Distance Education

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1. Distance Education

Today, humankind is busier than ever before. For that reason, classical education no longer suits some of us. The technological revolution has enabled learning on the go, changing the way we study forever.

Distance learning is a type of education in which students and their lecturers are separated, i.e., they reside in different physical locations, and the instruction between them is communicated using different technologies [1]. Distance education can be classified into two categories: *asynchronous* and *synchronous* learning [2]. Asynchronous distance learning is based on the interactions between the teacher and the learner at different times, such as learning from instructions on paper, listening to recorded lectures, or watching pre-recorded visual tutorials in a flexible timeframe. In turn, synchronous learning requires interactions in real-time, such as listening to live radio programs or attending live online lectures [3]. Naturally, asynchronous distance learning is older than its synchronous counterpart, as the latter was only made possible by new developments in communication technologies [4]. Both methods have become popular, and the selection of appropriate teaching methods depends on the knowledge that the learner wants to gain. Sometimes, a mix of synchronous and asynchronous teaching is used. Modern distance education uses computers and the Internet as the delivery mechanism, with at least 80 percent of the course content delivered online [5][6].

Several decades ago, to study in a given field, people had to attend classes physically, and it was impossible to start their studies without passing classification exams. Now, people only need to spend a few minutes registering online, and they can attend world-class lectures available for everyone from numerous places across the world, without leaving their home [7]. This form of education is no longer expensive, and it is not limited to only those who cannot attend classes due to important reasons like family or health issues, but to everyone. Participation is technically limited, due to the fact that this requires a computer/tablet and Internet access. Currently, online courses are available to all who wish to learn and understand something new. No matter the subject choice, courses are readily available, both for beginners and advanced students. From the basics of physics to quantum chromodynamics, everything can be learned online.

Depending on the country and the institution that organizes the online education, there are many techniques employed, such as social learning (learning through social interactions between peers) [8], gamification (incorporation of games into education, e.g., through learning platforms or video games) [9][10], and personalization (customized learning with an individual approach to students' strengths and weaknesses) [11][12]. All of these methods are utilized to ensure a high retention of knowledge and good absorption of the content by the course attendees. Unlike in the past, today, online education does not require the use of a stationary computer. Content can be displayed on a tablet [13][14], a smartphone [15][16], a laptop, [17][18], or with the use of Virtual Reality (VR) goggles [19][20]. This enables students to obtain knowledge and understanding, and new solutions are being implemented globally. Nowadays, students can read and respond to emails at any time via a computer, smartphone, tablet, or other electronic devices. Instructions for students can be delivered at a lower cost than ever before, and less time is needed to deliver these instructions. This makes the use of distance education more and more viable and accessible in many cases.

2. COVID-19 Pandemic and Distance Teaching Reality

Before 2020, the main reason for distance education was either the remoteness of students from teaching centers or poverty. However, in 2020, to slow the spread of the COVID-19 pandemic, schools were forced to limit face-to-face teaching and move to the digital world, i.e., online remote learning, at least for a while [21]. This shift was very rapid and, in some ways, brutal: most schools and teaching institutions were not ready for this occurrence because remote education was not the expected standard for education. Governments of different countries put in place various countermeasures to protect citizens against the spread of the COVID-19 pandemic. These restrictions covered not only involved limitations on movement, covering the mouth and nose, introducing lockdowns, or closing facilities such as shopping malls or sports facilities, but also the closure of schools, kindergartens, and universities in many countries, making it necessary to introduce distance learning. Across the world, there are currently more than 1.2 billion children in 186 countries who are affected by school closures due to the pandemic [22]. Most European countries decided to close their schools as early as March 2020 and temporarily reintroduce full-time teaching due to distance learning limitations only as a top-down regulation [23][24].

On the other hand, the approach to closing these institutions differed depending on the country. Some countries decided to close only high schools and universities, while kindergartens and primary schools remained open. Other countries introduced a shift system for students or hybrid learning models. Two main approaches to the rapid emergency education response were observed. The first concerned countries where educational systems had the technical and institutional capacity before the pandemic, allowing them to implement remote learning quickly. These countries practically closed their schools overnight, and children were left to learn at home. The second model was introduced in countries that had no experience in distance education. These regions had to react quickly to these changes by adjusting their resources or simply building them from scratch. As such, not all distance learning models started in the same place.

In Sweden, such switching was obligatory only for upper secondary schools, while other schools were left to make their own decisions regarding the provision of education [25]. Education on all levels was plunged into chaos due to

unclear regulations, a lack of remote learning tools, and the absence of appropriate training for teaching personnel. Schools and universities, which work remotely, use solutions based on remote communication platforms such as Zoom, Google Classroom, Microsoft Teams, D2L, and Edgenuity [26]. Some countries had a much easier transition to remote learning than others. For example, in Sweden, in 2016, almost all students used the Internet every day (about 98 percent). About 40 percent of adolescents owned multiple personal electronic devices, such as tablets, computers, and mobile phones [27]. Interestingly, distance education in secondary schools in Sweden was rare. After the lockdown was announced, schools switched to remote classes within one day, and 75% of students assessed that they were well prepared for remote learning [28].

Countries with a limited capacity for online teaching, or where this would be impossible, launched TV and radio teaching during the pandemic (e.g., Peru, Sierra Leone and Kenya). In Latvia, a dedicated educational video channel (tavaklase.lv) was created [29], and, in Poland, a program for students in grades 1–8 of primary school was broadcast from Monday to Friday on the public channels of Telewizja Polska (TVP) [30]. Furthermore, in Romania, a digital platform (digital.educred.ro) gathered relevant, validated, and recommended e-learning platforms and online learning resources in one place [31]. In some regions, additional support for the distance learning process was introduced, allowing teachers to contact students' families, making phone calls or home visits, and a free mobile application that allowed teacher-student interaction, e.g., in Sao Paulo state, Brazil [32].

Other countries, such as Luxembourg and Greece, introduced a rotational teaching model [33]. This allowed smaller groups of students to return to school at different times, thereby minimizing student-teacher interaction and mixing, thus reducing the transmission of COVID-19. As such, students were allocated specific days or weeks where some of them studied at school, and the rest studied remotely. Of course, the children who attended schools followed a robust full sanitary regime—wearing a mask, keeping a safe distance, and disinfecting their hands. Classes were also adequately prepared—children did not sit together at desks, and rooms were disinfected regularly. Some schools also decided that children would stay in classrooms during breaks to organize their movement.

Some countries developed different learning scenarios depending on the number of cases of COVID-19 in the country, called traffic light systems (e.g., Norway, Belgium and Austria). Belgium introduced a traffic light system for schools based on four colors: green, yellow, orange, and red. In a situation where the "green scenario" is introduced, all students go to school, and only hand hygiene is enforced. Yellow introduces a hybrid model of teaching in high school and restrictions related to maintaining a social distance and students wearing a mask. When the number of cases increases dynamically, the orange scenario is introduced and a rotation system for all students is implemented. The red scenario is more restrictive than the orange, introducing stringent hygiene rules. In Belgium, the above-described restrictions did not apply to kindergartens and primary schools, which operated on ordinary principles, with only the hygiene rules being maintained [34].

Countries such as Croatia, Germany, and Poland, decided to introduce a hybrid teaching model. Kindergarten and primary school grades 1–3 were resumed, and education for the upper grades of primary and high school was introduced remotely, except for vocational courses and laboratory classes. Some universities also opted for such solutions, like Wroclaw University of Science and Technology or Jagiellonian University, Poland [35]. In turn, many

universities, such as the Warsaw University of Technology, Poland, switched to remote learning by the end of the academic year.

Due to the European Commission data, schools in most of the European countries have digital strategies and agendas [36], which make it possible to maintain digital learning. Some general practical recommendations for schools, teachers, and students' families regarding education during the pandemic were also reported in the United Nations Educational, Scientific and Cultural Organization (UNESCO) report [37]. In many countries, schools and some universities were completely unprepared for such developments. Some teachers said they had received support, while others were left to fend for themselves, with no financial support for buying educational supplies and no training in using remote learning tools.

For example, outside Europe, an emergency policy for "Suspending Classes Without Stopping Learning" was introduced in China. In essence, this policy aimed to suspend face-to-face teaching and shift education into an online environment as smoothly as possible. Government regulations were implemented to prepare the necessary infrastructure (e.g., arranging appropriate access to network services) [38]. Appropriate training was also provided to teachers regarding the use of online learning platforms and methods. However, this implementation encountered issues; not everyone in China has access to fast broadband Internet, which is required for online education. According to the Chinese government's 2018–2020 plan, by 2020, 98 percent of the country's villages should have access to broadband Internet [35]. That leaves two percent of the population vulnerable to being left out of online education. In China, as of March 2020, Internet penetration was 64.5 percent, meaning a significant portion of the population still has no Internet access. This could hinder the implementation of online learning. In fact, in March 2020, only 46.8 percent of students used online education via the Internet [36].

Researchers attempted to analyze how lockdown and remote learning affected schools and academies. In [37], the impact of the blockade caused by the COVID-19 epidemic on higher education in the Czech Republic was examined. A survey concerning the ability to implement teaching online (at home) and the flexibility of institutions was conducted. Several remote learning techniques, such as streaming via Microsoft Teams, Zoom, pre-recorded videos, as well as face-to-face and online teaching and online consultations, were considered. Moreover, technical equipment, the software used for remote communication and the strong tendency of academics to use other solutions than those that were recommended were taken into account. It was found that, while the institution had special software before the pandemic, the knowledge of how to use it was almost equal to zero. However, such a quick reaction to the situation would not have been possible if the software was not available. The study pointed out that the description of the learning process and its documentation is of high importance. The transformation of traditional lessons into fully remote classes requires lessons, schedules and learning activities to be changed.

In the context of the Arabian culture, the consequences of implementing distance learning as a countermeasure to the development of the COVID-19 pandemic were presented in [39]. The analysis carried out suggests that the society was able to adapt to the new prevailing rules. The factors that contributed to the discipline of society were related to the advancement in communication technology, the increasing strength of individualism, and the fear of being infected with an unknown virus. An interesting study was also conducted by the authors of [40]. The research

survey considered a group of notary employees in Turkey, who voluntarily used a distance education platform. User satisfaction turned out to be strongly related to age, and factors such as gender, work duration in the profession, number of notary employees, educational level, and previous practice in distance education did not show significant differences. In turn, in [41], the status of Turkish secondary school education regarding distance education during the COVID-19 pandemic in Turkey was investigated. The study was based on the opinions and observations of teachers. It was found that the teaching staff had huge problems with the new teaching method and that they could not teach Turkish remotely in an acceptable manner.

While educators and academic theatres have experienced challenges during the COVID-19 pandemic, on the opposite side, we have pupils and students, and we should consider their difficulties, findings, and satisfaction in connection with remote learning. Currently, the world is struggling with the third wave of the pandemic and many countries have been forced to close their borders. A sense of fatigue among many students and teachers has been consistently growing. An analysis of two universities, one in China and one in South Korea, suggests that study satisfaction during the COVID-19 pandemic has decreased over time [42]. These results were unexpected, but students who were satisfied with the traditional way of learning were also satisfied with the remote form. International students were much more satisfied than domestic students.

Moreover, the effort that the tutors put into distance learning was strongly correlated with student learning satisfaction. However, the lack of physical contact negatively affected the students' sense of community and overall satisfaction. Despite being satisfied with the individual teaching mode, students began to see group work as a much less satisfying part of their online learning. Additionally, about 60 percent of students said they would like to learn online after the pandemic. In turn, 70 percent of India's agricultural students declared readiness for remote learning during the pandemic [43]. They preferred to use smartphones for online learning and attended the recorded classes with quizzes at the end. It was found that the flexibility and timing of remote courses for students from rural areas with broadband problems is a huge advantage. However, this type of study specificity, which requires practical classes, is only possible thanks to the hybrid learning model.

It is also worth stressing that growing Internet consumption and the advantage of online life over everyday life may lead to psychological and/or even psychiatric disorders [44], such as depression and anxiety, as well as harassment. Internet addiction has many similarities with addiction to the consumption of toxic substances. The results obtained suggest that the implementation of university educational programs to redirect addictive behaviors, which are a consequence of the Internet's excessive use, is of high importance. Initial research in this area was already carried out before the pandemic [45]. It was found that there is still a long way to go when it comes to perfecting remote learning in higher education.

Another important issue is connected with what we can observe during personal contact. During remote learning, children lack contact with their peers, especially the youngest students, who find it difficult to focus while learning on a computer, requiring the significant involvement of parents, who work simultaneously as the child is learning. Additionally, some children received a wholesome meal at school, which was often the only hot meal they received during the day in impoverished regions. As a result of the switch to remote learning, children have begun to lack

adequate nutrition, which could translate into serious health problems. It should also be emphasized that a teacher who has direct physical contact with a student may notice that the child is a victim of domestic or school violence, or that he/she may suffer from psychological problems, such as depression or anxiety. Unfortunately, some of these problems may go unnoticed in distance learning, and the consequences can be dramatic [34].

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