



itcc

IT CERTIFICATION COUNCIL

**REMOTE PROCTORING
TRENDS**

AN IT CERTIFICATION WHITE PAPER
FOR MEMBERS ONLY

Introduction

In 2016, the IT Certification Council took on an ambitious project to “document the pros and cons of remote proctoring, interview IT certification organizations regarding their experience with remote proctoring, and provide considerations for those exploring the adoption of remote proctoring.” This work was completed by interviewing IT certification organizations who had implemented remote proctoring in some way at that time. The report also provided key takeaways and a checklist to be used by organizations to evaluate whether or not remote proctoring would be a fit for their organization.

Since that time, remote proctoring has become nearly ubiquitous in the IT certification community. Most programs now offer some version of this delivery method in their credentialing portfolio of delivery options, while others have begun delivering exclusively through this channel. Given this evolution, the IT Certification Council’s Securing Certifications Task Force felt it sensible to reexamine the topic in order to identify changes in the remote proctoring landscape and key developments that may continue to create future changes in these services.

Through this process, committee members interviewed ten organizations that included both proctoring vendors and IT certification organizations who are actively using remote proctoring. The focus of the interviews included the types of remote proctoring methods vendors are now offering, new evolutions in the space, lessons learned from continued work in remote proctoring, and potential changes on the horizon. The questions and a summary of the interviewee responses have been enclosed in this report.

For clarification of definitions, we cite this section of the task force’s previous report defining remote proctoring methods:

“Remote, or online, proctoring is the process by which a test taker is proctored live over the internet via a web camera rather than being proctored by someone in the same physical location. This model of remote proctoring is often called ‘live, remote proctoring’ to distinguish it from other models, namely ‘record and review.’ In record and review proctoring, a test taker may have contact initially with a remote proctor, but once the test starts, it is not monitored; rather, it is recorded and viewed after the testing session by a proctor.”

In addition, in the time since the initial report’s publication, several organizations have introduced fully automated proctoring methods driven by artificial intelligence (AI) and/or machine learning technologies. In some cases, these technologies have also been overlaid by traditional live or record and review remote proctoring as a supplement to human proctors.

ITCC would like to thank the individuals and organizations who participated in the interviews, (listed at the end of this document), along with task force members who spent their time creating the interview protocol, conducting interviews, summarizing the results, and delivering this report.

Contents

Section 1: Background and Experience	4
Section 2: Trends.....	6
Section 3: Security/Privacy Concerns	7
Summary	10
Acknowledgements.....	11
Disclaimer	11

Section 1: Background and Experience

Please describe the remote proctoring exam delivery method or methods you offer.

Most organizations interviewed provide one or more of these models:

- Live, remote proctoring – a remote proctor observes a series of test takers by looking at the test taker using their webcam(s), observing their desktop, listening to the audio feed, and/or other tracking methods (e.g., keystroke logging)
- Record and review – test sessions are recorded and the results reviewed at a later time
- Automated proctoring – test sessions are recorded and flagged only by AI/machine learning based technologies, without human monitoring or review
- Some organizations also offered test center solutions, event solutions, and one organization offered remotely proctored test kiosks. One organization offered an AI-based proctoring method using computer vision to reduce cheating by recognizing a pattern of a test taker looking away from the screen and then quickly answering as if from a cheat sheet or helper.

Differentiation included:

- Screen recording on or off
- Microphone recording
- Integration with a learning management system (LMS)
- Use of a lockdown secure browser
- Tracking of head/eye movement and facial expressions or whether the test taker looks away
- Authentication via mobile device (e.g., fingerprint)
- Biometric keystroke analysis
- Uses of AI

What observations were made when implementing and testing the method?

Interviewees identified several major themes: cheating, technology, and the test taker experience.

Several interviewed organizations see remote proctoring as a better way to identify cheating, especially sophisticated cheating methods, than in-person proctors. This can be attributed to the test taker-to-proctor ratio, as well as the ability to review a recording of a remote test taker. It should be noted, however, that there are still ways for cheating to occur, due to the limited scope of view of many web cameras.

Interviewees also revealed that no party within the relationship is immune from limitations due to technology:

- Test takers do not always have a computer that meets the minimum system requirements.
- The vendor's remote proctoring solution may not work with a test taker's preferred internet browser.
- External factors such as the computer network's bandwidth and latency can also provide significant obstacles.

A major emphasis for all groups interviewed is on the test taker experience. Taking a high-stakes exam is stressful enough, and vendors strive to make the experience as simple and

seamless as possible for the test taker. Vendors continuously work to address the test taker experience through:

- Ensuring the technology works across platforms
- Establishing and adjusting procedures for their proctors
- Retraining their proctors to be aware of the latest methods of cheating
- Implementing changes to ensure all test takers have the same experience regardless of the testing modality

Additionally, an emphasis is placed on informing test takers of what they will experience to reduce their stress level and increase their comfort level. Even as steps are taken to ensure satisfaction with the current process, vendors are looking ahead to future advancements like artificial intelligence and biometric technology.

Who develops the requirements/policies for the test-taking environment of the test taker during remote proctoring?

Throughout the course of this study, it became clear that every company adheres to their own set of rules in terms of test taker policies when taking an exam via remote proctoring. Further, most proctoring vendors provide clients significant leeway in how remote proctoring is implemented, ranging from check-in procedures, business rules related to security rigor, and how misconduct is addressed among others.

Policies and procedures for online proctoring are formulated from common practices seen during in-person proctoring. However, it is likely that requirements will continue to change as the industry matures. This can also vary between proctoring vendors based on their experience and areas of specialization.

Common policies for the online proctoring test-taking environment include: a clear desk with minimal to no visible materials (food/drink, pen/paper, electronic devices, etc.), a test area with no exposed learning materials verified by webcam, and a solitary space free from distractions and assistance. These requirements can differ and fluctuate by exam and certification program, depending on certification stake level and proctor-to-test taker ratio. They also have adjusted, as technology and experience have allowed certain environmental requirements to become more relaxed.

Ultimately, each organization has their own policies constructed from years of feedback and experience, with many options available to provide the best testing experience for the test taker.

Can you describe any special accommodations in your approach to remote proctoring and the challenges you have had?

In the IT industry, it is predominantly the certifying body that drives approvals for any accommodation. They work with the test takers, schools, or training programs and require varying levels of proof to justify the need for an accommodation. The requirements vary by program and the accommodation being requested. Some requests are handled on a case-by-case basis.

In the United States, the Americans with Disabilities Act (ADA) ensures that individuals with disabilities have the opportunity to fairly compete and pursue such opportunities by requiring testing entities to offer exams in a manner accessible to persons with disabilities. When necessary testing accommodations are provided, test takers can demonstrate their true aptitude. Similar regulations exist in a number of other countries globally.

Some vendors may also be required to comply with the WCAG 2.0 AA standards of the World Wide Web Consortium (W3C), Section 508 of the Rehabilitation Act, and the EN 301 549 accessibility requirements suitable for public procurement of Information and Communication Technology (ICT) products and services in Europe.

The most common accommodations involve adding extra/double time, the use of screen readers, and additional breaks during the exam. More unique requests include the use of assistive technologies (e.g., JAWS, Dragon), accommodations for visual impairment, color deficiency, and hearing impairment. Common features provided in these instances are:

- Ability to increase font size to at least 200%.
- High contrast of colors (e.g., greys swapped with blacks and always on a white background).
- All background images removed.

Another accommodation mentioned by remote proctoring vendors, although not related to disabilities, was offering tests in several languages. Some vendors employ proctors who are fluent in multiple languages.

Section 2: Trends

What are the three biggest changes in your remote proctoring in the last 2-3 years?

This question highlighted several trends, namely:

- Artificial intelligence
- Other technological enhancements, such as biometrics and facial recognition
- Creating a better test taker experience
- Increases in IT certification organizations' interest in using remote proctoring technology

The most significant change in remote proctoring in the last 2-3 years has been the implementation of artificial intelligence. AI is currently being utilized or piloted to assist with test taker check-in, aid in identifying suspicious behavior, and flag irregularities through data forensics. AI augments the proctoring process by flagging suspicious behavior for review by the live proctor or by the instructor or test owner in a recorded session. Some of the ways AI monitors test takers include:

- Voice recognition – ability to pick up subtle sounds in the environment like whispering
- Facial recognition – provides identity verification and ensures the same person sits for the entire exam. Also monitors for additional faces in the test environment.
- Pattern recognition – detects patterns of test taker behaviors that may indicate cheating
- Voice-to-text – transcribing verbal speech to text provides searchable data that the system can index and use
- Eye movement detection – detects patterns in eye movement that may indicate reading notes or viewing other unallowed materials
- Object recognition – detects additional objects or people entering the environment

As more and more exams are monitored with AI and machine learning, the systems are becoming smarter. The long-term vision of several interviewees is that AI systems will continue to learn and become smart enough to make judgements on the severity of its own findings.

Other advances in technology were also cited as notable, recent changes. Examples included biometrics and more advanced facial recognition technology to assist with verifying test taker identity securely and in line with privacy guidelines.

A major area of continued focus is the test taker experience. Newer technology is being introduced to assist with efficiency from the test taker's perspective and making the process more self-service oriented. Similarly, integrations to enable easier access to the remote proctoring experience, limiting the number of superfluous steps, and eliminating information (e.g., confirmation numbers) that needs to be recalled has also contributed to a smoother test taker experience.

Another notable change is the interest level in the solution among certification organizations, especially those in the IT industry. This is contributing to increased changes in remote proctoring organization's client bases – from predominantly higher education to a diverse set of credentialing and educational clients. Several credentialing organizations mentioned the value in test taker convenience provided by remote proctoring and moving out of a test center environment.

What cost implications have you seen?

In financial terms, the opinions are varied with the respondent's perspective. Certification organizations are more willing to encourage test takers to utilize the remote proctoring modality because test takers who have participated have responded positively to the experience. Scalability is a major consideration, as organizations are discovering the benefits of the wider reach that remote proctoring provides. Though the cost per test taker may decrease as adoption increases, vendors may find it necessary to invest in the new technology and incorporate it into their products.

While finances are always a consideration, one vendor noted that cost is not their clients' primary concern – scalability and geographical reach is. It should also be noted that the introduction of AI-based remote proctoring does have the potential to reduce remote proctoring costs; however, limited effects have been seen thus far.

Section 3: Security/Privacy Concerns

How do your security concerns with remote proctoring differ from other exam delivery methods?

High stakes exam programs must remain vigilant against common threats to their programs which typically include use of unauthorized materials, proxy test taking, and content theft. Offering a remote proctoring option does not eliminate these threats, but it does present different deterrents for each one.

In a test center environment, a human greeter traditionally handles the securing of cell phones and other devices, oversees the emptying of pockets, and ensures that the test taker only has what is allowed for the particular test they are administering. A modified version of this happens in remotely proctored sessions, but the proctor has a more limited view of the environment since the proctor has a more limited view through the test taker's web camera. Many interviewees expressed concerns that hidden cameras could be used, notes or other cheating aids could be concealed, and that ID verification would be less secure since both the test taker and the ID they present are being viewed over a remote connection. Concerns were also raised about the

ratio of proctors to test takers, how that varies by vendor, and how that may contribute to a higher risk proctoring scenario.

The risk of content theft was perceived to be lower in physical test centers than in remotely-proctored scenarios though exceptions to that perception exist. One certification organization offered that if a program operates with small item pools, a physical test center is likely a better option than remote proctoring.

Interviewees revealed that concerns around physical test center security are either not present or less of a concern with remote proctoring. Many test centers are independently owned and operated and are susceptible to content theft by dishonest owners or proctors. With remote proctoring, the content is displayed on the test taker's screen and the proctor or test taker has less opportunity to steal the content; although it should be noted that some remote proctoring vendors have their remote proctors view the test content as well. In a purely performance-based, remotely-proctored exam, the chances for a test taker or test center to steal content are greatly reduced since the content is displayed through a virtual environment.

How do you manage security objections over traditional exam delivery methods?

Offering remote proctoring as an option can increase the reach of a program, but may also create obstacle that must be addressed.

Taking an exam in a remote environment vs. a test center offers challenges to the test taker. In most cases, a clean work environment and a clean work area is required. Photographs, books, papers, people, pets, or other items are not allowed in the room. These restrictions can limit the audience for remote proctoring since not everyone has ready access to a distraction-free environment. Too many restrictions can cause dissatisfaction with the process and with the exam by extension. On the other hand, if organizations enforce too few restrictions, it can invite theft, proxy test taking, or other forms of cheating.

Accessibility, addressed in a separate section of this paper, came up as a potential challenge in remote proctoring. Vendors are required to provide accommodations to test takers with disabilities, but also must maintain the integrity of the exam content. The proliferation of accommodation technologies can make this especially difficult.

Has GDPR affected your remote proctoring services? In what ways?

Responses to this question differed among certification organizations and proctoring vendors. Most certification organizations reported no issues with GDPR compliance and deferred to the proctoring vendors to address compliance.

One proctoring vendor reported that they had no issues with compliance due to their already high level of security and privacy, but most indicated that they'd had to do some work for their service to comply with GDPR. The actual proctoring was largely unchanged, but proctoring vendors had to address these regulations in areas such as:

- Coordinated compliance efforts and appointing a compliance officer(s)
- Development to make it easier to delete personal data and general enforcement of retention policies and deleting data
- Improving privacy policies
- Verifying subcontractor compliance with GDPR
- Ensuring that all processes using personal data are documented
- Improving privacy training for proctors

- Providing a link for participants to access the vendor's data protection policies
- Automating responses to data subject requests (e.g., deletion requests) by participants
- Auditing employee access to personal data and restricting it to fewer roles

One vendor stated that GDPR had helped raise awareness of privacy concerns and might accelerate adoption of vendors who prioritized privacy. Another vendor commented that data privacy potentially slows down the adoption of online proctoring due to the need to be mindful of privacy, especially with varying privacy laws in different countries.

How do you protect digital and/or recorded imagery?

Most certification organizations depend on their vendors to protect all data from the testing session through review steps. An aspect of the approach is protection through encryption. Vendors rely on encrypting data at rest and in transit. Some vendors use proprietary methods to increase protection.

Another aspect of protection is the data retention policy and data deletion. The typical retention period is 30 days. Certification organizations can request a shorter (1-2 days) or longer (up to 1 year) retention. If cheating has been detected, data might be held for 2-7 years. One vendor even retains the data indefinitely for use in training its AI model (unless specifically requested by the client to have their information deleted).

Can you describe the process used to vet the proctors, if any?

Certification organizations rely on their online proctoring vendor to perform the critical task of vetting, hiring, and training proctors. Some organizations reported that their proctoring vendors could improve in this area and cited utilization of all offshore proctoring resources and that training could be improved. Others reported that all proctors become employees of the proctoring company.

Most remote proctoring companies use a multi-step selection process consisting of background checks, technical capability, and pre-hire assessments for ethics and customer service. For one vendor, once an individual passes this initial vetting, they move to formal interviews. If chosen, the candidate must complete an initial 6-week training process prior to proctoring. The training process includes desktop research, training videos, a shadowing process under an experienced proctor, and is capped off by proctor certification.

It is also important to note there is no industry standard for becoming a certified proctor, whether proctoring in person or remotely.

Do you perform regular proctor performance reviews?

Yes, across vendors, but there are a wide variety of ways proctor performance is reviewed. All online proctoring vendors report regular performance audits.

One vendor reports daily audits for a proctor's first 30 days. These audits are performed live by behaviorists who will join sessions to assist the proctor if needed. Audits are conducted to ensure both procedural compliance and to help identify nefarious test taker behavior. Once the proctor reaches a passing score percentage in both areas, they pass through to the regular auditing process. At that point, they are audited four times per month unless an error is identified. If a proctor makes an error (depending on severity), they are either coached or placed back in remedial training. Then the cycle starts over, requiring them to recertify after additional training.

Proctoring vendors also gather test taker feedback and monitor test taker satisfaction with the proctoring experience. Another vendor performs the same proctor quality audits for remote proctors as they do for their test center proctors, looking for anomalies and any required fine tuning of proctoring processes.

In automated proctoring scenarios, the human element (potential for error and/or bias) is eliminated. However, the proctoring vendor must then train the AI to ensure it is identifying suspicious behaviors correctly to reduce the number of false positives or behavioral flags requiring further review.

Summary

In the constantly evolving marketplace of certification testing, it is essential to remain aware of the benefits and costs of test delivery options to determine if, when, and how their use would be most beneficial for your certification program. It is overwhelmingly clear that online proctoring vendors are trying to stay ahead of the curve by implementing technologies and processes that continually improve the delivery, security, and customer experience. Test publishers now have several options for remote proctoring that can enable new market opportunities and provide additional delivery choices to their exam test takers. As customers, we must evaluate online proctoring vendors based on corporate and stakeholder needs and priorities including security, availability, cost, and candidate capabilities.

Performing updated interviews has proven to be valuable and informative. There are advantages and disadvantages to all exam delivery methodologies which must be considered and weighed. In just a few years, we have seen how online proctoring has proven itself to be a secure and viable option for exam delivery.

The near-ubiquity of high-speed internet connections and built-in web cameras have enabled exam delivery providers to offer advances in online proctoring technology at a rapid pace. Every innovation brings new challenges for content theft and cheating, and remote proctoring is not immune from these challenges. Test publishers and exam delivery providers must remain vigilant in the areas of exam and candidate security to ensure cheating and content theft risks are minimized. These can be addressed through the proctor-to-test taker ratio, data forensics, and artificial intelligence. Increased costs will always be a concern as new technologies are introduced. Exam publishers will need to weigh these costs against the increased reach and candidate satisfaction offered by remote proctored delivery.

Despite the myriad of benefits, online proctoring does not solve every challenge. There are still many parts of the world where high-speed internet is not widely adopted and remote proctoring is not a viable option. In the case of test taker needing special accommodation, they may not be able to take advantage of the benefits of this modality. From a cost perspective, some programs simply may not be able to afford online proctoring.

As we see the expansion of online proctoring throughout the certification industry, IT certification organization will clearly want to consider whether remote proctoring is a fit for their program and candidates.

Acknowledgements

The ITCC would like to acknowledge those who contributed to the development of this white paper. Without their hard work, through the writing of the paper, interviewing of those with experience in remote proctoring, and reviewing the content, this valuable contribution to the IT certification industry would not have been possible.

ITCC Chair: Kristin Wall Gibson, IBM
ITCC Vice Chair: Jim Lucari, HPE
ITCC Securing Certification Chair (2018-2019): Dr. Rory McCorkle, PSI Services
ITCC Securing Certification Co-Chairs (2019-2020): Liz Burns, Adobe
Kate O'Connor, Caveon

ITCC Securing Certification Task Force Members:
Chuck Cooper, Member Emeritus
Stephanie Dille, ProctorU
Elwood Fischer, National Instruments
Carey Hardey, VMware
John Kleeman, Questionmark
Janet Lehr, HPE
Graham Livingstone, TrueAbility
Dr. Alan Mead, Linux Professional Institute
Andrew Nickels, Microsoft
Lourdes Soler, VMware
John Sowles, Ericsson
Karyn Waller, Teradata

Interviewees:
Noor Akbari, Rosalyn.ai
Howard Eisenberg, Questionmark
Elwood Fischer and Nathaniel Letchford, National Instruments
Derrick Jensen and Peter Pascale, Pearson VUE
Dr. Rory McCorkle, PSI
Scott McFarland, ProctorU
Mike Olsen, Proctorio
John Sowles, Ericsson
Tyler Tu, Adobe
Steve Winicki, Examity

Disclaimer

This report is intended only to provide information on remote proctoring for IT certification organizations. Users of this report must carefully consider whether any given section or subsection of the document is applicable to their specific program or examinations. All information is provided “as is” and neither the ITCC, nor any of the participating parties, makes any warranty, express or implied, nor do they collectively or separately assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, product, or process described in this document. In no event will the ITCC be liable to any user of this report

for any decision made or action taken in reliance on the information in this document, or for any consequential, special, or similar damages, even if the ITCC has been advised of the possibility of such damages. The information in this report is provided with the understanding that neither the ITCC, nor any individuals who participated in the preparation of this document, shall be deemed to be engaged in rendering legal, technical, or assessment advice and services.



The IT Certification Council (ITCC) is a nonprofit organization committed to growing and promoting professional IT certifications. Its core purpose is to support the industry and their member companies by marketing the value of certification, promoting exam security, furthering innovation, and establishing and sharing industry best practices.

Founded in 2007, ITCC is a community of 40 of the most respected companies in the IT certification industry. Members have access to exclusive resources, collaborate with industry leaders, and engage in task forces working on initiatives to benefit the certification industry. Learn more at itcertcouncil.org.