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Integration of Technology in Content Development for Effective Online Teaching in Private Universities in Kenya

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Abstract

To successfully teach in a technologically advanced environment, an online instructor needs a wide range of abilities and competencies. This descriptive correlational study aimed to establish the extent to which faculty integrated technology in content development for effective online teaching in private universities in Kenya, with a focus on the United States International University (USIU)-Africa. One hundred faculty from four schools responded to the questionnaire. Descriptive statistics, correlation, and linear regression analyses were used for data analysis. The results indicated that the faculty integrated different technologies in content development for online classes. For example, 85 % of the respondents integrated online course orientation (M = 4.3, SD= 0.855), and 86 % integrated eBooks/textbooks (M=4.2, SD=0.92). Only 42% of the respondents integrated personal generated videos (M=3.4, SD=1.42). A statistically significant linear relationship was found between integration of technology and effective online teaching (F (1, 98) = 19.432, p < 0.05). Integration of technology in content development accounted for approximately 17% of the variability in effective online teaching and had a statistically significant positive effect on effective online teaching (R^2 = .165, β = .232, t(98) = 4.408, p < 0.05).

Keywords: Online teaching, competencies, technology integration, content development

Introduction

To be a competent online teacher, knowledge is required in three primary areas: pedagogical knowledge (PK), content knowledge (CK), and technological knowledge (TK), with the overlapping area being critical, as described in the technological pedagogical content knowledge (TPACK) framework (Archambault, 2011; Mishra & Koehler, 2006). Knowledge that represents the intersections of technology and content (TCK), pedagogy and content (PCK), and technology and pedagogy (TPK) is also required. Instead of simply adding new knowledge of technology to CK and PK, faculty should understand how to present concepts using technologies, as well as how technology may be applied to expand on present knowledge to generate novel epistemologies or enhance current ones. They should also understand how technology can help address some of the issues that students confront and embrace pedagogical strategies that use technology in a constructive way to teach material (Koehler & Mishra, 2009).

The faculty should understand how to present concepts using technologies, how technology can be applied to expand present knowledge to generate new epistemologies or enhance current ones, pedagogical strategies that use technologies in a constructive way to teach material, and how technology can help address some of the issues that students face rather than simply adding new knowledge of technology to CK and PK.

High-quality online faculty members are required to satisfy the needs of online students. Instructors are often placed in these roles short of any formal training in online teaching with the

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expectation that they will learn on the job through short workshops or transitory professional development sessions (Rice & Dawley, 2009).

During the COVID-19 school closures, it was noted that to be able to transition to online teaching, the availability of ICT tools, teachers' professional competence, for example, in TPK, and exposure to opportunities for developing digital competence during teacher training were instrumental in adapting to online teaching among teachers in Germany (König et al., 2020). Based on the challenges teachers faced in Cyprus during emergency remote teaching, Nisiforou, Kosmas and Vrasidas (2021) reported critical issues that should be considered in the policy and practice of distance education. This includes enhancing teachers' digital literacy and training teachers on online teaching methods, tools, resources, and technical issues. To ensure an effective transition to online teaching, the technical and instructional support team at Sultan Qaboos University in Oman offered a sequence of short online training workshops and weekly webinars on several relevant topics such as online course design and interactive teaching (Osman, 2020). However, despite this training, it was noted that digital literacy skills were crucial for faculty to teach online, and there was a need for training in instructional design. One semester of online teaching, faculty across four institutions of higher education in Sarawak, Malaysia, rated competencies in time management, course design, course communication, and technical capabilities as important (Adi Badiozaman et al., 2022). They also indicated the need to enhance such competencies, as well as the use of different 21st century online technologies for effective online teaching. Otieno and Ochieng' (2020) studied the perceptions of private primary school teachers regarding the efficacy of online learning during the outbreak of the COVID-19 pandemic in the Athi River sub-county, Kenya. They established that the majority had a positive perception; however, insufficient capacity building and empowerment in the application of ICT was noted as a hindrance to online teaching.

To effectively change from face-to-face learning to online learning and ensure effective student learning, the faculty in USIU-A were taken through a series of training that included preparation of backboard content, setting and conducting assessments on the blackboard, use of blackboard tools such as discussion forums, weekly reflections, and the use of ZOOM for synchronous online teaching. Such training mainly focused on technology knowledge, as defined in the TPACK framework. Unfortunately, most faculty members lack formal training on how to successfully teach online, which calls for the integration of content, pedagogy, and technology to enhance the student learning experience. By establishing the technological competencies used by USIU-A faculty during content development, this study helps to identify areas that need more attention and, therefore, can be targeted and included during faculty development workshops for effective online teaching. Capacity building in competencies identified as lacking or deficient would provide similar exposure and experience to students who participate in online classes at the institution.

Literature Review

Steady growth in online education in its different forms has occurred due to the convergence of new technologies, global embracing of the Internet, and the increasing demand for a workforce trained for the ever-evolving digital economy (Palvia et al., 2018). Information and communication technology (ICT) is a crucial factor that affects the quality and quantity of online education. ICT in teaching is described as the moral practice of simplifying learning and refining performance by creating, applying, and managing suitable technological procedures and resources (Kaware & Sain, 2015). Following the global outbreak of COVID-19, ICT adoption in education systems has accelerated (Cone et al., 2022; Basri et al., 2018).

ICT was introduced in schools to prepare students for their knowledge, as there are numerous resources available online through which knowledge can be advanced using diverse videos, presentation topics, audio, charts, and so on. (Asad et al., 2021). This is of immense help to teachers and students in gaining maximum conceivable knowledge in their area of training. The use of ICT can also help transform the learning

process from an instructor-focused environment into a pupil-focused setting (Muianga et al., 2018). ICT and online learning can improve the quality of higher education through creative techniques that increase students' interest, motivation, and engagement. It also enables skill attainment and enhances instructor preparation, improving teacher-student interactions and information sharing (Pavel et al., 2015).

Technology Integration in Teaching

The meaningful application of technology to realize learning objectives is referred to as technology integration (Kimmons & Hall, 2018). Using different technologies in the online classroom helps in the active engagement of learners with the learning objectives and creates room for differentiated instruction, depending on student needs. This involves using tools such as PowerPoints, games, animation, online grading systems, online and self-generated videos, eBooks, and online assignments. According to Abdullah (2016), teachers and learning institutions apply technology to individualize learning when they support prevailing pupil-focused practices and help solve issues. Technology is also used when it is part of a systemic, organization-wide initiative to implement pupil-focused learning and instructors have access to sufficient professional development and ongoing support.

One of the frameworks used to understand teachers' technology integration in face-to-face and online teaching is the Technology Integration Matrix (TIM). It forms the basis for designating and directing the application of technology to augment instructions by incorporating the characteristics of meaningful learning environments, comprising collaboration, actions, construction, authenticity, and goal direction (Harmes et al., 2016). It is also related to five levels of technology integration–entry, adoption, adaptation, infusion, and transformation–which apply equally to online and face-to-face learning (Mohammed & Prakasha, 2017). In the entry stage, the instructor uses technological tools to deliver the curriculum; hence, information is received passively. The transformation step involves using ICT tools to change the classroom setting from a teacher to a student focus. Students can use technology to facilitate higher-order learning activities, which helps them set goals, develop hypotheses, track their progress, and eventually reflect on their findings. When technology is successfully integrated into subject areas, instructors become guides and facilitators. Simultaneously, students take responsibility for their learning outcomes, and technology serves as a tool that assists in the process (Abdullah, 2016). Rahmadi et al. (2020) noted that instructors' involvement in introducing the integration of technology to enhance learning was gratifying, advancing them into the transformation stage.

Factors Affecting Technology Integration in Teaching

Evaluating the issues and challenges related to ICT adoption in teaching and learning is vital for assisting teachers in overcoming hindrances and becoming efficient technology users. By adopting a quantitative research design, Ghavifekr et al. (2016) noted that the key issues in using ICT tools by teachers in the state of Melaka, Malaysia were lack of effective training, lack of instructors' competency, limited technical support, limited network connection and accessibility, and limited time**.** Despite enthusiasm among secondary school teachers in Nairobi, Kenya, a lack of capacity-building support in their mathematics teaching and learning was found to contribute to teacher laxity in integrating technology (Amuko et al., 2015). Tandika and Ndijuye (2019) conducted a study on teachers' preparedness for integrating ICT in pre-primary education in Tanzania. A qualitative transcendental phenomenological approach was used to analyze teachers' understanding and experiences relating to ICT and its incorporation into teaching and learning in pre-primary classes. Open-ended questionnaires and semi-structured interviews were used. A reasonable number of teachers have been reported to have inadequate understanding of ICT integration in teaching and learning. This could be attributed to their lack of pedagogical knowledge and preparation regarding the use of ICT in teaching and learning.

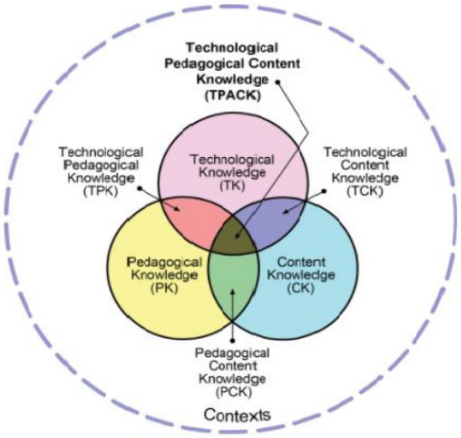
Several factors have been reported to have a greater impact on hindering ICT use than the lack of training among professors from the Dniprodzerzhinsk State Technical

University, Ukraine. These include insufficiently developed systems of incentives for information implementation, insufficiently formulated guidelines for using electronic tools, and insufficiently established electronic spaces for higher education (Nakaznyi et al., 2015). A study by Abdi et al. (2021) reported that a lack of ICT resources and training of instructors contributed to a lack of ICT integration in the teaching and learning of welding and fabrication at vocational training centers in Mandera County, Kenya. Asad et al. (2021) conducted a quantitative survey-based study to gauge how higher education institutions in Pakistan would be affected by the integration of e-learning and information and communication technologies. Data were collected from faculty and learners of the Business Administration, Computer Science and English departments. The results indicated that through e-learning materials and ICT, teachers can facilitate their teaching process and pupils can learn more effectively. However, the study found that university administrators do not encourage lecturers to use ICT in teaching and learning because of inadequate resources and a lack of ICT skills. Although instructors usually appreciate the advantages of ICT applications in teaching and learning, they face several challenges. Therefore, there is a need to understand these hurdles to offer possible solutions for effective learning.

Theoretical Framework

Technology integration models that support instructors to better appreciate the method and objectives of technology integration are TPACK, PICRAT, RAT, and TIM (Marcovitz & Janiszewski, 2016). In the 21st century, technology has played a key role as a tool to aid instructors in the delivery of lessons and students, thus completing the TPACK model (Santos & Castro, 2021). This is the intersection of TK, CK, PK, TPK, TCK, and PCK, as shown in Figure 1. The TPACK framework not only underscores the components individually but also emphasizes the multifaceted interaction of pedagogy, content, and technology knowledge, and how to apply this knowledge in the distinctive contexts within the teaching space (Willermark, 2018).

Figure 1
The TPACK Model.



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The foundation of good teaching with technology is TPCK, which calls for a mastery of the illustration of ideas using technologies, didactic techniques that constructively use technologies to deliver content, information on what makes concepts easy or difficult to learn, and how technology can help resolve the challenges pupils face, knowledge of learners' prior knowledge and theories of epistemology, and understanding how technology might be utilized to advance existing knowledge, create new epistemologies, or support existing ones (Koehler & Mishra, 2008).

Replacement, Amplification, and Transformation (RAT) technology integration and Substitution, Augmentation, Modification or Redefinition (SMAR) models can serve as a guide for assessing and choosing digital tools and applications that can produce meaningful teaching and learning experiences, particularly in virtual classes (Puentedura, 2015). RAT refers to the use of technology in educational settings to replace (R) a traditional method of instruction, amplify (A) existing learning, or transform (T) knowledge in ways that would not have been possible without the use of technology (Hughes et al., 2006). SMAR technology integration paradigm becomes applicable when technology use in class takes the form of substitution (S), augmentation (A),

modification (M), or redefinition (R) (Hamilton et al., 2016). While redefinition and transformation in SMAR deal with technology applications that enable instructors and learners to learn in novel ways, earlier impractical methods, transforming learning, substitution, and replacement applied in RAT deal with technology use that simply replaces or substitutes prior use without functionally improving efficiency (Mulyati, 2019). When integrating technology into teaching, instructors should consider its effects. It is less important to simply replace or substitute for earlier practices, but it is considered valuable if it redefines classroom practice (Kimmons, 2018).

Students' relationship with technology, either passive, interactive, or creative (PIC), and how the instructor's use of technology affects conventional practice are the foundations of the PICRAT technology integration approach (Hughes et al., 2006). With this model, teachers should aim to achieve content knowledge while integrating technology into their teaching. This model has been identified as helpful in teaching technology integration because it is straightforward, beneficial, and emphasizes technology as a means to an end. It also balances parsimony and comprehensiveness, and strongly emphasizes students, which helps them achieve their learning objectives (Kimmons et al., 2020). A technology-integrated matrix (TIM) was developed as an all-inclusive framework for assessing technology integration in instructional settings (Harmes et al., 2016). In addition to assisting with choosing teacher professional development, the model includes resources that model best practices and present a context for planning (Florida Center for Instructional Technology, 2019). By fostering learning environments with increasingly authentic instructions, the TIM model was created to help K-12 schools support their students in learning the real-world skills necessary for success in the 21st century.

Research Questions

This study aimed to establish the influence of technologies integrated in content development on the effective online teaching of teaching staff in private universities in Kenya, with a focus on USIU-Africa. The following research questions guided this study.

i. What is the relationship between integration of technology in content development and effective online teaching at USIU-Africa among the teaching staff?
ii. To what extent does integration of technology in content development influence effective online teaching at USIU-Africa among the teaching staff?

Methodology

A descriptive correlational research design was used to describe the extent to which USIU-A faculty integrated technology in content development and to establish the relationship between the integration of technology in content development and effective online teaching. Descriptive research provides a snapshot of the current thoughts, feelings, or behaviors of individuals, while correlation entails the evaluation of relationships between the dependent and independent variables (Moflih, 2016). Data related to the study variables were gathered, and general conclusions were developed from evidence collected from a sample. Since the study focused on a single organization (USIU-Africa), the research strategy adopted was a case study. This was a cross-sectional study, as data were collected during the spring of the 2022 semester for one month.

Population and Sampling Design

The target population in this study was all teaching staff at USIU-A who taught in spring 2022. Stratified sampling was used in the current study where the entire population was divided into five schools (strata) that offer programs in distinct disciplines, as shown in Table 1. Samples were then randomly selected from each stratum. This type of probability sampling allowed for generalization of the obtained results. To determine the sample size, Yamane's sample size formula was used at the 95% confidence level (Yamane, 1967).

$$n = \frac{N}{1 + N(e^2)}$$

$n =$ sample size

$N =$ Target population

$\varepsilon =$ Error tolerance, 0.05

Hence the sample size, n is given by $n = \frac{N}{1+N(0.05^2)} = \frac{279}{1+279(0.05^2)} = 164$

Table 1
Sample Size from each of the Schools

No.	Schools	Number of Faculty	Sample Per school	%
1	School of Humanities and Social Sciences (SHSS)	81	48	29.3
2	Chandaria School of Business (CSOB)	80	47	28.6
3	School of Science and Technology (SST)	49	28	17.1
4	School of Pharmacy and Health Sciences (SPHSS)	37	22	13.4
5	School of Communication Cinematic and Creative Arts (SCCCA)	32	18.8	11.6
	Total	**279**	**164**	**100**

Data Collections Methods

Quantitative and categorical data were collected by administering the questionnaires. The questionnaire was uploaded to survey monkey, and the faculty requested to participate by sending an email that contained a link to the survey questionnaire. Close-ended questions on a Likert scale of 1-5 (1=not at all, 2=very small extent, 3=small extent, 4=average, 5=very large extent) were used to ensure that the respondents provided uniform responses. The questionnaire comprised of three sections. Section A provided the general and demographic information. Section B collected information on the integration of technology in online teaching, where nine items were tested, and Section C collected information on effective online teaching. Ethical considerations were put in place during the entire study process to ensure the integrity and objectivity of the researcher, respect of respondents, avoidance of harm to the respondent, volunteerism, and the right to withdraw by obtaining informed consent from the respondent, explaining the study to the respondent, and maintaining anonymity. The study was approved by the USIU-Africa Institution Research Board and the National Commission for Science, Technology, and Innovation (NACOSTI), Kenya.

Cronbach alpha reliability index was used to assess the reliability of the study tools as described by Ercan, Yazici, Sigirli, Ediz and Kan (2007). To ensure that the alpha value remained high, items with lower alpha values were removed. From the pilot study, the Cronbach values obtained were in the range of 0.649 - 0.816 (Table 2). One of the variables from the statements describing effective online teaching was dropped to improve the Cronbach's alpha. The consensus is that an α value between 0.6 and 0.7 indicates adequate reliability while a value of 0.8 or higher indicates a very good level (Hulin et al., 2001).

Table 2
Cronbach Alpha Reliability Indices

Study Variable	Number of Items	Cronbach Alpha (α)	Remarks
Integration of Technology in Content Development	9	0.816	Acceptable
Effective Online Teaching	8	0.649	Acceptable

Data Analysis Method

Completed questionnaires were downloaded from survey monkey and uploaded to Statistical Package for Social Scientists (SPSS) version 26. Descriptive statistics and inferential statistical techniques were used to analyze the collected data. The descriptive statistics techniques used included frequencies, percentages, means, and standard deviations of the study variables. Inferential statistical techniques used in the analysis of the collected data included the Pearson correlation coefficient and simple linear regression analysis. The Pearson correlation coefficient was used to describe the strength and relationship between the dependent variable (effective online teaching) and the independent variables (integration of technology in content development). Simple linear regression analysis was used to determine the effect of the independent variable on the dependent variable. Prior to conducting the linear regression analysis, tests for assumptions of linear regression analysis (i.e., tests for normality, linearity, multicollinearity, and heteroscedasticity) were performed. We used a simple linear regression model. $Y = \beta_0 + \beta_1 X_1 + \varepsilon$

Where; $Y =$ effective online teaching, $\beta_0 =$ constant, $\beta_1 =$ slope of the independent variable, $X_1 =$ independent variable, $\varepsilon =$error

The regression analysis helped answer the research question that sought to establish the influence of the independent variable (integration of technology in content development) on the dependent variable (effective online teaching). The model helped determine whether there was a positive or negative relationship between the two variables, and to what extent.

Results

Descriptive statistics for Demographics

The target sample size was 164 and 100 responses were received. This represented a 61% response rate. According to Fincham (2008), the goal of researchers is to obtain response rates of approximately 60%. The results of the descriptive statistics and measured variables are presented in Table 3. Both male and female faculty members participated in this study. Above 60% of faculty teaching in USIU-A are of age 36-53 years hence in the productive years and able to embrace and adopt technology in teaching and learning. Only 2% of the faculty population were aged 63 years and above. The faculty holding different teaching positions in the university setting responded to the study, with the majority of the respondents (48%) being in the lecturer position and the full professor position at 4%. These results can be generalized because the teaching ranks were all presented in this study. More than 60% of the respondents had more than 11 years of university-level teaching experience. Full-time and adjunct faculty participated in the study at 57% and 43%, respectively, implying a reasonable distribution between full-time and adjunct faculty teaching at USIU-A; thus, the results could be generalized. The faculty (90%) rated themselves as good or excellent in online teaching skills, while 1% of the faculty indicated that they had poor online teaching skills. This may have contributed to the institution's ability to transition to emergency online teaching under the COVID-19 lockdown.

Table 3
Descriptive Statistics for the Demographic Variables

Variable	Frequency	Percentage
Gender		
Male	66	66
Female	34	34
Age		
18-26	1	1
27-35	7	7
36-44	28	28
45-53	35	35
54-62	27	27
63 and above	2	2
Teaching position		
Professor	4	4
Associate Professor	12	12
Assistant Professor	36	36
Lecturer	48	48
Terms of Engagement		
Full time	57	57
Adjunct	43	43
Personal rating of online teaching skills		
Poor	1	1
Moderate	9	9
Good	60	60
Excellent	30	30

Descriptive, Correlational and Regression Analyses of Integration of Technology in Content Development and Effective Online Teaching

From the diagnostic tests, all the integration of technology and effective online teaching variables were normally distributed from the Normal Q-Q plot, where data points fell along the reference straight line. There was a linear relationship between the integration of technology and effective online teaching from the scatter plot, where the data points displayed a pattern for a positive relationship. There was no multicollinearity because the Variance Inflation Factor (VIF) was one, and there was no evidence of heteroscedasticity, since there was no evidence of visible patterns for the residuals in the heteroscedasticity chart scatter plot. Table 4 presents descriptive statistics regarding the mean and standard deviation of how respondents rated their technology integration in content development. The integration of online course orientation yielded a relatively high mean score (M= 4.3, SD= 0.855). The integration of personally generated video and audio during content development had the lowest mean (M=3.4, SD=1.42).

Table 4
Descriptives for Integration of Technology in Content Development

	*	1	2	3	4	5	Mean	SD
	Statements	**% of Respondents**						
1	Integrated educational websites in development of course content.	5.0	9.0	9.0	54.0	23.0	3.8100	1.05117
2	Integrated ICT-applications that can be used to better understand the contents of your subject.	3.0	10.0	10.0	50.0	27.0	3.8800	1.01782
3	Integrated technologies that can be used to illustrate difficult contents in your subject	2.0	11.0	17.0	43.0	26.0	3.8081	1.01697
4	Integrated online collaboration tools (Adobe connect, google docs) in content development.	5.0	10.0	18.0	46.0	21.0	3.6800	1.07196
5	Integrated online video/audio in content development.	3.0	4.0	9.0	38.0	46.0	4.2000	0.97442
6	Integrated personal generated videos/audio in content development.	15.0	14.0	13.0	29.0	29.0	3.4300	1.42315
7	Integrated eBooks/Textbooks in content development.	1.0	7.0	6.0	41.0	45.0	4.2200	0.91652
8	Integrated online course orientation (e.g., introduction, getting started) in content development.	0.0	6.0	8.0	38.0	47.0	4.2727	0.85498
9	Integrated current research findings from peer-reviewed journals to enhance your course content.	4.0	9.0	14.0	45.0	28.0	3.8400	1.06097

Note. 1=not at all, 2=very small extent, 3=small extent, 4=average, 5=very large extent

The correlational analysis showed a statistically significant positive relationship between effective online teaching and integration of technology in content development ($r(100) = 0.407$, $p<0.05$), as shown in Table 5.

Table 5
Correlation between Integration of Technology in Content Development and Effective Online Teaching

		Integration of Technology in content development	Effective Online Teaching
Integration of Technology in course content	Pearson Correlation	1	.407**
	Sig. (2-tailed)		0.000
	N	100	100
Effective Online Teaching	Pearson Correlation	.407**	1
	Sig. (2-tailed)	0.000	
	N	100	100

**Correlation is significant at the 0.01 level (2-tailed).

Table 6
Regression Coefficients of Integration of Technology in Content Development on Effective Online Teaching

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	3.479	0.208		16.715	0.000	3.066	3.892
	Integration of Technology in content development	0.232	0.053	0.407	4.408	0.000	0.127	0.336

a. Dependent Variable: Effective Online Teaching
b. N=100
c. R^2(adj.R^2)=.165(.157)
d. F(1,98)= 19.432, p=<.001

The estimated regression equation from Table 6 is given by:

$$Effective\ online\ teaching = 3.479 + 0.232 * integration\ of\ technology\ in\ content\ development$$

A linear regression analysis generated a predictive model that showed a statistically significant linear relationship between the integration of technology in content development and effective online teaching (F (1, 98) = 19.432, p<.05) and that integration of technology positively and significantly affected effective online teaching β = .232, t(98) = 4.408, p < 0.05 as shown in Table 6. Integration of technology in content development accounted for approximately 17 % of variability for the regression model of integration of technology and effective online teaching at USIU-Africa (R^2=.165).

The model shows that for every unit increase in the integration of technology during content development, effective online teaching improves by 0.232 in USIU Africa.

Discussion

To prepare students for learning in an online environment, the study revealed that most respondents integrated online course orientation as part of the integration of technology in content development. The integration of course orientation in online classes has been shown to contribute to students' e-learning readiness, as it provides a roadmap of what is expected in the course (Yilmaz, 2017). The ability to integrate online course orientation could be attributed to faculty development workshops conducted at institutions, including online course delivery. This was contrary to the study by Farid et al. (2015), in which teachers' digital competencies were found to be insufficient in preparation for lesson plans. Al-Samarrarie and Saeed (2018) noted that although most instructors can conduct online courses and are digitally savvy, many struggle to effectively incorporate ICT into their teaching methods. Most teachers think that ICT integration to support student learning is effective because they can build confidence in communication to express their ideas and be more creative and imaginative as they advance in learning. However, Ghavifekr and Rosdy (2015) noted that teachers were not given enough time to learn, and were uncomfortable with ICT. Studies have shown that technological knowledge and applying technology in pedagogical practices are two different concepts, and effective use is attainable only if teachers are equipped with all fundamental competencies (Ifinedo et al., 2020).

The TPACK model also establishes that teachers must acquire all the necessary technological skills to effectively integrate ICT into educational practices (Mishra & Koehler, 2006).

Integrating personally generated video and audio during content development was observed as the variable faculty used, at least to some extent. This is despite the several positive advantages associated with using videos to enhance online teaching and learning. Draus et al. (2014) reported a positive and reasonable influence on learner satisfaction with engagement in asynchronous online courses using instructor-generated video content in all aspects of lectures, courses, discussions, and announcements. The use of targeted YouTube videos to augment instruction in online and hybrid courses has been reported to improve learner engagement, depth of understanding, and overall satisfaction in higher education courses (Bruzzetto, 2014). Improvements in student learning and performance in online mathematics courses have been reported with the use of instructor–generated video lecturers (Hegeman, 2015). By expecting students to complete instructor-generated directed note-taking sheets while watching the instructor-created video lectures, the course instructor's presence was enhanced in the redesigned college algebra course. Instructor-generated video usage has also been shown to improve performance in online accounting classes, with students primarily watching videos to review exams (D'Aquila et al., 2019).

The study revealed that the integration of technology into content development had a significant positive influence on effective online teaching. The use of ICT in teaching can stimulate and keep students inspired by the learning process, which is considered a significant predictor of their academic performance (Hanafi et al., 2017, Xu et al., 2021). It also allows students to play a more proactive role and be at the center of the learning process, while the instructor becomes a guide (Haleem et al., 2022). A study by Ghavifekr and Rosdy (2015) revealed that the use of ICT improves classroom management, as it makes students more focused and disciplined. Although teachers appreciate the positive effect of using technology in teaching and learning, several factors have been identified as affecting teachers' use of technology in their teaching, including teachers' knowledge, attitudes, and skills, which are also influenced by institutional culture (Spiteri & Chang, 2020). Hence, there is a need for guided teacher training on how to use digital technologies to communicate, create, and construct new knowledge as well as solve problems to support effective online teaching.

Conclusions and Recommendations

The integration of technology into content development positively affected online teaching. The faculty at USIU-A can integrate technology into a classroom setting by merging technological knowledge with pedagogical and content knowledge for effective online teaching. The respondents used various technologies to make classes lively and enrich students and faculty. Continuous faculty workshops on the use of LMS and access to the Internet have impacted the faculty with digital skills, which may have contributed to the majority of the faculty having this competence. However, institutions need to continuously support faculty in improving online teaching skills, such as capacity building in the creation and generation of personal course-related videos as well as the use of flipped teaching. There is also a need to be bound in coming faculty to ensure that they have already entrenched online teaching skills, hence ensuring the sustainability of technology integration in content development for effective delivery of online classes.

Study Limitations

This study focused on the integration of technology in content development as a component of competencies for effective online teaching by faculty at USIU-A. There is a need for further studies that target students and their views on the technologies they consider critical for integration in teaching content for their online learning for courses in diverse fields. The results are also limited to one private university (USIU-A), although several private and public universities exist in the country. Therefore, there is a need to conduct more similar studies in other universities, both private and public, and compare the similarities and differences in the outcomes.

Primary data was collected in this study by use of a questionnaire. Further use of primary data collection methods such as interviews and observations is recommended.

Disclosure statement

No potential conflict of interest was reported by the authors.

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