ONLINE FORMATIVE ASSESSMENT PRACTICES AMONG ACADEMICS OF TERTIARY EDUCATION IN SOKOTO STATE, NIGERIA

Ibnatul Jalilah Yusof[A], Siti Khadijah Mohamad[B], Mansur Bello[C], Hawa Syamsina Md Supie[D], Lukman Hakim Ismail[E]

ARTICLE INFO	ABSTRACT
	Purpose: This study examines the effect of two main factors, that is, lack of knowledge of ICT, and the availability of ICT facilities such as hardware, software, and internet access, which identified to be the common barriers towards practicing online formative assessment. **Theoretical framework:** Many educational institutions have been urged to adopt online learning due to the development of communications and digital device technology as well as the COVID-19 pandemic that ravaged the world in the previous two years. The shift from offline to online mode affects how formative assessment should be conducted during teaching and learning. The lack of knowledge of information and communication technology (ICT) and ICT facilities are prevalent in Nigeria. **Design/methodology/approach:** This study employed a survey design to examine online assessment feedback practice as well as factors contributing to the practices among 256 academics in one tertiary education in Sokoto. Descriptive and inferential statistical analyses were used. **Findings:** Online formative assessment feedback practice is at low level due to lack of knowledge of software applications and facilities. **Research, Practical & Social implications:** Government needs to invest more on educational technology by providing adequate ICT facilities in tertiary institutions in Sokoto, as well as offering suitable trainings on ICT literacy for academics. **Originality/value:** Online formative assessment contributes to enhancement in educational attainment and efficiency in learning and teaching. Doi: https://doi.org/10.26668/businessreview/2022.v7i3.e653

[A] A PhD in Evaluation and Measurement from Universiti Teknologi Malaysia (UTM) Malaysia. Jalan Iman, 81310 Johor Bahru, Johor- Malásia. E-mail: ijalilah@utm.my Orcid: https://orcid.org/0000-0001-7294-0307

[B] PhD in Educational Technology from Universiti Teknologi Malaysia (UTM) Malaysia. Jalan Iman, 81310 Johor Bahru, Johor- Malásia. E-mail: sitikhadijahmohamad@usm.my Orcid: https://orcid.org/0000-0002-0859-5630

[C] Masters in Evaluation and Measurement from Universiti Teknologi Malaysia (UTM) Malaysia. Jalan Iman, 81310 Johor Bahru, Johor- Malásia. E-mail: mansurbello87@gmail.com
Orcid: https://orcid.org/0000-0003-4466-4215

[D] Masters in Evaluation and Measurement from Universiti Teknologi Malaysia (UTM) Malaysia. Jalan Iman, 81310 Johor Bahru - Johor- Malásia. E-mail: syamsina3127@salam.uitm.du.my
Orcid: https://orcid.org/0000-0001-9501-5229

[E] PhD in Biomedical Engineering from Universiti Teknologi Malaysia (UTM) Malaysia. Jalan Iman, 81310 Johor Bahru, Johor-Malásia. E-mail: lukman@utm.my Orcid: https://orcid.org/0000-0002-9310-9368

Intern. Journal of Profess. Bus. Review. |Miami, v. 7 | n. 3 | p. 01-13 | e0653 | 2022.

1

PRÁTICAS DE AVALIAÇÃO FORMATIVA ON-LINE ENTRE ACADÊMICOS DO ENSINO SUPERIOR NO ESTADO DE SOKOTO, NIGÉRIA

Objetivo: Este estudo examina o efeito de dois fatores principais, ou seja, a falta de conhecimento das TIC e a disponibilidade de instalações TIC, tais como hardware, software e acesso à Internet, que identificaram como sendo as barreiras comuns para a prática da avaliação formativa on-line.
Estrutura teórica: Muitas instituições educacionais foram instadas a adotar o aprendizado online devido ao desenvolvimento das comunicações e da tecnologia de dispositivos digitais, bem como a pandemia COVID-19 que assolou o mundo nos dois anos anteriores. A mudança do modo off-line para o modo on-line afeta como a avaliação formativa deve ser conduzida durante o ensino e a aprendizagem. A falta de conhecimento da tecnologia da informação e comunicação (ICT) e das instalações ICT são predominantes na Nigéria.
Design/metodologia/abordagem: Este estudo empregou um desenho de pesquisa para examinar a prática de feedback de avaliação on-line, bem como fatores que contribuem para as práticas entre 256 acadêmicos de uma educação terciária em Sokoto. Foram utilizadas análises estatísticas descritivas e inferenciais.
Descobertas: A prática de feedback de avaliação formativa on-line está em baixo nível devido à falta de conhecimento de aplicações e instalações de software.
Pesquisa, implicações práticas e sociais: O governo precisa investir mais em tecnologia educacional fornecendo instalações adequadas de TIC em instituições terciárias em Sokoto, bem como oferecer treinamentos adequados sobre alfabetização em TIC para acadêmicos.
Originalidade/valor: A avaliação formativa on-line contribui para melhorar o desempenho educacional e a eficiência na aprendizagem e no ensino.

Palavras-chave: Avaliação Formativa Online, Feedback da Avaliação, Conhecimento das TIC, Facilidades das TIC, Instituições Superiores.

PRÁCTICAS DE EVALUACIÓN FORMATIVA EN LÍNEA ENTRE ACADÉMICOS DE EDUCACIÓN TERCIARIA EN EL ESTADO DE SOKOTO, NIGERIA

Objetivo: Este estudio examina el efecto de dos factores principales, a saber, la falta de conocimiento de las TIC y la disponibilidad de instalaciones de TIC, como el hardware, el software y el acceso a Internet, que se han identificado como las barreras comunes para la práctica de la evaluación formativa en línea.
Marco teórico: Muchas instituciones educativas se han visto urgidas a adoptar el aprendizaje en línea debido al desarrollo de la tecnología de las comunicaciones y los dispositivos digitales, así como a la pandemia de COVID-19 que asoló el mundo en los dos años anteriores. El paso de la modalidad offline a la online afecta a la forma en que debe realizarse la evaluación formativa durante la enseñanza y el aprendizaje. La falta de conocimiento de las tecnologías de la información y la comunicación (TIC) y de las instalaciones de las TIC son frecuentes en Nigeria.
Diseño/metodología/enfoque: Este estudio empleó un diseño de encuesta para examinar la práctica de la retroalimentación de la evaluación en línea, así como los factores que contribuyen a las prácticas entre 256 académicos de una educación terciaria en Sokoto. Se utilizaron análisis estadísticos descriptivos e inferenciales.
Resultados: La práctica de la retroalimentación de la evaluación formativa en línea se encuentra en un nivel bajo debido a la falta de conocimiento de las aplicaciones de software y las instalaciones.
Implicaciones prácticas, sociales y de investigación: El gobierno debe invertir más en tecnología educativa proporcionando instalaciones adecuadas de TIC en las instituciones terciarias de Sokoto, así como ofreciendo formación adecuada en materia de TIC para los académicos.
Originalidad/valor: La evaluación formativa en línea contribuye a mejorar los logros educativos y la eficiencia en el aprendizaje y la enseñanza.

Palabras clave: Evaluación Formativa en Línea, Retroalimentación de La Evaluación, Conocimiento de Las TIC, Instalaciones de Las TIC, Instituciones Superiores.

INTRODUCTION

Due to technological advancement in communications and digital devices, many education institutions have been called out to implement online learning. Most of the higher institutions already started with blended learning, online distance learning and massive open

Intern. Journal of Profess. Bus. Review. | Miami, v. 7 | n. 3 | p.01-13 | e0653 | 2022.

2

online courses. In addition, the COVID-19 pandemic that hits the world last two years has forced all learning institutions to adopt online mode of learning and teaching.

The change in learning and teaching from offline to online mode also affects how assessment, for instance, formative assessment, should be conducted during learning. Formative assessment is important to support learning and it is said to be beneficial for students' achievement when practiced correctly by academics (Gikandi et al., 2011; Said Pace, 2020). Gikandi et al. (2011) further outlines the three criteria of effective online formative assessment such as (i) timely feedback, (ii) active engagement of the students, and (iii) providing variety of assessment activities.

Numerous studies have been conducted on formative assessments and practice in Nigeria (Ikpi, et al., 2019; Mogboh & Okeye, 2019), yet, only few studies have focusing in the specific area of online formative assessment practice in Sokoto State. It has been mentioned in literatures that practicing online assessment is difficult for academics in Nigeria. Apart from lack of telecommunication infrastructure (Emetere et al., 2020; Wordu et al., 2020; Aworanti, 2016), academics have reported to be lack of knowledge in information and communications technology (ICT). Based on the preliminary study conducted in Shehu Shagari College of Education Sokoto in 2021, many academics reported that they have inadequate or no knowledge of using ICT to apply it in learning and teaching process. Therefore, in favour of having more insights on the feedback practice, this study examines the extent of online formative assessment that has been practiced in Sokoto State, Nigeria. In addition, through the preliminary findings, this study also examines the effect of two main factors, that is, lack of knowledge of ICT, and the availability of ICT facilities such as hardware, software, and internet access, which were, based on literature, to be the common barriers towards practicing online formative assessment.

LITERATURE REVIEW

According to Gikandi et al. (2011), formative assessment is defined as "the processes of creating what, how much and how well students are learning in relation to the learning goals and expected outcomes, in order to inform tailored formative feedback and support further learning, an instructive plan that is more productive when role is shared among the teacher, peers and the individual student" (p. 2337). Formative assessment frequently used in classroom as a source of continuing feedback targeting to advance learning and teaching (Hargreaves, 2008). Generally, formative assessment during teaching includes activities that allows monitoring of learning. It can also assess the understanding of students in order to modify teaching through continuous and timely feedback. The benefits of formative assessment have

Intern. Journal of Profess. Bus. Review. | Miami, v. 7 | n. 3 | p.01-13 | e0653 | 2022.

3

been well acknowledged and research has shown that the practices are supplementary with enhanced educational attainment (Hargreaves, 2005; Wiliam et al., 2016). When technology is used to enable and facilitate the provision of formative assessment, this process is sometimes referred to as a formative e-assessment (Pachler et al., 2010), online formative assessment (Gikandi et al., 2011; Koc et al., 2015; Baleni, 2015), web-based formative assessment (Costa et al., 2019), computer-based formative assessment (Bull et al., 2014), or simply technology-enhanced formative assessment (Feldman & Capobianco, 2018; Spector et al., 2016).

The influence and effectiveness of online formative assessment and the process to achieve its aim involves a few criteria such as timely feedback, active learners' engagement, and diversity of assessment activities (Gikandi et al., 2011). In addition, Black and William (1998) emphasized the importance of involvement of both teachers and students in formative assessment and suggested teachers to use various activities, namely, teacher observation, classroom discussion, homework, and tests to cater different learning abilities of students.

In this study, timely feedback refers to immediacy of academic's feedback during online settings whether it is given through synchronously or asynchronously. The feedback can be in a formative and/or summative form. The only difference is that feedback during formative should focus on knowledge, understanding and skills (Shute, 2008), timely and ongoing (Gikandi et al., 2011). Formative feedback is usually obtained from self-evaluation, peers, and academics. Hence, effective feedback should be provided frequently while the learning takes place, particularly in online platform, or else students will simply ignore it (Gikandi et al., 2011). Online learning environments and technology makes a positive contribution to learning for students (Bakerson & Rodriquez- Campos, 2014) and provides an opportunity for closing the feedback loop. If done correctly, online learning environments can "provide student and academic with richer, more immediate feedback" (Bajzek et al., 2018, p.1) which, in turn, will increase efficiency in learning and teaching.

The subsequent of a timely feedback is active engagement of students. Students participation can provide different advantages in the process of learning and teaching, including motivation, interest in studying, a dynamic classroom, enabling each other learning, and building trust among students (Abuid, 2014). In the context of online formative assessment, academics becomes the one who facilitate students to be more active and to encourage students to engage in different kind of assessment activities (Jonsson & Panadero, 2018). One of the easiest activities that can promote active participation is asking questions (Hodgson & Pyle, 2010). Academics can spend one-third of their teaching time asking students questions. Asking questions in formative assessment is important to get information about learning and

understanding of students. This goal can be achieved by through the provision of active and effective questions to determine the depth of the student's knowledge (McMillan, 2014). Hence, this study focuses on to what extent academics allow and encourage students to actively participate during online formative assessment activities.

Finally, diverse assessment activities are needed to meet individual learning needs. That can be facilitated by accommodating a variety of learning capabilities and styles. Moreover, it also helps with progressive learning development. In the context of online formative assessment, Gikandi et al. (2011) emphasize various and alternative activities of formative assessment to be incorporated into instruction. A study by Ogange et al. (2018) in Kenya shows that students appreciate different types of online formative assessments such multiple-choice questions and true-false questions. In the context of online formative assessment, there are several online platforms that commonly being used to implement diverse assessment activities such as Socrative, Google form, Kahoot, and Geddit, among others. Therefore, this study will measure to what extent academics providing various online formative assessment activities in their classroom.

METHODOLOGY

This study employed a survey research design method and utilized a questionnaire by the authors which comprises of 38 items measuring two constructs of knowledge of ICT, three constructs of availability of ICT facilities, and three constructs of online formative assessment practices.

Using simple random sampling approach, this study selected a total of 265 out of 850 academics in one tertiary education institution in Sokoto State, Nigeria. The questionnaire was administered online and also distributed face-to-face. Respondents were also reminded that their participation in the survey is voluntary.

Prior to administering the questionnaire, experts review, and a pilot study were conducted to examine the validity and reliability of the instrument. Fleiss Kappa value (k) was used to analyze three experts' agreements for each variable. The k value for knowledge of ICT is 0.92, ICT facilities is 0.68, and online formative assessments practice is 0.71. After amendments were made, the questionnaire was distributed to 36 academics for pilot study. Item reliability value (Ir) for each variable was generated using Winsteps. The Ir for knowledge of ICT is 0.94, ICT facilities is 0.78, and online formative assessment practice is 0.92. Based on these values, the questionnaire has a good validity and reliability.

Intern. Journal of Profess. Bus. Review. | Miami, v. 7 | n. 3 | p.01-13 | e0653 | 2022.

5

DATA ANALYSIS

This study employed a descriptive analysis such as mean, frequency, and percentage based on Rasch measurement model and inferential statistics of multiple regression analysis, to examine which two factors that contributed the most to online formative feedback. Using Winsteps software, the threshold or cut score of online formative assessment was determined based on standard deviation (SD) of item measure and the classification of respondents was based on person measure of each respondent (Yusof et al., 2021a; Yusof et al., 2021b). From the analysis, the SD of item measure of online formative assessment feedback is 0.72. Hence, the respondents who obtained a person measure exceeding 0.72 are classified under High level. The classification can be seen in Table 1.

Table 1: Threshold of Online Formative Assessment Measure

Level	Threshold	Classification
High	High > + 1 SD	High > + 0.72
Intermediate	+1 SD ≤ Intermediate ≤ -1 SD	+0.72 ≤ Intermediate ≤ -0.72
Low	Low > -1 SD	Low > - 0.72

RESULTS

Online formative assessment practice is measured based on three variables which are timely feedback, active learners' engagement, and diversity of assessment activities. Table 2 shows online formative assessment practice level among respondents. The overall result indicates that the online formative assessment practice is at low level with person logit mean at -1.92. For each practice, result for timely feedback and use of diversity of assessment activities are also at low level of practice with mean logit at -2.00 and -1.59, respectively while active learners' engagement is at intermediate level with mean logit of 0.60.

Table 2: Online Formative Assessment Practice

Variable Practice	Practice Level			Mean (Person Logit)
	High	Intermediate	Low	
	Frequency (f) Percentage	Frequency (f) Percentage	Frequency (f) Percentage	
Timely Feedback	20	69	176	-2.00 (Low Level)
	7.55%	26.04%	66.42%	
Active Learner's Engagement	130	105	30	0.60 (Intermediate Level)
	49.06%	39.62%	11.32%	
Diversity of Assessment Activities	0	32	233	-1.59 (Low Level)
	0.00%	12.08%	87.92%	
Overall	0	3	262	-1.92 (Low Level)
	0.00%	1.13%	98.87%	

Intern. Journal of Profess. Bus. Review. | Miami, v. 7 | n. 3 | p.01-13 | e0653 | 2022.

6

The second analysis is to measure the barrier, that is (i) lack of knowledge of ICT, and (ii) availability of ICT facilities such as hardware, software, and internet access, to online assessment practice among academics in Sokoto. Table 3 shows that academics have lack of knowledge of internet and software application, and they also perceived that lack of internet access and lack of software availability is high level of barrier while lack of hardware availability is intermediate level of barrier.

Table 3: Perceived Barriers

Barrier		Logit	Level
Knowledge of ICT	Knowledge of Application of Internet	-1.03	Low
	Knowledge of Application of Software	-0.88	Low
Barrier		**Logit**	**Level**
Availability of ICT Facilities	Lack of Internet Access	6.04	High
	Lack of Software Availability	3.05	High
	Lack of Hardware Availability	0.70	Intermediate

As for the factors, multiple regression was employed to examine which of these barriers contributed the most to online formative assessment practice. Prior to analysis, assumptions analysis was conducted. For multicollinearity, collinearity diagnostics was performed. VIF value for each independent variable is range from 1.052 to 1.298 (less than 10) and tolerance value is range from 0.618 to 0.950 (more than .01) which indicated the independent variables measured are not highly intercorrelated (Pallant, 2010). For normality, normal probability plot shows a reasonably straight diagonal line which suggested the data is normally distributed. Seven respondents were omitted from the analysis after their maximum critical value exceed 20.52 as suggested for five independent variables (Tabachnick & Fidell, 2007).

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.330a	.109	.092	.61936	
Model	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig**
Regressionn	11.852	5	2.370	6.179	.000a
Residual	96.669	252	.384	-	
Total	108.521	257	-	-	
a. Predictors: (Constant), HardwareAvail, KnowledgeInternet, KnowledgeSoftware, InternetAccess, SoftwareAvail b. Dependent Variable: OnlineFormative					

Intern. Journal of Profess. Bus. Review. | Miami, v. 7 | n. 3 | p.01-13 | e0653 | 2022.

7

Table 4 reveals a model summary for all variables measured. The model explains .330 (33.0%) of the variance in online formative assessment practice. The model also shows that knowledge of internet, knowledge of software, hardware availability, software availability and internet access statistically significantly predict online formative assessment practices with $F_{(5, 252)} = 6.719$ $p < .0005$.

Table 5: Coefficients

Coefficients					
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	-1.521	.096		-15.855	.000
	KnowledgeInternet	.053	.047	.068	1.129	.260
	KnowledgeSoftware	.061	.019	.189	3.147	.002
	InternetAccess	.007	.011	.046	.666	.506
	SoftwareAvail	-.105	.026	-.291	-4.041	.000
	HardwareAvail	.003	.037	.006	.090	.928
a. Dependent Variable: OnlineFormative						

Table 5 meanwhile shows that lack of software availability makes the strongest contribution (B = -.291) to explaining online formative assessment feedback practice followed by knowledge level of software application (B = .189). These two variables also significantly contributed to the prediction of online formative assessment feedback practices. The negative value of Beta for the lack of software availability indicates its negative correlation with online formative assessment feedback practices. This means that the higher software availability barrier, the less online formative assessment feedback being practiced. As for the knowledge of software application, the positive Beta indicates its positive correlation with online assessment feedback practice. This means that the higher the knowledge, the more online assessment feedback being practiced.

DISCUSSION

Formative assessment is important to support learning and it is said to be beneficial for students' achievement when practiced well (Gikandi et al., 2011; Said Pace, 2020) regardless of whether it is conducted through online or offline mode. A series of studies of online formative assessment have been contextualized to concerns about the effectiveness and quality of online courses. For example, a work conducted by Bahati et al. (2019) and Nurfiqah and

Yusuf (2021) showed that technology was used to allow and promote creative formative assessment practice in real classroom settings. Hettiarachchi et al. (2015) explained that online formative assessment is carried-out during learning, which provides practice for students on their learning in a course and possible development activities they could undertake to improve their level of understanding.

Based on the findings of this study, online formative feedback practices such as timely feedback and the use of diversity of assessment activities among academics in Sokoto are at low level, while student engagement is at intermediate level. This study went further to examine factors that might contribute to the lack of online formative feedback practices. Descriptively, this study found that the level of knowledge of ICT among academics are at low level. They also perceived that lack of internet access and lack of software as high level of barrier, while hardware availability as intermediate level of barrier to practice online formative assessment feedback.

Knowledge of ICT is very crucial to the implementation of online formative assessment, as cited in Jacob et al. (2020), Ezema et al. (2021), and Wordu et al., (2020). The findings of this study are similar to the study conducted by Ezema et al. (2021) who found that, members of the faculty do not have adequate knowledge and skills set to implement online learning. While other studies in Nigeria such as Jacob et al. (2020) and Abubakar (2016) revealed that the academics have a low level of knowledge and skills in ICT. Both studies found that academics are unable to use software applications such as Microsoft Word, Microsoft Excel, and Microsoft Access and do not know how to browse the internet.

ICT facilities are another critical component for conducting online formative assessment smoothly. This limitation was also reported in studies conducted in underdeveloped countries such as Pakistan and Nigeria. It was discovered that any online learning activities is not effective due to lack of access of the internet and ICT facilities (Anan & Anwar, 2020; Anene et al., 2014). In addition, insufficient funding to support and facilitate online assessment in Nigeria (Arowanti, 2016; Jacob et al., 2020). According to Jacob et al., (2020) and Jegede et al. (2019), the budgetary allocation for ICT education is low in Nigeria. With expensive ICT facilities, allocation for ICT is inadequate. These issues hindered quality operations of students' online assessment feedback.

Hence, this study supports recommendations made by Arowanti (2016) and Jegede et al. (2019) for all education institutions and government to facilitate academics to enhance their ICT literacy, provide adequate ICT facilities, increase the funding of ICT education, and subsidize the cost of ICT facilities.

CONCLUSION, LIMITATION AND RECOMMENDATION

To conclude, this study gives an account of one tertiary education academics' perceptions towards online formative assessment practice. Based on the findings made, the conclusion was drawn that, the respondents had low level of knowledge of ICT that would enable them to practice online formative assessment and there were limited infrastructural facilities in the tertiary institutions in Sokoto State that would be used to implement online formative assessment practice among lecturers of tertiary institutions in Sokoto State, Nigeria. Besides that, knowledge of internet, knowledge of software, hardware availability, software availability and internet access are all found to significantly predict the online formative assessment practices. Hence, an evaluation program needs to be introduced on a timely basis to assess the online formative assessment practice in tertiary institutions as to achieve the desired objectives of grooming competent lecturers who are ICT literates.

As for the limitation, this study was conducted in one tertiary institution in Sokoto State, Nigeria during the fourth phase of movement restriction order in Nigeria. Though the sample was chosen randomly, the generalization of the study will be limited to the one institution only. It is suggested for future research to expand the scope of the study and have a wider sample size from other institutions so that better generalizations can be made. It is also suggested that future research to test and consider other variables which could affect online formative assessment such as unstable power supply and old system slowness.

ACKNOWLEDGMENT

REFERENCES

Abubakar, A. M. (2016). *An assessment of the use of ICT in teaching and learning in public secondary schools in Northeastern Nigeria* (Master's thesis, Eastern Mediterranean University (EMU)-Dogu Akdeniz Universitesi (DAU)). http://i-rep.emu.edu.tr:8080/jspui/bitstream/11129/2994/1/abubakarabubakar.pdf

Abuid, B. A. (2014). A student participation assessment scheme for effective teaching and learning. *Learning and Teaching in Higher Education: Gulf Perspectives*, *11*(1), 71-97. https://www.emerald.com/insight/content/doi/10.18538/lthe.v11.n1.109/full/pdf

Intern. Journal of Profess. Bus. Review. | Miami, v. 7 | n. 3 | p.01-13 | e0653 | 2022.

10

Anan, M. & Anwar, K. (2020). Online learning amid the covid-19 pandemic: Students perspectives. *Journal of Pedagogical Sociology and Psychology Research, 2*(1), 45-51. http://www.doi.org/10.33902/JPSP.202020261309

Anene, J. N., Imam, .H. & Odmuh, I. (2014). Problem and prospect of e-learning in Nigeria universities. *International Journal of Technology and Inclusive Education, 3*(2), 320-334. https://infonomics-society.org/wp-content/uploads/ijtie/published-papers/volume-3-2014/Problem-and-Prospect-E-learning-in-Nigerian-Universities.pdf

Aworanti, O. A. (2016). Information and communications technology (ICT) in Nigeria educational assessment system--emerging challenges. Universal Journal of Educational Research, 4(6), 1351-1356. doi: 10.13189/ujer.2016.040612

Bahati, B., Fors, U., Hansen, P., Nouri, J., & Mukama, E. (2019). Measuring learner satisfaction with formative e-assessment strategies. *International Journal of Emerging Technologies in Learning*, *14*(7). 61-79. https://doi.org/10.3991/ijet.v14i07.9120

Bajzek, D., Brooks, J., Jerome, W., Lovett, M., Rinderle, J., Rule, G. & Thille, C. (2018). Assessment and instruction: Two sides of the same coin. In C. Bonk et al. (Eds.), *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2018* (pp. 560-565). AACE. http://www.editlib.org/p/29661

Bakerson, M. A., & Rodriguez-Campos, L. (2007). The evaluation of internet usage within the higher education classroom. *International Journal of Learning*, *13*(10), 23-32.

Baleni, Z. G. (2015). Online formative assessment in higher education: Its pros and cons. *Electronic Journal of E-Learning*, *13*(4), 228-236. https://academic-publishing.org/index.php/ejel/article/view/1730/1693

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice, 5*(1), 7-74. doi:10.1080/0969595980050102

Bull, S., Quigley, S., & Mabbott, A. (2014). Computer-based formative assessment to promote reflection and learner autonomy. *Engineering Education, 1*(1), 8–18. doi: 10.11120/ened.2014.01010008

Costa, D. S., Mullan, B. A., Kothe, E. J., & Butow, P. (2019). A web-based formative assessment tool for masters students: A pilot study. *Computers & Education, 54*(4), 1248–1253. doi: 10.1016/j.compedu.2013.11.011

Emetere, M. E., Tunji-Olayeni, P., & Sanni, S. E. (2020). Gaining Insight into Sustainable Telecommunications Infrastructure: A Case of Aerosol Retention over Sokoto, Nigeria. *Wireless Personal Communications*, *111*(1), 189-208. https://doi.org/10.1007/s11277-019-06852-7

Ezema, M., Nworgu, B., Ebem, D., Echezona, S., Ugwu, C., Ezugwu, A., ... & Ukwandu, E. (2021). Development of An Assessment Benchmark for Synchronous Online Learning for Nigerian Universities. *arXiv preprint arXiv:2103.07215,* 1-6. https://doi.org/10.48550/arXiv.2103.07215

Feldman, A., & Capobianco, B. M. (2018). Teacher learning of technology enhanced formative assessment. *Journal of Science Education and Technology, 17*(1), 82–99. doi: 10.1007/s10956007-9084-0

Gikandi, J. W., Morrow, D., & Davis, N. E. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education, 57*(4), 2333–2351. doi: 10.1016/j.compedu.2016.06.004

Hargreaves, E. (2005). Assessment for learning? Thinking outside the (black) box. *Cambridge Journal of Education*, *35*(2), 213-224. https://doi.org/10.1080/03057640500146880

Hargreaves, E. (2018). Assessment. In G. McCulloch, & D. Crook (Eds.), *The Routledge international encyclopaedia of education* (pp. 37–38). Routledge

Hettiarachchi, E., Mor, E., Huertas, M. A., & Guerrero-Roldan, A. E. (2015). Introducing a formative e-assessment system to improve online learning experience and performance. *J. Univers. Comput. Sci.*, *21*(8), 1001-1021. https://dblp.org/db/journals/jucs/jucs21.html

Hodgson, C., & Pyle, K. (2010). A literature review of assessment for learning in science. Nfer. https://www.nfer.ac.uk/media/1556/aas01.pdf

Ikpi, E.E, Ojating, H., & Mpantor, O.B. (2019). Formative Assessment Practices, Attitude and Learning Outcome of Students in Mathematics in Selected Secondary Schools in South-South Nigeria. *British Journal of Education, 7*(6), 26-37. https://www.eajournals.org/wp-content/uploads/Formative-Assessment-Practices-Attitude-and-Learning-Outcome-of-Students-In-Mathematics.pdf

Jacob, O. N., Jegede, D., & Musa, A. (2020). Administration of information communication technology (ICT) in Nigerian secondary schools: challenges and the ways forward. *Electronic Research Journal of Engineering, Computer and Applied Sciences*, 2(2020), 50-63. shorturl.at/egr13

Jegede, D. (2019). Challenges facing the administration of ICT infrastructural facilities in public primary schools in Nigeria. *Electronic Research Journal of Engineering, Computer and Applied Sciences*, *1*(2019), 30-40. https://ssrn.com/abstract=3703495

Jonsson, A., & Panadero, E. (2018). Facilitating students' active engagement with feedback. In A. A. Lipnevich & J. K. Smith (Eds.), *The Cambridge handbook of instructional feedback*: Cambridge University Press

Koc, S., Liu, X., & Wachira, P. (2015). *Assessment in online and blended learning environments*. IAP (Information Age Publishing).

McMillan, J. H. (2014). Classroom assessment: Principles and practice for effective standards-based instruction. Pearson.

Mogboh, V. E., & Okoye, A. C. (2019). Formative and summative assessment: Trends and practices in basic education. *Journal of Education and Practice*, *10*(27), 39-45. http://eprints.gouni.edu.ng/id/eprint/2278

Nurfiqah, S., & Yusuf, F. N. (2021, April). Teacher practice on online formative assessment. In *Thirteenth Conference on Applied Linguistics (CONAPLIN 2020)* (pp. 534-538). Atlantis Press.

Ogange, B. O., Agak, J. O., Okelo, K. O., & Kiprotich, P. (2018). Student perceptions of the effectiveness of formative assessment in an online learning environment. *Open Praxis*, *10*(1), 29-39. https://search.informit.org/doi/abs/10.3316/INFORMIT.423669258504414

Intern. Journal of Profess. Bus. Review. | Miami, v. 7 | n. 3 | p.01-13 | e0653 | 2022.

12

Pachler, N., Daly, C., Mor, Y., & Mellar, H. (2010). Formative e-assessment: Practitioner cases. *Computers & Education*, *54*(3), 715-721. https://doi.org/10.1016/j.compedu.2009.09.032

Pallant, J. (2010). *A step by step guide to data analysis using the SPSS program: SPSS survival manual*. McGraw Hill Education and Open University Press.

Said Pace, D. (2020). The use of formative Assessment (FA) in online teaching and learning during the covid-19 compulsory education school closure: The Maltese experience. *Malta Review of Educational Research, 14*(2), 243-271 https://www.um.edu.mt/library/oar/handle/123456789/66440

Shute, V. J. (2008). Focus on formative feedback. *Review of Educational Research*, *78*(1), 153-189. https://doi.org/10.3102/0034654307313795

Spector, J. M., Ifenthaler, D., Sampson, D., Yang, J. L., Mukama, E., Warusavitarana, A., …Gibson, D. C. (2016). Technology enhanced formative assessment for 21st century learning. *Journal of Educational Technology and Society, 19*(3), 58-71. https://repository.nie.edu.sg/bitstream/10497/18335/1/JETS-19-3-58.pdf

Tabachnick, B. G., & Fidell, L. S. (2007). *Experimental designs using ANOVA*. Thomson/Brooks/Cole.

Wiliam, D., Lee, C., Harrison, C., & Black, P. (2016). Teachers developing assessment for learning: Impact on student achievement. *Assessment in Education: Principles, Policy and Practice, 11*(1), 49–65. https://doi.org/10.1080/0969594042000208994

Wolsey, T. (2008). Efficacy of instructor feedback on written work in an online program. *International Journal on E-learning*, *7*(2), 311-329. https://www.learntechlib.org/primary/p/23564/.

Wordu, H., Adegbeye. O., & Okoh, F.K. (2020). Computer-Based Assessment: Application, Prospects and Challenges in Nigeria. *International Journal of Education and Evaluation, 6*(1), 9-13. https://www.iiardjournals.org/get/IJEE/VOL.%206%20NO.%201%202019/Computer-Based%20Assessment.pdf

Yusof, I. J., Latif, A. A., & Supie, H. S. M. (2021b). Assessing Statistical Literacy Level of Postgraduate Education Research Students in Malaysian Research Universities. *Turkish Journal of Computer and Mathematics Education, 12*(5), 1318-1324. https://doi.org/10.17762/turcomat.v12i5.1800

Yusof, I. J., Supie, H. S. M., & Ismail, L. H. (2021a). Research Methodology Knowledge between Master and Doctoral Education Research Students. *Revista Geintec-Gestao Inovacao E Tecnologias*, *11*(2), 1831-1840. https://revistageintec.net/wp-content/uploads/2022/02/1801.pdf