

## CAN E-LEARNING BE A SOLUTION FOR EGYPTIAN HIGHER EDUCATION IN THE TIMES OF COVID-19? A LOOK AT TECHNOLOGICAL CAPACITIES AND DIGITAL SKILLS

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### Abstract

This paper investigates whether e-learning is a viable solution for higher education in Egypt under the circumstances of the COVID-19 pandemic and policy responses to it. The analysis uses rich cross-sectional data from the 2018 wave of the Egypt Labor Market Panel Survey Body to assess what prerequisites for e-learning students and teachers meet in terms of technological capacities and digital skills. Overall, the paper confirms that Egyptian higher education largely meets those prerequisites. Over 90% of students have access to the internet, although not necessarily rapid or affordable access, and most students access the internet through mobile devices. Widespread computer and internet use, including using the latter for education purposes, suggest that students' digital skills are generally well-developed. However, students' technological capacities and digital skills reflect important divides along gender, socioeconomic background, and location. Finally, higher education teachers appear to be largely well-prepared as well, as most have access to digital devices and computers and three quarters of teachers already use the internet for their work. Based on these findings and a review of the regional literature, a set of policy recommendations for policy makers concludes.

### Introduction

On March 12<sup>th</sup>, 2020, in the heart of Cairo, the City International School in Zamalek was closed by authorities after fears that students had been infected with SARS-CoV-2. Two days later, a presidential decision suspended schools and universities (Tayea, 2020) and the Supreme Council of Universities cancelled midterm exams at all universities and delayed final exams until after at least May 30<sup>th</sup>, 2020. As a result, higher education in Egypt has been forced to move comprehensively and abruptly to distance education formats, a change that mirrors the global reaction of higher education institutions to the disruptions caused by COVID-19 and governments' attempts to contain the pandemic. In doing so, higher education in Egypt can build upon the surge of e-learning initiatives witnessed

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throughout the 2010s, including the emergence of Massive Open Online Course (MOOC) platforms. However, while e-learning – defined herein as a type of distance learning that uses the internet and electronic devices to support remote interaction among students and teachers for learning purpose – can certainly broaden access to education, its implementation and impact have been fraught with challenges and shown to be highly contiguous on the presence of certain prerequisites and success factors (McPherson & Bacow, 2015), especially in developing countries such as Egypt.

Despite an abundance of case studies on the use of e-learning in Egyptian higher education, a nation-wide assessment of key prerequisites and success factors of e-learning adoption has not yet been undertaken, even though a lack of ex ante assessments, especially concerning "institutions" technological capacity, has been identified as one of the main reasons for failed adoptions of e-learning (Al-araibi, bin Mahrin, Yusoff, & Chuprat, 2019; Ali, 2018); performing this assessment regarding technological capacities and digital skills is the key contribution of this paper. The remainder of this paper is structured as follows: following this introduction, Section 2 reviews the literature on key success factors for e-learning adoption with a focus on the Egyptian context, with an emphasis on technological capacity, digital skills, e-learning system, organisational support and culture. Section 3 presents the data used in the analysis, which is taken from the 2018 wave of the Egypt Labor Market Panel Survey (ELMPS), while Section 4 presents the results of the analysis. Section 5 concludes with a summary of the main findings and caveats, discusses their policy implications, and highlights avenues for further research.

### Background

A vast literature has studied the determinants of e-learning readiness and adoption. Since such determinants may be specific to certain regions, this review limits itself to the literature on e-learning in higher education in developing and emerging countries, with a strong focus on the Middle East and North Africa (MENA) and Egypt. A cornerstone of the literature is the perspective that both individual factors (e.g. the characteristics of learners and instructors as well as their extrinsic motivation) and institutional factors (e.g. institution and service quality) along with the characteristics of the e-learning system itself, matter for e-readiness in general and e-learning readiness in developing countries in particular (Dada, 2006; Bhuasiri, Xaymoungkhoun, Zo, Rho, & Ciganek, 2012; Barclay, Donalds, & Osei-Bryson, 2018). In keeping with this perspective, the review groups the discussion of success factors into five parts: (a) technological capacity, (b) digital skills, (c) e-learning system (esp. ease of use), (d) organisational support and (e) culture.

### Technological Capacity

At its basis, e-learning requires learners and teachers to have access to internet-capable devices, the internet and complementary software. More broadly, the technological aspects of e-learning readiness include software, hardware, connectivity, security, system flexibility, technical skills and support, and the availability of a data centre (Al-araibi, bin Mahrin, Yusoff, & Chuprat, 2019). Such technological capacity is a key bottleneck in developing and emerging countries, with e.g. 87% of the Jordanian students surveyed in Al-adwan and Smedley (2012) who "did not have access to a reliable computer [...] in good working order that did not normally crash and had all necessary software installed". To the extent that the unequal distribution of such technological capacities reflects underlying socioeconomic inequalities, these digital divides exacerbate educational inequality as learners in the Arab world's small towns and rural areas struggle to access e-learning offers (Adham & Lundqvist, 2015), while well-educated and digitally literate learners are wellplaced to take advantage and benefit most from e-learning opportunities. With access to mobile phones in developing countries steadily growing, interest in mobile learning (M-Learning) and the use of social media for learning and teaching has risen in the last years, although proper adoption of M-Learning in the Middle East will require more awareness, training and motivation (Khan, Al-Shihi, Abdullah, & Sarrab, 2015). Nevertheless, it has the potential to offer easier access to education for learners without access to the infrastructure needed for online education and is well accepted among students (El-Sherbiny Attalla, El-Sherbiny, Mokbel, & El-Moursy, 2012). Through approaches such as bring-your-own-device (BYOD) or mobile learning programs, though with challenges of their own, can be implemented at "low cost and high speed" (UNESCO, 2012; p.22). The use of social media for learning purposes goes hand in hand with M-Learning adoption. Sobaih, Mohamed, and Ghandforoush (2016), for example, showed that though underutilised among teachers, social media (e.g. Facebook, WhatsApp) can have a high added value for academic purposes in Egypt. Nonetheless, traditional technologies such as printed material, radio, television and instant messaging can still be effectively used for education in those (rural) areas where the lack of ICT infrastructure remains a key constraint (Gulati, 2008; World Bank, 2020). Finally, reliable and affordable access to electricity often remains an impediment to e-learning in many developing countries, albeit not in Egyptian higher education.

### Digital skills

As teachers and learners are key e-learning users (Kim & Park, 2017), their ability to use digital devices and the internet effectively – their digital skills – makes them more likely to accept e-learning. This is underlined in Abbad's (2009) observation of prior digital experiences, such as frequency of internet use, as a success factor for the adoption of e-

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learning by Jordanian students. Concurringly, Al-Adwan, Al-Adwan, and Smedley (2013) highlight a lack of ICT skills and confidence in technology use as significant barriers to elearning adoption in Jordan, whereas Kanwal and Rehman (2017) highlight a positive influence of computer self-efficacy and internet experience on Pakistani students' perceptions of e-learning's ease of use (see further below). As for teachers, Ahmed (2013), for instance, finds that their intention to participate in e-learning systems increases with their experience with computers and the internet and their perceptions of the possibility to test e-learning prior to implementation. More elaborately, using data from the private Egyptian university, El Afly, Gómez, and Ivanov (2017) find that teachers' technological readiness has a direct negative effect on their intentions to adopt e-learning, perhaps because they anticipate implementation challenges, but increases them by generating more positive attitudes towards e-learning technology. The lack of awareness of the fundamentals of e-learning is another obstacle mentioned in the literature, with e.g. El-Gamal (2014; p.199) attributing Egypt's slow adoption of e-learning in spite of technological readiness to a lack of knowledge about e-learning. This leads to it being perceived as "only limited to providing more educational opportunities to a limited sector of students in non-practical fields". This lack of awareness is also one of the biggest challenges in the use of MOOCs in the Arab world (Adham & Lundqvist, 2015). More generally, Bhuasiri et al. (2012) emphasises raising technology awareness as important for successfully implementing e-learning solutions in developing countries. Importantly, teachers' and learners' e-learning adoption is affected differently by personal factors in the use of ICT (Kim & Park, 2017), as teachers' previous computer experience and ICT innovativeness have a stronger effect on computer self-efficacy and technology use. This could be explained by the fact that students are generally better prepared to benefit from e-learning initiatives through their relatively higher exposure to ICT whereas teachers require more technical support, e.g. to digitalise learning materials (Shraim & Khlaif, 2010).

### **E-learning System**

Independent of the technological capacities and digital skills of its users, the characteristics of the e-learning system have a strong influence on its adoption. Particularly important among these characteristics is how easy it is for both learners and teachers to use the e-learning system (Abdel-Wahab, 2008). For example, ease of use is fostered by making e-learning systems in general and e-learning interfaces in particular informative, interactive and/or simple, especially for inexperienced users. Integrating e-learning systems with different multimedia may further foster the perception of ease of use by increasing users' enjoyment. This also applies to various features the e-learning system might offer; e.g. in El-Seoud et al. (2014), students in Egypt highlight their interest in using e-learning to be

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able to give and receive feedback on activities, to vote on priority topics, and to share research papers and other files. However, achieving satisfactory levels of the ease of use of e-learning systems is particularly challenging in developing countries where access to information and communication technologies (ICT), especially for disadvantaged groups and people in remote areas, remains an issue, as good quality devices and high-speed internet are needed to exploit e-learning's potential fully. Although scarcely mentioned in the literature, the content and relevance of e-learning can also be assumed to play a key role in whether e-learning is adopted.

### Organisational support

While adopting e-learning, teachers and learners may benefit strongly from dedicated organisational support. Such organisational support may e.g. target technical bottlenecks through tech support, raise the use of e-learning among teachers through instructional support or improve students' perceptions of ease of use and usefulness through offers of computing support and training (Lee, 2008; Zheng, Wang, Doll, Deng, & Williams, 2018), with e.g. Kanwal and Rehman (2017) suggesting to make computer training a prerequisite for graduate programmes in Pakistan. Computer training is also essential for teachers, for instance, Sadik (2007) finds that the majority of teachers from a wide range of faculties at South Valley University in Egypt considered themselves to have "limited competence and little experience in e-learning", although "they perceived e-learning [...] to have the potential to support their teaching-related activities". Organisational support is also essential for teachers how to use ICT to develop content or transform existing content for the use in e-learning formats, which teachers otherwise need to invest additional time and effort into in addition to their regular workload (Al-adwan & Smedley, 2012; Farid et al., 2015), which can disincentives them from engaging in e-learning.

### Culture

A growing body of research studies the cultural aspects of technology acceptance e.g. Strite and Karahanna (2006), and specifically e-learning acceptance within the Arab culture. Therein, key aspects include the consideration of local cultural values when introducing new technology, which may require a more locally participative approach to e-learning, e.g. in terms of co-creating the content and technological format of MOOCs (Bali & Aboulmagd, 2020). Moreover, students' motivation and behavioural intentions towards the use of e-learning are related to the cultural factor, with Arab learners accustomed to a teacher-centric education process struggling with self-directed and unsupervised learning (Al-adwan & Smedley, 2012; Adel, 2017; Weber & Hamlaoui, 2018). Furthermore, students in Arab cultures are highly sensitive to the influence of their peers and teachers or other social structures (see e.g. El-Masri and Tarhini (2017) for evidence from Qatar), which

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implies that raising the general acceptance of e-learning in students' social environment may be highly effective, e.g. by mandating the use of e-learning systems and/or convincing early adopters through e.g. social media about the advantages of e-learning (El-Masri & Tarhini, 2017; Tarhini, Hone, Liu, & Tarhini, 2017).

### Data

This paper uses the 2018 wave of the Egypt Labor Market Panel Survey (ELMPS), a comprehensive longitudinal and nationally representative panel survey (Krafft, Assaad, & Wahedur Rahman, 2019), which covers 61,231 individuals from 15,746 households from all governorates except North and South Sinai, New Valley, Red Sea and Matrouh. Data were collected mainly from late April till November 2018. Analytical sampling weights provided as part of the ELMPS are used to make the results representative at the national level. The data analysis uses data from two nationally representative samples: (a) a sample of 1,131 persons currently studying in higher education (college or university) in 2018 and (b) a sample of 42 persons teaching in higher education in 2018. Descriptive statistics for these samples can be found in panels A and B of Table 1. In terms of residence, nearly 46% of students live in the Delta, followed by 25% living in Upper Egypt, 18% in Greater Cairo, and 11% in Alexandria and the Suez Canal region. We identify persons working in education through their occupation group, which follows a modified version of the International Standard Classification of Occupations (ISCO), and we focus on teachers in higher education. Unfortunately, the ELMPS does not permit to identify professionals, e.g. research professors, teaching at university if doing so is not their main activity or they belong to special types of education (e.g. musical education). Using this restrictive approach, we obtain a sample of 42 observations. Finally, the ELMPS 2018 has extensive information on access and use of ICT, including on (home-based, personal) ownership of ICT devices, internet access and (purpose of) use as well as computer skills as job requirements, which are marshalled to proxy individuals' digitals skills.

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	Panel A: Higher education students			Panel B: Higher education teachers		
	Mean	Median	Min / Max	Mean	Median	Min / Max
Female (%)	48.84	-	-	47.36	-	-
Age	21.85	21	18 / 98	44.12	39	25 / 73
Rural (%)	46.90	-	-	54.73	-	-
Observations		1,131			42	

Table 1:Sample characteristics of higher education students and teachers

Source: Own calculations based on ELMPS 2018.

### Analysis

As highlighted in Section 2, a key prerequisite of e-learning are students' and teachers' technological capacities. Starting with students, key statistics are presented in Figure 1.

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Overall, while only a quarter of students own a computer or tablet and another quarter could access one at home (which may be used by others), at least 80% own a mobile phone capable of connecting to the internet. Only 9% do not have home-based or personal access to a computer, tablet, smartphone, or internet-capable mobile phone. At home, only 37% of students have access to rapid DSL internet, which is generally a prerequisite for flat-rate internet access, although an additional 37% use the internet through data plans on their mobile phones. For 85% of higher education students, home is the place where they use the internet most frequently, therefore the quality of home-based internet access is important, especially if other pathways of access – e.g. at work or at friends' places – become restricted due to lockdowns.



Figure 1. Share of higher education students by technological capacity and digital skills (Source: Own calculations based on ELMPS2018)

However, while students' technological capacities are a necessary condition for most types of e-learning, they may not be a sufficient one, as digital skills are a clear predictor of successful e-learning adoption (see Section 2). Taking the perspective that internet skills are experientially acquired through internet use, it is worth highlighting that 82% of students were using the internet through their mobile phones or computers. However, only a third of students had used the internet through a computer or tablet in the month prior to the interview, thus again pointing to the dominance of mobile internet. Positively, already 69% of students using the internet list education or their studies among the top three purposes for their internet use, with 56% highlighting education as the main reason; besides education, access to news and information as well as socializing and communicating with friends are also highlighted as key purposes of internet use.

There are significant gender differences in technological capacities among students. First, while 84% of male students own a mobile phone and use it to access the internet and 28% own a computer or tablet, only 77% and 21%, respectively, of female students do. By contrast, 74% of female students highlight education as one of their top reasons for internet use, compared to only 65% of male students. Important differences in access to e-learning also exist depending on students' household wealth score: whereas 97% of students belonging to the top quintile of wealthiest households have home-based or mobile access to the internet, that share drops to slightly more than 50% for students from the bottom

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quintile. Similarly, as shown in Figure 2, the share of students with internet access varies strongly across governorates, being particularly low in Sharqia, Suez, and especially Aswan governorates. It also displays a clear rural-urban divide, with the share of urban students with internet access about 10 percentage points higher than that of students living in rural regions.



Figure 2. Share of higher education students with internet access by governorate (Source: Own calculations based on ELMPS2018)

Turning to higher education teachers, only 13% of them do not own a computer or tablet or could access one at home, which suggests that the vast majority of personnel doesn't have to rely on access to devices at higher education institutions in case of lockdowns. In line with the view that higher education personnel is experienced in using computers and the internet, nearly 90% indicate that they use a computer connected to the internet at work, while 87% confirm that computer skills are part of their job requirements. However, it is not clear how comfortable teachers are in terms of using the internet, as 43% hadn't used the internet on a computer or tablet in the month prior to the interview, which suggests that – as with students – teachers tend to rather use the internet through their mobile phones. Through whatever means that access may take place, among those using the internet, 87% of teachers list using the internet for work among the top 3 purposes for its use, including 74% who use it primarily for work. Finally, only one person in the teacher sample mentioned a computer course as the main training programme for their job.

### **Conclusion & Recommendations**

Considering the Egyptian government's efforts to use e-learning as a substitute for presence-based education during the COVID-19 pandemic, this paper studies the preconditions for successful e-learning in higher education in Egypt. Overall, the paper

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confirms that Egyptian higher education largely meets key pre-conditions for e-learning in terms of technological capacity and digital skills. Over 90% of students have access to the internet, although affordable access to rapid internet remains an issue, as most students access the internet through mobile devices. Widespread computer and internet use, including with a strong focus on internet use for education purposes, suggest that students' digital skills are generally well-developed. However, students' technological capacities and digital skills reflect important divides along gender, socioeconomic background, and location. Finally, higher education teachers appear to be largely well-prepared, as most have access to digital devices and computers and three quarters of teachers already use the internet for their work.

Several caveats need to be mentioned. First, the data used in this study are from 2018 and thus neglect the substantial efforts undertaken by the Egyptian government in 2019 and early 2020 to improve the state of ICT and the use of technology in higher education. Second, because it does not have data from North or South Sinai, Matrouh, Red Sea and New Valley governorates, the ELMPS falls short of covering the whole of Egypt, although the ELMPS nonetheless provides representative results for over 98% of the Egyptian population since those governorates are among the least-populated. Third, this study makes claims about the viability of e-learning based on technological capacities and digital skills as key prerequisites. However, it does not directly observe e-learning outcomes nor address alternative success factors, e.g. organizational support or culture, since such data is not available in the ELMPS 2018.

These caveats notwithstanding, the analysis points to several important policy implications. First, although M-Learning is still in its infancy in Egypt, it is worthwhile looking into M-Learning solutions considering that they are well-accepted among students, require relatively low technical capacities, and that nearly all students and teachers own mobile phones and use them to access the internet relative to other devices. Second, linking social media with e-learning solutions could play an important role in fostering learning since (a) students already use the internet to socialize, (b) social media tend to have particularly user-friendly interfaces that make them especially easy to use for inexperienced users, (c) can increase the acceptance of thusly augmented e-learning solutions through social media's entertainment and socializing functions, (d) generally don't require additional introduction or training. However, care needs to be taken to avoid social media from distracting students and reducing their engagement in e-learning. Third, given that students tend to use the internet for entertainment and socializing purposes, functions like instant messaging, topical voting options, pop quizzes, feedback functions, etc. should be integrated in mobile and e-learning design in order to increase students' acceptance, especially since many students don't have access to internet flat-rates. Fourth,

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promoting interactivity as part of mobile learning, especially in connection with social media, may also increase students' acceptance through peer effects, a point likely to be particularly salient in the cultural context of MENA. Fifth, it is essential for institutions to provide instructional support and computer courses to teachers, be it online (through professional development offers or online technical support) or offline (e.g. as a hotline). Moreover, teachers must be incentivized to invest sufficient time and effort in designing elearning solutions (e.g. in terms of financial rewards or career development). Sixth, considering the digital divides highlighted in the analysis, the government should ensure that marginalized students can participate in elearning, e.g. by improving internet access in Aswan, Sharqia and Suez, providing students from poor households with internet vouchers or by offering female students without internet-compatible devices opportunities to purchase devices at subsidized prices. Finally, it is important to bear in mind that the policy recommendations are attuned and specific to the COVID-19 pandemic and may not be generalizable to other situations without further analysis.

E-learning in Egyptian higher education presents several extensions for further research. First, while e-learning is most prominent in higher education, it would be of interest to expand the analysis of this paper to other sectors of education. Second, process and impact evaluations of the e-learning initiatives undertaken in Egypt in response to the COVID-19 pandemic would be of interest in order to better understand what challenges and bottlenecks were faced and how the policy measures impacted students' education and labour market outcomes, a vital aspect in informing Egypt's response in case of future epidemics. Third, specifically regarding the integration of social media approaches, further research and especially data from learners is needed before reaching more general conclusions.

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