



Educators Pave the Way for Next Generation of Learners

As educational assessments shift to outcome-based learning, providers must adopt new forms of test delivery to increase their global reach and provide ubiquitous services to a new student population.

Executive Summary

Educational assessments continue to evolve at warp speed. In fact, the landscape is transforming before our very eyes into a set of digitally guided activities that are increasingly actionable, outcomes-oriented (i.e., results unified with instruction) and able to facilitate students' continuous learning.

Moving forward, educational assessments need to deliver richer and more predictive results that can inform educators of an individual student's learning patterns and abilities, as well as growth potential and related attributes. Moreover, when coupled with advanced analytics, these instruments can advance pedagogy and enable student success. As such, the next generation of educational assessments must move from evaluating "how much," to "how to succeed," and operate not as a one-time-only event but as a continuous developmental aid in a student's educational life.¹

Parents and educators, however, still favor formative over summative assessment. And, many contend that these instruments should include life-skill assessments (i.e., problem-solving, criti-

cal thinking, creativity, collaboration, innovation etc.), which will not only broaden the assessment but also provide frequent results for early and continuous corrective action. The ongoing shifts from traditional to future assessment are summarized in Figure 1 (page 2).

Technology innovations and advancement have introduced the possibilities of alternative assessments through better use of information literacy, social media and ubiquitous access. Together, these developments will lead to more qualitative and less time-consuming assessments. Platforms of the future will need to provide holistic assessments while embracing SMAC Stack™ technologies, such as cloud computing, to reduce deployment costs and meet the millennial learner's need to take assessments anytime/anywhere. We conclude with a way for educational institutions to move forward with continuous data-driven insights to improve learning outcomes.

Forces of Change

Classrooms today are overwhelmingly digital and virtual. In fact, 89% of high school students now have access to smartphones or devices, and 46% of teachers use videos in the classroom.² As the



Education Assessment Transition

Traditional Assessments	Future Assessments
✗ Occurs at the end of the learning stage (summative)	✓ Occurs throughout the learning process (formative)
✗ Measures knowledge level	✓ Measures what's required to be successful
✗ Assesses subject-matter knowledge	✓ Measures subject knowledge plus life-skills adaptability
✗ Is based on student output	✓ Is outcome-based for students
✗ Does not help in decision-making	✓ Helps in triggering decisions
✗ Is an end phenomena	✓ Is a fulfilling journey throughout
✗ Can be a negative and stressful experience	✓ Can be encouraging and positive

Figure 1

teaching-learning process changes to accommodate this transformation, the role of assessments is also evolving. Formal educational assessments are no longer constrained to the measurement of learning but are used to evaluate improved learning outcomes.

According to a survey by the Northwest Evaluation Association (NEWA),³ 84% of parents and teachers feel that frequent and formative assessments help to actively engage and guide the student through individualized instruction. Providing immediate performance feedback to

students helps to course-correct, leading to improved annual outcomes and greatly reduced stress for both learners and administrators.

When properly deployed, technology can improve every step of the assessment process, starting with test development, rendering and scoring, through reporting and results analysis.

Adaptive learning design is now driven by assessment outcomes; hence, every step of the assessment value chain (see Figure 2, next page) is undergoing a radical transformation.

- **Test development:** The interface for test construction integrates content from multiple sources and knowledge/item banks. Such a system will allow users to build adaptive tests

with not only text but also videos, images, audio and other stimuli to enable testing of key competencies.

- **Test rendering:** As learning is now modular, with an anytime-anywhere approach, so is testing. Mobile assessment applications allow formative and personalized testing, to support meaningful intervention in the learning process. Leading mobile device manufacturers are customizing devices to support virtual learning and testing. Massive open online courses (MOOCs) now can support testing of large numbers across the world by utilizing cloud technology. Already, millions of Khan Academy students, educators and self-learners around the world access this type of learning environment.⁴
- **Scoring:** With the use of technology-enhanced items to test skills and aptitude, scoring is no longer a matter of numbers, grades or rubrics. Users need increasingly flexible systems of scoring to measure and rate quality across multiple parameters, which can then be analyzed for learning outcomes. In the U.S., state adoption of Smarter Balanced Assessment Consortium (SBAC) and Partnership for Assessment of Readiness for College and Careers (PARCC) will require new scoring scales and guidelines and eventually artificial intelligence-based scoring capabilities for open-ended response types.
- **Reporting and analysis of outcome:** In addition to tracking progress, one of the biggest benefits of frequent formative and

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The Assessment Value Chain

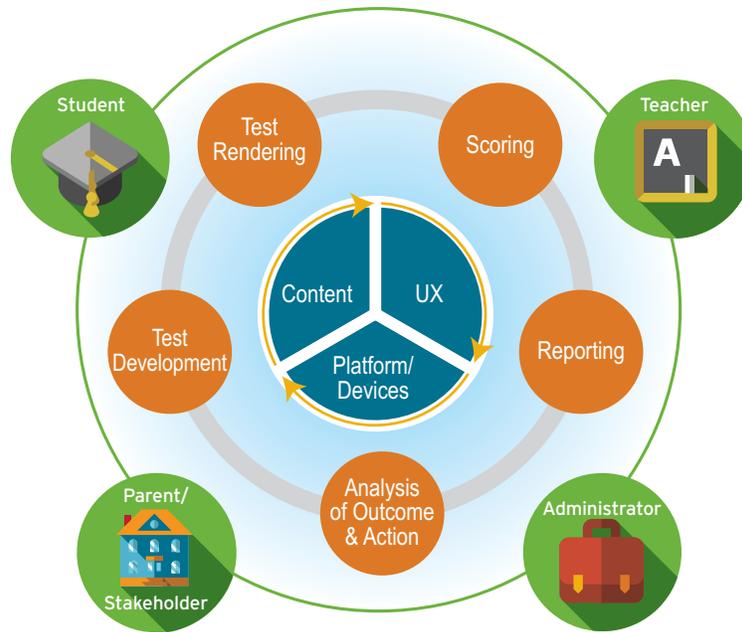


Figure 2

online assessment systems is to gain insight into the learning process through collection and analysis of performance data. Big data and learning analytics will give institutions the predictive tools they need to improve learning outcomes for individual students.

Various kinds of data can be reported and analyzed:

- **Who?** This includes information about students, such as demographics, attendance frequency of logging in, and which parts of the assessment or application are being accessed. Rosters, grades, disciplinary records and attendance information are all examples of system-wide data that could be stored about the users.
- **What?** What are the concepts and skills being tested? What are the benchmarks for testing? What are the expected learning outcomes, and the results or scores?
- **How?** How do students perform on skills and concepts? How is the performance measured against a benchmark and average?

The who, what and how, in our view, needs to be combined with empirical and social data. We call this the learner's "Code Halo,"™ which can redefine the credentialing landscape through insights from future assessment systems.⁵

Advancing Educational Assessments

Our Education Practice can help learning institutions build and support key assessment platforms and events that involve high student traffic. Our expertise spans core assessment processes, from marking, grading and related knowledge in center administration and management, through courses, certifications, enrollments and results processes, among other capabilities. Our adaptive approach to future-enabling assessment systems centers on:

- **End-to-end transformation:** We use best-of-breed and SMAC (social, mobile, analytics and cloud) technologies to design assessment systems of the future. As such, we address the forces of change in assessments by providing:
 - Advisory services for leveraging best-in-class technologies and processes for enabling transformation of assessment models:
 - » Review current state against industry trends and anticipated future-state capabilities.

Big data and learning analytics will give institutions the predictive tools they need to improve learning outcomes for individual students.

- » Define future-state processes based on the required capabilities.
- » Design the future-state technology platform/architecture.
- » Develop the implementation roadmap.
- » Implementation of the roadmap to enable future-state technology platforms and processes. Our expertise and success in implementing SMAC technologies can help to transform assessment delivery models.
- **Using analytics in assessments to attain better results:** Future assessment platforms are heavily dependent on analytics, which help build better formative assessment courses and provide better insights to academicians. Our Analytics Center of Excellence (CoE) helps clients develop analytics capabilities and drive a fact-based decision-making process. Add this to our experience working with leading assessment providers and enabling educational institutions with a fine-grained understanding of the products they use for assessments to deliver better outcomes for students.
- **Unique delivery models and technical expertise:** Our global delivery model allows us to tap best-of-breed expertise wherever it exists. Our structure allows us to integrate domain expertise with multiple technology centers of excellence to deliver the required capabilities. For example, our combination of domain and technology expertise helps clients understand the evolution and adoption of relevant industry standards, such as:
 - » Common Education Data Standards (CEDS) for student data exchange.

Quick Take

Transitioning and Transforming the Assessment Ecosystem

A major organization for higher learning in the UK wanted to update the assessment systems used by its international examinations group and not-for-profit partner organizations. The twin goals were to efficiently support an ever-increasing number of students and provide a better user experience.

This organization partnered with us to design a multi-directional and multi-dimensional technology transformation roadmap that included legacy application support services, enabling a new architecture for future scalability and proofing, and implementing a digitization strategy. Our accomplishments included:

- Streamlined processes and support for twice-per-year critical assessment result cycles, as well as 24x7 services that meet stringent SLAs and KPIs, resulting in increased user satisfaction.
- Support processes for 2.3 million new student enrollments twice a year.
- Effective management for over 100 of the organization's core mission-critical assessment platforms, up to 80 million tests annually while containing costs.
- Future direction, strategies and a roadmap based on the ongoing changes within the education and assessment field.
- Consulting services to revamp the assessment platform, including an integration strategy and implementation roadmap.

With the success of the engagement, the organization has retained us to transform its legacy assessment platforms to a next-generation assessment system using the SAP enterprise software suite.

As part of this initiative, we are providing a business process blueprint for computer-based testing, which requires a radical change due to growing demands from students, teachers and other educational bodies. The proposed model is in line with the future of educational assessments and includes anytime/anywhere assessments; simulation, interactivity and multimedia-enabled assessments; personalized and tailor-made assessments; automated exploration of student thinking; more in-depth investigations and diagnoses of individuals' misunderstandings and errors; and high-quality, timely feedback to learners to guide further action.

End-to-End Engineering Services to Sustain, Enhance Educational Assessment System

A major K-12 publisher in the U.S. needed to transform its strategic assessment platform to the next level of functional and technical maturity while maintaining total cost of ownership (TCO). The company asked us to deliver a full managed-services offering, with end-to-end product ownership and 24x7 production support to manage its back-to-school seasonal load of twice the typical number of transactions.

The scope became complex due to the simultaneous need to scale the platform to meet common core standards and state and district regulatory requirements, while promoting data-driven decision-making. As adoption of the managed service increased, the platform was enhanced, using the Agile development approach, to provide:

- A multi-tenant architecture hosting 542 individual sites.
- Coverage for 29 states, including 10,081 schools serviced 24x7.
- A faster and more engaging user experience.
- Full integration with third-party tools, such as GradeCam and DataScanner to automate scoring for paper/pencil-based assessments and to import test data.
- Intuitive interfaces for answer sheets, item banks and summary assessments to generate standards-aligned assessments.
- Improved content publishing tools.

We provisioned a multi-disciplinary, integrated service delivery team, including business consultants delivering domain thought leadership; infrastructure and technology architects validating and enhancing the core technology backbone; centers of excellence for interactive and user experience; and data analytics to support dashboards, student profile reports and longitudinal reports.

As a result of us managing the entire product management lifecycle and releases, the organization reduced TCO by 40% within 18 to 24 months. It was also able to seamlessly conduct experimental pilots to test in-the-classroom formative assessments compliant with PARCC and SBAC.

- Common core standards to ensure all K-12 students have the necessary skills and knowledge in English language arts and mathematics.
- SCORM, Tin APIs and IMS standards that are changing the technical adoption of assessment and learning technologies.
- **Addressing scalability and performance needs:** Given the increase in student volume and seasonal spikes, there is a need for assessment platforms to be scalable to meet performance requirements. Our Performance Architecture Consulting and Engineering (PACE) Practice helps educational institutions to assess and certify the performance of existing assessment platforms and understand whether these systems will scale to meet their future needs. Our architecture assessment offering provides a short-term analysis of existing assessment platforms and includes a report chronicling their current state, along with a multi-phase recommendation for remediation. We also provide a flexible capacity model that manages peaks and valleys in the needs of assessments providers to scale up application support resources to coincide with the seasonal cycles of examinations and results.
- **Creating mobility-based assessment platforms:** Our cloud and mobile solutions practices enable education service providers to create highly interactive multimedia test content on scalable cloud technologies and seamlessly render it to a wide variety of mobile platforms. For mobile devices, we understand the need to adopt user interface concepts, such as responsive Web design (RWD), to provide a better user experience. Leveraging our digital design services organization, we help service providers build intuitive user

experience capabilities for their platforms. In addition to this, our partnership with niche education technology providers allows for the conceptualization of solution accelerators and frameworks that can help stakeholders across the educational value chain adapt successfully with new age assessment platforms.

Looking Forward

Educational assessment providers must embrace the transformation of the assessment lifecycle, from process design and technology implementation, through ongoing support services. To do this, we offer the following recommendations:

- Build platforms that provide holistic assessments that meet millennial learners' needs for life-skill assessments.

- Implement technology that can improve every step of the assessment process, starting with test development, rendering and scoring, through reporting and results analysis.
- Embrace SMAC Stack technologies, such as the cloud, to reduce deployment costs, deliver assessments anytime/anywhere on any device, supported by continuous data-driven insights to improve learning outcomes.
- Manage the complexities of multiple technologies by adopting optimized service models for improved service to an increasingly globalized user community.

Footnotes

- ¹ Jannette Elwood and Valentina Klenowski, "Creating Communities of Shared Practice: The Challenges of Assessment Use in Learning and Teaching," *Assessment and Evaluation in Higher Education*, Vol. 27, Issue 3, pp. 243-256, 2002, <http://eprints.qut.edu.au/9318/>.
- ² "Speak Up" survey, which polled hundreds of thousands of teachers, students, administrators, parents and community members about technology trends in education, presented at the FETC 2014 Conference.
- ³ "Assessment Perceptions Survey, 2012," North West Evaluation Association (NWEA).
- ⁴ "The Khan Academy Scales and Simplifies with Google App Engine," Google, <https://cloud.google.com/files/KhanAcademy.pdf>
- ⁵ For more on Code Halos, see "Code Rules: A Playbook for Managing at the Crossroads," Cognizant Technology Solutions, June 2013, <http://www.cognizant.com/Futureofwork/Documents/code-rules.pdf>, or read our book *Code Halos: How the Digital Lives of People, Things, and Organizations Are Changing the Rules of Business*, written by Malcolm Frank, Paul Roehrig, Ben Pring, John Wiley & Sons, April 2014.

About the Authors

Venkat Srinivasan is Cognizant's Education Practice Lead. He has over 20 years of experience in business strategy, innovation and operations in the education industry. Venkat's areas of interest and research include higher education, online learning, student retention analytics and emerging technology disruptions for schools and universities. He earned an M.B.A. in global business from Georgia Tech. Venkat can be reached at Venkatraman.Srinivasan2@cognizant.com.

Joydeep Sinha is the Consulting Lead for Cognizant's Education Practice. He has seven years of professional experience and is responsible for developing the company's consulting capabilities in the education domain across sectors such as higher education, assessment, training and digital publishing. Joydeep has also worked with leading education publishers and new media customers across various geographies, including the U.S., UK, Singapore, China and the Middle East. Joydeep received his M.B.A. degree from the SP Jain School of Global Management. He can be reached at Joydeep.Sinha@cognizant.com.

Subhasis Sen is a Delivery Lead in Cognizant's Education Practice, overseeing the delivery of services for multiple clients across the globe. Subhasis has worked with numerous clients in supporting and building learning solutions in the areas of assessments, learning management systems and student information systems. Subhasis's interest areas include adopting new technology models to enhance computer-based testing services provided to students. He can be reached at Subhasis.Sen@cognizant.com.

Partha Sarathi Adhikary is Cognizant's offshore Education Practice Head. Partha has varied experience working with global customers to design, build and deliver IT solutions. He currently manages the delivery of services for Cognizant's education customers across the globe. Partha also oversees the construction of education solutions in the areas of student success, next-generation learning environments and institutional effectiveness. He can be reached at Parthasarathi.Adhikary@cognizant.com.

About Cognizant Education

Cognizant Education provides end-to-end IT-enabled services across the phases of planning, building and operating to address the challenges facing higher education institutions. Our solutions are fully integrated across strategic business consulting, enterprise architecture, design, development, implementation, maintenance and support, IT infrastructure, and business process outsourcing. Our solutions support the transformation of higher education institutions, including business and technology strategy and operations, data warehousing and business intelligence and next-generation learning solutions, to improve student success, institutional effectiveness and adaptive learning.

About Cognizant

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Cognizant

World Headquarters
500 Frank W. Burr Blvd.
Teaneck, NJ 07666 USA
Phone: +1 201 801 0233
Fax: +1 201 801 0243
Toll Free: +1 888 937 3277
Email: inquiry@cognizant.com

European Headquarters
1 Kingdom Street
Paddington Central
London W2 6BD
Phone: +44 (0) 20 7297 7600
Fax: +44 (0) 20 7121 0102
Email: infouk@cognizant.com

India Operations Headquarters
#5/535, Old Mahabalipuram Road
Okkiyam Pettai, Thoraipakkam
Chennai, 600 096 India
Phone: +91 (0) 44 4209 6000
Fax: +91 (0) 44 4209 6060
Email: inquiryindia@cognizant.com