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Schools Went Online Over One Weekend – Opportunities and Challenges for Online Education Related to the COVID-19 Crisis

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Abstract: This study aims to further the understanding of the opportunities and challenges for online education from the perspective of the coronavirus disease (COVID-19) outbreak. The situation was unique in many ways, as the migration from traditional to online education was very rapid and forced by situational circumstances. However, it also had the potential to foster organizational change in the use of online education in a way that has never been seen before. A literature review was used to explore the opportunities and challenges for online education, and the results are discussed in connection with the COVID-19 crisis. The study identified nine opportunities and nine challenges for online education that apply to online education in general and that can be considered when creating strategies for dealing with a crisis situation similar to COVID-19.

Introduction

The coronavirus disease (COVID-19) outbreak has had widespread effects in many countries, including economic disturbances and changes to how daily life is organized at different levels of society. The World Health Organization (WHO) (2020) declared COVID-19 a pandemic on the 11th of March 2020, when the confirmed cases amounted to 118,000 in 114 countries. COVID-19 is the first coronavirus to have caused a pandemic (WHO, 2020). To slow the spread of COVID-19, schools and universities worldwide were closed at short notice in spring 2020 (UNESCO, 2020), impacting over half the world's student population.

In responding to the COVID-19 outbreak, education was facing an unprecedented challenge. The spread of COVID-19 forced educational institutions to close their doors and minimize their physical interactions with learners, ruling out or at least significantly decreasing the possibility of using traditional classroom methods. The situation was similar in many countries; distance education needed to be organized rapidly, and even blended learning was not possible. As classes moved online, it became essential to ensure that there were effective learning technologies and enough know-how related to online education, teaching, and learning during home confinement. However, it is well-known that educational organizations and educators have different capabilities when it comes to organizing distance education.

This study furthers the understanding of the effects that the COVID-19 outbreak has had on organizing online education. More concretely, it identifies opportunities and challenges for online education related to the

COVID-19 crisis situation by means of a literature review. The study provides information about opportunities and challenges for online education that apply to online education in general and that can be considered when creating strategies for dealing with a crisis situation similar to that caused by COVID-19. The study also contributes to the European Commission-funded 'Learning Technology Accelerator' roadmap focusing on identifying schools' and municipalities' learning technology procurement needs in order to prepare common European procurement potential for the future with and without crisis situations.

Method

A traditional or narrative literature review and meta-synthesis employing non-statistical techniques (Jesson, Matheson, & Lacey, 2011) were seen to fit the purposes of this study. Electronic databases (e.g. ERIC, Google Scholar, JSTOR, and ScienceDirect) were investigated to identify studies published between 2000 and 2020, but publications from 2010 to 2020 were preferred due to their timeliness and to ensure that technology use is understood in the modern context. There was a particular emphasis on targeting literature published in the spring of 2020 due to the specific characteristics of the COVID-19 crisis. Some of the most frequent keywords used were "online learning/education", "e-learning", "virtual school/ing", "cyber school", "remote learning", "distance learning/education", "web-based learning", and "homeschooling". These were used both separately and in various combinations. Keywords such as "enablers" or "opportunities", "strengths" and "barriers, or "challenges" and "limitations" were also used. During this phase of our study, we included in the literature review studies concerning all different educational levels as well as studies considering the perspectives of teachers, learners, and parents alike.

For the purposes of this analysis, we identified 20 publications that included analysis of positive and/or negative elements of online education. All publications were written in English, and most focused on English-speaking countries. Of the 20 publications, four were review articles and one was a meta-analysis. Around half of the articles were related to K-12 education, while the rest dealt with higher education or online education in general. Most of the articles focused on educational institutions', teachers', or learners' perspectives. Six articles dealt with parents' perspectives. Of them, three discussed homeschooling in particular. With two exceptions, all publications focused on voluntarily learning and teaching online, not on online education in emergency situations.

In the analysis, we identified general opportunities and challenges for online education reported in the publications that could also be applied in a sudden transfer to online education from more traditional school education during the COVID-19 crisis. In the following section, the results of the literature review are discussed in light of the rapid change to online education caused by the COVID-19 situation.

Results and Discussion

In this analysis, we identified nine opportunities and nine challenges related to online education that can be seen as relevant for the COVID-19 crisis and that can be considered when creating strategies for online education both in general and in crisis situations. Table 1 presents the identified opportunities. First, in a literature review on K-12 virtual schools (Barbour & Reeves, 2009) and in a survey study identifying barriers and enablers in the implementation of web-based learning in colleges of education (Surry, Grubb, Ensminger, & Ouimette, 2009), *flexibility* was seen as an important advantage of online education. Flexibility is related not only to scheduling but also to geography; that is, online education provides learners who are not physically able to attend school an opportunity for schooling (Barbour & Reeves, 2009). Likewise, in a qualitative case study on educational activities and the role of parents in homeschooled high school students (Carpenter & Gann, 2016), flexibility in schedules, both on a daily basis and in the long term, was considered an important opportunity in homeschooling. Second, and strongly related to flexibility, online education can be seen as an excellent opportunity for the *individualization* or *personalization* of, for example, difficulty level, pace, methods, and consideration of each learner's needs, preferences, and personality (see Barbour & Reeves, 2009). In a doctoral dissertation on parents' support for their elementary school children in the virtual classroom (Fairbairn, 2013), parents thought that their children's individual support needs were better considered in virtual than traditional classrooms. Likewise, in a qualitative study investigating why parents choose cyber charter schools (Marsh, Carr-Chellman, & Sockman, 2009), parents selected this form of online education due to the possibility to customize education to their children's needs. In a review of the arguments related to its strengths and limitations

(Romanowski, 2001), homeschooling was seen as a way to better respond to children's emotional and educational needs. However, flexibility (e.g. in schedules and between asynchronous and synchronous teaching and learning) and personalized online education require careful planning and strategy development. As already stated, the sudden onset of the COVID-19 situation did not leave a lot of time for educational organizations or educators to develop such strategies.

Third, at best, online education can offer *high-quality instruction* (Barbour & Reeves, 2009). In a meta-analysis of the effects of distance education on K-12 student outcomes (Cavanaugh, Gillan, Kromrey, Hess, & Blomeyer, 2004), differences between distance and classroom learning were not identified, but this was seen as related to good teacher preparation in distance education. In a mixed-method study on K-12 students' perceptions of support provided by online teachers or facilitators (Borup, Chambers, & Stimson, 2019), teachers and facilitators were found to, for example, successfully motivate and advise students, provide instruction, and orient them in online learning procedures and expectations. Skilful educators with experience of online education have surely also been able to provide quality instruction during the COVID-19 crisis. Furthermore, when interacting more closely with their children, parents may be able to better support them academically and help them reach their potential (see Romanowski, 2001). Fourth, even independently from the offer of high-quality educational opportunities, for autonomous, self-directed, and motivated learners with good time management, literacy, and technology skills, online education may even lead to *improvements in learning outcomes and skills* (see Barbour & Reeves, 2009; Cavanaugh et al., 2004). During the COVID-19 crisis, this may have been the case due to, for instance, having fewer distractions in a home environment than in a classroom.

Fifth, *the benefits of using ICT* have also been connected to online education. The use of remote learning tools can, for instance, expand educational access (Barbour & Reeves, 2009; Morpeth et al., 2009). In a survey study investigating factors impacting the use of technology in a homeschool environment (Neil, Bonner, & Bonner, 2014), the use of ICT and the Internet was seen to provide access to a wide variety of learning materials and resources. Furthermore, in a commentary article on the factors promoting or slowing the spread of virtual schools (Russel & Holkner, 2000), synchronous and asynchronous multimedia and online tools that can be used any place at any time were seen as a great opportunity for online education. In addition, as the sixth opportunity type, and also related to the use of ICT and the Internet, online education can provide opportunities for *online collaboration and social networking with peers* (Neil, Bonner, & Bonner, 2014). In online education, educators may facilitate interactions and caring relationships in a group, and many possibilities for online interaction and participation can be provided (Borup, Chambers, & Stimson, 2019). Furthermore, a survey study examining technology adoption in higher education (Jacobsen, 1999) suggested that support networks can be created between tech-savvy teachers and their peers. Likewise, multiple ICT and online resources and tools for collaboration, interaction, and participation have served online education during the COVID-19 crisis.

Seventh, in online education it is also possible to *provide support for learners' emotional (Romanowski, 2001), mental, and physical health*. In a commentary article on mitigating the effects of home confinement on children during the COVID-19 crisis in China, Wang, Zhang, Zhao, Zhang, and Jiang (2020) recommended including educational activities related to, for example, physical exercise, sleep, and breaks to online education. They also recommended collaboration between parents, psychologists, or social workers in supporting learners in matters related to health and wellbeing.

Eighth, in relation to achieving *higher administrative efficiency*, online education has been seen as a way to provide a wider range of courses, for example, or to require smaller physical spaces (Barbour & Reeves, 2009). Online education can also be justified for economic reasons and savings (Russel & Holkner, 2000). In addition, other savings, such as in travel time and costs, have resulted from the use of online education during the COVID-19 pandemic. Ninth, in a research report discussing open and distance learning for basic education in South Asia, online education was identified as an important educational strategy for *ensuring education in exceptional circumstances*, such as when dealing with hard-to-reach children and children in conflict, disaster, and emergency situations (Morpeth, Creed, Cullen, Page, & Raynor, 2009). The report provided clear evidence that education can be provided via online methods despite the physical distance between people. Unfortunately, there has generally been a lack of emergency strategies for situations such as the COVID-19 crisis where the effect on education has been unprecedented. We argue that countries with less experience of emergency/crisis situations could strongly benefit from carefully studying the strategies developed in areas with experience of different conflicts and disasters, and in areas with hard-to-reach children due to other reasons, such as in rural areas that cover large distances.

Opportunities	Example(s)	Source(s)
Flexibility	<ul style="list-style-type: none"> - Teaching and learning schedules are more flexible on a daily basis and in the long term. - There is more geographical flexibility. 	Barbour & Reeves (2009); Carpenter & Gann (2016); Surry, Grubb, Ensminger, & Ouimette (2009)
Individualization/ personalization	<ul style="list-style-type: none"> - Learners' skills, pace, specific needs, preferences, and personalities can be better taken into account in teaching. - Parents may be able to support their children's unique educational and emotional needs. 	Barbour & Reeves (2009); Fairbairn (2013); Marsh, Carr-Chellman, & Sockman (2009); Romanowski (2001)
High-quality instruction	<ul style="list-style-type: none"> - There is at least the same efficiency as in a classroom situation. - Educators can motivate, advise, provide instruction, and orient learners. - Parents may be able to support their children academically to reach their potential. 	Barbour & Reeves (2009); Borup, Chambers, & Stimson (2019); Cavanaugh et al. (2004); Romanowski (2001)
Improved learning outcomes and skills	<ul style="list-style-type: none"> - For autonomous, self-directed, and motivated learners with good literacy, technology, and time-management skills, online education may improve student outcomes and skills. 	Barbour & Reeves (2009); Cavanaugh et al. (2004)
Benefits of using ICT	<ul style="list-style-type: none"> - The use of remote learning tools expands educational access. - There is access to a wide variety of learning materials, resources, and tools. 	Barbour & Reeves (2009); Morpeth, Creed, Cullen, Page, & Raynor (2009); Neil, Bonner, & Bonner (2014); Russel & Holkner (2000)
Online collaboration and social networking with peers	<ul style="list-style-type: none"> - Online collaboration and networking can be fostered. - Educators may facilitate interactions and caring relationships in a group. - There are possibilities for online interaction and participation. - Support networks can be created between tech-savvy teachers and their peers. 	Borup, Chambers, & Stimson (2019); Jacobsen (1999); Neil, Bonner, & Bonner (2014)
Providing support for learners' mental and physical health	<ul style="list-style-type: none"> - It is possible to include activities related to physical exercise, sleep, and breaks. - Parents, psychologists, or social workers can support learners in matters related to health and wellbeing. 	Romanowski (2001); Wang et al. (2020)
Higher administrative efficiency	<ul style="list-style-type: none"> - A wider range of courses can be provided due to the scalability of online learning. - There is less need for large physical spaces. - It may be more economical than traditional education. 	Barbour & Reeves (2009); Russel & Holkner (2000)
Ensuring education in exceptional circumstances	<ul style="list-style-type: none"> - Education can be provided via online methods despite the physical distance between people. - Online education is an important educational strategy for hard-to-reach children and in conflict and emergency situations. 	Morpeth, Creed, Cullen, Page, & Raynor (2009)

Table 1: Opportunities in Online Education

As the first type of challenge in online education (see Table 2), in a literature review on barriers and enablers in the adoption and diffusion of e-learning (Singh & Hardaker, 2013), e-learning was seen to *require a change in teaching methods*, something that may lead to a fear of losing control over one's teaching. It may be hard to identify an appropriate pedagogy for online education (Russel & Holkner, 2000). In the COVID-19 situation, this change was extremely sudden, and thus required teachers to adapt very quickly. Second, the *changing roles of teachers and parents* in online education cause challenges. In online education, parents have more responsibility for their children's learning when they are at home instead of being monitored at school by teachers (Russel & Holkner, 2000; see also Fairbairn, 2013). Parents are also often expected to motivate and monitor their children and communicate with educators (Borup, Chambers, & Stimson, 2019). The lack of teachers' physical presence and confusion regarding parents' roles in online education during the COVID-19 crisis are also evident.

Third, while online education is particularly suitable for autonomous and self-directed learners (see Table 1), for younger learners and learners with difficulties in, for example, time management and self-discipline, it may result in additional *difficulties in learning* (Barbour & Reeves, 2009; Romanowski, 2001). Factors such as poor engagement, a lack of self-discipline, and low self-efficacy were identified as barriers in a literature review of the enablers and barriers affecting e-learning in adult education in the field of health sciences (Regmi & Jones, 2020). Evidently, there have also been many individuals with additional learning difficulties during the COVID-19 crisis.

Fourth, *teachers' negative attitudes towards technology* and educators opposing the use of technology (Singh & Hardaker, 2013; Surry, Grubb, Ensminger, & Ouimette, 2009) create challenges. Similar findings were identified in a literature review on barriers and motivators in faculty participation in online distance education (Maguire, 2005), which found barriers such as resistance to change and being intimidated by technology. Fifth, amongst the most-cited challenges in online education is *the lack of ICT competency and support*, entailing, for example, a lack of training, a lack of organizational or technical support or strategies, inexperience with online education, and inadequate online teaching or learning skills (Maguire, 2005; Morpeth, Creed, Cullen, Page, & Raynor, 2009; Regmi & Jones, 2020; Russel & Holkner, 2000; Singh & Hardaker, 2013; Surry, Grubb, Ensminger, & Ouimette, 2009). For instance, in a study aiming at classifying barriers to e-learning and suggesting solutions (Assareh & Bidokht, 2011), teachers' lack of knowledge of online education was seen as one of the major barriers. Sixth, a *lack of up-to-date ICT infrastructure*, including poor Internet access or connections, may obstruct both teaching and learning in online education (Assareh & Bidokht, 2011; Surry, Grubb, Ensminger, & Ouimette, 2009; Regmi & Jones, 2020). In a qualitative study on online education in schools (Muirhead, 2000), teachers were found to be frustrated by technical problems. Likewise, in a survey study on barriers in online education (Lloyd, Byrne, & McCoy, 2012), technical problems were amongst the greatest drawbacks. Furthermore, the lack of availability of equipment can cause problems, and educational organizations may lack readiness to arrange distance education (Barbour & Reeves, 2009). In addition, suitable hardware or software may not be available for online education (Assareh & Bidokht, 2011). Negative attitudes towards technology, a lack of ICT competency and support, and problems with ICT have also likely affected online education during the COVID-19 crisis.

Seventh, while at best online education supports collaboration and social networking (see Table 1), many studies (Assareh & Bidokht, 2011; Fairbairn, 2013; Muirhead, 2000; Russell & Holkner, 2000; Romanowski, 2001; Surry, Grubb, Ensminger, & Ouimette, 2009; Wang et al., 2020) suggest that distance learning may lead to a *lack of social contact* and the isolation of children when they do not have opportunities to meet their peers in person at school, and in the long term this may also decrease children's social skills. Furthermore, the lack of teachers' personal relationships with learners has been identified (Assareh & Bidokht, 2011; Lloyd, Byrne, & McCoy, 2012) as a potential problem. These challenges have also evidently required attention during online education due to the COVID-19 crisis. Eighth, *negative effects on learners' physical and mental health* have been identified. According to Wang and colleagues (2020), home confinement during the COVID-19 crisis was likely to make it more difficult for children to maintain a healthy lifestyle and a daily rhythm. They may, for instance, have lacked physical activity, had more screen time, irregular sleep patterns, less favourable diets, fears, frustration, boredom, or lacked personal space (ibid.). Online education during home confinement has been particularly hard for learners with difficult family backgrounds and a lack of caring social networks.

Ninth, the *increased workload* for both teachers and learners and a *need for additional resources* or compensation have been identified as a challenge in various studies (Lloyd, Byrne, & McCoy, 2012; Maguire, 2005; Muirhead, 2000; Surry, Grubb, Ensminger, & Ouimette, 2009; Regmi & Jones, 2020). For instance, preparing an online course is seen to require approximately triple the time needed for a traditional course (Singh

& Hardaker, 2013). Increased workload has undoubtedly also been common in teaching and learning during the COVID-19 crisis.

Challenges	Example(s)	Source(s)
Requiring a change in teaching methods	<ul style="list-style-type: none"> - Many traditional teaching methods do not work in online education. - Educators may fear losing control over their teaching. 	Singh & Hardaker (2013); Russel & Holkner (2000)
Changing roles of teachers and parents	<ul style="list-style-type: none"> - The teacher is no longer physically present in the pupils' learning. - Parents have more responsibility for their children's learning when they are at home instead of being monitored at school by teachers. 	Borup, Chambers, & Stimson (2019); Fairbairn (2013); Russel & Holkner (2000)
Difficulties in learning	<ul style="list-style-type: none"> - Distance education complicates learning due to challenges such as problems with time management. - It requires skills such as self-directedness and self-discipline, which are demanding for younger learners in particular. 	Barbour & Reeves (2009); Regmi & Jones (2020); Romanowski (2001)
Teachers' negative attitudes towards technology	<ul style="list-style-type: none"> - Some educators oppose the use of technology and are resistant to change. 	Singh & Hardaker (2013); Maguire (2005); Surry, Grubb, Ensminger, & Ouimette (2009)
Lack of ICT competency and support	<ul style="list-style-type: none"> - A lack of training/knowledge, of organizational or technical support or strategy, inexperience with online education, and inadequate teaching or learning skills obstructs online education. 	Assareh & Bidokht (2011); Maguire (2005); Morpeth, Creed, Cullen, Page, & Raynor (2009); Regmi & Jones (2020); Russel & Holkner (2000); Singh & Hardaker (2013); Surry, Grubb, Ensminger, & Ouimette (2009)
Lack of up-to-date ICT infrastructure	<ul style="list-style-type: none"> - There may be poor Internet access or technology may not be functioning as expected. - The lack of proper hardware and software can cause problems. - Schools may lack readiness to arrange online education. 	Assareh & Bidokht (2011); Barbour & Reeves (2009); Lloyd, Byrne, & McCoy (2012); Muirhead (2000); Surry, Grubb, Ensminger, & Ouimette (2009); Regmi & Jones (2020)
Lack of social contact	<ul style="list-style-type: none"> - Online education may lead to the isolation of children when they lack the opportunity to meet their peers in person at school. - Possibility of a decrease in children's social skills. - Teachers may lack personal relationships with students. 	Assareh & Bidokht (2011); Fairbairn (2013); Lloyd, Byrne, & McCoy (2012); Muirhead (2000); Russell & Holkner (2000); Romanowski (2001); Surry, Grubb, Ensminger, & Ouimette (2009); Wang et al. (2020)
Negative effects on learners' physical and mental health	<ul style="list-style-type: none"> - Online education can make it more difficult for children to maintain a healthy lifestyle and a daily rhythm. 	Wang et al. (2020)

Increased workload and need for additional resources	<ul style="list-style-type: none"> - There is an increased workload and time commitment for both students and teachers. - There is inadequate compensation for online teaching. - There is a need for additional financial resources. 	Lloyd, Byrne, & McCoy (2012); Maguire (2005); Muirhead (2000); Singh & Hardaker (2013); Surry, Grubb, Ensminger, & Ouimette (2009); Regmi & Jones (2020)
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Table 2: Challenges in Online Education

Concluding Words

In the sudden change from traditional to online education, the lack of policies and proper planning for online education in emergency situations (see Morpeth, Creed, Cullen, Page, & Raynor, 2009) became more evident than ever. The COVID-19 crisis showed that situations like this provide both opportunities and challenges for online education. This literature review identified that (1) increased flexibility, (2) possibilities for personalization, (3) high-quality instruction, (4) improved learning outcomes and skills, (5) benefits of using ICT, (6) online collaboration and networking with peers, (7) providing support for learners' mental and physical health, (8) higher administrative efficiency, and (9) ensuring education in exceptional circumstances are opportunities in online learning that can be converted into educational benefits.

The challenges that need to be overcome, as identified in the literature review, related to (1) changes required in teaching methods, (2) changing roles of teachers and parents, (3) difficulties in learning, (4) teachers' negative attitudes towards technology, (5) lack of ICT competency and support, (6) lack of up-to-date ICT infrastructure, (7) lack of social contact, (8) negative effect on learners' physical and mental health, and (9) increased workload and a need for additional resources. It can be noted that challenges or barriers can exist at multiple levels of the educational institution, and addressing them may require organizational change. We argue, however, that sometimes even a change at the individual level (e.g. teachers' attitudes) may be enough to enable the wider use of online education possibilities. Nevertheless, as individuals and organizations are different, it should be noted that the shift from traditional to online education is rarely straightforward. Thus, it is important to maintain cooperation between relevant stakeholders to ensure that online educational activities are designed to address the needs of the specific educational institution in question.

We hope that this literature review will support the actions to be taken in developing strategies for online education both in emergency situations and in general. Some of the questions that should be considered in such an online education strategy are: How can we create teaching activities that do not require tremendous efforts from parents, as parents should also have time to focus on (distance) work? How can we support the parents of children with special education needs in particular? How can we support teachers' and learners' ICT competencies, learners' self-directedness, and teachers' online teaching skills both before the emergency situation and during the situation? How can we foster good communication between different stakeholders in a crisis situation?

This study, identifying opportunities and challenges related to online education during the COVID-19 crisis, serves as a basis for empirical studies analyzing both qualitative and quantitative data collected during and after school closures against the backdrop of the themes that arose in the literature review. In future, there is also a need for more studies focusing specifically on different educational levels and on the viewpoints of different educational stakeholders (educators, learners, parents, etc.).

From the perspective of the 'Learning Technology Accelerator' project, the results of this research are expected to make a practical contribution to the procurement of learning technologies to aid municipalities and schools to prepare for both future emergency situations and more flexible online education. Another interesting and related perspective worth studying is how educational technology (edtech) providers have managed to deal with the sudden increases in their user volumes, which may be jeopardizing the steady and smooth functioning of their service or product. In addition, what remains interesting to see is how these strong fluctuations in edtech demand will affect the edtech providers, especially after the crisis. Will the edtech sector continue to expand rapidly? Will the rapid growth be followed by a rapid drop in demand as education institutions migrate back to traditional education? Or will educational organizations succeed in converting the identified opportunities of online education into benefits, find ways to overcome the challenges, and create solid strategies for the use of online education not only in crisis situations but also in their everyday praxis?

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