



The Future of Online Testing

WHAT TO EXPECT AND HOW TO STAY RELEVANT

MEASURE
LEARNING

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Foreword

Internet-based testing has been used by credentialing organizations and higher education institutions for years, and remote proctoring has existed since around 2008. However, once a mere alternative to paper-based and in-person testing, online testing is now the dominant form of assessment.

That shift isn't surprising, given the recent changes we've witnessed in professional credentialing, higher education, and assessment. With these changes, those involved have begun to see online testing not just as an option but as an expectation—drawn to its flexibility, accessibility, and opportunities for greater reach.

Note: When we use the term “online testing” in this e-book, we’re referring to the combination of internet-based testing (IBT) and remote delivery.

Why Read This E-Book Now?

We've entered an era where understanding online testing is non-negotiable, but mastering its nuances is what will ultimately set you apart. Whether you're a beginner looking to grasp the fundamentals of online testing or a seasoned professional aiming to stay at the forefront, there's a lot to consider—and even more to learn.

We designed this e-book to be a valuable, impartial resource for exploring the future impacts and advantages of online assessment. It was **not** written to sell you any services or products. Rather, we hope to provide you with an objective view of the online testing landscape. Our goal is to help you—regardless of your role in the assessment industry—make well-informed decisions.

How Will It Benefit You?

This e-book offers a forward-looking perspective on the future of online testing. It covers a wide range of emerging technologies and societal trends, offering fresh insights into how these advancements may impact the assessment industry. With these insights, you can better anticipate changes and prepare for the future strategically, ensuring your assessments remain innovative and competitive.

Let's get started!

LEARN THE LINGO

- **Paper-based testing (PBT):**
The use of paper and pen to deliver tests
- **Computer-based testing (CBT):**
The use of technology to deliver exams as an alternative to paper-based testing
- **Internet-based testing (IBT):**
The administration of an assessment online, where test-takers complete it via an online application or platform
- **In-person proctoring:**
The supervision of a test by a proctor who is physically present in the same location as the test-taker
- **Online proctoring:**
The remote supervision, either synchronously or asynchronously, of tests delivered online
- **In-person delivery:**
The administration of a test at a physical, brick-and-mortar location
- **Remote delivery:**
The administration of assessments through online technology, allowing test-takers to participate from disparate locations





Introduction

In every industry, change is a constant—and the assessment industry is no exception, having seen major shifts in recent years. As the testing landscape evolves, our strategies for developing, delivering, and protecting assessments must keep pace as well. As a result, industry professionals may feel like they're in constant catch-up mode—always being reactive rather than proactive. But by staying updated on emerging trends and technologies, we can ensure that online tests remain relevant, fair, valid, and reliable.

Evolving Trends and Technologies

Leveraging Emerging Technologies

Technology and software engineering have long been key drivers of innovation in the assessment industry, and it's increasingly clear that they hold immense potential for progress in the future. In recent years, rapid advancements in technology and engineering—including artificial intelligence (AI), machine learning (ML), and generative content models—have been made. While we can't predict with 100% certainty what else will come from these advancements, we're already seeing trends that have opened our eyes to what the future could hold. Some of these advancements may feel like science fiction right now, but it's important to consider what capabilities may be on the horizon. Solution providers and programs that proactively embrace these changes stand to benefit significantly in both the near and the long term.

Let's explore why.

Adaptive Testing and Personalized Learning Experiences

Adaptive testing and personalized learning experiences have become increasingly important in online testing. Advancements in these areas in recent years have led product and engineering teams to explore ways to further enhance the adaptability of assessments, with a focus on integrating adaptive methodologies more deeply throughout the assessment life cycle—and improving the technology needed to do so.

Today, algorithmic testing methods like computer-adaptive testing (CAT) and linear on-the-fly testing (LOFT) are already being used to improve the security, quality, reliability, and efficiency of online tests. Moreover, exam programs, publishers, and solution providers are experimenting with generative AI (GenAI) to draft questions for review and refinement by SMEs. As algorithms continue learning over time, we expect fewer human resources will be needed to generate and safeguard test content.

Consider what an assessment may look like if a GenAI model is integrated into a delivery platform used to administer an online cybersecurity certification exam. As a test-taker answers questions about network security correctly, the model could instantly create a tailored case study question asking the test-taker to devise a security protocol for a specific type of cyber threat. This would test their understanding of the material and evaluate their practical problem-solving skills in an IT-specific context.

RELATED RESOURCE

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In every industry, change is a constant. The assessment industry is no exception.

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It's easy to think big about what the future could hold, considering all the advancements we've already made. But how will these advancements continue enhancing the testing process as their models improve? Will future testing platforms use sensor or biometric data to analyze test-taker emotions and engagement levels, providing insights to further personalizing their learning and testing experience? Will personal AI assistants be used through the education journey to create custom pathways? These are just a few scenarios that depict a future where technology not only assesses what we know but also understands how we learn, providing a deeply individualized educational journey.

Efficiency and Scalability

The world is changing fast, which means testing requirements are changing fast as well. Assessment technology must be agile enough to pivot at the same pace. This will pose challenges for product and engineering teams, but it will ultimately deliver significant benefits to both test-takers and test owners.

Let's look at automated item generation as an example. While this type of algorithmic technology has been around for years, the recent advancement in GenAI has opened the door to a potential revolution in test development and psychometrics. As we explored previously, AI systems can currently generate test items automatically, but they require a great deal of human involvement to ensure their accuracy, relevance, etc. In the future, though, we believe these systems will be able to produce a lot of diverse and complex questions with less human oversight, significantly reducing the time and effort required at this stage.

Automating certain aspects of the online testing process, such as scoring, has long enhanced the efficiency and scalability of assessments, especially for standard items like multiple choice, true/false, and dropdown select. Currently, machine learning (ML) algorithms are extending this capability to accurately score responses to short-answer or constructed-response items, helping program staff save time and reduce human error. In the future, this capability may be applied to more complex item types and assessment formats, such as objective structured clinical exams (OSCEs) and practical exams. When ML scoring models are integrated into a program's chosen exam delivery platform, test-takers may be able to complete an exam and receive their score through a unified interface more rapidly. That's a far cry from today's turnaround times, when scoring advanced exam formats can take days or even weeks.

Looking even further into the future, there may even be the possibility of leveraging quantum computing, which harnesses the principles of quantum mechanics to process information at speeds unattainable by traditional computers. This possibility could lead to near-instantaneous scoring and analysis of complex tests—even with an extremely large volume of test-takers. (We told you these predictions may sound like science fiction by today's standards.)

LEARN THE LINGO

Machine learning is a subset of AI that involves developing algorithms and statistical models that enable computer systems to improve their performance on a specific task. They do so through iterative learning from data, without being explicitly programmed.



Security and Integrity

Future technological advancements hold vast potential for test integrity and security. Algorithms can already be used during the proctoring process to monitor test-takers and detect unusual behaviors in real time. Eventually, however, we anticipate broader applications and enhancements in this area, potentially resulting in technology that's smart enough to monitor test-takers without human involvement.

Let's consider the potential use of predictive ML algorithms in future online test delivery. By assessing keystroke rhythms, typing speeds, mouse movements, and click patterns over multiple sessions, a comprehensive behavioral profile of a test-taker could be created. Then, any deviation by that test-taker during subsequent sessions could be flagged by ML models. For instance, if a test-taker typically types at a consistent speed with a specific pattern but suddenly changes this behavior, it could suggest potential proxy testing. Applying predictive ML like this could avoid invasive or intrusive techniques while still improving test security.

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Beyond test delivery and proctoring, there may be opportunities to use blockchain technology to securely store and manage test-taker data and exam results. This would provide transparency in the assessment process while maintaining individual privacy because the technology allows for the validation of data without revealing sensitive information. We could even imagine something straight out of a sci-fi movie: Using advanced biometric technologies—such as fingerprint recognition, webcam facial recognition, or even retina scanning—throughout the assessment life cycle. One day, these technologies could be used for everything from securing access to item banks to verifying the identities of test-takers.

RELATED RESOURCE

VIDEO: [Exam Security Solutions for an Evolving Industry](#)



Data Analysis

Emerging technology capabilities will bring forth an increasing ability to uncover deeper data analytics throughout the testing journey. For example, ML can already process and analyze vast amounts of data that were previously difficult or impossible to obtain, such as response times, answer patterns, and completion rates across various demographic groups. Continuing to gather data and train these algorithms will help solution vendors, program owners, and test administrators identify meaningful patterns, trends, and correlations—resulting in better strategic direction and decision-making.

Exam Access

With technology and AI-driven tools, we believe tests will become more accessible to people of varying demographics. One way in which technology is poised to do so is by broadening the range of devices that can be used to schedule and deliver online tests. For example, at some point, mobile devices will play a larger role in test delivery and associated portions of the testing process—but to what extent is still unclear.

Evolving Beyond Traditional Assessments

The past decade has ushered in a shift from questions based on rote memorization to those that require applying knowledge to real-world workplace scenarios or using critical-thinking skills to address complex problems. The goal of these questions (often called “innovative items” or “alternative items”) is to replace or supplement traditional, multiple-choice (MC) items, which have long been known to provide an incomplete and artificial representation of competence and practical application of knowledge. Historically, attempts to create innovative item types have been very expensive or proven ineffective. With recent technological advancements, however, the range of possible online test formats has expanded.

Assessing higher-order cognitive knowledge and skills is of utmost importance for many high-stakes exam programs. Specifically, program owners need to know how test-takers will perform when faced with real-life, on-the-job situations. These higher-order skills can be assessed through performance-based assessments (PBAs), such as objective structured clinical exams (OSCEs), oral assessments, and various low- and high-fidelity simulations.

In the future, we expect these non-traditional, skill-oriented assessments to leverage remote delivery and virtual reality technology. Currently, neither the technology nor the assessment industry is in a state to conduct OSCEs virtually, but we’ll likely get there as AI and VR capabilities advance. Already, we can envision immersive, realistic simulations where test-takers navigate complex clinical scenarios in a virtual environment. This leap in technology would not only enhance the assessment of higher-order cognitive skills but also bring a new dimension to remote proctoring and PBAs.

CONSIDER THIS

In the future, sentiment analysis—a natural language processing (NLP) technique that helps analyze and understand the sentiment or emotions expressed in text data—may be used to understand the emotional responses and feedback of online test-takers.



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The Potential Impact of Evolving Societal Values on Testing Decisions

Online testing trends are not solely influenced by technology and engineering; they're deeply influenced by societal shifts as well. How assessment programs respond to these shifts can affect their credibility, relevance, and effectiveness.

One clear example of this is the increasing focus on cultural competence in test development. Recent societal shifts toward greater awareness of diversity and inclusion have led program managers to scrutinize and revise their content to eliminate cultural biases. In doing so, they've improved test fairness while enhancing its relevance and credibility. Now and in the future, it's crucial to ensure tests are developed and delivered in ways that are representative, inclusive, and free from cultural biases.

Diversity, Equity, and Inclusion

As the world grows more interconnected, there will be a continued push to build diversity into test design and development processes while catering to the needs of neurodiverse test-takers. The key challenge will be creating tests that are globally inclusive yet still respectful of local nuances, ensuring everyone is fairly represented and evaluated. Beyond mere translation, exams will require cultural and contextual adaptation. At some point, technology may be advanced enough to initiate the process of standard setting across different languages, potentially using advanced language translators or ML to bridge linguistic and cultural divides more easily.

Additionally, we will likely be able to customize online testing and proctoring platforms to suit the specific linguistic and cultural contexts of different geographic regions. This may involve adapting the language, content, and functionality of the platforms to align with local norms, dialects, and cultural sensitivities, ensuring that the test delivery experience is accessible, relevant, and respectful of test-takers from various cultural backgrounds.

RELATED RESOURCE

ARTICLE: [Advancing Equity: The Latest in Testing Accommodations](#)



Ethics, Data, and Privacy

With the advent of new and changing technology, data security and privacy protocols will need to evolve to ensure test-taker data is always protected. As concerns about data privacy and ethical use continue to evolve, building trust will hinge on more transparent data practices and fortified security measures for exam delivery and proctoring platforms.

Microcredentialing, Stapling, and Badging

The boundaries between education and careers continue to blur as the demand for specific, job-related skills grows. In response, microcredentials—verified through online tests—are poised to fill the evolving skills gap, often by “stapling” them to traditional credentials or academic achievements. And since microcredentialing often involves continuous, smaller tests than traditional programs, its modular approach aligns well with online tests, which can be administered anytime, anywhere. As microcredentialing becomes more popular, online testing platforms need to scale in order to assess test-takers concurrently, even across various regions and time zones. Equally important, programs must also consider adopting a modular approach to accommodate this scalability effectively.

RELATED RESOURCES

ARTICLE: [5 Most-Pressing Questions Facing Credentialing Today](#)

GUIDE: [The State of Higher Education: Emerging Trends and Student Demands](#)



THE MORE YOU KNOW

Microcredentials have gained popularity not only for their educational value but also for their role in gamifying the learning process. On LinkedIn and other online platforms, learners can proudly display their digital badges as symbols of their achievements.



The Impact of Emerging Trends and Technologies on Current Strategic Decisions

Organizations that proactively embrace the emerging trends and technologies we've previously explored stand to gain a competitive edge, offer better test experiences, and ensure the continued relevance, validity, and reliability of their tests. Now and in the future, program owners should consider the following questions when weighing the impact of these changes:

- Are you allocating enough resources to research and integrate the latest technology solutions?
- Does your current staff possess the skills needed to harness these new technologies effectively? What training initiatives can you implement to ensure a seamless transition and proficient use of emerging tech?
- As you evaluate existing or prospective providers that use AI and ML in test development and/or delivery solutions, how can you work together to weigh the ethical implications? What measures are your organization and your solution provider taking to ensure fairness, transparency, and the elimination of biases in their AI-led processes?
- Are you effectively communicating with all stakeholders—including test-takers, program owners, exam administrators, IT staff, board members, executives, educators, and other relevant personnel—about technological shifts? How can you enhance your communication strategies to secure buy-in and address potential concerns?
- How can you ensure that your investment keeps you competitive and elevates the quality of your assessments? Have you considered pilot-testing new technologies before a full-scale rollout? What mechanisms do you have in place to identify challenges and collect valuable feedback during these phases?



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The assessment community must continue to embrace innovative solutions to meet evolving demands.
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Conclusion

The evolution of assessment has brought about exciting changes for credentialing programs, higher-ed institutions, test-takers, and solution providers. It's also significantly altered our understanding of best practices in testing, security, and psychometric methodologies.

As we reflect on these changes, it's clear that the assessment community must continue to embrace innovative solutions to meet these evolving demands. By viewing these advancements as opportunities—rather than barriers—to refine our resources and practices, we can continue to drive assessment forward and deliver better outcomes for everyone involved.



Wrap-Up

This e-book explores what the future of testing could entail—and what it might take to keep assessments relevant and competitive. Emerging technologies, including the omnipresent impact of AI, are shaping future capabilities in efficiency and scalability, personalization, test security and integrity, data analysis, and accessibility. These advancements, coupled with an even greater emphasis on inclusivity, are driving substantial changes in how assessments are developed and delivered.

Now, armed with this knowledge, the next step is yours. In Appendix A, you'll find a series of reflective questions and scenarios that will help you apply these newfound insights to your own program. Designed not just for contemplation but also as a springboard for action, these questions and scenarios challenge you to think critically about this new era of testing.

Appendix A: Discussion Guide

Now that you have a better understanding of the evolving trends and technologies impacting the future of the assessment industry, this part serves as both a summary and a practical guide.



Core Concepts and Key Takeaways

- Emerging technologies have introduced a wave of new or enhanced capabilities in AI, ML, automation, and more. While there are—and will continue to be—risks associated with these capabilities, they're poised to deliver numerous benefits throughout the assessment life cycle.
- A shift from traditional question formats to those requiring application of knowledge in real-world scenarios and performance-based assessments is underway. This shift presents an opportunity to make tests more personalized and secure.
- Diversity, equity, and inclusion are continuing to grow in prominence and importance, with increased focus on adjustments that can be made along the testing journey.
- The growing trend of microcredentialing and stapling as a way to bridge the career readiness gap aligns well with online testing's modular and flexible nature, especially when paired with digital badging systems.



Apply the Knowledge to Your Program

- Assess your program's readiness to integrate and leverage emerging technologies. Are your current resources and staff skills aligned with future technological needs?
- Reflect on the ethical considerations of AI and ML use in both the development and delivery of assessments. How can your program collaborate with solution providers to ensure fairness, eliminate bias, and avoid inaccuracies or legal issues as testing processes move to further incorporate AI and ML?
- Consider your current communication strategy for internal and external stakeholders. How can you inform them and engage with them about emerging technological changes within your program and overall industry?
- Think about the shift from traditional assessment methods. Are there opportunities to incorporate innovative item or assessment types into your program?



If you have any questions that this e-book hasn't answered, please contact us. We'd love to have a one-on-one conversation with you about online testing and proctoring.

GET IN TOUCH

Appendix B: Glossary of Terms

Agile Technology: Systems that are flexible, nimble, and capable of rapidly evolving or responding to user needs and market demands

Algorithm: A set of systematic, computational rules or procedures used to process data and make decisions

Algorithmic Bias: Occurs when an algorithm produces systematically prejudiced results due to erroneous assumptions in the machine learning process

Artificial Intelligence (AI): The simulation of human intelligence processes by machines, especially computer systems, used in various aspects of online testing

Assessment Life Cycle: The seven-stage process of designing, developing, administering, scoring, and evaluating assessments

Computerized Adaptive Testing (CAT): A method of testing where the difficulty of questions is adjusted in real time based on the test-taker's responses

Computer-Based Testing: The use of technology to deliver exams as an alternative to paper-based testing

Data Analytics: The process of examining datasets to uncover patterns, correlations, and insights; increasingly used in online testing for strategic decision-making

Data Forensics: The process of examining exam data to detect patterns of cheating, collusion, or other forms of misconduct

Digital Badges: Electronic representations of achievements or skills, often issued upon the completion of a course or assessment

Exam Delivery Platform: Technology used to administer, deliver, and manage online tests or exams; can be a native computer software application or an internet-based platform

Fairness: The equitable treatment of all test-takers, ensuring that the testing experience is free from bias and that every individual has an equal opportunity to demonstrate their abilities

Generative AI: A type of AI that can create content, such as test questions or scenarios, based on data inputs and learning algorithms

Innovative Item Type: A test item that differs from a traditional item type in its aim to assess a test-taker's critical-thinking skills and real-world or workplace application of knowledge

In-Person Delivery: The administration of a test at a physical, brick-and-mortar location

In-Person Proctoring: The supervision of a test by a proctor who is physically present in the same location as the test-taker

Integration: The process of combining different testing systems and components to function as a unified whole

Internet-Based Testing: The administration of an assessment online, where test-takers complete it via an online application or platform

Keystroke Biometrics: A technique used to identify individuals based on their unique typing patterns, including rhythm and speed

Linear on-the-Fly Testing (LOFT): A method of delivering tests where items are randomly selected from a pool of items during the administration of a test, making each test unique

Machine Learning: A subset of AI that involves developing algorithms and statistical models that enable computer systems to improve their performance on a specific task through iterative learning from data without being explicitly programmed

Microcredentialing: The granting of badges, certificates, or credentials to individuals who have completed a short learning course on a specific subject or skillset and passed a competency-based assessment

Multiple-Choice Item: An item that consists of a problem (stem) and a list of suggested solutions (alternatives), where the latter includes one correct or best option (i.e., the answer) and incorrect or inferior alternatives (i.e., distractors)

Natural Language Processing: A field of artificial intelligence that enables computers to understand, interpret, and respond to human language

Objective Structured Clinical Exams (OSCEs): Hands-on, practical exams used in health care to assess clinical skills and competencies when faced with a set of pre-determined scenarios

Online Proctoring Platform: Technology that facilitates the supervision of exams remotely, using various tools like webcam monitoring, screen sharing, recordings, and AI to ensure test integrity

Paper-Based Testing: The use of paper and pen to deliver tests

Performance-Based Assessment (PBA): A form of testing that requires test-takers to perform tasks or create responses rather than selecting answers from given options

Predictive Algorithms: Algorithms that use historical data to predict future outcomes, used in online testing for security and behavioral analysis

Psychometrics: The psychological theory or technique of cognitive measurement

Psychometrician: A person who is trained in the development, administration, and interpretation of tests

Reliability: The degree to which an assessment consistently produces stable and accurate results over repeated administrations

Remote Delivery: The administration of assessments through online technology, allowing test-takers to participate from disparate locations

Responsive Technology: Systems that can quickly adapt and adjust to changing conditions or requirements, often in real time or with minimal delay

Scalability: The ability of a system or process to handle a growing amount of work or to expand in order to accommodate that growth

Sentiment Analysis: The use of natural language processing to identify and categorize opinions or emotions expressed in text

Stapling: The practice of integrating industry certifications directly into academic programs or curricula; allows students to simultaneously earn academic credits and professional qualifications, thereby aligning educational outcomes with industry standards and job market requirements

Subject Matter Expert (SME): An individual with extensive knowledge and expertise in a particular discipline, often working alongside psychometricians to develop exam content that is technically accurate

Test Content and Metadata: The actual questions (or “items”) and related information in a test, including data about the nature and structure of the items

Validity: The extent to which an assessment measures what it intends to measure