OTESSA PROCEEDINGS

Impact of Higher-Institution-Organised Training and MOOCs on Academic Staffs' Innovative Skills Acquisition: Integrating and Developing Sustainable Digital Pedagogical Online-Learning Resources

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Abstract

The teaching and learning innovations in this post-COVID pandemic study focus on improving content knowledge, pedagogy, instructional resources, the learning environment, and learning outcomes. Using technologies to provide sustainable interventions is good, but adopting innovative digital pedagogical resources to facilitate instructional activities for the future is challenging because of digital skills required. Lacking this knowledge could lead to inappropriate integration for pedagogical practices and problems for learners. In this research, among the massive open online courses (MOOCs) that the academic staff used to acquire the digital skills for online learning were two Commonwealth of Learning MOOCs: Introduction to Technology-Enabled Learning and Using Open Education Resources for Online Learning. Considering training and standards, this study investigated innovative pedagogical digital skills acquired by academics participating in higher-institution-organised training, compared to those participating in MOOCs in Nigeria. Purposive sampling was used for the descriptive survey. A validated questionnaire, ASOLICQ (0.86 reliability co-efficient), was used for data collection. Data were analysed using frequency, percentage, correlation, and chi-square. Findings revealed a significant difference between levels of skill acquired by staff trained with the two different methods. Based on the findings, recommendations emphasise provision of quality assurance, engaging hands-on practices, participatory learning reflection sessions, and friendly monitoring.

Keywords: digital skills, higher-institution-organised, sustainable innovation, MOOC training, pedagogical resources

Background to the Study

Prior to the COVID-19 pandemic, most teachers in Africa and many other countries around the world were teaching their students face-to-face or in person in a brick-wall classroom, not using an online learning approach (Adarkwah, 2021). The general indifference to using online learning approaches by the teachers in Nigeria and many African countries was due to factors such as infrastructure challenges, phobia of digital devices, instability of the Internet network, unreliable supply of electricity, lack of ICT skills, lack of incentive for data subscription, and other student-related challenges (similar to the challenges confronting the teachers). Unexpectedly, disruption by the COVID-19 pandemic compelled schools at all levels to embrace online learning. During the COVID-19 pandemic, Ashman et al. (2020) acknowledged that there was very little time for course planning, and this hindered provision of proper training to support teachers to move from a traditional in-person teaching method to an online learning method.

The COVID-19 pandemic brought a new-normal approach to society and to the educational sector, especially in the integration of online teaching, often though an emergency remote teaching (ERT) approach (Hodges et al., 2020). Some teachers acquired digital skills through personal efforts since most institutions did not have a learning management system (LMS), while other teachers were trained by their institutions in order to increase their digital skills capacity to function remotely. The ERT made use of any accessible digital media that were easy to use for both teachers (facilitators) and students (learners) to prepare, store, and share instructional contents, make learning interactions, conduct assessments, and provide feedback on learning activities. Xie et al. (2020) found that many faculties and students who were compelled by the COVID-19 lockdown to adopt online teaching and learning encountered a number of challenges.

Before the COVID-19 pandemic, Hollands and Tirthali (2014) asserted that apart from cost-effective training provision at scale, massive open online courses (MOOCs) have enormous benefits provided a few factors are addressed. Meanwhile, Baturay and Yukselturk (2015) reported that flexibility, individualisation, interactivity, and user-friendliness factors in an online learning environment would influence student achievement. From the reports of Mays et al. (2021), after most schools and institutions were closed, barring face-to-face teaching and learning activities, there was a great challenge because most countries did not have a common online platform in place; but the Commonwealth of Learning (COL) rendered supports to some partners by developing a short course, exploring the use of MOOCs, to train teachers in moving teaching and learning from the traditional in-person method to the online method.

As observed by O'Neal et al. (2017), there is need for technological support to functionally integrate technology in pedagogical activity; Hall and Trespalacios (2019) as well as Vidal-Hall et al. (2020) expressed the opinion that the support is particularly necessary for integrating technology into teaching and learning practices. According to Suárez-Rodríguez et al. (2018), the procedure for teachers to integrate technology into their practices could be seen as taking much time. However, Yakub et al. (2022) asserted that many teachers lack the pedagogical knowledge to enable them to explore the benefits of educational technology appropriately. Yet, Mlambo et al. (2020) strongly emphasised steady use of digital technology in teaching and learning as part of development for educators.

In this study during the COVID-19 pandemic, institution-organised training and MOOC training were used to provide theoretical and hands-on practice to enable academic staff to acquire capacity to facilitate online learning. There are many MOOCs available online. Every MOOC should contain knowledge content and a series of well-planned learning activities (with interactive instructional resources such as reading text, video-based lectures, discussion forums, chats, assignments, quizzes, grading, relevant technical supports, and so forth) based on the learning objectives. A MOOC should also have assessment of learning achievement, and all these should be appropriately structured. The course should be hosted on a website and accessed by an Internet connection. The course should also be available free of cost or openly licensed as in the example of an open educational resource (OER). MOOC courses should be able to be accessed by a vast population of users at the same time, irrespective of their geographic location. Some unique features of MOOCs include that there are no requirements to be met before participants enroll or register, and that the courses are self-paced to allow users to learn at their own speeds and at times that do not interfere with other aspects of their lives.

In conducting this study, we provided links to academic staff in a higher education institution (population sample) to access MOOCs, including two Commonwealth of Learning MOOCs: Introduction to Technology-Enabled Learning (https://www.col.org/news/mooc-technology-enabled-learning/) and Using Open Education Resources for Online Learning: An Introduction (https://www.mooc4dev.org/OnlineTeaching4). Ko and Rossen (2017) and Wray et al. (2008) explained that teaching in the online modality is different from teaching in the classroom and that the online faculty member's role is different from that of a faculty member teaching in the classroom. Despite people in the global education field expressing serious interest in 21st century competencies (European Union, 2018), some difficulties are being encountered in training teachers to use emerging technology (Brinkley, 2020; Gómez et al., 2019); hence, Shafie et al. (2019) suggested that it would be pertinent to explore the benefits inherent in the technological pedagogical content knowledge (TPACK) model (Mishra & Koehler, 2006; Shulman, 1986, 1987) and 21st century skills. According to Van Vaerenewyck et al. (2017), the TPACK model makes it easy to incorporate digital resources in teaching and learning activities.

As many higher institutions of learning had never prepared to deliver online learning, lacked LMSs, and had academic staff who could not facilitate online learning, quick trainings were organised on how to integrate digital technologies into existing curricula, to deliver or facilitate online learning via ERT. Some students and other stakeholders who were new to the online learning approach reacted with mixed feelings; and these reactions necessarily raised the need for evaluation, to advance the scholarship of teaching and learning using a sustainable, innovative pedagogical approach. This study was carried out in response to this situation in order to provide prompt solutions to the difficulties caused by the sudden disruption of teaching and learning during the COVID-19 pandemic; thus, the study was intended to provide empirical data that could be used to structure further research that would be sequential and exploratory on professional capacity building. The focus of this study was on the impact of higher-institution-organised training and MOOCs on academic staffs' innovative skills acquisition in integrating and developing sustainable digital pedagogical online-learning resources.

Theoretical Framework

This study was built around the TPACK theory that emphasises technological skills, pedagogical skills, and content knowledge as pertinent components of a professional educator's competency; and particularly applicable to technical and vocational education and training

(TVET) educators in this study. The TPACK framework was originally proposed by Shulman (1986, 1987), based on the notion of pedagogical content knowledge (PCK), and further advanced by Mishra and Koehler (2006) who added the technological knowledge (TK) component (in order to comprehend teachers' knowledge of integrating technology successfully). The combination resulted in technological content knowledge (TCK), technological pedagogical knowledge (TPK), and finally, technological pedagogical and content knowledge (TPACK). Trained TVET teachers should demonstrate competency in skills such as critical thinking, collaboration, communication, and creativity, in order to provide quality learning experiences to the learners. In our research, the TVET teachers were to be equipped with necessary competency to decide on appropriate digital technologies to facilitate teaching and learning experiences to achieve instructional objectives. In addition, the TVET teachers were expected to become knowledgeable in pedagogy, technology integration, and content knowledge skills with emerging digital tools to enhance their continuous professional development.

Methodology

Research Questions

This study was guided by these five research questions:

1. To what extent did the academic staff trained by the higher institution faculty (in the form of institution-organised trainings) and the academic staff trained by the Commonwealth of Learning MOOCs acquire skills on how to integrate digital technologies for online learning into their courses?

2. To what extent did the academic staff trained by the higher institution faculty (institution-organised training sessions) and the academic staff trained by the Commonwealth of Learning MOOCs acquire skills on how to develop pedagogical digital learning resources?

3. To what extent were the innovative skills acquired by the academic staff to integrate digital technologies for online learning related to the innovative pedagogical skills acquired to develop digital learning resources for online learning?

4. How comparable were the institution-organised digital training sessions and the Commonwealth of Learning MOOCs in terms of their impact on academic staff's ability to integrate innovative pedagogical digital technologies for online learning?

5. How comparable were the institution-organised digital training sessions and the Commonwealth of Learning MOOCs in terms of their impact on the academic staff's ability to produce innovative pedagogical digital resources for online learning?

Hypothesis

To answer research questions 3, 4, and 5, the following hypotheses were formulated:

1. There is no relationship between academic staff's skills to integrate digital technologies and their skills to develop pedagogical digital learning resources for online learning.

2. There is no significant difference between levels of skills acquired by the academic staff trained with the institution-organised trainings and the academic staff trained with the MOOCs in terms of their ability to integrate digital teachnologies into their teaching practices.

3. There is no significant difference between academic staff trained with institution-organised trainings and academic staff trained with MOOCs in terms of their ability to develop digital pedagogical learning resources for online learning.

Research Design, Instrument, and Procedure for Data Collection

In this study, a descriptive survey research design was used. For our data collection, we designed a validated questionnaire, the Academic Staff Online Learning Integration Capacity Questionnaire (ASOLICQ) that used a 4-point Likert scale and had a 0.86 reliability co-efficient (see Appendix). The instrument was subjected to reliability testing using a test-retest method that involved 14 teachers whose demographic characteristics were similar to the sample in the study. The target population was all the lecturers in higher institutions in Lagos state, Nigeria, and a purposive sampling method was used to select the sample for the study. The sample was made up of the academic staff in higher educational institutions. The sample was comprised of 105 voluntary participants who responded to the online questionnaire on Google Forms. The link to the digital questionnaire was shared on the academic staffs' WhatsApp and Telegram platforms. All responses received were used in the study because all respondents participated in either institution-organised training or MOOC training. Data were statistically analysed in terms of frequency, percentage, correlation, and chi-square distribution.

Data Analysis and Results

To answer the first research question on the extent to which skills were acquired on how to integrate digital technologies for online learning, we found that the MOOCs training group performed better than the institution-organised training group.

To answer the second research question regarding the extent to which skills were acquired on how to develop pedagogical digital learning resources for online learning, we found again that the MOOCs training group performed better than the institution-organised training group.

The institution-organised training was not prepared on a standard LMS application because the ERT approach was used. The way the ERT was hurriedly prepared might have affected the structure of the training contents and their delivery; in contrast, the MOOCs were well planned. Trainees in the MOOCs had choices (audio, text, or video-based resources) that had the potential to match their preferred learning styles (since these trainings were prepared on a LMS). However, there were no such alternatives or options available to the trainees in the institution-organised trainings, and their preferred learning styles were of no consequence. Moreover, considering the fact that the institution-organised training sessions were not recorded (everything was synchronous), this meant that participants were unable to review or revisit the course materials to get more personal understanding. On the other hand, those trained with the MOOCs had the opportunity to revisit the learning contents online as many times as they wished in order to improve on what they had learnt.

Referring to the research questions 3, 4, and 5 in this study, answers are provided via the three stated hypotheses. For hypothesis 1, as shown in Table 1, the correlations analysis between *academic staff acquired skills for integration of digital technology* and *acquired skills for development of pedagogical digital resources* showed a very strong relationship (.64). Thus, hypothesis 1 is rejected.

Table 1

Correlation Between Academic Staff Acquired Skills for Integration of Digital Technology and Acquired Skills for Development of Pedagogical Digital Resources

Acquired skill	N	M	SD	r
Integration of digital technology	105	18.03	3.74	
Development of pedagogical digital resources	105	25.63	6.96	.64

For hypothesis 2, the chi-square analysis of acquired skills on integration of digital technology for online learning between the academic staff in the institution-organised training group versus those in the MOOC group revealed that there was no significant difference between levels of skill acquired by the academic staff trained with the institution-organised training and those trained with the MOOC (.192 > .05); hence, hypothesis 2 is accepted. See Table 2.

Table 2

Frequencies and Chi-Square Results for Acquired Skills on Integration of Digital Technology for Online-Learning Comparing the Academic Staff With Institution-Organised Training and Those With MOOC Training

Level of acquired skills	Training approach			
	Institution-organised		MOOC	
	n	%	n	%
Low	12	21.1	5	10.4
Medium	26	45.6	20	41.7
High	19	33.3	23	47.9

Note. N = 105. MOOC = massive open online course. df = 2. Sig. = .192 *ns*.

p = 3.23. Fisher's exact test was used.

For hypothesis 3, the chi-square analysis of acquired skill for development of pedagogical digital resources for online learning between the academic staff who received institution-organised training and those who were trained in MOOCs showed a significant difference in levels of skill acquired by the by the two groups (.026 < .05); therefore, hypothesis 3 is rejected. See Table 3.

Table 3

Frequencies and Chi-Square Results for Acquired Skill for Development of Pedagogical Digital Resources for Online Learning Comparing Academic Staff With Institution-Organised Trainings and Those With MOOC Training

Level of acquired skills	Training approach			
	Institution-organised		MOOC	
	n	%	*n*	%
Low	8	14	4	8.3
Medium	21	36.8	8	16.7
High	28	49.1	36	75

Note. *N* = 105. MOOC = massive open online course. *df* = 2. Sig. = .026.

p = 7.37. Fisher's exact test was used.

Discussion of Results and Conclusion

The findings in this study establish a serious and positive relationship between the skills acquired by academic staff to integrate digital technologies and the skills to develop pedagogical digital learning resources. This could have been caused by an already-high level knowledge of pedagogy possessed by the teachers. This finding agrees with Suárez-Rodríguez et al. (2018) that the pedagogical role of the teacher is very important in integrating technology into teaching and learning.

This study also supports the notion put forward by the OECD (2015) that technology can amplify great teaching but great technology cannot replace poor teaching. In addition, this research aligns with the opinions of Hodges et al. (2020) and Misiejuk et al. (2023) that ERT is different from online learning. In support of this, the study by Chen and Senatorova (2024) on the learning experiences of the students in two different learning environments namely online learning environment before COVID-19 pandemic and ERT learning environment as intervention in the period of the pandemic emphasised that ERT is different from online learning. However, the results in this current study point out that the skills acquired by those who were trained in the institution-organised group and those who were in the MOOCs group were not significantly different on integration of digital technology for online learning but were significantly different on development of pedagogical digital resources for online learning.

These results could have been the result of having unlimited access to a quality repository of learning resources, as those in the MOOCs group had. This corroborates Hernández-Selles et al. (2023) who stated that the availability of technological resources does not really mean integration of technology unless there are teachers with requisite digital competence to use the technology appropriately. In this post-COVID-19 pandemic period, in which higher institutions are willing to commence providing online education, academic staff should be given necessary competency-based training to prepare them to go beyond being simply trained teachers to instead achieving competence as learning facilitators. This will align them with the new normal being established across the globe.

Recommendations

As a result of this research, two recommendations are offered:

1. During training of academic staff for digital skills acquisition (to integrate technology, to develop instructional resources, and to facilitate online learning), serious emphasis should be on quality assurance and engaging hands-on practice, emphasizing and expanding best practices.

2. Each institution should be creative and proactive to motivate teachers to genuinely participate in training sessions and workshops being organised by the institution, with particular emphasis on being active and productive in the practical, hands-on practices that have the potential to lead towards a sustainable shared future.

Authors' Contributions

All three authors actively participated in the study. We were among the trainers who provided the participants with the approaches (institution-organised trainings and MOOC links). Ibrahim Abdul was the director of training, Adebowale Adebagbo was responsible for measurement and evaluation, while all authors participated in data collection. Adebowale Adebagbo designed the study, analysed the data, and wrote the article; while all authors participated in the review and editing to incorporate necessary corrections.

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Ethics Statement

Ethics regulations were observed as all study activities were conducted with the consent of the participants. Participants were given details about the category of information being collected and how the information would be used. The participants were free to withdraw at any stage of the study.

Conflict of Interest

No conflict of interest was involved in this study.

Data Availability Statement

Participants were informed that the data collected were for research purposes and that their confidentiality would be protected. However, data could be made accessible upon special request to the corresponding author, provided such data sharing would not violate individual privacy or the terms of the agreement with participants.

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Appendix

Questionnaire on Skills Acquired for Online Teaching via Training During COVID-19

Dear Respondent,

This questionnaire is about the impact of the training and workshops that were organised (facilitated) or recommended (through sharing of links to courses hosted by third parties, such as the COL/Commonwealth of Learning) by the Flexible Skills Development Centre (FSDC), on "capacity development for online teaching" (for the academic staff) during the COVID-19 pandemic. This questionnaire is for research purposes, thus, there is no right or wrong answer. Any information supplied will be treated confidentially. Kindly express your honest opinion on the following items.

Thank you.

SECTION A (DEMOGRAPHY)

Instruction: Please choose as appropriate:

Your School in the institution (choose one only):

School of Art, Design & Printing ☐ School of Engineering ☐

School of Environmental Studies ☐ School of Management & Business Studies ☐

School of Liberal Studies ☐ School of Science ☐ School of Technology ☐

School of Technical Education ☐ Other (specify) [＿＿＿＿＿＿＿＿＿＿＿＿]

Gender: Male ☐   Female ☐

Your highest educational qualification: First degree ☐ Master's degree ☐ PhD ☐

SECTION B

As a member of the teaching staff, indicate the level of capacity that you are really sure you acquired during the training and workshops organised/facilitated or recommended through sharing of links to courses hosted by third parties like the COL, by the Flexible Skills Development Centre for this research.

Kindly respond to each statement in the first column by choosing from the options to indicate your response.

Indicate your response (one choice) to this question.				
Description of participation	I was **not able** to carry out hands-on practice (actual practical activities to acquire the online teaching skills), during the workshop organised by the FSDC during COVID-19 pandemic. **And I did not participate in other third party courses** (e.g., COL courses) recommended by the FSDC.	I was **not able** to carry out hands-on practice (actual practical activities to acquire the online teaching skills), during the workshop organised by the FSDC during COVID-19 pandemic. **But I participated in other third party courses** (e.g., COL courses) recommended by the FSDC.	I was **able** to carry out hands-on practice (actual practical activities, to acquire the online teaching skills), during the workshop organised by the FSDC during COVID-19 pandemic; **But I did not participate in other third party courses** (e.g., COL courses) recommended by the FSDC.	I was **able** to carry out hands-on practice (actual practical activities, to acquire the online teaching skills), during the workshop organised by the FSDC during COVID-19 pandemic; **And I participated in other third party courses** (e.g., COL courses) recommended by the FSDC.
How would you describe your participation in the workshops and hands-on practice (practical activities) during the training?				

Indicate your response (one choice) to each of the questions.				
Description of skills capacity acquired during the workshops and trainings	**I cannot use it.**	**I can use it to a small extent.**	**I can use it satisfactorily.**	**I can use it well.**
Integration of WhatsApp for online teaching.				
Integration of Google Drive file sharing for online teaching.				
Integration of Dropbox for online teaching.				
Integration of Google Classroom for online teaching.				
Integration of Zoom for online teaching.				
Integration of screencast applications (e.g., Xrecorder and Screencast-O-Matic) for online teaching.				
Integration of LMS (e.g., Moodle) for online teaching.				

Description of skills capacity acquired during the workshops and trainings	**Very Low**	**Low**	**High**	**Very High**
How would you describe your capacity or ability on the following skills:				
Skills to formulate "smart" instructional objectives for emergency remote teaching (online learning).				
Skills on identification of useful software for emergency remote teaching (online learning).				
Skills for selection of appropriate technologies for emergency remote teaching (online learning).				
Skills on how to search for OER.				
Skills on how to use licensed OER for emergency remote teaching (online learning).				
Skills for selection of appropriate technologies to produce images/graphic resources for emergency remote teaching (online learning).				
Skills for selection of appropriate technologies to produce text-based resources for emergency remote teaching (online learning).				
Skills for selection of appropriate technologies to produce audio resources for emergency remote teaching (online learning).				
Skills for selection of appropriate technologies to produce video resources for emergency remote teaching (online learning).				

There is a need to improve the technology-enabled learning environment in our institution. If you have additional comments, kindly use space below. Thank you.

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Once again, Thank you.