100 people, with a 40-minute time limit, and other free features such as live chat, screen sharing and recording. Zoom gained even more users worldwide after the outbreak of COVID-19, due to its flexibility and compatibility. Internet security researchers have identified some vulnerabilities, security vulnerabilities and data leaks when using Zoom, which is why many, such as the Pentagon, the German government and the Taiwanese government, have stopped using it (Zou, Zhao & Siau, 2020).

Cisco WebEx is another popular online teleconferencing platform. WebEx has similar features to Zoom and is available at a price comparable to Zoom. The main difference between the two is that the free WebEx program allows users to host meetings at any time, while the free Zoom program limits one meeting to 40 minutes. Since the typical duration of a school class is just over 40 minutes, WebEx is more suitable for longer sessions and Zoom is more suitable for a shorter group session.

Microsoft Teams is a digital hub that gathers conversations, meetings, files, and applications into a single learning management system - LMS. Microsoft Teams allows individual teams to self-organize and collaborate on different business scenarios. At Microsoft Teams, teams are a collection of people, content, and tools that compose different projects within an organization. It is estimated that by the end of 2020, 41% of organizations will use Microsoft Teams worldwide (Microsoft, 2018). Like Zoom and WebEx, Teams lets you share audio, video, and desktop.

The usability of Microsoft Teams, WebEx and Zoom is generally very good and that is probably the reason for their popularity in the market. The three platforms also have quite similar features and functions. The market is highly competitive and a useful feature of one platform is quickly adopted by the other two. In addition, users can easily switch from one platform to another. Usability features and costs are key to competing in such cases (Zou, Zhao & Siau, 2020).

From the comparison of the three platforms in the same research (Zou, Zhao & Siau, 2020), using VLE heuristic search algorithms (Figueroa et. al., 2019), the following results emerge:

- Screen sharing is a common choice in e-learning and teaching environments. For these three platforms, screen sharing is not as intuitive and simple as it should be for a novice user. The choice of this function should become more natural and obvious.
- Also, in the context of educational assessment, educators may need to look at students' screens, such as when instructors share a test, and should ensure that students do not search for answers online. Although formal exams may require a professional supervision service, the supervision of simple distance learning quizzes can be easily accomplished when instructors can see students' screens. This feature does not need to be activated continuously - but only when needed (e.g., during quizzes) and with the student's consent.
- An effective way to evaluate the involvement of distance education is to monitor classroom monitoring. While Teams provides a tool for downloading watch lists with

a single click from the side menu, WebEx and Zoom make the function a bit more complicated - instructors need to perform a few steps before they can download watch lists.

- Although Teams provides a fairly clear user interface during teleconferencing, the option of starting a new teleconference is visually indistinguishable.
- The process of attracting students' interest and active participation in events is more difficult for a teacher in distance education than in lifelong learning. All three platforms feature images such as a handshake for speech, applause, or a nod for a slower pace. However, these options are only available if the chat feature is enabled - something that might need to change. Images that would meet additional needs, such as "explain better", could also be used.

The Cisco WebEx, Microsoft Teams and Zoom platforms are not designed for e-learning. Due to the new conditions created with Covid-19, millions of students in many countries were suddenly forced to use them to continue their education. Their experience and exposure to different distance learning platforms will change the pedagogical landscape after the pandemic. Issues to be addressed to further enhance the acceptance of distance education include issues of security, confidentiality, and trust.

## **2 DESIGN PRINCIPLES AND STRUCTURE OF EDUCATIONAL APPLICATIONS**

Users typically experience problems in complex multimedia environments. The interface of educational applications must be properly designed to allow easy navigation, without disorientation of the user, inability to determine its location in the application or inability to create a clear picture of the content of the application, and difficulty in locating specific information. The former leads to loss of position and pointless wandering (Panagiotakopoulos, Karatrantou & Pintelas, 2012).

The design of the application should be linked to the desired pedagogical goals and cognitive classification, but also the level of user-learners (Carusi & Mont'Alvao, 2006).

The design of the navigation must be based on certain principles. The main ones are (Panagiotakopoulos, Pierrakeas & Pintelas, 2003; Panagiotakopoulos, Pierrakeas & Pintelas, 2005):

- The segmentation, prioritization in terms of difficulty, and recording of information must be done in a small number of levels.
- Multiple paths from the same screen image to the same content section should be avoided.
- The "depth" of penetration into the thematic content from the active elements of a screen image should be as small as possible.
- The course that the trainee will follow during his navigation in the application to be defined by himself. In fact, the learner should be able to reuse the same course, so that he can access again parts of content that he has already visited.
- When designing the content, the possibility of informing the trainee about the position he/she is in at the moment while navigating the program must have been foreseen.

In recent years, culminating in the unexpected situation that has arisen worldwide due to the spread of COVID-19, telecommunications through communication networks, is mainly affecting ICT in two ways: either by integrating communication tools into existing

educational software or by developing new environments that allow or support collaboration on a specific project, between users who are spatially located.

## **CONCLUSION**

Undoubtedly, today we are experiencing the era of the information revolution, as the result of the rapid development of new applications of technologies and communications, which permeates almost all of everyday life. Day by day more and more activities, from banking to entertainment, are part of the services of various networks, making us share in virtual situations, performances, and worlds. This creates the need to upgrade the traditional teaching model, by creatively utilizing the potential of New Technologies. Distance education has already taken huge strides - due to circumstances - with educational institutions timidly trying to take advantage of the rapid development of new media and technologies to offer distance education to a wider student body than it is possible to attend studies with conventional classical methods, and look for ways to improve the efficiency of the learning process.

Most applications for this purpose are still in the experimental stage and quite difficult to use, while they do not seem to effectively support communication between students. However, it is easy to imagine the possibilities that can be offered in the future by well-designed programs, educational social networks that - depending on the interests and profile of each user - will place him in different environments, which will be calibrated based on the level of knowledge, experience, skills, and interests of students. It is important not only to create user-friendly environments and systems of social networking applications but also to make them accessible to all the students and this is a challenge for future work aimed at further exploitation of New Technologies in the field of social networks and education.

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