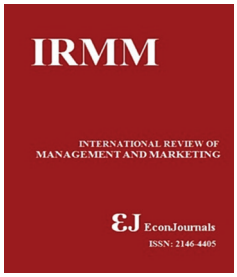

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Assessment Management in Higher Education

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ABSTRACT

This paper presents key findings from a study conducted with several universities in the GCC region regarding their approach and use of e-Assessment within their learning environments. The study identifies key factors that could impact the use and quality of e-Assessment, and describe how those factors could influence forming a consistent and effective approach to employ a long-term e-Assessment approach. Data was collected from several higher education institutions in the GCC region, using an online survey, in-depth interviews with academic administrators, and direct observation. The study identifies six critical factors that may have a direct or indirect impact on forming a consistent and effective approach to employ a long-term e-Assessment approach. Moreover, the study reveals a strong correlation between e-Assessment quality, and the centralization of e-Assessment strategy, e-Assessment administration, and e-Assessment Technology.

Keywords: e-Assessment, e-Learning, Education Technology
JEL Classification: M

1. INTRODUCTION

Quality assurance is not only a key accreditation standard, but also a fundamental process in any education institution. To remain viable and competitive, education institutions must make better decisions based on performance management in all critical strategic and operational functions, including the assessment of students' learning and attainment of course and program outcomes. Performance management is critical in the student-curriculum-faculty triangle, as it has direct impact on students' short-term, and long-term success, employability, retention, and subsequently resource optimization and overall return on investment for the institution (Daniel, 2015; Ahmed et al., 2023). Nstruction leaders at all levels are faced with crucial decisions and need reliable, updated and actionable information they can use best practices. This data usually is stored in various formats and through several information systems within the institution, but that data is either overlooked, underused, or otherwise not properly used.

Assessing student learning accurately is always a concern, such as matching reliable, valid, and appropriate learning assessment methods and tools to all course learning objectives; developing or selecting learning assessment tools that are appropriate, fair, and easily understood by both faculty members and students; developing or selecting learning assessment methods that Setting aside resources and time to develop new learning assessment approaches as it fits the student cognition and learning styles (Daniel, 2015; Phillips et al., 2012 and The OECD, 2005).

The e-assessment idea arose in response to these issues among other reasons including digital transformation in the education industry and the more recent COVID-19 pandemic which driven distance education, in addition to to achieve some of the inadequacies of the traditional pen and paper assessment modes. E-Assessment can be defined as means of the information technology for various purposes like evaluation of student learning and performance. Such could include the use of Web-specific tools, e-testing software, e-portfolios, polling, or simulation software. The application

of e-Assessment entails the use of digital devices to aid in the development, administration, storage or reporting of learner evaluation tasks, responses, grades and feedback (Crisp, 2011).

E-Assessment platforms simplify the process of submitting, grading, and analysing assessment results. By means of the assessment software, instructors can create various question types inside the platform or select from the already created questions. These scores can be sent to students and then they are marked automatically. As the main mission of many assessment software products is to deliver conventional tests and exams, there are platforms that provide extra assessment methods for the students, such as getting live feedback from the students or allowing them to collect portfolios for their teachers grading (Reed, 2021).

The assessment software is in use by educational institutions, corporate HRM, certification authorities, and other organizations which require to conduct assessments (Ivanova, 2020). Though the use of e-Assessment in higher education is a relatively new practice and research area, there has been steady growth in the number of institutions adopting it. E-Assessment is employed to collect and analyze student performance data and to look for any correlations between activities and learning outcomes. The type of data obtained will vary from one institution to the other, and from application to application, but at a general level, it involves the results of the assessments from student exercises and activities (Yas, 2021). The types of analyses performed are different but it depends on the new approach which the evaluation of historical student data to create predictive models of successful and at-risk students that are presented visually to facilitate fast understanding of the results (EDUCAUSE, 2011).

Unlike assessment software products, which are often standalone tools that can be used independently and can produce results that are triangulated, they can work together with other types of software like learning management systems. Some of the features which education software may have in common consist assessment and testing, template creation, custom assessment, administration, online assessment, identity authentication, locked browser or tab, behaviour monitoring, team based test, scoring, feedback, online, computer, tablet and smartphone access, privacy and data security, analytics, dashboards, and reporting, certification management, and integration with student information systems (Ivanova, 2020)

For the past two decades, universities have been implementing various e-assessment systems. As a second example, it can be mentioned that since 2012, the global investment into LMSs has arisen by 52%, (21% in 2014) and it is currently more than $2.5 billion dollars annually. Nine out of ten American institutions use one of the top five LMS vendors. Blackboard has the largest market share with 42% (Lang and Perani, 2014). The transformation of LMSs from learning environment software suites into tools that are used by universities to write intelligent electronic coursework and to deliver that coursework with high-reach and flexibility is one of the main reasons for the growth (Phillips et al., 2012; OECD, 2005). In accordance to a research (EDUCAUSE, 2011), 15% from campus-based schools in U.S. are planning to change their LMSs within the next 3 years, and they want others to have features such as analytics especially for outcomes assessment and program reviews. Furthermore, e-assessment is not only for academics, it can be also administrative (EDUCAUSE, 2013).

There are advantages to e-Assessment, including lesser cost than traditional exam, automation of grading, the ability to use anytime anywhere, immediate feedback to students, improved access to different groups, ability to use more tools and more approaches, data management, and better reporting. E-Assessment has its own challenges as well, including plagiarism, cheating, impersonation, and objectivity of assessment (Gambari et al., 2017). E-Assessment is a wide area for research in directions related to development of theories, models and practical solutions for flexible, adaptive, secure and intelligent e-Assessment systems. Given the importance of the role e-Assessment play in education performance management and decision making, the aim of this study is to identify key factors that could impact the use and quality of e-Assessment, and describe how those factors could influence forming a consistent and effective approach to employ a long-term e-Assessment approach (Ivanova, 2020).

Education institutions and other stakeholders in the education hierarchy, such as students, teachers, researchers, institutions, and government agencies, should take note of this study (Reyes, 2015). This research provides some insight into how e-assessment data may be used to assist university decision-making processes. Since e-assessment data is one of the main measures of student performance, it is significant because it provides a plethora of information that can assist universities in making more informed decisions about their performance, particularly with regard to curriculum, advising, and the success, retention, and employability of their students (Suhirman et al., 2014).

2. RELATED WORK

Both direct and indirect methods can be used to evaluate data on pupils' performance. The degree of student learning attained in relation to predetermined learning outcomes is ascertained through direct assessment. Assignments, tests, quizzes, reports, essays, research projects, case study analysis, and rubrics are examples of direct measurements. Indirect measurements, which include course evaluations, student surveys, course enrolment data, retention in the major, alumni surveys, job rates, and graduate school placement rates, are commonly used to assess the caliber of student learning experiences. Summative and formative assessments are two common terms used to describe techniques used to measure student learning. Summative evaluations are nearly always given at the conclusion of a course and are typically cumulative. On the other hand, formative assessments occur throughout the course and provide students feedback on how they performed in relation to other students in order to help them do better. Since a summative evaluation compares a student's performance to a predetermined learning outcome, it is inherently direct (Ivanova et al., 2018).

With the acceleration of digital transformation higher education, and the increased adoption of distance education following the COVID-19 pandemic, many education institutions have moved some, or all of their assessment activities online, not only for

transactional purposes, but also to be able to gain business intelligence "BI" and analytics out of the e-Assessment data for better decision-making. Business Intelligence describes the "technologies, systems, practices, methodologies, and applications used to analyse large amounts of data into meaningful information to support sound and timely decision-making (Chen et al., 2010; Marks et al., 2016; Williams, 2011).

Analytics is a part of business intelligence that offers a set of approaches that assist in finding trends in data and making decisions based on these trends to ensure the improvement of organizational performance (Wixom et al., 2011). Under this regard, e-Assessment analytics (EAA) may be considered as "electronic measurement, and analysis of students' records to reveal trends from patterns in data on learners' performance and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs (Long and Siemens, 2011). More widely speaking, EAA might be applied for improving universities' processes and workflows, for measuring academic data and institutional data, and for organizational effectiveness (Jones, 2012).

The advance of EAA started with the appearance of learning performance applications, for example, SunGard and Desire2Learn, and learning management systems entailing data specific to the organization such as the institution or the university (Brown, 2011). One major feature of EAA is the use of visualization in which the results of the analysis are displayed as graphs, charts, plots, diagrams, and dynamic analytical pictures for easy comprehension by the decision makers (Brown, 2012).

Stakeholders EAA is readily obtainable, visually presented with the huge number of digital data left by learners about their learning experiences in different systems in a way that the business intelligence market analyses consumer data today (Johnson et al., 2013). (Chen et al., 2010; Turban et al., 2011).

The Benefit of EAA is that it can change every area of the institution into administration, research, teaching and learning and support services. Through EAA, universities can improve the decision making and resource allocation, they can identify students who are likely to fail, institutions' weaknesses, and curriculum and assessment test suitability. This data can also be used in these predictive models (Mattingly et al., 2012). In addition to the retrieval of the relevant data and knowledge about the learning process and relationships between the learning agents, the transformation of the data into useful information is also necessary (Arnold and Ralph, 2012). This gets more critical in cases of a high number of enrolments and instructors being in need of support in terms of monitoring activities and student performance (Scheffel et al., 2014).

EAA can help education institutions monitor and predict academic progress, and potential future performance, and risks, to act proactively (Johnson et al., 2012; Elsharkawy and Farahat, 2022). Moreover, with novel technologies and intelligent techniques education institutions can also create personalized learning experiences, using, intelligent textbooks creation (Boulanger and Kumar, 2019), using social robots as tutors and peer learners and technology for information exchange between intelligent systems and laboratory equipment that emerging to resolve available educational problems (Belpaeme et al., 2018).

Contemporary information technologies address problems in prediction of learner's behaviour and performance, content and learning tasks sequencing, issues that concern the affective states of learners, challenges in dialog in context of self-learning, life-long learning, formal and informal learning, and problems related to learners with learning difficulties (Khudhair et al., 2019).

Even though the area of education has access to many datasets containing learner data, there is still room for improvement in the procedures for measuring, gathering, analyzing, reporting, and exchanging data within and across institutions (Verbert et al., 2012; Ricardo et al., 2022). The ignorance about how students engage with instructional materials is one of the biggest problems confronting education today. In light of this, the research by Scheffel et al. (2014) was crucial in identifying the most crucial information that teachers must provide. These included the overall success rate of the students, the degree of conceptual, practical, and methodological competence, as well as the most commonly identified errors (Scheffel et al., 2014).

LMSs may be quite helpful when it comes to EAA. Because the data collected by LMSs is organized and represents how students engage with the system, LMSs have become a popular choice for e-assessment (Long and Siemens, 2011). Software that supports traditional course delivery by offering an integrated suite of online materials and communication tools is known as an LMS. It may also be used as a platform for entirely online courses. A standard learning management system (LMS) offers a variety of learner activities, makes it easier for students to complete assignments and quizzes, and permits tracking student participation and grade reporting. A good portion of LMS implementations are integrated with student information systems" (Lang and Perani, 2014). LMSs process, track and report the interactions of the learner, the content and the instructor. LMSs track the progress made by learners, record their test scores, and show course completion, while allowing instructor to monitor the performance of their students (Dalsgaard, 2006). Systems consolidate preparation, delivery, tracking, and a variety of activities such as discussion and collaboration, assessing, collecting, and presenting results. In addition to new functions and features, the data collected will be more than enough to distinguish patterns that might suggest how students can be helped further (Wright et al., 2014). The core concept behind an LMS is that learning is structured and controlled within a single framework. Some of these are Blackboard, Desire to Learn, Canvas, Moodle, Pearson LearningStudio, and Sakai. Modern-day LMSs come with a range of Web-based analytics capabilities embedded into them, including early alerts, content aggregation and analysis mechanism and progress tracking, simultaneously ensuring that education data shows its unique features. To illustrate this, educational data is text-heavy; many of the educational objectives are difficult to deal with quantitatively and measure (like improving the learning process); In this case, there are multiple dimensions involved in the analysis process such as students, instructors, courses, grades and degree programmes (Hill, 2013). (Romero et al., 2010; Zafra and Ventura, 2009).

An e-Portfolio System is an electronic device that serves to record, store, and store the learning and reflection artefacts of one learner over time. It can bear witness to professional and personal development, exhibit best practices, and act as a planning environment for future professional development. The system allows for combining all the assessments into the comprehensive list of learning outcomes, learning objectives, and/or graduate attributes of any program. The two systems, Bright Space and Blackboard offer e-Portfolio systems. Pols are short-time, informal tests that can find application in your classes to examine students' understanding throughout the learning period. A wonderful method of formative assessment. Kahoot and Quizalize are the types of polling apps. Software for surveys and course evaluations is made to gather both quantitative and qualitative information from users in order to evaluate various elements of the educational process. Finding trends in the data can help identify areas that need to be improved in the future. Survey and end-of-course tools are provided by Anthology and Blue. A program that facilitates the creation and administration of online exams is called exam software. The computer-based assessment choices offered by the online exam software enable the testing process to be automated. All of the assessment data may be gathered and arranged centrally via the exam administration software system. Exam software is provided by Capterra and Examsoft (Ivanova, 2020).

A number of domain professionals, including e-content developers, instructional designers, media developers, and technical experts with the aid of an authoring tool ecosystem, are involved in the creation of e-Assessment content in addition to software. The most popular e-assessment technologies are those found in learning management systems (LMSs) for activities involving individualized and group assessments (Brooks, 2014). Additionally, specifically designed cloud-based e-assessment systems are used to help teachers and students organize various assessment kinds, including formative, integrative, summative, and diagnostic. Such platforms may include Surpass, which has tools for online examination and language testing, Rogo, which has several testing functions and the ability to integrate various media formats, and Cirrus, which has capabilities for transforming written text and mathematical formulae into digital format. The TeSLA system, which offers capabilities for facial recognition, voice recognition, keyboard dynamics, forensic analysis, and plagiarism and can be connected with LMSs, is an inventive approach to trust-based and adaptive e-Assessment (Ivanova et al., 2018; Al Basheer and Ozcek, 2023).

According to Okada et al. (2019), the TeSLA system can assess a wide range of assessment tasks, including quizzes, forum participation, blog notes, learning diaries, oral presentations, game or simulation tasks, role-play tasks, practice in a lab with voice explanation, and mathematical problems.

3. METHODOLOGY

Although the relevance of e-Assessment is acknowledged, there is no research and statistics available about its effectiveness within the education and academic administration settings, especially in the developing world. This research aims to determine the factors that could influence the increased adoption of e-Assessment in the GCC higher education, and subsequently show how each factor could form and improve a sustainable and successful approach for using e-Assessment over the long-term.

This study was conducted using three research methodologies: Survey, in-depth semi-structured interviews, and direct observation. Utilizing the survey approach made it possible to get data beyond the immediate research environment and know how institutions did their EAA and what factors played the most crucial role in e-Assessment in their environment. The online survey was distributed to 50 respondents from GCC universities. A total of 43 responses were received. The survey had twenty-five questions targeting e-Assessment and EAA utilization across the different higher education settings. Some of the questions were dedicated to in-depth evaluation of e-Assessment systems functions, including LMS functions utilized, extent of use, range of services, structure and setup, etc. Fifteen in-depth, semi-structured interviews were held with Academic Administrator to find out the rationale behind their decisions to use e-Assessment, and the usefulness of EAA decision-making (Alsaud et al., 2021; Ramos-Medina, 2023). The interviews were also intended to capture the relationship between the analytics functions in the LMSs used and the type, relevance, usefulness, and timeliness of the functions. Direct observation was held at five universities for the purpose of triangulation and validation of survey and interview results. Direct observation included policies, procedures, system manuals, and other documentations. It also reviewed earlier reports on curriculum changes, along with their histories.

4. DISCUSSION

The results of the study provide a number of key findings. Education institutions can utilize the findings of this study to guide e-Assessment administration, and subsequently make more informed decisions on course, curriculum, program and overall quality assurance.

The first question of the study is concerned with identifying key factors that could impact the use and quality of e-Assessment in the GCC higher education environment. Table 1 below displays those factors in order of importance as per the input of the participants.

The second question of the study is concerned with how the identified factors could influence forming a consistent and effective approach to employ a long-term e-Assessment approach that could be transformed into actionable education policy.

In this section, we will address each factor separately connecting each identified factor in Table 1 with the participants' feedback on question two.

Table 1: Results of experiments and comparisons

Factor	Percentage
e-Assessment Policies and ORG structure	87
e-Assessment Strategy	83
e-Assessment Administration	82
e-Assessment Technologies, and Ease of Use	79
e-Assessment Data, Access, and Scope	78
e-Assessment Reporting and 360	76

4.1. E-Assessment Policies and ORG Structure

In almost all examined institutions, there was a policy and a manual that refers to the process of quality assurance, and outcomes assessment. In larger universities, assessment, accreditation, and program reviews had their own separate policies and procedures. In most cases, those policies were under OIE, or the Division of Strategic Planning, and Quality Assurance.

Depending on the organizational structure. The OIE or Division of Strategic Planning may report directly to the President, or in some cases to the Provost. When reporting to the President, the institutional effectiveness function provided more effective check and balance, since academic deans usually report to the provost.

In general, the policies and procedures outline quality assurance processes within the academic calendar, and assign ownership for each process. They describe the processes in details, and in some cases go further to specify the systems, methods, and other details pertinent to each process.

4.2. E-Assessment Strategy

E-Assessment strategy refers to the methods used to evaluate students' progress. Examples include tests, surveys, rubrics, portfolio, exit questions, etc. Some universities use a consistent e-Assessment strategy across colleges, departments, and programs, while others assign this task to the colleges and program coordinators.

For example, some universities use the same end of course evaluation questions for all courses, while others may deploy different set of questions. Another example, one program may use e-portfolio as an e-Assessment strategy, while another program in the same college may use an exit exam as an e-Assessment strategy.

The findings of the study reveal a relationship between the size of the institution, and the e-Assessment strategy. In smaller institutions with 10 or less academic programs, the e-Assessment strategy was driven centrally by the Office of Institutional Effectives (OIE). In larger institutions, the e-Assessment strategy was driven by the individual college, or programs. That also mean that the larger the institution is, the less consistent is the e-Assessment strategy. Two of the examined institutions employed a hybrid strategy using OIE at the institutional level, while using program specific e-Assessments at the program level. For the majority of the examined institutions in this study, e-Assessment strategy with a consistent approach, and central focal point rendered better results at the institution level. E-Assessment strategies at the individual college or program rendered feedback that was more specific to the program, however in some cases, the feedback lacked rigor and ownership, and was received negatively by faculty members as additional load. The hybrid approach seemed to deliver the best results, however at an increased administrative load. Lastly, while were attempts to explore new e-assessment tools by faculty members on their own initiative, in some cases, a wholistic e-assessment strategy and plan were lacking, or driven by a single champion

4.3. E-Assessment Administration

E-Assessment administration is not the same as e-Assessment strategy. While strategy refers to the methods used for e-Assessment, administration refers to the responsible unit to administer e-Assessments. While institutional strategy are usually managed by the OIE being the responsible unit for institutional effectiveness, program-specific e-Assessment could be managed by the OIE, or in the college. As mentioned earlier, some universities also use a hybrid approach, where an institution may deploy institutional level e-Assessment, and program-level e-Assessment at the college or the program level.

Similar to the e-Assessment strategy, the study shows a relationship between the institution size and e-Assessment administration. Smaller institutions prefer central e-Assessment administration, while larger ones decentralize the process somewhat of even fully. The data also shows a correlation between e-Assessment strategy, and e-Assessment administration. One of the benefits of centralized administration, as reported, is that it establishes ownership and authority for the e-Assessment process. For institutions that use a hybrid approach, benefits included reducing the workload and dependency on faculty members, and providing more electronic evidence, that can be triangulated with evidence from other e-Assessments.

4.4. E-Assessment Technologies, and Ease of Use

In terms of e-Assessment technologies, all examined universities reported the use of an LMS, and survey software, especially for end of course evaluations, outcomes attainment surveys, or exit surveys. E-portfolio software was used at the program level. The LMS was mainly used for exams, assessments with rubrics, such as case studies, research papers, discussions forums, individual projects, and group projects. Polling software was used for formative e-assessments. Only two universities used exit exam software, more at the graduate program level. Universities pursuing international accreditation for their programs are exploring newer technologies, including analytics based on embedded, common e-Assessments for goal performance, evidence collection, and secondary evaluations, and predictive models (Aboelazm, 2023). More universities are considering the use of digital badges, and other digital credentialing software to assess and report extracurricular and co-curricular activities.

In terms of ease of use, the majority of faculty members were comfortable with the use polls, surveys, and reported assessments in the grade centre for the courses they are teaching. Faculty members are more focused on curricular assessments, and appear to pay less attention to co-curricular and extracurricular activities. That could be attributed to the workload. In most cases, faculty members had 4 classes to teach per semester. Faculty members also seemed less interested in using advance technologies and analytics in the LMS, especially if embedding outcomes, or embedding rubrics was involved.

4.5. E-Assessment Data, Access, and Scope

Needless to say that the larger the sample is, the more accurate the average values will be, and the more confident we can be of the data results. Some of the weaknesses of traditional assessments included the limited sample size of assessment, and the poor quality of data. This is where e-Assessment can provide broader

access to more sources, better quality, larger sample size, and better insight into the institution's data.

On average, using traditional assessment in the examined institutions, each program Learning Outcome (PLO) was assessed as follow: Each faculty member will assess two courses, and two sections for each course, using one assessment instrument. Assuming a class size of 25 students, each faculty member should have 100 submissions (evidence). Using e-Assessment, access a larger scope of e-Assessments, such as more courses, more sections, and more instruments within the course is easy, and does not add any additional cost or workload. Moreover, access to different sources of e-Assessments can solidify finding, and improve the overall quality of data received. In some of the examined institution, the number of evidence supporting PLO attainment was more than 24000 submissions in a single semester. Statistics, and analysis on performance were automatically provided by the system at the course level, goal level, instrument level, faculty level, and more. In addition, more data was available in institutions that used central e-Assessment strategy, or central e-Assessment administration.

In terms of access, while instruments such as surveys could provide access to more recipients than other e-Assessment instruments, the response rate in several cases was below expectations. For universities that require end of course evaluations before a student can see his/her final grade, students' responses in some cases did not truly reflect their opinion, responses were provided mainly for the sake of the grade. E-Assessment data from LMS reflecting students 'work during the semester were treated as most objective.

4.6. E-Assessment Reporting and 360

In terms of e-Assessment reporting, most of the e-Assessment reports were provided directly by the e-Assessment system used. Consolidation, reconciliation, analysis, and final reports at the PLO or program level took place outside of e-Assessment systems. E-Assessment administration frequency was by semester, but reporting was annual, and few universities every 2 years. Because of e-Assessment technologies, e-Assessment reporting has now become more focused on analysis, since the data and reports can easily be produced by the systems. In fact, some of the academic administrators believe that now they have more data than needed, but they have less time for proper analysis.

E-Assessment reporting should result in findings and recommendations such as curriculum revision, instrument revision, etc. In the majority of examined institutions there was no relationship between curriculum changes and e-Assessment findings. In other words, the 360 was largely missing. E-Assessment reporting was treated as a stand-alone process that must be conducted regularly for regulatory requirements, completely separate from curriculum change management.

Since e-Assessment reporting is usually shared with the deans and academic administration, presentation was important. In most cases, e-Assessment reporting was done visually using charts, graphs, and executive level tabular data. Detailed information was shared with faculty members, and program coordinators.

5. CONCLUSION AND RECOMMENDATIONS

Higher education institutions can begin to make more sense of their e-Assessment data. The data gathered in this study illustrates not only the availability of new capabilities, but also the value that could be gained from more-informed decision making with the use of those capabilities. E-Assessment is now more about analysis and less about constructing and collecting evidence. The new e-Assessment technologies provide advanced features that could reduce constructing and reporting time to a minimum, and allowing institutions to spend more time in making sense of data.

As higher education institutions engage in designing e-Assessments for better performance management, they need to pay closer attention to the identified factors that could impact their long-term e-Assessment approach, and subsequently the successful transformation of e-Assessments into actionable education policy.

This study identifies six critical factors that could have a direct or indirect impact on forming a consistent and effective approach to employ a long-term effective e-Assessments. The identified factors in order of importance are: e-Assessment Policies and ORG Structure; e-Assessment Strategy; e-Assessment Administration; e-Assessment Technologies and Ease of Use; e-Assessment Data, Access, and Scope; and e-Assessment Reporting and 360. The study reveals inverse correlation between the institution size, and the centralization of e-Assessment. The study also shows correlation between quality of e-Assessment, and the centralization of e-Assessment strategy, e-Assessment administration, and e-Assessment Technology. The study supports the following notions:

1. Institutions must have clear policies and procedures for quality assurance, including e-Assessments, with details about cycle, ownership, methods, and other pertinent information. For better check and balance, it is recommended that the quality assurance unit reports to someone else other than the provost, since academic deans usually report to the provost.
2. A hybrid E-Assessment strategy using methods at the institutional level, and methods at the program level as well, appear to deliver best of results both for the institution and the programs. This approach also guarantees a minimum level of e-Assessment data in case of any shortcoming. In addition, a central strategy for e-Assessment delivers more consistent data that could be used for benchmarking purposes.
3. A central e-Assessment administration alleviates faculty workload, provide better ownership to the process, and improve the overall quality.
4. While the use of the LMS is critical, it is recommended that higher education institutions gain data from different e-Assessment systems to reconcile and triangulate data. This combination could provide plethora of evidences for direct and indirect assessments. There are e-Assessment systems that come with advanced reporting features and analytics that's help higher education institutions move from data collection into data analysis.
5. Newer technologies afford institutions better access to a much larger pool e-Assessments data, significantly increasing

the level of confidence in the data, and allowing for better decision-making. Institutions should also make greater use of e-Assessment data in the course work in the LMS. This data is the most reflective of students' performance.

6. Institutions should ensure that e-Assessment data results in recommendations that are actually translated into actions, especially in the course of curriculum improvement. Institutions should also be able to provide a range of reports from e-Assessment systems using advanced features and analytics.

Finally, just like any process, e-Assessment has three parts to it, input, process, and output. The output will always be a reflection of the input and process. Institutions must pay close attention to e-Assessment strategy (Input), and e-Assessment administration, e-Assessment technologies, e-Assessment data, access, and scope (Process), before they can see good e-Assessment results in e-Assessment Reporting and 360 (Output). The environment must be supportive (Policies, and ORG structure). That means that the developed eLearning and e-Assessment content must be interactive and in multi-mode formats, it must be created on the ground of appropriate instructional and learning design theories, based on standards and for realization of those appropriate technologies must be utilized or developed. Learning materials, learning content, user interface of software systems, learning analytics need modern tools for multi-perspective visualizations. Educational theories and scenarios should be extended to satisfy the new technological requirements of eLearning.

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