EFFECT OF PREFERENCE AND MANAGEMENT OF E-ASSESSMENT SYSTEM ON ITS QUALITY ASSURANCE PROCESS

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ABSTRACT

This study aims to explore university students' perception regarding an e-assessment system in terms of preference, assessment management, and the quality assurance process. A cross-sectional online survey was employed among 384 students of Nepal Open University (NOU). Structural equation modeling (SEM) was used in the research. Findings indicate that the perception of students regarding preference, e-assessment management, and the quality assurance process was found to be significantly high. In particular, the perception of preference regarding digital assessment was higher than assessment management and the quality assurance process. Gender, ethnicity, and place for taking classes, have an effect on implementation. This study concludes that three attributions of preference for digital assessment, management, and quality assurance are affected by one another.

Keywords: *e-assessment, preference, management, SEM, Nepal*

INTRODUCTION

Assessment is an inseparable part of teaching and learning activities that are conducted in-person, online, or in both modes. Due to the COVID-19 pandemic, educational institutions, both traditional and nontraditional, were forced to switch to virtual learning and remote assessment. E-learning and e-assessment have become a reality in different parts of the world and are the future of higher education (Huda et al., 2020). Digital assessment is an end-to-end, electronic assessment process using information and communication technology in assessment activities for evaluating learning achievement (Jisc, 2020). All the components of assessment, such as test design, test implementation, response record, and feedback, are done using digital technology (Alruwais et al., 2018). Factors such as test design, infrastructure, technology skills, administration, and stakeholders' cooperation and beliefs play a vital role in the effectiveness of either mode of assessment. The primary beneficiaries of the assessment are students, so their views and perceptions indicate the usefulness of the assessment (Valdez & Maderal, 2021). Student satisfaction is one of the key components for the success of the system. Khan and Khan (2019) argued that convincing students of the usefulness of e-assessment is important before applying it.

In the context of higher education in Nepal, there is no long history of online or virtual education or digital assessment. In the course of online education, only a few institutions, like Nepal Open University (NOU), have been conducting digital assessments, although several other institutions have begun practicing an online assessment system after NOU. In the Nepali higher education context, there is little exploration of how the students perceive the e-assessment system. Thus, this

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research would provide the necessary information to improve the existing system. This study aims to explore students' perceptions regarding preferences, e-assessment management, and quality assurance, and the effect of each on the other in the digital assessment in the institutions.

LITERATURE REVIEW

Digital Assessment: Quality Assurance

The quality of an assessment is a multifaceted concept that includes reliability and validity as the most important quality criteria (Sluijsmans & Struyven, 2014). The quality assurance process is not clearly defined because the assurance indicators vary in terms of context (Conard & Openo, 2018). The study of Sluijsmans and Struyven (2014) summarized six components of quality assessment in a paramedical field as assessment tasks, assessments, assessment programs, assessment policy, assessment literacy, and assessment organization. They viewed these from a holistic perspective and linked them to each other. Similarly, Gulikers et al., (2008, p.185) stated twelve key criteria for a quality assurance framework for student assessment, which are "fit for purpose, authenticity, cognitive complexity, educational consequences, fitness for self-assessment, fairness, transparency, meaningfulness, reproducibility, comparability, cost and efficiency, and acceptability". Quality assurance isn't a one-time job. It's an ongoing process that should be considered throughout an entire assessment. It is like a loop that includes a plan of how to ensure quality beforehand (preparation), then put that plan into action during the assessment (implementation), and finally, check how well it worked afterwards (evaluation) (Sluijsmans & Struyven, 2014).

In the process of designing an assessment, it is necessary to test various assessment techniques to ensure the quality of the assessment. For example, paper writing/ takeaway exam, interview or presentation and group work, etc., are conventional assessments (Akimov & Malin, 2020), whereas e-portfolios, online journals, or group work are alternative assessments that have been practiced (Martin et al., 2019). Both assessments of learning as summative and assessments for learning as formative (Sluijsmans & Struyven, 2014) are important for the overall evaluation of learning performance. Different formative assessments, such as e-portfolios, journal writing, projects, and group work (Conard & Openo, 2018), as well as different types of written tests, can provide opportunities for learners to authentically engage in the learning process and enhance the quality of online assessment.

The assessment process is connected to quality assurance processes adopted by the university (Conard & Openo, 2018). Implementation or administration of digital assessment in a virtual environment is another challenging stage for ensuring the quality of the assessment. Appropriate policies, structures, processes, and resources are key components for the quality assurance of e-assessment, so ethical and legal consideration should be ensured (Huertas et al., 2019). Even if online proctoring is not available or other e-authentication software, cheating can be controlled through the modification of the assessment format, e.g., using higher-order thinking multiple-choice questions, higher-order thinking short-answer questions, increasing the frequency of testing, and academic integrity (Li, 2018; Nguyen et al., 2020). A review by Ukobizaba et al. (2021) showed that the problem-solving skills of students can be strengthened through assessment strategies structured with the observed learning outcomes taxonomy, higher-order thinking skills model, performance assessments, authentic assessments, dynamic assessment, and gamification in assessment, along with a learner-centered teaching method like problem-based or cooperative learning style.

After administrating an assessment, quality assurance criteria involve marking and analyzing the assessment results. In digital assessment, besides some measures used in conventional assessment, several techniques are used for scoring and providing feedback after an assessment. Automatic marking is one of the characteristics of e-assessment (Mora et al., 2012), which can assist in attaining the objectivity criteria in the assessment process (Deutsch et al., 2012). While designing e-assessment components for tests like written examinations, assignments, and group work, the process of marking should be transparent and objective. Rubrics could help establish clearer and more replicable assessment practices (Dawson, 2017). Some features of good rubrics are specificity, secrecy, exemplars, scoring strategy, evaluation

criteria, quality levels, quality definitions, quality processes, etc., that could support the reliable scoring procedure in e-assessment (Dawson, 2017). The key trends in measuring quality assurance in higher education are accountability, scrutiny, and the capacity of universities to inform performance outcomes (Newman, 2015).

In the formative assessment, feedback and feed-forward mechanisms are the foundation of assessment that encourages innovation in tracking students' improvement. Students seem positive about computer-based assessment because the feedback system is provided in an online mode (Acosta-Gonzaga & Walet, 2018; Adesemowo et al., 2016; Bloom et al., 2018; Cheng & Hou, 2015; Debuse & Lawley, 2016; Demir, 2018; Fyfe et al., 2014). Students can become self-reflective and self-regulated learners through the use of e-assessment feedback moderation and by visualizing all activities (Debuse & Lawley, 2016; Fyfe et al., 2014), and they can develop as independent learners and promote higher-order thinking (Alruwais et al., 2018). In particular, students appreciate the time taken to give constructive feedback and the feedforward system of e-assessment (Helfaya, 2019). However, it should be noted that the effectiveness of feedback relies on the student's expectations and the use of feedback in the learning process (Timmers et al., 2013).

Students' Perception of Digital Assessment

This study intends to explore the student's perception of the digital assessment conducted in higher education in Nepal. Several studies have been carried out in this area in an international context, and most of them found positive responses from the students. For example, Bahar and Asil (2018), Broughton et al. (2013), Debuse and Lawley (2016), Snekalatha et al. (2021), and Wang and Jeffrey (2017) found a positive perception of students and instructors on computer-based assessment. The perception differs depending on the factors related to the students and assessment. In the above studies, Bahar and Asil (2018) found that male students had significantly more positive attitudes than their female counterparts on e-assessment. Duration of computer usage was also a significant determinant in attitudes, in which users who had a long history of computer usage had more positive attitudes. Education level did not significantly affect perception, though the level of competency in technology was a determinant of student perception. Patronis et al. (2019) found a significant correlation between students' levels of competence in technology and their perception of e-assessment, seeing that it improved achievement and performance. Feeling competent in technology could reduce stress and may support concentrating on questions, which ultimately enhances their performance. However, there was no significant relationship between competency and reducing anxiety. Students' perception of the computer-based assessment and feedback production, namely SuperMarkIt (SMI), was positive regarding its quality, efficiency, and versatility. Mostly SMI was beneficial regarding time for reducing repetition (Broughton et al., 2013), improving efficiency, providing immediate feedback, being consistent and legible, and having ecological benefits. More specifically, students perceived its benefits because it increases feedback, saves time, reduces repetition, provides moderation, and displays all activities (Debuse & Lawley, 2016). Thus, students preferred computer-based assessment as compared to paper-based assessment (Faniran & Ajayi, 2018).

Snekalatha et al. (2021) did a study on the perception of medical students on no proctored online, formative assessments regarding reliability, usefulness, and feasibility. Overall, students positively perceived the online formative e-assessment. The findings of the study suggest that students perceived the viva-voce exam administered through video conferencing as being reliable, and online multiple-choice examinations as having faster feedback than classroom assessment. Thus, online exams help students to learn the subject matter. Students prefer formative assessment rather than summative assessment because formative and continuous assessment gives them opportunities to reflect on their learning process (Fyfe et al., 2014; Holmes, 2015). However, there is also the possibility of students developing apprehensions regarding e-assessment activities due to lacking a well-defined theoretical framework and clear guidelines for its operations (Brady et al., 2019). In the study conducted by Gerritsen-van Leeuwenkamp et al. (2019), higher education students positively perceived assessments that used the deep approach, strategic approach, and learning approach. Many studies show a positive perception of students toward digital assessment.

Based on this review, the theoretical assumption for the study was that the students in Nepal preferred digital assessment in relation to preference, management, and quality in higher education.

Digital Assessment: Higher Education Context of Nepal

To improve school and higher education in Nepal, initiatives were taken by the Ministry of Education, Science and Technology (MOEST), the University Grants Commission (UGC), and some universities in Nepal. For school education, MOEST issued guidelines for delivering education online or other distance modes (Khadka, 2020) during the COVID-19 pandemic. In the context of Nepali higher education, after the COVID-19 pandemic, the UGC also issued guidelines for facilitating alternative modes of learning in higher education in Nepal (UGC, 2020). Some universities delivered courses in the distance mode, but none of them, like Tribhuvan University, conducted the assessment in the virtual or digital mode. In the meantime, Nepal Open University approved Assessment Guidelines (NOU, 2020) for designing and implementing assessments, which have been provided to all classes in the distance/virtual mode. All assessments from undergraduate to postgraduate levels were conducted in a virtual mode according to these guidelines (NOU, 2020).

NOU was the site for this study. It employed at least two different techniques such as writing papers, taking time-bound examinations, making presentations, conducting interviews, and other techniques such as e-portfolios as a process-based assessment for assessing learning achievement. Further, as a formative assessment throughout the semester, different techniques such as making presentations, writing papers, taking quizzes, posting to a discussion forum, preparing a glossary, and peer-grading work were used. This study includes the participant students from undergraduate to postgraduate level and assesses their perceptions towards the digital assessment employed by the university.

RESEARCH METHODS

The study was carried out among the students of Nepal Open University as it is the first university established in Nepal to provide higher education through the virtual mode. The university was established in 2017 under the Nepal Open University Act 2073 (see www.lawcommission.gov.np). There are three faculties: the Faculty of Health Science and Technology, the Faculty of Social Science and Education, and the Faculty of Management and Law. The university runs different programs from bachelor's to master of philosophy (MPhil). The university holds its regular classes in the evening from 6:00 to 9:00 PM. Microsoft Teams is used for taking online classes, and Moodle has been used as a learning management system (Joshi et a., 2021).

Sample and Sampling Techniques

Out of the three faculties of NOU, the Faculty of Social Science and Education and the Faculty of Health Science and Technology were selected for the study as these faculties run all levels from bachelor to MPhil levels. In total, there have been 2,000 students enrolled in the university since its establishment (Khanal & Ghimire, 2022) and this number was considered the population for the research. The online sample size calculator (calculator.net) showed 323 to be the appropriate sample size for the study with a 95% confidence level, 5% margin of error, and 50% population proportion. A link to the Google Survey Form was shared with 450 students of these faculties through their email, and 384 respondents participated in the survey. Based on missing responses for some items, 13 respondents were excluded from the analysis. Still, this sample size fulfilled the criteria of representativeness.

Sample Characteristics

Gender, ethnicity, place of taking online classes, study level, and location of residence were taken as sociodemographic variables. Gender had two categories: male (82.48%) and female (17.52%), indicating that the male student's participation was very high as compared to females. The ethnicity had three categories: Brahmin/Chhetri (78.44%), Janajati (14.82%), and Others (6.74%). Brahmin/Chhetri had better educational status than Others (Khadka et al., 2022). Additionally, Others represent Dalits and other people having a poorer education status in Nepal. place of taking online classes represents the location where students took their regular online classes at NOU (one class per week for each subject from 6:00 to 9:00 PM). There were two categories: at home (85.98%) and at office/organization (14.02%), indicating that almost all the students were taking

their online classes from home, though some of them took their classes from their offices because they had internet access. Study levels were determined by student enrolment at NOU as bachelors (12.94%), masters (20.22%), and MPhil (66.85%) level. Additionally, the location of residence represents the place where students live: Hill (38.01%), Kathmandu Valley (15.26%), Mountain (8.09%), and Terai (38.54%). The Kathmandu Valley is an advanced area that consists of the three districts of Kathmandu, Bhaktpur, and Lalitpur, including the territory of the capital city of Nepal. Mountain areas are less developed compared to Kathmandu Valley, which Hill and Terai areas are moderate in their development. The details of the sociodemographic variables are presented in Table 3.

Research Instrument

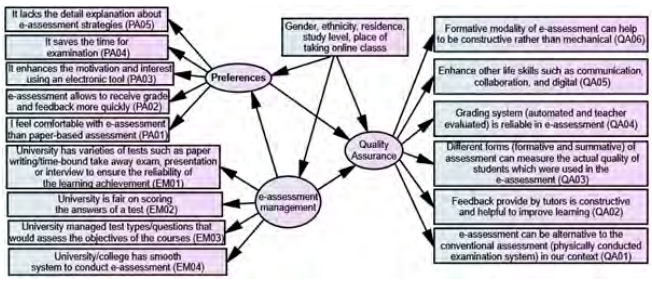
A self-constructed tool was used for the research that consisted of 15 items under the three dimensions of Preference, Management, and Quality Assurance of digital assessment. The dimensions were tested by confirmatory factor analysis (CFA), which is presented in Table 2. The items were measured using a five-point Likert Scale from 1 (*strongly disagree*) to 5 (strongly agree). The Cronbach Alpha reliability of the tool was found to be 0.90, which is acceptable for the research (Civelek, 2018). Convergent and discriminant validity were ensured and are presented in Table 1. The details of the instrument, including items and dimensions, are presented in Figure 1.

Validity and Reliability of the Instrument

Table 1.
Instrument Reliability and Validity

Construct	Cronbach's Alpha	CR	AVE	HTMT Analysis		
				PA	EM	QA
Preferences (PA)	0.70	0.73	0.36			
e-assessment Management (EM)	0.77	0.78	0.47	0.84		
Quality Assurance (QA)	0.89	0.89	0.59	0.72	0.67	

Figure 1.
Conceptual Framework



Preference of Assessment

Preferences represent the practice and feelings of students towards regular assessment of online classes because all classes at the university are virtual. Under this dimension are five items: (a) students feel more comfortable with e-assessment than with paper-based assessment (Faniran & Ajayi, 2018; Fyfe et al., 2014; Holmes, 2015), (b) e-assessment allows students to receive grades and feedback more quickly, (c) enhances student motivation and interest in using an electronic tool, (d) saves time for examination (Debuse & Lawley, 2016), and (e) lacks detailed explanation about e-assessment strategies (Brady et al., 2019).

Management of Assessment

Management of assessment in the virtual mode of instruction is a challenging, risky, and complicated task. e-Assessment management represents the managerial part of assessment at the university during academic years. The university has a provision of 40% internal evaluation in each subject at all levels that consist of attendance, participation in quizzes and the discussion forum, essay writing, peer evaluation, and other features of Moodle (Akimov & Malin, 2020; Martin et al., 2019). This dimension includes the reliability of these types of tests on learning achievement, the fairness of scoring or evaluation, the objectivity of test items, and how smooth the system of e-assessment is (Mora et al., 2012).

Quality Assurance

e-Assessment is compulsorily implemented in each academic program in the university, and 40% of it is for internal assessment to ensure the quality of the evaluation, because if there is a problem, then it endangers the relevancy of the academic degree of the institution. Quality assurance is mainly concerned with the policy, structure, and

process of e-assessment (Huertas et al., 2019). There are six items for this dimension: (a) establishing e-assessment as a firm alternative to the conventional assessment (Huertas et al., 2019), (b) feedback and a feed-forward mechanism for the acceptance of e-assessment (Acosta-Gonzaga & Walet, 2018; Adesemowo et al., 2016; Bloom et al., 2018; Cheng & Hou, 2015; Debuse & Lawley, 2016; Demir, 2018; Fyfe et al., 2014), (c) the assessment process uses formative and summative assessment practices to measure the actual quality of students, (d) the grading system (automated and teacher evaluated) is reliable (Conard & Openo, 2018), (e) enhancing life skills such as communication, collaboration, and digital, and (f) formative modality of e-assessment is constructive (Li, 2018; Nguyen et al., 2020).

Data Analysis Techniques

The mean and standard deviation (SD) were calculated to find the item-wise and dimension-wise status of the assessment system of NOU. One sample *t*-test was used to calculate the significant level of perception of items by assuming 3 as the population mean because it is the average value of the five-point rating scale measured from 1 to 5. Structural equation modeling (SEM) was used to calculate the effect of sociodemographic variables on Preference, Management, and Quality Assurance of e-assessment, and the effect of Preference on Quality Assurance. Assumptions of SEM were employed and checked before analysis.

RESULTS

The perception of the students towards the digital assessment practice of NOU was significantly high in each item against the theoretically average value of 3 (p-value of one-sample < 0.01). However, the level of perception was higher in Preference (Mean = 4.12, SD = 0.58) as compared to Management (Mean = 3.97, SD = 0.67) and Quality Assurance (Mean = 4.03, SD = 0.71). Furthermore, the level of perception was higher in "enhancing the motivation and interest of learners in using electronic tools" (Mean = 4.35, SD = 0.69), "university has varieties of tests such as paper writing/time-bound take away exam, presentation or interview to ensure the reliability of the learning achievement" (Mean = 4.18, SD = 0.79), and "enhance other life skills such as communication, collaboration, and digital" (Mean = 4.12, SD = 0.90). The level of perception was lower in Preference, Management, and Quality Assurance compared to the remaining items of respective dimensions. The level of perception was lower in "lacks detailed explanation about e-assessment strategies" (Mean = 3.66, SD = 1.02), "university is fair on scoring the answers of a test" (Mean = 3.85, SD = 0.96), and "grading system (automated and teacher evaluated) is reliable in e-assessment" (Mean = 3.83, SD = 0.96).

Table 2.
Item-wise Mean and Standard Deviation (n = 371)

Items	Mean	SD	FL	t-value
Preference on Assessment	4.12	0.58		
PA01	4.23	0.78	0.62	30.2*
PA02	4.11	0.88	0.63	24.4*
PA03	4.35	0.69	0.66	37.4*
PA04	4.24	0.92	0.69	26.0*
PA05	3.66	1.02	0.32	12.4*
Management of Assessment	3.97	0.67		
EM01	4.18	0.79	0.67	28.8*
EM02	3.85	0.96	0.64	17.0*
EM03	3.98	0.81	0.71	23.4*
EM04	3.85	0.88	0.70	18.6*
Quality Assurance	4.03	0.71		
QA01	4.09	0.93	0.64	22.5*
QA02	4.05	0.85	0.76	23.8*
QA03	3.99	0.83	0.85	23.0*
QA04	3.83	0.94	0.81	17.0*
QA05	4.12	0.90	0.78	24.0*
QA06	4.10	0.85	0.75	24.8*

*p<0.02, FL=Factor loading

Significant results of the sociodemographic variables on the perceptions of learners in preferences, e-assessment management, and quality assurance are presented in Table 3. The results showed that there is no significant difference in the perception of students in preferences and e-assessment management with respect to all measured sociodemographic variables. However, the result is significant in quality assurance with respect to gender, ethnicity, and place of taking online classes in favor of males, other ethnic groups, and those taking online classes

from home, respectively. Additionally, the post hoc statistics show significant results in e-assessment management between Brahmin/Chhetri and others, whereas similar results were measured in quality assurance with respect to ethnicity.

The item-wise relationship is presented in Figure 2, and the finding indicates a positive significant relationship between each item. The correlation value was found to be in the range of 0.14 to 0.66, indicating that the increase in the level of perception helps to positively improve the others.

Structural Equation Modeling

The assumption of model fit indices was tested before applying SEM. The nature of items, the suggestion of experts, and the use of confirmative factor analysis (CFA) were major statistical and nonstatistical techniques for model specification, whereas the factor loading detail is presented in Table 2. The chi-square value was significant, indicating that the model is not a good fit, hence

Figure 2.
Visual Representation of Item-Wise Correlation

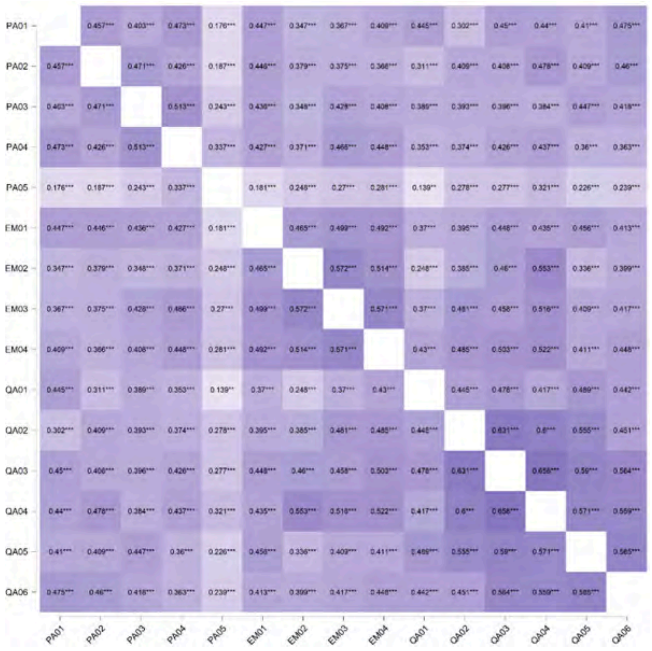


Table 3.
Results Based on Sample Characteristics (n=371)

Variables	Fr.	Preferences			E-Assessment Management			Quality Assurance		
		Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value
Gender										
Female	65	4.05	0.58	0.29	3.87	0.64	0.20	3.85	0.70	0.02*
Male	306	4.13	0.58		3.99	0.67		4.07	0.71	
Study Level										
Bachelor	48	4.23	0.57	0.11	4.07	0.62	0.16	4.04	0.76	0.86
Master	75	4.19	0.57		4.05	0.67		4.07	0.81	
MPhil	248	4.07	0.58		3.92	0.67		4.02	0.67	
Location of Residence										
Hill	141	4.13	0.62	0.6	3.98	0.65	0.67	4.00	0.71	0.46
Kathmandu Valley	57	4.11	0.56		4.04	0.65		4.17	0.56	
Mountain	30	4.23	0.51		3.98	0.69		3.97	0.80	
Terai	143	4.08	0.57		3.92	0.68		4.02	0.75	
Ethnicity										
Brahmin/Chhetri	291	4.11	0.59	0.83	3.94	0.67	0.06	3.97	0.74	0.01*
Janajati	55	4.12	0.56		3.97	0.69		4.21	0.55	
Others	25	4.18	0.47		4.26	0.52		4.35	0.50	
Place of Taking Online Classes										
Home	319	4.13	0.58	0.23	3.98	0.65	0.26	4.12	0.59	0.00*
Office/Organization	52	4.03	0.56		3.87	0.74		3.51	1.09	

*$p<0.05$, Fr.=Frequency

Table 4.
Model Fit Indices (n = 371)

Indicators	CMIN	DF	CMIN/DF	GFI	AGFI	NFI	IFI	TLI	CFI	RMSEA	SRMR
Model 1	195.83	87	2.25	0.93	0.91	0.91	0.95	0.94	0.95	0.06	0.04
Model 2	311.02	157	1.98	0.92	0.90	0.88	0.94	0.92	0.94	0.05	0.05

other fit indices such as goodness-of-fit statistic (GFI), adjusted goodness-of-fit statistic (AGFI), normed-fit index (NFI), comparative fit index (CFI), and Tucker-Lewis index (TLI), and incremental fit index (IFI), standardized root mean square residual (SRMR), and root means square error of approximation (RMSEA) were checked for model fit. Bentler and Bonett (1980), Byrne (1989), Hu and Bentler (1999), MacCallum et al. (1996), and Sarker and Chakraborty (2021) suggest that CMIN/DF should be less than 5, GFI, AGFI, NFI, IFI, TLI, and CFI should be greater than 0.09, RMSEA should be less than 0.08, and SRMR should be less than 0.05, whereas the value of these indicators in this study was CMIN/DF = 2.25, GFI = 0.93, AGFI = 0.91, NFI = 0.91, IFI = 0.95, TLI = 0.94, CFI = 0.95, RMSEA = 0.06, and SRMR = 0.04, showing that the model is perfectly fit (see Table 4). In relation to sample size, the sample size of this research was 371 and the observed variables were 15, thus the sample size is sufficient for SEM analysis (MacCallum et al., 1996).

Effect of e-Assessment Management on Quality Assurance and Preferences

Figure 3 shows that the direct effect of preferences (beta = 0.47) and e-assessment management (beta = 0.44) have a significant effect on quality assurance, explaining a 42% variance. Figure 4 shows that e-assessment management has a significant effect on preference (beta = 0.83) and quality assurance (beta = 0.32) whereas the preference has a significant effect on quality assurance (beta = 0.42), explaining 69% and 51% variances in the model. In item-wise analysis, the preference has a significant positive highest effect on PA04 (λ = 0.69), and the least effect on PA04 (λ = 0.32). Similarly, e-assessment management has a significantly positive highest effect on EM03 (λ = 0.71) and the least effect on EM02 (λ = 0.64), whereas quality assurance has a significantly positive highest effect on QA03 (λ = 0.85) and least effect on QA01 (λ = 0.62).

Figure 3.
Direct Effect of Preferences and e-Assessment Management on Quality Assurance

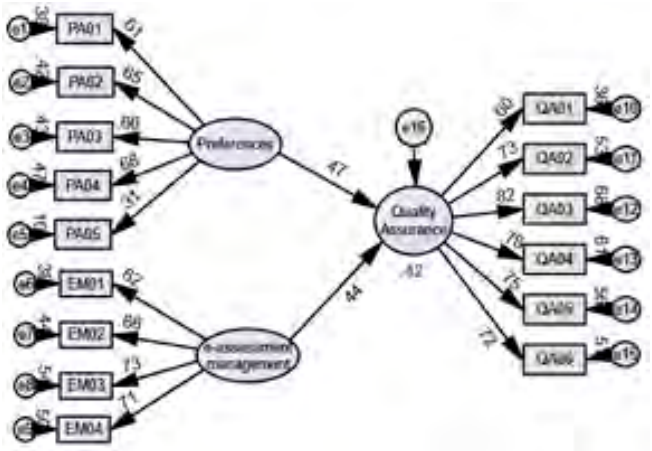


Figure 4.
Effect of Preferences and e-Assessment Management on Quality Assurance (Model 1)

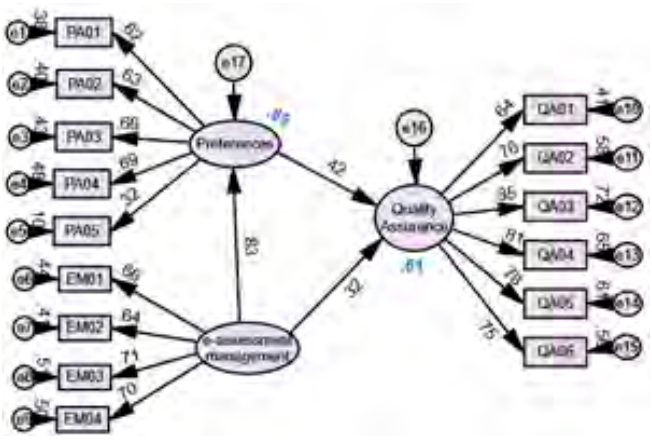
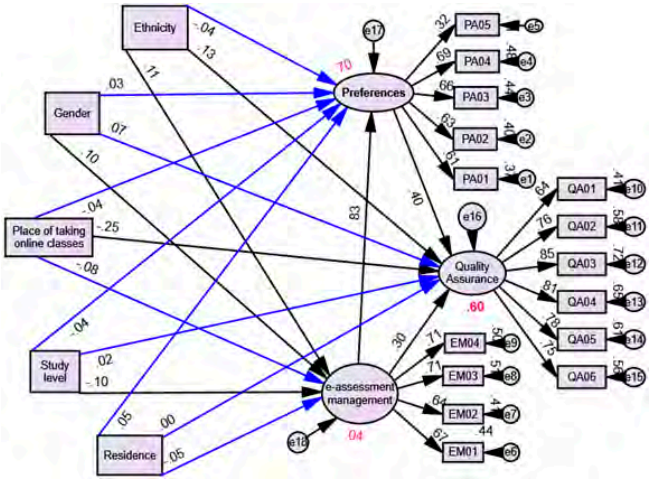


Figure 5 shows that ethnicity has a positive effect on quality assurance (beta = 0.13) and e-assessment management (beta = 0.11), gender has a significant positive effect on e-assessment management (beta = 0.10), place of taking online classes has a negative effect on quality assurance (beta = −0.25), and study level has a negative significant effect on e-assessment management. However, location of residence has no significant effect on performance, quality assurance, and e-assessment

Figure 5.
Effect of Sociodemographic Variables on e-Assessment Management, Preferences, and Quality Assurance (Model 2)



Note: black arrows represent significant results and blue arrows represent insignificant results.

management. Furthermore, the result also indicates that the sociodemographic variables explain a 4% variance in e-assessment management whereas only a 1% variance is increased while loading these demographic variables in the model. Hence this result shows that e-assessment management is the main predictor of performance and that e-assessment management and preference are the main contributing factors to quality assurance.

DISCUSSION

This study aimed to analyze the perception of students towards the assessment system of the university in Nepal. The findings indicate that the perception of the students towards the assessment practices was significantly high in terms of preferences, management, and quality components. It means that the students take the digital assessment positively when the university uses e-assessment in the form of a written assignment, discussion forum, quiz, and other features of Moodle, and this is self-evaluative to some extent. In the semester-end examination, multiple methods, such as writing papers, making presentations, and interviewing subjects, as well as eportfolios, have been employed that might increase the trustworthiness and reliability of the assessment. Appropriate and effective use of digital tools and techniques can save time, reduce repetition, and help to visualize all activities done in an online platform (Debuse & Lawley, 2016). Thus, students prefer digital assessments compared to paper-based examinations (Faniran & Ajayi, 2018). Furthermore, the level of student perception was found to be lower in e-assessment management and quality assurance as compared to preferences. In the Nepali context, access and use of digital technologies are not similar across the country (Khanal et al., 2021; Khati & Bhatta, 2020). Trust in e-assessment management can be improved by increasing the level of competency in using digital devices (Patronis et al., 2019). The reason behind the lower level of perception of e-assessment management is student unawareness of the process used in assessing their performance. Also, students might expect smooth management of the assessment without any technical problems.

The respective categories of gender, ethnicity, study level, location of residence, and place of taking online classes have almost similar perceptions towards preferences and e-assessment management (because of insignificant results). This result indicates that the NOU can manage equality and equity in the process of assessment, which is very important to increase the level of acceptance of e-assessment (Huertas et al., 2019). However, in the quality assurance component, the sociodemographic variables of female, Dalit (Other), Janajati, Madhesi (Terai), and those taking online classes from outside of their home have significantly lower results. Bahar and Asil (2018) found that male students had a more positive perception than females of e-assessment implementation. Additionally, the relation between all items was found to be significantly positive, indicating that the positive perception of one item, positively enhances the perception of the other.

The effect of preferences and e-assessment management on quality assurance was found to be positively significant; hence, the university should focus on the management of a comfortable environment for all learners that allows them to receive grades and feedback, enhances motivation and interest in using an electronic tool, explains in detail e-assessment strategies, manages varieties of tests, is fair on scoring, and has a smooth system of e-assessment for enhancing quality assurance of e-assessment. Effective management of e-assessment. Furthermore, the sociodemographic variables explain only 1% of the variances in preferences, and quality assurance confirms

that to enhance quality assurance, the stakeholders should focus on promoting e-assessment management and preferences.

CONCLUSION

An educational program intends to fulfill the objectives of education through teaching and learning activities, and the success of the program is assessed by different assessment techniques in either physical or virtual/online modes. Assessing the student's perception of the digital assessment system employed in higher education institutions in Nepal was the major intent of this study. As the students are direct beneficiaries of the educational program, their perception is significant to improve the existing digital/online assessment system in higher education. The participant students' high level of positive perception leads us to conclude that they, irrespective of most demographic factors such as gender, ethnicity, use of the internet, location, and residential area, prefer e-assessment and want to continue using it. Based on the student responses, the management of assessment and its quality are fine as they agreed with the statements concerning assessment management and quality assurance. However, from a dimension-wise perspective, gender, ethnicity, or places for taking classes have a different level of perception which is considerable for effective implementation. Further, we conclude that the three dimensions of digital assessment (preference, management, and quality assurance) are affected by one another. Thus, a change in the management of assessment brings significant changes in preference and quality assurance. Similarly, preference for assessment also signifies the level of quality assurance.

RECOMMENDATIONS

University should focus more on enhancing the varieties of tests and increasing fairness in scoring. Universities should establish a smooth system of e-assessment as an alternative to the conventional assessment system that is constructive and can measure the actual quality of students. Our study shows that the motivation and interest of learners in using electronic tools increases when providing a variety of tests, presentations, and interviews to ensure the reliability of the learning achievement and enhance life skills. This should lead universities to provide three days of orientation focusing on the use of Microsoft Teams and Moodle for taking online classes and using the learning management system. The results of our study provide valuable information for the concerned university to explore the reason behind a low level of positive student perception of e-assessment in students. Similarly, the result could provide crucial information for other universities in Nepal that are planning to implement e-assessment in the future. Additionally, assessment management has a significant positive effect on preferences, so a university should focus on enhancing the assessment management-related items to promote preferences.

References

Acosta-Gonzaga, E., & Walet, N. R. (2018). The role of attitudinal factors in mathematical online assessments: A study of undergraduate STEM students. Assessment and Evaluation in Higher Education, 43(5), 710–726. https://doi.org/10.1080/02602938.2017.1401976

Adesemowo, A. K., Johannes, H., Goldstone, S., & Terblanche, K. (2016). The experience of introducing secure e-assessment in a South African university first-year foundational ICT networking course. Africa Education Review, 13(1), 67–86. https://doi.org/10.1080/18146627.2016.1186922

Akimov, A., & Malin, M. (2020). When old becomes new: A case study of oral examination as an online assessment tool. Assessment and Evaluation in Higher Education, 45(8), 1205–1221. https://doi.org/10.1080/02602938.2020.1730301

Alruwais, N., Wills, G., & Wald, M. (2018). Advantages and challenges of using e-assessment. International Journal of Information and Education Technology, 8(1), 34–37. https://doi.org/10.18178/ijiet.2018.8.1.1008

Bahar, M., & Asil, M. (2018). Attitude towards e-assessment: Influence of gender, computer usage and level of education. Open Learning, 33(3), 221–237. https://doi.org/10.1080/02680513.2018.1503529

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. Psychological Bulletin, 88(3), 588–606. https://doi.org/10.1037/0033-2909.88.3.588

Bloom, T. J., Rich, W. D., Olson, S. M., & Adams, M. L. (2018). Perceptions and performance using computer-based testing: One institution's experience. Currents in Pharmacy Teaching and Learning, 10(2), 235–242. https://doi.org/10.1016/j.cptl.2017.10.015

Brady, M., Devitt, A., & Kiersey, R. A. (2019). Academic staff perspectives on technology for assessment (TfA) in higher education: A systematic literature review. British Journal of Educational Technology, 50(6), 3080–3098. https://doi.org/10.1111/bjet.12742

Broughton, S. S., Robinson, C. C., & Hernandez-Martinez, P. (2013). Lecturers' perspectives on the use of a mathematics-based computer-aided assessment system. Teaching Mathematics and Its Applications, 32(2), 88–94. https://doi.org/10.1093/teamat/hrt008

Byrne, B. M. (1989). A primer of LISREL: Basic applications and programming for confirmatory factor analytic models. Springer-Verlag. https://doi.org/10.1007/978-1-4613-8885-2

Cheng, K. H., & Hou, H. T. (2015). Exploring students' behavioural patterns during online peer assessment from the affective, cognitive, and metacognitive perspectives: A progressive sequential analysis. Technology, Pedagogy and Education, 24(2), 171–188. https://doi.org/10.1080/1475939X.2013.822416

Civelek, M. E. (2018). Essentials of structural equation modeling. Zea Books. https://doi.org/10.13014/k2sj1hr5

Conard, D., & Openo, J. (2018). Assessment strategies for online learning: Engagement and authenticity. AU Press.

Dawson, P. (2017). Assessment rubrics: Towards clearer and more replicable design, research and practice. Assessment and Evaluation in Higher Education, 42(3), 347–360. https://doi.org/10.1080/02602938.2015.1111294

Debuse, J. C. W., & Lawley, M. (2016). Benefits and drawbacks of computer-based assessment and feedback systems: Student and educator perspectives. British Journal of Educational Technology, 47(2), 294–301. https://doi.org/10.1111/bjet.12232

Demir, M. (2018). Using online peer assessment in an instructional technology and material design course through social media. Higher Education, 75(3), 399–414. https://doi.org/10.1007/s10734-017-0146-9

Deutsch, T., Herrmann, K., Frese, T., & Sandholzer, H. (2012). Implementing computer-based assessment—A web-based mock examination changes attitudes. Computers & Education, 58(4), 1068–1075. https://doi.org/10.1016/j.compedu.2011.11.013

Faniran, V. T., & Ajayi, N. A. (2018). Understanding students' perceptions and challenges of computer-based assessments: A case of UKZN. Africa Education Review, 15(1), 207–223. https://doi.org/10.1080/18146627.2017.1292112

Fyfe, G., Fyfe, S., Meyer, J., Ziman, M., Sanders, K., & Hill, J. (2014). Students reflecting on test performance and feedback: An on-line approach. Assessment and Evaluation in Higher Education, 39(2), 179–194. https://doi.org/10.1080/02602938.2013.801063

Gerritsen-van Leeuwenkamp, K. J., Joosten-ten Brinke, D., & Kester, L. (2019). Students' perceptions of assessment quality related to their learning approaches and learning outcomes. Studies in Educational Evaluation, 63, 72–82. https://doi.org/10.1016/j.stueduc.2019.07.005

Gulikers, J., Sluijsmans, D., Baartman, L., Bartolo, P. (2009). The power of assessment in teacher education. In: Swennen, A., van der Klink, M. (eds) *Becoming a Teacher Educator.* Springer, Dordrecht. https://doi.org/10.1007/978-1-4020-8874-2_13

Helfaya, A. (2019). Assessing the use of computer-based assessment-feedback in teaching digital accountants. Accounting Education, 28(1), 69–99. https://doi.org/10.1080/09639284.2018.1501716

Holmes, N. (2015). Student perceptions of their learning and engagement in response to the use of a continuous e-

assessment in an undergraduate module. Assessment and Evaluation in Higher Education, 40(1), 1–14. https://doi.org/10.1080/02602938.2014.881978

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling, 6(1), 1–55. https://doi.org/10.1080/10705519909540118

Huda, S. S. M., Kabir, M., & Siddiq, T. (2020). E-assessment in higher education: Students' perspective. International Journal of Education and Development Using Information and Communication Technology, 16(2), 250–258. https://files.eric.ed.gov/fulltext/EJ1268772.pdf

Huertas, E., Kelo, M., Roca, R., Ranne, P., Gourdin, A., & Foerster, M. (2019). Framework for quality assurance of e-assessment [paper presentation]. INQAAHE Conference 2019 - Colombo (Sri Lanka) 25th to 28th March 2019. https://www.inqaahe.org/sites/default/files/INQAAHE-2019-Conference-Lavender-1_0.pdf

Jisc. (2020). The future of assessment: Five principles, five targets for 2025. https://www.jisc.ac.uk/reports/the-future-of-assessment-five-principles-five-targets-for-2025

Joshi, D. R., Singh, J. K., & Neupane, U. (2021). Mental health problems and patterns of self-care associated with the use of digital devices among university students. European Journal of Mental Health, 16(2), 146–169. https://doi.org/10.5708/EJMH.16.2021.2.7

Khadka, J. (2020). Student-teacher relationship in online class of Nepali schools during COVID-19. Nepal Journal of Multidisciplinary Research, 3(3), 77–93. https://doi.org/10.3126/njmr.v3i3.34887

Khadka, J., Adhikari, K. P., & Dahal, N. (2022). The learning performance of indigenous students in Nepali private schools: A mixed-methods study. International Journal of Instruction, 15(4), 987–1010. https://doi.org/10.29333/iji.2022.15453a

Khan, S., & Khan, R. A. (2019). Online assessments: Exploring perspectives of university students. Education and Information Technologies, 24(1), 661–677. https://doi.org/10.1007/s10639-018-9797-0

Khanal, J., & Ghimire, S. (2022). Practices enacted by Nepal Open University for equity and access: A qualitative study. Perspectives: Policy and Practice in Higher Education, 26(3), 78–84. https://doi.org/10.1080/13603108.2022.2043480

Khanal, B., Belbase, S., & Joshi, D. (2021). Effect of digital awareness on mathematics achievements at school to university levels in Nepal. *Mathematics Teaching Research Journal*, *12*(4), 47–68. https://commons.hostos.cuny.edu/mtrj/wp-content/uploads/sites/30/2021/01/v12n4-Effect-of-Digital-Awareness-on-Mathematics-Achievements.pdf

Khati, K., & Bhatta, K. R. (2020). Challenges of online education during COVID-19 pandemic in Nepal. *International Journal of Entrepreneurship and Economic Issues*, *4*(1), 45–49. https://doi.org/10.32674/ijeei.v4i1.45

Li, X. (2018). Self-assessment as 'assessment as learning' in translator and interpreter education: Validity and washback. Interpreter and Translator Trainer, 12(1), 48–67. https://doi.org/10.1080/1750399X.2017.1418581

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. Psychological Methods, 1(2), 130–149. https://doi.org/10.1037/1082-989X.1.2.130

Martin, F., Ritzhaupt, A., Kumar, S., & Budhrani, K. (2019). Award-winning faculty online teaching practices: Course design, assessment and evaluation, and facilitation. Internet and Higher Education, 42, 34–43. https://doi.org/10.1016/j.iheduc.2019.04.001

Mora, M. C., Sancho-Bru, J. L., Iserte, J. L., & Sánchez, F. T. (2012). An e-assessment approach for evaluation in engineering overcrowded groups. Computers and Education, 59(2), 732–740. https://doi.org/10.1016/j.compedu.2012.03.011

NOU. (2020). Students' authentic assessment system: Implementation framework—2077. Nepal Open University. https://nou.edu.np/uploads/attachments/xpm2sczujskkrtjz.pdf

Newman, A. (2015). Evidence of learning: A framework for facilitation. Educause Review, 50(6). https://er.educause.edu/articles/2015/10/evidence-of-learning-a-framework-for-facilitation

Nguyen, J. G., Keuseman, K. J., & Humston, J. J. (2020). Minimize online cheating for online assessments during covid-19 pandemic. Journal of Chemical Education, 97(9), 3429–3435. https://doi.org/10.1021/acs.jchemed.0c00790

Patronis, M., Ishtaiwa-Dweikat, F. F., Al Awad, M., & Aburezeq, I. M. (2019). Attitudes and perceptions towards summative e-assessment for free-text responses: A case study of a UAE university. International Journal of Information and Communication Technology Education, 15(1), 13–28. https://doi.org/10.4018/IJICTE.2019010102

Sarker, B., & Chakraborty, S. (2021). Structural equation modeling-based performance estimation and parametric analysis of wire electrical discharge machining processes. Sadhana—Academy Proceedings in Engineering Sciences, 46(5). https://doi.org/10.1007/s12046-020-01546-4

Sluijsmans, D., & Struyven, K. (2014). Quality assurance in assessment: An introduction to this special issue. Studies in Educational Evaluation. 43. https://doi.org/10.1016/j.stueduc.2014.08.003

Snekalatha, S., Mohamed Marzuk, S., Swapnatai, Meshram, A., Uma Maheswari, K., Sugapriya, G., & Sivasharan, K. (2021).

Medical students' perception of the reliability, usefulness and feasibility of unproctored online formative assessment tests. Advances in Physiology Education, 45(1), 84–88. https://doi.org/10.1152/ADVAN.00178.2020

Timmers, C. F., Braber-Van Den Broek, J., & Van Den Berg, S. M. (2013). Motivational beliefs, student effort, and feedback behaviour in computer-based formative assessment. Computers and Education, 60(1), 25–31. https://doi.org/10.1016/j.compedu.2012.07.007

Ukobizaba, F., Nizeyimana, G., & Mukuka, A. (2021). Assessment strategies for enhancing students' mathematical problem-solving skills: A review of literature. EURASIA Journal of Mathematics, Science and Technology Education, 17(3), em1945. https://doi.org/10.29333/ejmste/9728

UGC. (2020). The guidelines for facilitating alternative mode of learning in higher education. University Grants Commission. https://www.ugcnepal.edu.np/uploads///upload/83pV9K.pdf

Valdez, M. T. C. C., & Maderal, L. D., (2021). An analysis of students' perception of online assessments and its relation to motivation towards mathematics learning. The Electronic Journal of e-Learning, 19(5), 416–431. https://doi.org/10.34190/ejel.19.5.2481

Wang, P., & Jeffrey, R. (2017). Listening to learners: An investigation into college students' attitudes towards the adoption of eportfolios in English assessment and learning. British Journal of Educational Technology, 48(6), 1451–1463. https://doi.org/10.1111/bjet.12513