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CONCEPT NOTE

Online Examinations in Emergency Contexts

Are Proctoring and Other Technologies Feasible in Syria to Facilitate Inclusive School Exams for All?

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ABBREVIATIONS AND ACRONYMS

AP	Advanced Placement
CAA	Computer-Assisted Assessment
CBA	Computer-Based Assessment
C4D	Communication for Development
ERC	Emirates Red Crescent
ERT	Emergency Remote Teaching
GoS	Government of Syria
GRE	Graduate Records Examination
IB	International Baccalaureate
MBRGI	Mohammed bin Rashid Al Maktoum Global Initiatives
MoE	Ministry of Education
OER	Open Educational Resources
PIRLS	Progress in International Reading Literacy Study
PISA	Programme for International Student Assessment
SAAT	Standard Achievement Admission Test
TOEFL	Test of English as a Foreign Language
ToT	Training of Trainers
TVET	Technical and Vocational Education and Training
TIMSS	Trends in International Mathematics and Science Study
UBC	University of British Columbia
UCLES	University of Cambridge Local Examinations Syndicate
WASSCE	West African Senior School Certificate Examination

EXECUTIVE SUMMARY

Natural and man-made disasters, and most recently the Covid-19 pandemic, have highlighted the role that remote and hybrid learning play in education delivery, as well as the need to reimagine the educational practices appropriate in emergency contexts.[1] While there has been a rise in online learning, digital assessments and e-proctoring platforms in high-income countries, questions remain as to the feasibility of online examinations in disaster-prone emergency situations.

In Syria, 11 years of conflict and economic shocks, as well as a fracturing of administrative control of education services across the country, have hindered the access of students wishing to participate in the Syrian national 9th Grade and 12th Grade exams. These challenges pose the question of whether online examinations could be an option that facilitates access to exams for more students in an emergency context such as Syria's. At the same time, any attempt to explore the feasibility of online examinations in Syria must consider how 11 years of conflict, poverty, and economic shocks have destroyed and battered basic infrastructure, power plants, and ICT infrastructure. Most Syrian families cannot afford ICT devices and have been deprived of opportunities to acquire digital literacy skills for more than a decade. Overall, the country has been unable to develop digital support systems for teachers and students. All these factors add layers of complexity to implementing online high-stakes examinations.

The purpose of this document is to serve as a guide that education practitioners working in emergency contexts can use to assess the feasibility of implementing online examinations and using proctoring technologies. The Syrian crisis will be referenced as an example case in order to illustrate opportunities despite significant constraints and dilemmas. After a review of relevant definitions and context (Section 2), the document provides a summary of the opportunities, risks, and constraints associated with online examinations and proctoring (Section 3). The document also includes criteria which decision-makers can use to determine whether online high-stakes examinations are suitable for their context and the investments needed to warrant the results (Section 4).

The document concludes that the implementation of online high-stakes examinations in Syria and other emergency contexts will require significant investments in achieving the prerequisites needed for feasibility and credibility (Section 5). Prerequisites include electricity, internet, and devices, as well as the development of the digital skills necessary for students to participate in online exams and for teachers and administrators to facilitate online exams. Further efforts are needed to prevent leakage of information on exam questions and content, and promote cultural change around online examinations.

In the event that decision-makers choose to implement online high-stakes examinations (in Syria and other education emergency contexts), the document recommends the use of an iterative approach, where online examinations are first piloted with a subset of students and schools prior to scaling up nationally.

[1] Emergencies are defined by INEE Minimum Standards as 'a situation where a community has been disrupted and has yet to return to stability' (INEE, 2010). Categories of emergencies include: conflict settings, epidemics and natural disasters (Ashlee et al., 2020).

1. PURPOSE OF THIS DOCUMENT

This document was produced in response to a request from the UNICEF Syria team that was submitted to the EdTech Hub Helpdesk in January 2022. The UNICEF team requested support to assess the feasibility of implementing online examinations and proctoring technologies in emergency contexts, in order to provide guidance in the form of lessons learned and good practices for the Syrian context.

For the first phase of this request, EdTech Hub conducted a rapid scan of EdTech companies around the world focused on online examination technologies. The exercise compiled 18 companies that have partnered with Ministries of Education (MoEs) (for high-stakes examinations), universities (for online testing) and/or business companies (for staff assessments). A table of MoE partner companies and proctoring tools is provided in Annex A. For the second phase, EdTech Hub developed this document which delves further into the topic of online examinations in emergency contexts.


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2. OVERVIEW OF ONLINE EXAMINATIONS AND PROCTORING

2.1. DEFINITIONS LINKED TO ONLINE EXAMINATIONS

This section discusses definitions linked to online examinations, provides a short history of online examinations (comparing national examinations and other assessments), and finally offers definitions linked to proctoring technologies.

A **computer-based assessment** (CBA) can be defined as an assessment that is delivered and marked by a computer. **Online examinations** form a subset of CBAs and can be defined as "examinations administered via the internet" (Barkley, 2002). There are a number of ways to classify online examinations. Often, online examinations are categorised according to the modality of their implementation into home-based and lab-based, depending on the location where the online examination is administered. While **lab-based online examinations** require learners to be physically present in a designated centre where the test is administered, **home-based online examinations** can be taken in any location, provided that the learner taking the examination has a device to use (e.g., a laptop or a tablet) and that the examination location has access to the internet and to electricity. A number of high-stakes examinations also have home-based online versions. Examples include the Graduate Records Examination (GRE), the Advanced Placement (AP) exams, and the Test of English as a Foreign Language (TOEFL) exam (Luna-Bazaldua et al., 2020). Questions remain, however, as to the feasibility of administering home-based online examinations in emergency contexts.

Lab-based examinations allow learners to take a digital form of the examination while being proctored by an observer; sometimes proctors can also monitor each other to ensure that observers are not providing illegitimate assistance to learners. This is of special importance in the context of **high-stakes examinations**, or assessments which are statutory and/or whose results are important to both the authority administering the examination and the learners. Oftentimes, the outcomes of the high-stakes examination affect learners' progress to the next phase of their education or career.

Understandably, authorities have generally been interested, but at the same time also reluctant, to transform high-stakes examinations into digital form. Authorities are attracted by the opportunity to reach children who lack access to exam centres and by the possibility of digitally collecting exam data and managing exams. On the other hand, governments worry about viruses causing system interruptions, possible leakages of exam questions prior to the exams, and the fact that protection against hackers ultimately cannot be guaranteed. Governments may also be aware that infrastructure is not equally available, and that a lack of funds prevents the remedying of infrastructure gaps.

2.2. A SHORT HISTORY OF ONLINE EXAMINATIONS

Many have been hopeful that examinations can be automatised and made interactive, leading to savings in time and effort and to better engaging learners, since even before the development of the first computers in the 1970s. Yet despite the initial optimism, computer-based assessments remain underutilised, even in high-income countries not affected by disasters. The 2000s witnessed

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the development of a number of on-screen tests which use automated marking to evaluate learners' answers to standardised multiple-choice questions, as well as other e-assessment tools that use a wider range of question types and incorporate interactive media elements (Oldfield et al., 2012).

The Covid-19 pandemic has arguably provided the biggest impetus yet for moving examinations online. In response to the pandemic, a number of testing organisations began offering online versions of the examinations they administer (e.g., GRE, AP exams, and the TOEFL). Some states in the United States, most notably California, decided to move professional certification exams to an online format (Luna-Bazaldua et al., 2020). In Saudi Arabia, its high-stakes Standard Achievement Admission Test (SAAT) was moved from a paper-and-pencil format to online following school closures in 2020 (ETEC, 2020); "this move was possible due to investments made over previous decades in infrastructure and expertise for assessments, plus careful planning and communication for the new system and its roll-out" (Al-Qataee et al., 2020). While the discussion around online examinations, in response to the pandemic, focuses on the use of online examinations in emergency contexts, the discussion unquestionably takes high-income countries as its focus. The authors are not aware of examples of the use of online assessments in low- and middle-income, crisis-affected countries.

2.3. COMPARING NATIONAL EXAMINATIONS AND OTHER ASSESSMENTS

Currently, there are a number of global and national assessments that are already being offered or will be offered in a digital format:

- The **Programme for International Student Assessment (PISA)**, which is used at both the national and the international level to inform education policy decisions, is a two-hour computer-based exam for 15-year-olds which primarily consists of multiple-choice questions. Starting in 2015 for most countries, PISA was delivered as computer- and lab- based assessments (OECD, no date). In 2018, PISA was delivered to around 600,000 learners across 79 countries (Andreas Schleicher, 2018).
- The International Association for the Evaluation of Educational Achievement (IEA), which has been administering its **Progress in International Reading Literacy Study (PIRLS)** examination to fourth graders every five years since 2001, decided to also offer a digital option of its 2021 examination, in addition to the option of the paper-based version. The digital version, called digitalPIRLS, "will be offered as a web-based system via school-based or IEA web servers, or via a USB drive connected locally to a PC with the Windows Operating System" (TIMSS & PIRLS International Study Center, 2022). In total, around "319,000 students, 310,000 parents, 16,000 teachers, and 12,000 schools participated" in PIRLS 2016 (TIMSS & PIRLS International Study Center, 2019).
- The **Trends in International Mathematics and Science Study (TIMSS)**, an examination that has been administered since 1995, began a transition to becoming to a computer-based assessment in 2019 which is expected to be completed in 2023, when TIMSS will be available for delivery "online or locally using USB sticks or a local server," and with each country where the test will be administered deciding if to "use school equipment or bring equipment into schools" (IEA, 2022). Around 4,000 learners participated in TIMSS 2019 (TIMSS & PIRLS International Study Center, 2019).
- The **SAT exam**, widely used to make college admissions decisions in the United States, will move to a digital format in 2023 internationally and in 2024 in the United

States. The digital SAT will not be home-based, however, even though learners will be allowed to use their own devices if they so choose. Instead, the digital SAT will be administered in proctored schools or test centres (Nadworny, 2022; Moon, 2021). In 2021, one and a half million learners to the SAT exam, down, no doubt because of the pandemic, from 2.2 million in 2020 (The College Board, 2021).

Significant differences exist between standardised tests like the SAT, which largely include multiple-choice questions, and high-stakes national examinations, which can include a broad mix of questions that are more open-ended (e.g., a biology question that asks a learner to draw a cell) in addition to multiple-choice questions. Multiple-choice questions can be evaluated against objective criteria, which means that "the response can be marked right or wrong without the need for expert / human judgement" (JISC, 2006). The digital skill set required for multiple choice questions is thus relatively straight forward. Notwithstanding, the needed aptitudes and practical abilities – for composing digitized in-depth responses that demonstrate an in-depth understanding of an academic subject; or for digitally drawing a cell structure as part of a biology exam – are much more sophisticated. They require advanced knowledge and experience for navigating particular and often costly software and hardware modalities. As a result, an assessment with mostly multiple-choice questions will be better suited to an online format than an assessment with mostly open-ended questions.

2.4. DEFINITIONS LINKED TO PROCTORING TECHNOLOGIES

The proctoring of exams has traditionally been done by a trained individual who is physically present in the examination hall or classroom. With the development of online examination technology, proctoring technology was also developed to ensure the validity of online exams. Remote proctoring is a proctoring method that "allows students to take an assessment at a remote location while ensuring the integrity of the exam"; it involves "the use of software to monitor students during the administration of remote exams and assessments" (Eckenrode et al., 2016; Parghi et al., 2021).

> "Online proctoring is a form of location-independent digital assessment. The invigilation takes place online using special software. Online proctoring software promises to allow students and course participants to sit their exams anywhere (for example at home) in fraud-resistant conditions and/or with invigilation against fraud. Monitoring software, video images and the monitoring of students' screens should prevent them from engaging in fraud."
>
> - SURF, 2020

There are different types of proctoring for remote online examinations; these include live proctoring and automated proctoring. **Live proctoring** entails an invigilator (also known as a proctor) watching test takers to ensure no fraud is committed; this proctoring method is used by platforms like Examity and ProctorU. For example, the University of Mississippi uses ProctorU "to allow its students to "take an exam wherever they choose (in a residence hall or apartment, for example)" (Chin, 2020; Eckenrode et al., 2016). Live proctoring can take the form of **live supervision**, where lecturers themselves watch test takers through a conferencing software. Alternatively, a special software which "allows someone to watch and intervene during the exam" can be used for proctoring online examinations (SURF, 2020). Another form of remote "live" proctoring involves the recording of each examination so that it can be watched at a later stage by an invigilator (SURF, 2020).

Automated proctoring involves the monitoring of test takers through machine learning and facial recognition, among other technologies; this is used by platforms like Proctorio (Chin, 2020). Instead of proctors monitoring or reviewing the entire exam, automated proctoring allows for the use of a specialised software to identify specific moments of potential fraud or suspicious behaviour which a reviewer can watch again in order to assess whether they indeed constitute suspected fraud (SURF, 2020). Online examinations proctoring can also utilise a **lockdown mechanism** which can be "used to prevent students from accessing web browsers or other applications" (Eckenrode et al., 2016).


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3. OPPORTUNITIES AND RISKS OF ONLINE EXAMINATIONS IN EMERGENCY CONTEXTS

Education emergencies can have a number of causes which impact the specific shape that they take. These causes can range from biological hazards (e.g., as a consequence of a global pandemic such as the Covid-19 pandemic) and economic shocks, to climate changes and armed conflict, which "can disrupt the delivery of education services and cause destruction or damage to education infrastructure in the short — and long-term" (Ashlee et al., 2020).

In Syria — the country example chosen for this report as a case in point for illustrating the feasibility and constraints of proctored online examination in emergency settings — all of these above crisis factors are at play, leading to challenges surrounding the lack of ICT infrastructure such as stable electricity and internet, the lack of devices at home, low levels of digital literacy of students, teachers and school administrators, and the limited systems of support for teachers and students (UNDP, 2022).

A survey conducted by the Norwegian Refugee Council (NRC) highlighted that 89% of families with students in formal education in Syria do not have access to laptops, desktops, or tablets.[2] With millions of children reported still out of school, or having missed out on education for months and even years, it is obvious that digital skills are mostly lacking across student populations with the exception of a small minority of privileged children. The challenges are compounded for those student populations living in isolated regions since national exams are only offered in those areas where the Government of Syria (GoS) is in effective control, whereas students who live in areas outside of government control need to travel far to access government exam centres. Furthermore, some platforms and learning resources are not available in Syria (e.g., Zoom, Google workspace, Coursera) due to sanctions and the need to comply with US export regulations (NRC and UNICEF, 2022, forthcoming).[3]

In 2021, Syrian national exams were conducted as paper-and-pencil exams, as they have been for decades. Syrian national exams are conducted once a year in the months of May and June, for 9th and 12th graders. Other grades examinations take place two to three weeks prior to 9th and 12th grade exams. 9th and 12th grade exams are considered to be milestone exams as they decide on whether a student is allowed to continue her or his education pathway to universities or mid-level continuing education programmes such as technical and vocational training (TVET), tourism schools, and sport education programmes. Passing these milestone exams is therefore 'a must' for a student; and high-achievers will be able to enroll in universities offering programmes such as medicine and engineering that offer enhanced career prospects. The top ten 12th graders attending TVET programmes likewise have the opportunity to enroll into corresponding university programmes.

[2] Note that the survey did not capture access to mobile devices. In 2020, there were 95 mobile cellular subscriptions reported per 100 people in Syria (World Bank, 2020). This data suggests that mobile devices may serve as an alternative channel for learning in the country.

[3] However, Learning Passport, a platform with global and local learning resources developed by UNICEF and Microsoft, has been made available in Syria. This marks an important success story in light of sanctions.

Exams for both 9th and 12th graders usually last 3-4 weeks, with only one subject exam per day, all of them administered in the presence of teachers, and scheduled in time intervals of one to three days. Each exam lasts a minimum of an hour and a half, but some exams can also last for up to three and a half hours. Students whose upper-secondary specialisation is Sciences are tested in up to eight science subjects, whereas those specialising in the humanities take up to seven humanities subject tests. Once exams are completed, students wait for the announcement of results through the Ministry. The results are published online, usually a month after the exams. Depending on the results, students who are disappointed with their grades are invited to take the examinations again, but only in three subjects, and are usually allowed to do so only within a period not exceeding a maximum of two weeks after the first round of exams.

Given that Syria has some geographic areas that are not under the control of the GoS, and with separate non-coordinated education authorities as a consequence of the crisis, the Ministry of Education (MoE) with support from UN and civil society agencies developed a system of 'national exam accommodation centres' – for so-called 'crossline children' that need to travel from areas not under GoS control into areas where national GoS exam centres are operating. Crossline children travel to GoS exam centres and stay in accommodation centres. From there, crossline children visit schools that host national paper-and-pencil exams which are supervised, in specially arranged classroom settings, by teachers who are appointed by the MoE. Although the number of crossline children registering for exams annually is around 16,000, in recent years the number of crossline children attending national exams has been between 6000 and 7000.

3.1. RECAP OF RESEARCH

This section compiles discussion and research on the opportunities and risks surrounding online examinations and e-proctoring, and the ability to administer credible examinations (Ironsi, 2021) across several areas:

1. Flexibility and inclusion
2. Costs
3. Fraud prevention
4. Ethical and legal concerns
5. Adapting to a new examination modality
6. Digital literacy

3.1.1. FLEXIBILITY AND INCLUSION

Globally, many high stakes examinations were cancelled in 2020 due to Covid-19 including the SATs, International Baccalaureate (IB) exams, and state-wide national exams such as in Uttar Pradesh in India (Liberman et al., 2020). In some cases, exams were postponed, as was the case for national exams in Colombia and the West African Senior School Certificate Examination (WASSCE) (Liberman et al., 2020).

In other scenarios, online assessment and proctoring technologies have allowed learning to proceed undisrupted during prolonged school closures (Ironsi, 2021; Ferri et al., 2020; Luna-Bazaldua et al., 2020; Liberman et al., 2020). The flexibility that these technologies provide to educational institutions creates an option for learning and assessment to continue even when face-to-face learning cannot, and means that exams can be administered at any time and in any place (SURF, 2020). This allows educational institutions to provide learners with opportunities regardless of where learners are located around the world, which enables benefits for more students, especially those based outside of their country of citizenship (SURF, 2020). Further, online examinations allow for the possibility that learners may take examinations at times of their choosing, which fits well with a trend in education that aims to place learners at the centre of educational decision-making (SURF, 2020).

Online examinations pose challenges of their own in terms of equity and the inclusion of all learners. The feasibility of online examinations depends on the availability of electronic devices and access to the internet for the test-takers (as well as the invigilators in the case of e-proctoring; Ironsi, 2021). Online examinations, then, will not be accessible to all learners given the existing inequities in access to technology. Even learners who have access to appropriate digital infrastructure to support online examinations might not have the appropriate space at home to be able to take the test in appropriate exam conditions or possess the digital literacy skills to take online examinations (Luna-Bazaldua et al., 2020).


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In Syria's context, the vast majority of learners lack access to technology at home and have never owned a computer, let alone have the privilege of a designated space at home suitable for online examinations. This adds a layer of inequity to the examination process and leads to the marginalisation of learners whose circumstances (e.g. socio-economic background, large families, geographical location) mean they have limited access to and engagement with the required technology for online learning and assessment. In fact, relying solely on online examinations carries a real risk of further exacerbating inequities, whether these be financial inequities or inequities in access to needed infrastructure. Financial and accessibility inequities can thus become even more geographically concentrated if online examinations are used uncritically. Other than access to digital devices, the use of online assessments also poses the risk of exclusion of learners with special educational needs and disabilities (SEND; Luna-Bazaldua et al., 2020).

A multitude of complexities surrounding online examinations for learners with SEND should be acknowledged. In general, an inadequate focus on ensuring that online examinations are designed and delivered in such a way as to meet the needs of learners with SEND will, in all likelihood, result in the further marginalisation of learners with SEND. Additional in-person support, supplemented by the use of EdTech tools (e.g, assistive technologies with features including text to speech and on-screen magnification), can potentially play a role in meeting the needs of learners with SEND during test-taking procedures (Coflan & Kaye, 2020).

The extent to which these risks can be mitigated will always depend on the specific context in which they present themselves. In Italy, for example, initiatives to donate devices, as well as efforts to direct funds to give students devices, were launched in an effort to mitigate the risk of uneven access to technology exacerbating inequality (Ferri et al., 2020). In the context of a country undergoing a humanitarian crisis, such as Syria, however, inequities tend to be especially pronounced: children from less war-affected areas, or from better-off families, will have better opportunities than children from poor or displaced families to develop digital literacy skills, and urban areas are technologically better equipped than rural areas. What's more, depending on the political support networks available in different regions, some areas fare better or worse when it comes to access to technology.

3.1.2. COSTS

Whether online examinations cost more or less than in-person alternatives varies depending on many factors, including the administering institution, the study programme, and the specific situation in the country where the tests are administered (SURF, 2020). In high-income countries that are not affected by natural or man-made disasters, the availability of online learning and assessment options, especially in higher education, has created opportunities to reduce costs of education for learners, with learners in some cases taking online courses that are available for free and thus only needing to pay for the examinations, which allows learners to save on tuition,

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textbooks, and school-related living expenses (Ferri et al., 2020). This is obviously not the case for learners in low- and middle-income countries where many learners cannot even afford textbooks or stationery and thus will not be saving on costs (which they already do not incur). The costs for learners, however, is only one cost among many, and one of the risks to online examinations in emergency contexts is their limited cost-effectiveness for authorities administering the examinations, due to high overarching costs. Evidence supports that online proctoring technologies are more expensive than in-person exams, whether in schools or universities (SURF, 2020). To begin with, there is the cost of the infrastructure, including devices for test-taking which needs to be in place for online examinations.

In Syria, for example, costing requires consideration of the crisis-produced dilapidation of infrastructure, the country's loss of digital learning and investment opportunities when compared with countries not affected by conflict, sanctions and economic shocks. Therefore, any kind of costing structure must consider infrastructure, hardware, software, and possibly satellite technology to provide Internet to particular isolated locations where phone lines and cellular networks are not available,[4] as well as digital skills development and administration expenditures, which eventually need to be scaled up across the country.

In addition, authorities need to consider the costs of e-proctoring tools, which are often too high for most educational institutions to afford (Ironsi, 2021). Other costs include those required to transform and develop content that is suitable for online delivery, and the cost of hiring and training personnel (such as remote proctors) (Luna-Bazaldua et al., 2020). For the physical monitoring of school-based exams, schools may wish to use their own facilities and their own staff as invigilators; online proctoring, on the other hand, would require additional fees that are often more expensive (SURF, 2020). In Syria, schools all over the country lack not only these facilities themselves but also the capacity to maintain and administer them. Therefore in Syria, substantial investment would be required either to create the facilities necessary for physical monitoring of school-based exams, or to develop online proctoring systems.

Please see Section 4.2 for a cost analysis template tailored to help emergency education practitioners to plan and budget for proctored online examinations.

3.1.3. FRAUD PREVENTION

A significant challenge with online examinations is ensuring their validity, transparency, and reliability. While fraud and cheating arguably also occur during in-person examinations, educational institutions tend to have more experience in administering in-person examinations and "are thus capable of making a relatively good assessment of the associated risks" (SURF, 2020). This is not the case with online proctoring, with which educational institutions "have not yet built up the same level of experience" (SURF, 2020). In addition, since "each supplier uses different methods and technologies … the experiences of one institution may not

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[4] An organisation that has experimented with the provision of satellite technology for isolated or crisis-affected areas in need of digital education content is the Mohammed bin Rashid Al Maktoum Global Initiatives (MBRGI) in support of its e-learning platform Madrasa.

always be directly applicable to other institutions" (SURF, 2020). This points to a lack of information as to whether online examinations can in fact be administered in such a way as to successfully prevent cheating.

One of the main strategies to address these challenges is the use of e-proctoring software (Ironsi, 2021). E-proctoring software uses tools such as accessing the test takers' microphones and webcams during the examination, facial recognition software, screen sharing (which allows the proctor to view the test taker's screen), lock-down browsers (special browsers to prevent test takers' access to other browsers or applications during the examination), AI software to detect cheating, and even keystroke dynamics (which, by analysing how test takers type their answers, can be used to issue a warning if someone is suspected of impersonating a test taker) (Ironsi, 2021; SURF, 2020). While "fraud involving manipulation of hardware or software can usually be detected … this often has far-reaching implications for student privacy" (SURF, 2020). Moreover, AI software needs time to learn the different ways in which cheating can take place in different contexts, and thus cannot be counted on to be fully effective in detecting cheating from its first deployment.

An examination of the literature on the topic found that 80% of the e-proctored online examinations being surveyed showed evidence of malpractice (Ironsi, 2021). Further, the ability of artificial intelligence software to detect and identify cheating is questionable (Ironsi, 2021). Automated reviewing of positive fraud detection is much less accurate than live proctoring; an invigilator can more accurately identify if a certain movement by the test taker is indicative of fraud or not (SURF, 2020). Instances of false positives, or the indication of a suspicion that an instance of fraud or cheating has been committed when in fact none has been, are much more likely to occur with automated proctoring compared to online live proctoring and in-person proctoring; "with recordings, it is impossible to be sure whether a student was trying to cheat or whether they just glanced away from the screen" (SURF, 2020).

The scalability of fraud and cheating is substantially increased in online examinations. "As soon as a student has developed software to make it possible to commit fraud, they could pass it on to a large group of students in the blink of an eye" (SURF, 2020). The heightened use of online proctoring technologies increases the chances that some software will be developed to bypass them. Unless an education institution has some control over the space where an examination is conducted, "fraud can be committed in ways that are (almost) impossible to detect" and the list of possible ways to do so "is almost endless" (SURF, 2020). While control mechanisms such as webcams can reduce the risk of fraud and cheating, they cannot eradicate that risk entirely (SURF, 2020).

In the eventuality that a student is suspected to have committed fraud, Ministries need a protocol for reporting a suspected fraudulent behavior, keeping in mind that students cannot be charged with cheating unless a case was duly reported and the suspicion has been reviewed by the education authorities, and relevant action has been recommended in line with policies and procedures. A suggested reporting template is enclosed under Annex B.

Another set of challenges of online examinations are not caused by proctoring risk factors. Nevertheless, challenges relating to the storing and sharing of the content of online examinations, as well as challenges related to the reporting of cheating incidents, are significant to preserve the validity of online examinations. However, it is worth noting that exam questions can be leaked for both online and paper examinations. Mechanisms and protocols must be in place to prevent teachers, administrators, or other persons who have access to an exam's content from leaking the exam's questions and thus jeopardising its validity. Randomised monitoring visits, most ideally by third-party monitors, and the requirement that proctors fill a daily report detailing instances of suspected cheating or fraud can be effective mechanisms to ensure that proctors in test centres are appropriately reporting cases of suspected malpractice.


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Moreover, it is essential that the reporting of cheating cases is done professionally to ensure that no harm or abuse is done to children. In some cases, teachers and proctors may not be aware of established protocols to follow when reporting cheating cases. While children must not be harmed when cheating is being reported, some aspects of this potential harm and how to mitigate it (e.g., the power which a proctor who has caught a learner cheating has) are culturally specific and must be dealt with in a way that pays attention to the local context.

Table 1. *Online proctoring risk factors and possible countermeasures to them (SURF, 2020)*

Online proctoring risk factors	Description	Possible countermeasures
An extra browser or tab	A student attempts to search for answers online during an examination	Monitoring by proctors; screen captures, an extra webcam, and a good lock-down browser
Another person in the room	A student looks at the answers of others or tries to consult with them (verbally or nonverbally)	*Lab-based examinations:* Dividers/screens between desks *Home-based examinations:* Microphone, cameras[5]
Hidden crib sheets	A student uses crib or cheat sheets; this also can be a regular occurrence during in-person examinations	*Lab-based examinations:* Proctors can keep an eye out for the use of crib sheets *Home-based examinations:* cameras (however, in these situations, "the room will never be fully visible during the exam, and hidden crib sheets remain a possibility")
Someone else using the PC	A student has another individual take the exam for them	Identity verification, through showing a student card or ID to an invigilator or to the webcam
A second person monitoring or controlling the PC	A student gives another individual remote access to their computer. The other person can see their screen and control the keyboard and mouse	*Lab-based examinations:* Proctors can see student's keyboard and mouse and check if movements match what is happening on the screen; it would also be more difficult for a student to use a shared computer in the testing centre to grant remote access *Home-based examinations:* Logging software that identifies external connections to the computer
Software that provides answers	A student installs software that scans the questions on the screen and looks up the answers. The software could show these on the screen, or possibly even fill them in directly	*Lab-based examinations:* Similar to the risk factor above, proctors can see student's keyboard and mouse and check if movements match what is happening on the screen; it would also be more difficult for a student to install software on a shared computer in the testing centre *Home-based examinations:* Logging software that identifies external connections to the computer

[5] Students are often asked to show the entire room to the camera prior to the start of the examination. However, a second person could hide outside of the camera's field of view.


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3.1.4. ETHICAL AND LEGAL CONCERNS

Ethical concerns related to data collection and sharing, monitoring the biometric identities of test takers, and accessing test takers' audio and cameras are all issues related to the privacy of the test takers. This calls for a revaluation of e-proctoring software and raises questions which have yet to be resolved (Ironsi, 2021). In the Netherlands, complaints have led courts to rule that e-proctoring software does not violate students' privacy, but it also reaffirmed that it must be compliant with data protection and data privacy laws in the country (Luna-Bazaldua et al., 2020). The Dutch Personal Data Protection Act (WBP) requires that students must be able to freely give their permission for their data to be used, which means that students must be able to refuse to give this data without suffering any consequences. In other words, the WBP requires that an alternative to e-proctored online examinations, which need access to learners' data to work properly, must always be made available for those learners who refuse to give their permission for their personal data to be used (and hence cannot take online examinations; SURF, 2020). Complaints have also been raised at the University of British Columbia (UBC) in Canada arguing that online automated proctoring technologies are "ableist and discriminatory, intrusive, unsafe, inaccessible, and huge invasion of privacy" with their reliance on facial recognition technology (Chin, 2020).

E-proctored examinations have also been shown to increase test takers' feelings of anxiety and therefore may in fact affect learners' academic performance (Ironsi, 2021. During disruptions to learning, assessments are often given less importance and at times even cancelled in order to avoid exacerbating the stressful circumstances (Hodges et al., 2020). The focus on developing online examination and proctoring technologies should not put learners at a disadvantage or expose them to undue stress, especially when learners have not been previously exposed to these technologies; decision-makers should be careful to avoid adding to the anxiety of children and young adults through the use of unfamiliar technologies (Chin, 2020). Digitised mock exams may help children transition more easily into a new online exam modality.

3.2. ADAPTING TO A NEW EXAMINATION MODALITY

3.2.1. TRANSITIONING TO ONLINE EXAMINATIONS

In some cases, the general public may react negatively to the transition to online examinations. For example, learners may be worried about how their exam scores will be affected by the new format, or teachers may express concerns about adequately equipping learners with digital literacy skills. Addressing the general public's opinions and concerns about online examinations is crucial to mitigating this risk.

Student preparations for online examinations can further be supported by:

1. Identifying pilot groups who express an interest or preference to participate in online exams;
2. Giving advance notice of at least one year about the transition from traditional to online examinations;
3. Holding virtual or in-person workshops about the new examination format and logistics;
4. Organising a mock examination a few weeks before the "real" examination;
5. Allowing participants to take the examination multiple times (at least during the first few years of rolling out the exam). This can help account for variables that can negatively affect a student's score, including emergency situations, test jitters, etc.

3.2.2. DIGITAL LITERACY

Digital literacy can be defined as the "ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technologies for employment, decent jobs and entrepreneurship. It includes competences that are variously referred to as computer literacy, ICT literacy, information literacy, and media literacy" (Law et al., 2018).

Possessing digital literacy skills is essential if learners are to perform well on online examinations. In order for online examinations to be able to assess learners' actual knowledge of the core content that they are being tested on, learners need to possess the digital literacy skills that are necessary for them to be able to take online examinations painlessly. Otherwise, the examination will effectively be a test of learners' digital literacy skills, not their knowledge of content. A study of the results of learners who took the Partnership for Assessment of Readiness for College and Careers (PARCC) test in 2015-2016 found that those learners who took paper-and-pencil PARCC tests performed 56% better than learners who took the same exact PARCC test online (Herold, 2016).

Since digital literacy skills are distributed unevenly across different indicators of disadvantage (such as income, gender, disability, age, education level, area of residence—e.g., urban vs. rural —, etc.), one's previous exposure to IT will enhance one's ability to perform better than others on online examinations, simply because one possesses digital literacy skills that other learners lack. This constitutes an unfair advantage. Moving examinations online without making sure that learners and teachers are provided with appropriate training in digital literacy skills will, in all likelihood, increase the disparity in performance between the most privileged learners and the most marginalised.

This concern is even more significant in education emergency contexts where teachers and learners are more likely to be less acquainted with digital technologies and where only the most privileged are likely to possess the necessary digital literacy skills essential to performing well on online examination. In Syria, more than a decade of conflict and economic distress resulted in 2.4 million children dropping out of school, or being forced to access non-formal education platforms due to lack of access or affordability to formal education institutions. These children can often not even afford transportation, stationary or school uniforms; their opportunities past and future to develop digital literacy competencies were and are very limited.

However, it is evidently possible to build digital competencies and help children and adolescents to transition from paper-based to digital learning and exam participation. In fact, Syrian children and adolescents as well as teachers ask for the opportunity to train and acquire digital skills. A government or civil society organisation interested in building digital communication competencies (writing, drawing, surfing, browsing, checking, troubleshooting) must be prepared, however, to invest the time and resources for cultivating and honing digital skill sets ahead of time, and for different subject topics, and prior to the day when children are invited to sit for, and education staff are expected to facilitate proctored online exams.

In addition to honing digital literacy skills, it would also be important to explore transforming the current examination culture that requires children to demonstrate cognitive capacities through writing, designing and drawing exercises, to multiple-choice testing modalities that require a less demanding skill set of digital writing, typewriting and drawing skills.


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4. PRE-ASSESSMENT TOOLS

As highlighted in the previous section, the range of opportunities and risks of online examinations signifies that the assessment modality may be a good fit for some, but not all, contexts. This section encompasses two tools (feasibility criteria and cost analysis) that will support decision-makers to assess whether online examinations, and especially online examinations conducted in crisis contexts, are achievable and affordable.

4.1. FEASIBILITY CRITERIA

The table below can be used to determine an overarching feasibility score (out of 136 points) for lab-based online examinations. In general, if a score is over 95, then the context may be a good fit for online examinations.[6] While this table can serve as a general benchmark for feasibility, we strongly recommend that any decision-maker consult with the Ministry of Education and other digital assessment experts prior to proceeding with implementation. If the available ICT infrastructure varies significantly across regions of a country, the feasibility score can be calculated separately for each region.

The tool is organised across the following categories:

1. Exam location and environment
2. ICT infrastructure and hardware
3. Software
4. Digital literacy skills and training
5. Exam administration
6. Prevention of cheating
7. Equity

[6] Note that a score of 95 signifies that roughly 70% of the criteria are met.

Category	Question	Score
1. Exam location and environment	**Total / 18 :**	
Exam space	Do the testing locations include: ☐ Desks, tables and comfortable chairs ☐ Access to bathrooms or latrines ☐ Lockers where students can leave their belongings to ensure exam security To determine your score for this question, add the number of checked boxes (0—3).	
Exam environment	Will the exam environment: ☐ Be quiet and distraction free ☐ Be comfortable for students, with proper air circulation and temperature ☐ Include live proctoring by trained individuals To determine your score for this question, add the number of checked boxes (0—3).	
Exam location part 1	Are there available buildings that can be used for the testing centres? ☐ 1—No, the set-up of tents and/or construction of new buildings are needed for testing ☐ 2—Yes, buildings are available for testing	
Exam location part 2	Will the testing centre be established in a safe location (e.g., a significant distance from active conflict or natural disasters)?[7] ☐ 1—Nov ☐ 2—Yes	
Transportation	Participants ☐ 1—Do not have access to any forms of transportation to testing centres ☐ 2—Can access transportation to testing centres, but only for a fee ☐ 3—Can access transportation to testing centres for free	
Commute distance	On average, how far will participants need to travel to testing centres? ☐ 1—Over 20 kilometres ☐ 2—Between 4—20 kilometres ☐ 3—Less than 4 kilometres	
Basic services	Will the testing centre have basic Water, Sanitation and Hygiene (WaSH) services available? ☐ 1—No ☐ 2—Yes	
2. ICT infrastructure and hardware	**Total / 41 :**	
Electricity	Will testing centres have stable electricity or be powered by alternative energy sources (e.g., solar)? ☐ 1—No ☐ 2—Sometimes ☐ 3—Yes Note: If you selected "1" for this question, online examinations may not be feasible for your context.	

[7] The 'Whole of Syria' Education Sector (2021) defines the severity of the education emergency in a specific area by rating areas from '1' which is the lowest score, to '5' which is the highest score and describes a catastrophic situation. In Syria, the United Nations prioritizes locations with a severity score of 3 to 5, which are classified as "acute and [in] immediate need of humanitarian assistance" (Whole of Syria Education Sector, 2021, p. 1). The Severity Scale Framework that forms the basis for the severity scale used in Syria has been developed by the Joint Intersectoral Analysis Framework Steering Committee (JFIA, 2022). JFIA offers "… a methodologically new approach to analysing the multiple needs of populations in crisis. … Since 2020, countries preparing humanitarian responses within the Humanitarian Programme Cycle have been using this enhanced approach to inform their country's 'Humanitarian Needs Overview' [HNO]." (p. 1)

Category	Question	Score
Internet connectivity	What is the quality of internet connectivity at testing centres? ☐ 1—None to poor (0—5 Mbps) ☐ 2—Moderate to good (5—25 Mbps) ☐ 3—Very good to excellent (over 25 Mbps) Note: If you selected "1" for this question, online examinations may not be feasible for your context.	
Internet availability	How available is the internet at testing centres? ☐ 1—Available for a fee or on a personal device ☐ 2—Available through zero costing on the internet connection required for the testing ☐ 3—Available for free	
ICT support	Will testing centres have a technician available to offer support in cases of hardware and/or software failure? ☐ 1—No ☐ 2—Sometimes ☐ 3—Yes	
Centre tools and resources	Will the testing centre include: ☐ Pens and paper ☐ Computers or tablets for each student ☐ Stylus ☐ Cameras (webcams) ☐ Earphones ☐ Calculator ☐ Mp3 player/recorder To determine your score for this question, add the number of checked boxes (0—7).	
Hardware affordability	What is the per unit cost of the hardware (computers or tablets)?* • 1—Over USD 700 • 2—Between USD 500–700 • 3—Between USD 200–500 • 4—Under USD 200	
Hardware battery life	What is the battery life of the hardware? ☐ 1—Under 4 hours ☐ 2—Between 4–8 hours ☐ 3—Over 8 hours Ideally, the hardware should be able to last for an entire school day off-grid in areas with unreliable electricity.	
Hardware storage space	How much storage space is available for each hardware device? ☐ 1—Under 32 GB ☐ 2—Between 32–64 GB ☐ 3—Over 64 GB Larger amounts of storage are necessary for areas with no or unreliable internet.	
Hardware life expectancy	How long is the hardware expected to last before requiring replacement? ☐ 1—Within the year ☐ 2—Within 1 to 3 years ☐ 3—Over 3 years	

Category	Question	Score
Hardware durability	How sensitive will the hardware be towards heat, cold, water and dust and so on? ☐ 1 — Sensitive ☐ 2 — Somewhat resistant ☐ 3 — Resistant	
Hardware maintenance	Will there be assigned personnel responsible for hardware maintenance (e.g., volunteers, teachers, paid professionals)? ☐ 1 — No ☐ 2 — Not sure ☐ 3 — Yes	
Exam tool storage	Will there be a secure location at the testing centre to store the hardware? ☐ 1 — No ☐ 2 — Not sure ☐ 3 — Yes	

3. Software	**Total / 27 :**	
Origin	Where will the software to be used be developed? ☐ 1 — Software development will be outsourced to a foreign corporation ☐ 2 — Software development will be outsourced to a national corporation ☐ 3 — The government will develop the software in-country	
Source	How will the software be sourced? ☐ 1 — Paid software ☐ 2 — Free, downloadable software ☐ 3 — Pre-existing software that is already being used by students, teachers, and/or MoE staff	
Subscription	The software program is available through a: ☐ 1 — Subscription basis (yearly, monthly, etc.) ☐ 2 — One-time purchase with unlimited usage ☐ 3 — N/A; the software is freely available	
Connectivity requirements part 1	Which of the following options is the software able to operate on? If more than one, select the option with the highest numerical value. ☐ 1 — High-speed internet ☐ 2 — Mobile networks, including hotspots ☐ 3 — Offline	
Connectivity requirements part 2	Does the software require a steady internet connection throughout the duration of the examination? ☐ 1 — Internet connection is required at all times during the exam ☐ 2 — Internet connection is required at multiple checkpoints throughout the exam ☐ 3 — Internet connection is only required for download and upload	
User capacity	How many test-takers can the software support at one time? ☐ 1 — Under 10,000 ☐ 2 — Between 10,000 to 100,000 ☐ 3 — Over 100,000	

Category	Question	Score
Technological development	How much additional development will the software require to be suitable for exam needs? ☐ 1 — Requires moderate to extensive development, such as integrating multiple software ☐ 2 — Requires minimal development, such as adjusting existing features of the existing software ☐ 3 — No additional software development required	
Available languages	The software program ☐ 1 — Is only available in English ☐ 2 — Is available in local languages (e.g., Arabic) ☐ 3 — Has an automatic translation option	
Format	What exam answer options does the software offer? ☐ 1 — Multiple choice only ☐ 2 — Multiple choice, fill-in-the-blank, and a few other options ☐ 3 — Multiple choice, fill-in-the-blank, matching, drawing (using a stylus and touch screen), open-ended essays, and several other answer options	

4. Digital literacy skills and training	**Total / 15 :**	
Skills part 1	Do participants possess adequate digital skills to use the hardware (computers or tablets) and software? ☐ 1 — No, participants have not used the hardware and software in schools or at home ☐ 2 — Somewhat, participants have used the hardware, but not the software, in schools or at home ☐ 3 — Yes, participants have used the hardware and software in schools or at home	
Skills part 2	Can participants type? ☐ 1 — No, participants have not learned how to type in school or at home ☐ 2 — Somewhat, participants have learned how to type in school or at home but have had limited opportunities to practise ☐ 3 — Yes, participants have learned and practised typing in school or at home	
Skills part 3	Can participants use a stylus pen? ☐ 1 — No, participants have not learned how to use a stylus pen in school or at home ☐ 2 — Somewhat, participants have learned how to use a stylus pen school or at home but have had limited opportunities to practise ☐ 3 — Yes, participants have learned and practised using a stylus pen in school or at home	
Training	What is the anticipated level of training* that will be needed for administrators, teachers, and learners who will participate in an online examination for the first time? ☐ 1 — High: in-person or virtual training sessions by IT support staff or teachers (accessed synchronously) ☐ 2 — Medium: online content or videos (accessed asynchronously) ☐ 3 — Low: instructions can be provided right before the examination starts *Note that training can include topics such as: testing centre rules, day-of logistics, what to expect for examination content and formats, testing advice and technical troubleshooting.	

Category	Question	Score
Test prep	How will participants be supported to prepare for the online examinations? ☐ Exam duration will be extended (e.g., participants will receive an extra 30 minutes to familiarise themselves with digital exams for each hour they are given to prepare for paper exams) ☐ Guidelines will be shared to help familiarise participants with the exam rules ☐ Sample exam formats and questions will be shared To determine your score for this question, add the number of checked boxes (0—3).	

5. Exam administration	**Total / 6 :**	
Technical difficulties	If there are technical difficulties (due to electricity or connectivity) during the exam: ☐ 1—There is no way to retrieve the data; participants will need to retake the exam ☐ 2—Participants will be able to continue their exam on paper in the testing centres ☐ 3—Online progress will be saved and participants can continue at a later date or after the issue is resolved, or participants can continue to take the exam offline	
Scoring and results	How will online examinations be scored? ☐ 1—Exams will be scored manually by a team of proctors, teachers, etc. ☐ 2—Some exam parts will be scored manually, while others will be scored automatically using the software ☐ 3—Exams will be scored automatically using the software	

6. Prevention of cheating	**Total / 21 :**	
ID verification	How will participant identities be verified? ☐ 1—By asking students to enter their contact details into the online examination ☐ 2—By checking national government or student ID approved identification cards ☐ 3—By checking national government or student ID approved identification cards, and verifying a match with unique exam ID codes	
Seating part 1	Will seating be randomised to prevent cheating? ☐ 1—No ☐ 2—Yes	
Seating part 2	Will physical barriers be provided to prevent participants from looking at others' screens? ☐ 1—No ☐ 2—Yes	
Switching screens	Will the participant be able to open other windows on the computer or tablet while taking the exam? ☐ 1—Yes ☐ 2—No	
Proctor capabilities	Will the live or AI proctor be able to: ☐ Observe the participants' screen or environment ☐ Check surroundings for prohibited use of notes or textbooks ☐ Monitor participants' eye movements To determine your score for this question, add the number of checked boxes (0—3).	

Category	Question	Score
Proctor code of conduct	What training on code of conduct will proctors be required to take (to ensure integrity of the proctoring team)? ☐ 1—No training required ☐ 2—Proctors will be required to complete a one-time code of conduct training ☐ 3—Proctors will be required to complete an annual code of conduct training	
Disciplinary actions	What disciplinary actions will be enacted for attempts of bribery, fraud and cheating during the exam? ☐ 1—None ☐ 2—Participants' score will be disqualified, but they will be allowed to retake the test ☐ 3—Participants' score will be disqualified and they will not be able to retake the test	
Reporting	Will students, teachers, proctors and others be able to report incidents of bribery, fraud and cheating to the Ministry of Education authority? ☐ 1—No ☐ 2—Yes, reports can be shared with a designated official at the MoE ☐ 3—Yes, they can call a hotline to report concerns anonymously	

7. Equity	**Total / 8 :**	
SEND students	Will participants with special educational needs and/or disabilities (SEND) be accommodated during online examinations? If yes, how? ☐ Audio support will be provided for visually impaired students ☐ Braille alphabet keyboards will be provided for visually impaired students ☐ Closed captions will be provided for students who are hard of hearing ☐ Trained staff will be present at testing centres to support SEND students To determine your score for this question, add the number of checked boxes (0—4).	
Opt out	Will participants with special needs or requests be able to opt out of online examinations and take a paper version instead? ☐ 1—No ☐ 2—Yes	
Universal Design for Learning (UDL)	Have Universal Design for Learning (UDL) principles been applied to adapt the examinations from a paper to online format? ☐ 1—No ☐ 2—Yes	

Total Score / 136 :	

4.2. COST ANALYSIS

A decision-maker can fill out the below table to calculate the total cost per child of implementing online examinations. Prior to engaging in this exercise, they should consider the following:

- Approximately how many children are expected to take the online examinations? The total cost for each line item in the table can be divided by the total number of children to determine the cost per child.
- Who is covering the costs of the online examinations? For example, will the costs be subsidised by development partners? Costs can be incurred on facilities, hardware, software, training, and other activities which may be needed to implement online examinations
- Will participants be required to pay a fee to take the examination? How will equity be ensured, so that students from low-income families are able to participate? Will participants be required to pay extra if they choose to reschedule their exam?
- Are there economies of scale? In other words, will the cost per child decrease as online examinations are scaled up nationally?

Item	Cost per child (please specify currency)
1. Building infrastructure, including but not limited to: • Desks and tables • Dividers between desks • Other furniture • Additional renovations for testing centres	
2. ICT infrastructure and hardware, including but not limited to: • Internet • Electricity • Computers or tablets for each student • Stylus • Cameras (webcams) • Earphones • Calculator • Mp3 player/recorder	
3. Software fees: • Online examination platform • (If applicable) Proctoring AI technologies • Security system to prevent hacking and ensure data privacy • Software licensing fee **For consideration:** What is the software subscription model (e.g., freemium, per usage, annual fee)? How will this affect short-term and long-term costs?	
4. Salaries of staff, including but not limited to: • Proctoring team • IT support team • Security team for testing centres • Personalised assistants (for students with special needs) • Scheduling coordinators (for assigning students to testing centre locations and times) • Assessment team (if tests need to be scored manually) • Teachers (for additional examination needs) • MoE staff • Subject matter experts to develop and review exam questions • Instructional designers to ensure that the online examination formatting meets universal design for learning guidelines	

Item	Cost per child (please specify currency)
5. Training: • Sessions on running and facilitating online examinations for proctoring and support teams • Sessions on providing an inclusive environment for all students for proctoring and support teams • Sessions on how to take the online examination for teachers and students • Sessions on general digital literacy for teachers and students • Training materials and resources	
6. Learning design, including the annual review of exam questions and formats	
7. (If applicable) Transportation of participants to and from the testing centres: • Drivers • Vouchers for public transportation	
8. Other (e.g., administrative overhead costs)	
Total cost per child for online examinations	

Table 2 below provides an example budget template for the implementation of online examinations for 100 students.

Table 2. *An example budget template for 100 students.*

Number of students targeted				**100**
Number of examination centres				**7**
Number of examination subjects				**10**
1. Examination centre for 15 children with spacing				
Description	**Single centre cost**			**Project cost**
A. Premises cost	**Unit**	**Unit cost**	**Number/quantity**	**Total**
Facility rental (at least 4 x 5 m)	Monthly		12	
Physical rehabilitation	Once		1	
Cooling and heating provisions			1	
Furniture			15	
Alternative power source (e.g. solar System 15 KVA or diesel generator)			5	
Surveillance system connected to cloud or server inside and outside the room			1	
Unforeseen maintenance and operation costs				
Generator running cost			12	

Description	Single centre cost			Project cost
B. Internet connectivity	**Unit**	**Unit cost**	**Number/quantity**	**Total**
DSL router with 3/4G slot (1 + 2 backup)			1	
Internet DSL subscription	Monthly		12	
Alternative B internet 3/4 G subscription	Monthly		12	
Alternative C satellite internet subscription	Monthly		12	
Receiver and antenna for satellite internet			1	
Other connectivity equipment and installation cost				
C. Computer hardware	**Unit**	**Unit cost**	**Number/quantity**	**Total**
Personal computers			15	
Wireless PC connector			15	
Web cameras for PCs			15	
Maintenance and servicing	Monthly		12	
Unforeseen costs				
D. Staffing	**Unit**	**Unit cost**	**Number/quantity**	**Total**
Trainers	Sessions		10	
Proctors	Monthly		1	
Examination centre management	Monthly		12	
Other staff (e.g. security, medical, etc.)				
2. Exam design and development				
A. Online exams	**Unit**	**Unit cost**	**Number/quantity**	**Total**
Establishment of digital examination concept				
Development of exam question bank for different levels and subjects			50	
Design of mock exams			5	
Preparation of teachers and instructors' user manual			1	

Description	Single centre cost			Project cost
A. Online exams (cont)	**Unit**	**Unit cost**	**Number/ quantity**	**Total**
Preparation of user manual for students			1	
Unforeseen costs				
B. Training	**Unit**	**Unit cost**	**Number/quantity**	**Total**
Training of trainers (ToT) for teachers on developing online exam questions			2	
Senior trainers per examination subject	Monthly			
Other training cost				
3. Online examination software				
A. Software development	**Unit**	**Unit cost**	**Number/quantity**	**Total**
Develop in house online web-based software	Once		1	
Develop proctoring software	Once		1	
Surveillance software with online cloud storage 5TB	Annual		5	
Hosting and server costs	Annual		5	
Software hosting maintenance costs	Annual			
Unforeseen costs				
B. Training	**Unit**	**Unit cost**	**Number/quantity**	**Total**
Training of trainers (ToT) for system administrators	Once		1	
Training workshops on ICT intermediate (for users and teachers)			5	
Training workshops on ICT advances (for managers and support staff)			2	
Unforeseen costs				
C. Staffing	**Unit**	**Unit cost**	**Number/quantity**	**Total**
Project coordinator	Monthly		12	
Monitoring and evaluation/research			12	
Total centre budget				

5. CONCLUSIONS

Over the past few years, the number of tech-enabled education initiatives have multiplied. However, such initiatives can come with an array of challenges, especially for (but not limited to) emergency contexts. For example, in Syria, ongoing challenges encompass financial constraints, limited digital literacy, as well as limited ICT infrastructure and systems of support for teachers and students. These barriers have important ramifications for remote and hybrid learning, in addition to an equitable and inclusive implementation of online high-stakes examinations.

For Syria and other emergency contexts, large investments in digital literacy capacity development, as well as electricity, internet, and devices are necessary to ensure the feasibility and credibility of online examinations Investing in an online exam modality which uses proctoring technology, especially in a crisis or emergency context, will require substantial start-up costs, even at a small scale. Such costs are linked to the provision of electricity, internet connection, hardware and software, and the training of staff and students to familiarise them with information technology and digital learning exercises prior to sitting for exams.

In addition, efforts to prevent cheating and promote a transition from a culture of paper and pencil exams towards online exams will be necessary. In certain emergency contexts such as Syria, some geographic areas in the country are under non-government controlled authority groups that are localized and not the same, and there is no communication or coordination between them. This makes it difficult to facilitate universal access to Syria's national examination systems.

Should decision-makers decide to prioritise this initiative, an iterative approach is recommended, where online examinations are first piloted with a subset of students and schools prior to scaling up nationally. Funding is also necessary to test and implement digital platform modalities, where students and teachers can become accustomed to using digitised technology prior to eventually participating in or administering online exams.

Working iteratively in stages, decision-makers could also investigate the possibility of implementing online, formative assessments across classrooms and schools first. Formative assessments are low-stakes, and often informal, examinations used to provide feedback to students to facilitate their learning (UNESCO IIEP, no date). This initiative would help to build digital literacy skills for students and teachers, and provide a less intensive environment to test and design online examinations. Once students have become accustomed to the online platform and the necessary cultural change has taken place, the same or similar software, platforms and tools could then be applied to high-stakes examinations.

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ANNEX A

The following table provides a list of 18 proctoring companies that have partnered with MoEs with a brief description for each company, their current partners and customers, the kinds of proctoring tools and services they offer and an example of their use, available cost information, and the languages they support.

Company / software	Brief description	Number of customers	Cost information*	Example of use	Partners and customers	Supported languages	Additional notes
AGI/Assessment Gourmet (Egypt)	AGI is an EdTech firm offering products and services in educational assessment and e-learning. AGI has developed Assessment Gourmet, an assessment management system that is configurable to different educational institutions, and is widely used across the MENA region. AGI's other educational assessment products include IBMP, iScore, X5, and STATEQ.	N/A	N/A, but can request a quote through website	In 2020, Cairo University, the largest university in the MENA region, digitised its learning and assessment processes and adopted Assessment Gourmet as its online exam system.	Cairo University Al-Ola Modern Systems BlackBoard Anthology Egyptian University for E-learning UNICEF India	Arabic English	Link: AGI, 2021
Eklavvya (India)	Eklavvya's website mentions that they have "experience in managing large scaled proctored exams" and have "supported concurrency of 100,000+ sessions." Features include: auto proctoring with AI, integration with third party systems (Moodle, LMS, etc.), and the ability to conduct an exam in multiple languages.	500	Free trial available Pricing plans starting at Rs. (Indian rupees) 35,000 per year	East Africa University wanted to conduct home-based exams for students in a secure manner during Covid-19 school closures. Using the Eklavvya platform, they conducted more than 15,000 proctored exams in 3 weeks' time. East Africa University received positive feedback from the students about the simple user interface and the overall smooth experience of attempting online exams remotely from their home.	Essilor North Gujarat University	English Hindi Spanish Arabic Tamil	Link: Eklavvya, 2022
Eskadenia Software/ESKA Academia (Jordan)	Eskadenia Software provides fully integrated software packages to educational institutions; for example, ESKA Schools and ESKA Universities offer e-learning platforms with online examination systems.	N/A	N/A	Various schools and educational institutions in Jordan and the MENA region utilise ESKA Academia solutions for e-learning and e-assessments.	Maintrac IBM Oracle Amman Academy Al Bayan School	Arabic English	Link: Eskadenia, 2022
Examity (US)	Examity offers online proctoring services, with options for live or automated proctoring (using AI). Features for the live proctoring option include: live ID authentication, reporting and analytics, and real-time support. Examity offers a Premium automated option that includes a human audit after the testing session is completed.	500+	Live proctoring (per exam): USD 25 Automated proctoring (per exam): USD 10	The Limerick Institute of Technology (LIT) in Ireland used Examity's live proctoring option to administer exams during Covid. "Some LIT programmes have requirements to fulfil from external regulating bodies for accreditation purposes, and staff were reassured that Examity provided highly secure live proctoring for online exams."	DuoLingo CollegeBoard Kaplan Indiana University	English	Examity is able to record a student's activity via their laptops during an exam session. These include eye and body movements. Examity is also able to access students' computers, monitor IP addresses, record video, audio, and prevent switching of tabs. Link: Examity, 2022

* Subject to change based on available bundles

Company / software	Brief description	Number of customers	Cost information*	Example of use	Partners and customers	Supported languages	Additional notes
ExamSoft (US)	ExamSoft is a provider of assessment software for on-campus and remote programs, providing e-assessment solutions to efficiently create, administer, grade, and analyse assessments. It aims to support data-driven assessments to increase learning performance for every student, teacher, and institution.	N/A—2,100+ programs worldwide	N/A	Alfaisal University in Saudi Arabia and Mohammed Bin Rashid University Of Medicine and Health Sciences (MBRU) in UAE adopted the ExamSoft software for their assessments in 2016 and 2017, respectively. This was part of an effort to digitise their assessments and limit paper-based exams; the institutions were well-prepared for remote exams during COVID-19 lockdown.	Alfaisal University MBRU, UAE	Multiple languages including Arabic and English	Link: ExamSoft, 2022
Examus (US)	Examus focuses on AI initiatives for online education. The company offers remote proctoring that includes features such as user authentication and cheating detection. Ministries of Education and universities can use Examus as a white-label online proctoring solution that will allow them to create their own proctoring centre.	150+	Three pricing models are available: pay as you go, SaaS, licensing.	In the Middle East region, Examus provided proctoring services for pre-employment and scholarship exams for a major petroleum company. They also have run a series of K-12 pilot projects in the region.	SwiftAssess Microsoft Pan Africa Skills & Consulting Ltd	Arabic English Russian Spanish	Examus' patented monitoring solution is integrated with testing platforms and learning management systems such as Moodle and OpenedX. It works with 100+ universities in Eastern Europe; in North America, Examus AI proctoring is used for pre-employment tests and corporate staff training. Link: Examus, 2022
iMocha (India)	iMocha offers AI-powered digital skills assessments that are customizable and available in a user-friendly format. In addition, the software can track instances of a candidate's suspicious activities with real-time image, video and audio proctoring. The software activates the candidate's webcam and captures images periodically during the test using AI (based on Microsoft Azure Face API).	850	USD 150 Month/starter USD 500 Month/enterprise	Chegg, an online textbook and tutoring company, partnered with iMocha to map course content with iMocha's skills library and add skills assessments to their repertoire. iMocha thus helped Chegg to identify job-ready candidates and place them at leading companies, bridging the gap between graduates and employers.	Hexaware Fujitsu Coupa World Food Programme	Multiple languages including: Arabic, English, French, and Spanish	There are over 1500 ready skills assessments available. All assessments have been validated by subject matter experts (SMEs) around the world. Link: iMocha, 2022
mElimu (India)	mElimu provides both a learning management system (LMS) and an online examination/proctoring solution integrated with AI-powered tools. Features include: an online exam designer, AI face recognition, lockdown browser, random ordering of pages/questions/choices, etc.	500+	N/A	Futures Language Schools (FLS), a chain of private schools in Egypt, uses mElimu as an LMS.	University of South Africa BUC Cairo Egypt Futures Language Schools Young African Leaders Initiative Network (YALI)	Multiple languages including: Arabic, English, French, and Spanish	Over 1.2 million exams have been conducted with mElimu (live video monitoring; AI is used for identity verification). Online tests can be run on mobile phones as well. Link: mElimu, 2022

* Subject to change based on available bundles

Company / software	Brief description	Number of customers	Cost information*	Example of use	Partners and customers	Supported languages	Additional notes
Mercer | Mettl (India)	Mercer | Mettl offers an online examination platform, AI-based and human-based proctoring and online certification software. In the Middle East, they work with universities, institutes and organisations such as: Jordan Hospital, Emirates Institute for Banking & Financial Studies, Gulf University, and National Open University of Nigeria.	6000+	N/A	The Center for Educational Measurement, Inc. or CEM, in the Philippines provides nation-wide testing services for the evaluation and assessment needs of private and public education sectors. Mercer | Mettl enabled CEM to administer a high-stakes exam (the National Medical Admission Test or NMAT) online. Mercer | Mettl conducted over 20,000 assessments across 7,641 islands in the Philippines.	National Institute of Advanced Studies Manav Rachna University Shiv Nadar University	English Spanish German Portuguese Indonesian French	The software can be deployed in web, cloud, SaaS, and mobile across both iOS and Android services. Link: Mercer | Mettl, 2022
MKCL Arabia Ltd (Saudi Arabia)	MKCL Arabia Ltd is a joint venture company established between International Company for Education and eLearning (ICEEL), Saudi Arabia and Maharashtra Knowledge Corporation Ltd India (MKCL India). It offers products that include online courses and online examinations. For the latter, the exam system can be hosted online, partially offline or offline.	N/A	N/A	MKCL and TETCO (Tatweer for Educational Technologies) collaborated with the Ministry of Education in Saudi Arabia to develop the Ekhtibar online examination platform. It is installed on the MoE's Cloud to conduct online exams for two million students daily and 400,000 concurrent users. The MoE launched the system officially in September 2021 after conducting a full load test, penetration test, and integration with Madrasti e-learning platform. In 2021, more than 10 million online student exam sessions were conducted successfully.	TETCO INSPIRE King Faisal University King Saud University Alexandria University	Arabic English	Link: MKCL Arabia Ltd, 2021
Pearson VUE (UK)	Pearson VUE offers computer-based testing for high-stakes certification and licensure exams in the healthcare, finance, information technology, academic, and admissions markets. OnVUE online proctoring by Pearson uses ID verification, face-matching technology, and a live greeter.	N/A— in 180 countries	N/A	In December 2020, Pearson VUE launched the 'Pearson Undergraduate Entrance Exam for Engineering' across India. This exam is already recognized by more than 100 private universities across India. Students can take their exam in person at a Pearson VUE Authorised Test Center or at home via Pearson VUE's online proctoring solution, OnVUE.	Microsoft Apple Adobe Oracle Kaplan QLTS	47 languages available	Link: Pearson VUE, 2022
ProctorExam (Netherlands)	ProctorExam is one of the leading online proctoring services in Europe. It is adaptable to different assessment contexts including: high stake exams, professional certifications or recruitment processes. ProctorExam offers three monitoring options, ranging from screen-sharing to a 360° view of the candidates' workspace using their smartphones.	N/A— in 25 countries	N/A	In the Middle East, ProctorExam works with AL-ARABIYYA-INSTITUTE, a global provider in Arabic language testing, on their certification exams. ProctorExam is also partnering with Strategy Directives, an organisation providing learning programs in the MENA region.	University of Amsterdam ProtOS Educational Solutions Surpass RemindoTest France Université Numérique	Multiple languages available — ProctorExam includes an automated translating feature to provide a choice of languages to candidates.	"ProctorExam , the largest online proctoring company in Europe and the global leader in flexible SaaS proctoring technology, enables more than two million home exams during COVID-19." The ProctorExam mobile app only has 1.1 stars on the app store. Link: ProctorExam, 2022

* Subject to change based on available bundles

Company/ software	Brief description	Number of customers	Cost information*	Example of use	Partners and customers	Supported languages	Additional notes
Proctorio (US)	Proctorio offers remote proctoring software with services across identity verification, automated and live proctoring, plagiarism detection, lock down and content protection (to avoid exam questions being posted outside of the assessment platform)services.	2,000+	USD 5 per test per student	N/A	Microsoft Edge University of British Columbia (UBC	Multiple languages available —"Proctorio can interpret multiple languages by checking the source language of the submitted assignment and then translating it"	Proctorio experienced 900% growth in exams proctored from April 2019 to April 2020 (partly due to Covid). In 2020, Proctorio received criticism from students and others over data privacy concerns. Link: Proctorio, 2021
ProctorU (US)	ProctorU provides online proctoring services for colleges, universities and certification organisations. Their most secure option blends technology with human supervision; this includes "a live proctored launch, continuous monitoring, active proctor intervention to stop suspicious behaviour, comprehensive reporting and more."	1,500	USD 15 to USD 30 (per exam) depending on the length of the exam	Georgia Southwestern State University has used ProctorU since 2013. GSW selected ProctorU based on its human-based proctoring; "our students receive the help they need from a real person at ProctorU, and a lot of the other proctoring companies don't do that."	Andrew Jackson University The University of Notre Dame California Southern University University of Florida Northwestern University	English	Link: ProctorU, 2022
Qorrect (Egypt)	Qorrect provides digital assessment solutions for educational and business institutions through a comprehensive e-assessment management system.	N/A— 120K users	N/A	In 2021, Ain Shams University in Egypt adopted Qorrect's e-assessment system across all its faculties in an effort to fully digitise its examinations.	Ain Shams University Cairo University Misr University for Science and Technology	Arabic English	Link: Qorrect, 2021
Talview (US)	Talview caters to educational institutions to conduct online exams with capabilities such as: secure exam browser, live/recorded online proctoring, integration with popular LMS tools. Talview supports various examination formats, including aptitude tests and essays. Talview Proview Live Proctoring combines the power of AI-enabled automated proctoring with active human monitoring and intervention.	N/A— in over 120 countries	USD 500 per user/month	The Thunder Bay District Health Unit (TBDHU) in Canada worked with Talview to transition from in-person to online certifications, while maintaining exam integrity and reducing operational costs substantially. TBDHU now has a 100% virtual certification process that allows test-takers from across Canada to get certified remotely.	The School District of Philadelphia Microsoft IBM Psymetrics Linkedin Talent Hub	English Spanish French Hindi Italian Portuguese Romanian	Link: Talview, 2022

* Subject to change based on available bundles

Company / software	Brief description	Number of customers	Cost information*	Example of use	Partners and customers	Supported languages	Additional notes
Syrian Educational Publishers (Syria)	Syrian Educational Publishers has supported numerous projects on the digitalization of education in the MENA region. Syrian EP offers an assessment platform that is currently being used for lab-based online high-stakes exams. Test takers, test centres admins, and proctors are assigned to test centres; at these test centres, proctors have access to monitoring dashboards. The platform offers features such as: Auto-scoring for closed item types, question editor, creation of multiple versions of a test through blueprints or test maps.	N/A— Syrian EP operates in 12 countries in the MENA region	N/A	N/A	Ministries of Education Chains of schools Universities	English Arabic	Tests could be administered through the platform. But also, if desired, as paper based. When computer based the delivery has the following benefits: - Tests can be scheduled for a group of test takers at determined times. - Test centres and sub-test centres can be created to reflect the physical distribution of test deliveries in different locations. - Test takers, test centre admins, and proctors are assigned to test centres, and proctors have access to monitoring dashboards. - Test centres admins and proctors can control the delivery session for a group or for individual test takers.
Madrasa E-Learning (UAE)	Madrasa is an e-learning platform that provides Arabic language educational content and videos for subjects like science and mathematics. The platform includes a Learning Management System (LMS) that encompasses learning materials, online lessons, quizzes and group work (note that high-stakes exams are not included in this scope). Madrasa is part of the Mohammed Bin Rashid Al Maktoum Global Initiatives (MBRGI).	N/A— Available to over 50 million Arab students	Free	N/A	Zayed University Microsoft Teachers Association — UAE UNESCO	Arabic	UNICEF SCO is in regular contact with this organisation. In partnership with various MoEs, Madrasa is exploring a Digital Classroom option for children to obtain a digital classroom certificate, which has academic value and will be recognized for re-integration into public schools. Link: Madrasa, 2022

* Subject to change based on available bundles

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For information on the data in this concept note, please contact:

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