Digital Teaching Competence and Lecturers Self-Efficacy in Online Classes: Insights from Public Universities in Uganda

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(Accepted date: 10 February 2023/Published: 28 February 2023)

https://doi.org/10.58653/nche.v10i2.02

Abstract

The COVID-19 pandemic which resulted in the lockdown of educational institutions hastened the adoption of online classes. However, especially in public universities in Uganda, online teaching and learning was received with mixed feelings by students and some lecturers. Nevertheless, it is incontestable that the COVID-19 pandemic ushered in many different ways of doing things, such as compulsory online teaching and learning. This study seeks to obtain insights into the digital teaching competences of lecturers and their self-efficacy in online classes. Specifically, the study examined the relationship between lecturers' course design, technical, course communication and time management competences with their self-efficacy in online classes in terms of instructional methods, student management and student engagement. This correlational study involved a sample of 327 academic staff from four public universities. Data was collected using a self-administered questionnaire and analysed quantitatively. Data analysis involved structural equation modelling using partial least square structural equation modelling (PLS-SEM). The results revealed that course design, course communication and time management competences had a positive and significant influence on lecturers' self-efficacy in online classes. However, digital technical competence had a positive but insignificant influence on lecturers' self-efficacy in online classes. The conclusions of the study are to the effect that the capacity to design online courses is imperative for lecturers' self-efficacy in online classes, course communication competence

is essential for lecturers' self-efficacy in online classes, and time management competence is vital for lecturers' self-efficacy in online classes. However, digital technical competence is not very imperative for lecturers' self-efficacy in online classes. The study recommends that university managers should develop lecturers' capacity to design online courses, develop their online course communication competence, and sensitise lecturers about the importance of time management in teaching online classes. Nonetheless, university managers should not over emphasise digital technical competence of lecturers.

Keywords: Communication; Competence; Digital; Online Classrooms; Self-Efficacy; Time Management.

Introduction

In the wake of the COVID-19 pandemic that led to the closure of educational institutions to prevent the spread of the coronavirus, educational institutions adopted online classes, which have become part and parcel of higher education learning culture (Baroudi & Shaya, 2022). Therefore, the higher education landscape across the globe has completely changed, with universities and other educational institutions stopping to completely rely on the traditional face-to-face classrooms and integrating virtual learning into the education system (Shohel et al., 2022). Online learning has expanded and those institutions that had not been keen to adopt it have been forced to integrate it into their teaching and learning (Almajali et al., 2022). Prior to COVID-19, interest in online learning was an emerging method considered as a unique style of instruction used by particular institutions and departments, such as those offering distance education (Masalimova et al., 2022). However, after COVID-19 the situation changed and all teachers in higher educational institutions have been required to become flexible, rethink and adjust their teaching strategies by organising creative lessons for virtual engagement of students, and try unconventional methods to evaluate students' achievement virtually. Nonetheless, the rise of online education requires that teachers have the know-how and strategies to incorporate digital tools and platforms successfully (Baroudi & Shaya, 2022).

While teachers were required to use online teaching, it is important to note that developing self-efficacy in using technology for teaching is a gradual on-going process, yet following the COVID-19 outbreak teachers in higher education institutions were required to implement teaching using online technologies instantly. The sense of self-efficacy develops over time, with the person accumulating knowledge from various sources about their functioning in different areas (Blonder et al., 2022). Bandura (1977) identified sources that past experience, observing models or vicarious experience, positive feedback from one' s surroundings or verbal persuasion, and physical and emotional reactions (Regier, 2021). The major challenge for many teachers in institutions of higher education was their efficacy to conduct online

classes. Teachers from different backgrounds and ages were abruptly required to teach online, sometimes without sufficient technical support (Rapanta et al., 2020). Bada et al. (2020) in a study done at Makerere University Business in School in Uganda revealed that the challenges responsible for poor uptake of e-learning included conservative teachers' resistance to a paradigm shift in education, as well as lack of online teaching and students' work assessment skills. Bwire et al. (2020) in a study involving lecturers at five public universities in Uganda also reported the challenge of teachers' lack of the required skills for designing online courses. Furthermore, in a study also done in Uganda at Kyambogo University, Mugizi and Nagasha (2023) revealed that a number of university lecturers lacked ICT skills, some had negative attitudes towards online learning, and many were stuck to the face-to-face approach. Three years since the outbreak of COVID-19 that led to the extended adoption of online learning, it is imperative to examine teachers' self-efficacy in Ugandan universities.

Self-efficacy is the self-assessment people make about their ability to carry out expected everyday tasks which influences how they make decisions (Ma et al., 2021). The notion of self-efficacy is anchored in the self-efficacy theory by Bandura (1977), which posits that individuals who rate themselves highly tend to set challenging goals to accomplish, are highly resilient and hardly suffer negative emotions as they pursue the goals (Yu et al., 2019). Self-efficacy is crucial for educational institutions because teachers with high levels of self-efficacy are more likely to stay motivated and make the proper choices for personal greater performance and their students (Larsen & James, 2022). Teachers with higher teaching self-efficacy withstand adversities of teaching and attempt to use more resourceful approaches to enable students to understand higher-level content (Ma et al., 2021). Therefore, teacher self-efficacy determines teachers' choices, personal goals, level of persistence in the face of hurdles and the level of enthusiasm to be at par in teaching, such as the use of digital devices to teach (Glackin & Hohenstein 2018). In their teacher efficacy model, Tschannen-Moran et al. (1998) indicate that teachers' self-efficacy is related to self-perception of competence. Therefore, assessment of teachers' self-efficacy should consider assessment of their competence (Allouh et al., 2021). This study investigated the lecturers' digital teaching competence and how it affected their self-efficacy in online classes.

Digital competence refers to the ability to use technology as it advances, changes and renews itself (Gümüş & Kukul, 2022). Teachers' digital competence involves a special dynamism, including the knowledge, skills and attitudes necessary to accomplish tasks using digital devices (Hämäläinen et al., 2021). This means that teachers need to be able to identify the tools they need to accomplish their tasks and have the ability to use them relevantly in their personal settings. Therefore, digital teaching demands different methodologies and a unique set of abilities compared to traditional classroom settings in designing/planning teaching, instructional delivery and classroom management (Badiozaman & Segar, 2022). Digital competence encompasses a wide range of complex skills in terms of mental, operative, sociological and emotional abilities that users need to have in order to use digital

environments effectively. It goes beyond simply knowing how to use software or digital equipment (Buffardi & Taddeo, 2017). Teachers' digital competence is highly imperative for the integration of digital technologies into the education process (Amhag et al., 2019). In their measurement scale, Badiozaman and Segar (2022) indicate that teachers' digital competence has four dimensions, and these are course design, technical, course communication, and time management. Therefore, this study tested the following hypotheses with respect to digital teaching competence and lecturers' self-efficacy in online classes:

H1: Course design competence has a significant influence on lecturers' self-efficacy in online classes.

H2: Digital technical competence has a significant influence on lecturers' self-efficacy in online classes.

H3: Course communication competence has a significant influence on lecturers' self-efficacy in online classes.

H4: Time management competence has a significant influence on lecturers' self-efficacy in online classes.

Digital Teaching Competence and Lecturers Self-Efficacy in Online Classes

Teachers' digital competence refers to a set of operational, informational and essential skills necessary for online teaching (Blayone et al., 2018). Badiozaman and Segar (2022) indicate that the digital teaching competences needed by teachers include course design, technical, course communication, and time management. Course design competence refers to the ability to select content, choose the best methods for instruction, collaborate to improve the course, and carry out collective changes for improving teaching and learning (Smith et al., 2019). Course design competence helps to prescribe optimal methods of instruction for effective teaching (Baldwin et al., 2018). Brinkley-Etzkorn (2020) reported that improved online course design competence of teachers led to modest improvements in teaching effectiveness. However, Baroudi and Shaya (2022) found that teachers' instruction design competence significantly predicted participants' sense of self-efficacy. Relatedly, Badiozaman and Segar (2022) established that course design was the most important online teaching competence related to online teaching ability. Also, Martin et al. (2019) indicated that teachers' course design competence led to their online teaching readiness. Further, Steinert et al. (2006) revealed that development of lecturers' course design competence led to self-reported changes in teaching behaviours. However, the studies above reveal the existence of limited literature on the study variables. Still, no study examined course design and teachers' self-efficacy in the context of universities in Uganda where e-learning implementation was problematic. These gaps attracted the attention of this study.

With respect to digital technical competence, this is the capacity to accomplish a variety of different tasks using information technology and to develop different ways of accomplishing the task (Reichert et al., 2020). Technical competences are pertinent to using the technology, including technical know-how (e.g. knowledge about how to use software, synchronous

and asynchronous devices, operating systems, learning systems, web browsers, and how to carry out security updates) and proficiency at manipulating the devices, the ability to handle system challenges that arise, and to assist learners successfully (Martin et al., 2019). Adiyarta (2018) found that technical know-how in terms of technology skills was related to e-learning implementation in institutions. In their study, Basantes-Andrade et al. (2020) revealed that teachers' digital technical competence enhanced their online classroom efficacy because of the ability to generate environments of collaboration and comprehensive learning. Relatedly, Baroudi and Shaya (2022) and Mailizar and Fan (2020) indicate that teachers' technical competence significantly predicted participants' sense of self-efficacy. In the same vein, Liu et al. (2022) established that teachers' online teaching technical competence was positively related to perceived online learning outcomes. Consistent with other scholars, Sorochinsky (2021) reported that increasing teachers' technical competence enhanced their online classroom efficacy. However, while the studies above point to the existence of a relationship between teachers' digital technical competence and their self-efficacy, the studies were skewed outside Ugandan educational institutions. This study was thus necessary to explore the technical competence and self-efficacy of teachers in Ugandan institutions and how the two were related.

Regarding course communication competence, it is the extent to which an individual can transfer information through effective and appropriate interaction (Kiessling & Fabry, 2021). Course communication competence involves the ability to communicate using different online channels, such as email, and sending announcements through the learning management system (Martin et al., 2019). Investigating the importance of communication competence, Adeleke (2022), Chang and Hu (2017) and Okoli (2017) reported that there was a relationship between communication skills/competence and teacher effectiveness/efficacy in the classroom. This means that digital course communication competence is related to teachers' efficacy in online classes. In their study, Badiozaman and Segar (2022) found that course communication competence was related to online teaching ability. Relatedly, Martin et al. (2019) revealed that teachers' digital course communication led to their online teaching readiness. Generally, the literature above shows that scholars were unanimous that communication competence had a significant relationship with teachers' self-efficacy. However, except for the studies by Badiozaman and Segar (2022) and Martin et al. (2019), all the other studies were not specifically focused on digital communication competence but general communication competence which suggested lack of sufficient empirical studies on the same. This study was thus carried out to ascertain the relationship between the variables in a context other than those considered by the two previous scholars.

Concerning time management competence, this is the ability by an individual to structure, follow and adapt time to changing conditions (Aeon et al., 2021). Competent lecturers have adequate time-management skills which help them to ensure that their other commitments do not interfere with the ability to instruct the course. Digital course design and planning require adequate time management because it is time-consuming as course objectives, content,

activities and assessments have to be redesigned for the online format (Martin et al., 2019). Effective time management indicates one's readiness to participate in online courses (Kebritchi et al., 2017). Badiozaman and Segar (2022) established that time management competence was important for transitioning to online teaching. Therefore, online time management enhances teachers' online classroom efficacy. Bryson and Andres (2020) reported that online teaching in real time demands higher focus and is time-consuming. This suggests that digital time management competence leads to teachers' online classroom self-efficacy. In their review, Kebritchi et al. (2017) found that time management is related to delivering online courses. Also in a review, Roddy et al. (2017) indicated that effective time management was related to readiness to conduct online classes. In an empirical study, Martin et al. (2019) and Rajab et al. (2020) also revealed that time management influenced the ability to participate in online classes. However, the literature above revealed a contextual gap. The contextual gap was that none of the studies was done in the context of Ugandan universities, where the implementation of digital education was problematic. Another gap was that the literature search revealed limited empirical studies, with the literature by Kebritchi et al. (2017) and Rajab et al. (2020) being simply reviews. These gaps made it necessary for this empirical study to be carried in the context of Uganda.

Methodology

This section presents the methodologies that were used in implementing the study. These include the strategies, tools and processes that enabled the collection of data from the study participants. The methodologies also show how the variables were measured and data management methods.

Research design and sample

Using the quantitative approach, this study adopted the correlational research design to make inferences. The correlation design was used because it helps to collect the data necessary for establishing linkages between predictor and criterion variables (Rohrer, 2018). Therefore, the correlational research deign helped to establish causal relationships between digital teaching competence and lecturers' self-efficacy in online classes. The sample comprised 327 participants from a population of 2,225 lecturers from four public universities, namely Busitema (245), Gulu (152), Makerere University (1,492) and Mbarara University of Science and Technology (336). The sample size was reached at using the table for sample size determination by Krejcie and Morgan (1970). The sample was obtained from the universities using simple random sampling from a sampling frame. This provided equal opportunity to all lecturers to participate in the study, hence the collection of data necessary for generalisable findings.

Measures of constructs

The measures of self-efficacy of lecturers in online classes (dependent variables) were instructional methods, student management and student engagement; while the measures

of digital teaching competence (independent variables) were course design, technical, course communication and time management. The indicators of self-efficacy in online classes were adapted from Allouh et al. (2021) and those of digital teaching competence were adapted from Badiozaman and Segar (2022). The indicators of measures were anchored in a Likert five-point frequency scale where 1 = never (N), 2= almost never (AN), 3= occasionally/sometimes (O), 4= almost every time (AT) and 5 = every time (ET).

Data analysis method

Partial least square structural equation modelling (PLS-SEM) involving use SmartPLS software was carried out. SmartPLS was used because of its ability to produce higher-order constructs and estimate complex models with several latent variables (Hair Jr et al., 2021). SmartPLS helped to develop measurement models for the different measures of the variables and display the paths between the constructs. Data analysis showed causal relationships between the variables. PLS-SEM using SmartPLS suited this study in testing the causal links conjectured because the sample was higher than 100 (n = 327) (Hair Jr et al., 2020). Therefore, using SmartPLS, the causal links between digital teaching competence and lecturers' self-efficacy in online classes were shown.

Findings

The study findings include demographic characteristics, descriptives, measurement model, structural models and model estimates. The demographic characteristics helped to show the categories of the participants that provided responses while the measurement models indicated validity and reliability. The structural and models estimates showed the influence of the independent variables on the dependent variables.

Participants' demographic profiles

The categories of the demographic characteristics of the participants included sex, age groups, highest level of education, and working experience. Table 1 presents the results.

Table 1: Participants demographic profiles

Profiles	Categories	Frequencies	Percent
Sex	Male	224	68.5
	Female	103	31.5
	Total	327	100.0
Age group	Up to 39 years	132	40.4
	40–49	140	42.8
	50 and above	55	16.8
	Total	327	100.0

Educational level	Bachelor' s degree	12	3.7
	Master's degree	195	59.6
	PhD	120	36.7
Working experience in years	Less than one year	39	11.9
	1 but less than 5 years	97	29.7
	5 but less than 10 years	87	26.6
	More than 10 years	104	31.8
	Total	327	100.0

The results in Table 1 on sex of the respondents showed that the majority percentage (68.5%) represented males and that the females were 31.5%. The results on age groups indicated that the larger percentage (42.8%) were those between 40-49 years while 40.4% were up to 39 years and 16.8% were 50 years and above. The results on educational level showed that the larger percentage (59.6%) had master's degrees while 36.7% had PhDs and 3.7% had bachelor's degrees. With respect to working experiences, the larger percentage (31.8%) had experience of more than 10 years, 29.7% had worked for one but less than five years, followed by 26.6% who had worked for five but less than 10 years, and 11.9% who had worked for less than one year. The results for demographic profiles show that the study participants of varied categories provided responses.

Measurement models

The measurement models (Tables 2 and 3) include descriptive statistics in terms of means, validity tests, i.e. average variance extracted (AVE) and heterotrait-monotrait (HTMT) discriminant validity, and reliabilities in terms of Chronbach's alpha and composite reliability.

Measurement model 1

Measurement model one (Table 2) includes descriptive results and validities. The descriptive results are specifically means and the validities that are AVE and heterotrait-monotrait (HTMT) discriminant validity.

Table 2: Descriptive results, AVE and heterotrait-monotrait (HTMT) discriminant validity assessment

Measures	Means	AVE	SEIS	SEIS	SESE	
SEIS	3.67	0.555				
SESM	3.72	0.614	0.770			
SESE	3.94	0.526	0.867	0.728		

SSE	3.78					
Measures	Means	AVE	CDC	DTC	CCC	TMC
DCDC	3.78	0.560				
DDTC	4.09	0.515	0.694			
DCCC	3.96	0.563	0.672	0.594		
DTMC	4.06	0.573	0.734	0.424	0.664	
DTC	3.97					

Abbreviations: SEIS = Instructional methods; SESM = Classroom management; SESE = Student engagement; SSE = Lecturers' self-efficacy; DCDC = Course design competence; DDTC= Digital technical competence; DCCC = Course communication competence; DTMC = Time management competence; DTC = Digital teaching competence

Descriptive results in Table 2 show that lecturers revealed that their self-efficacy was high (mean = 3.78) because, basing on the five-point Likert scale (where 1 = never, 2 = almost never, 3= occasionally / sometimes, 4= almost every time and 5 = every time) that was used, the mean was close to code 4, which denoted almost every time or high. The results further showed that lecturers' self-efficacy in terms of instructional methods (mean = 3.67), classroom management (mean = 3.72) and student engagement (mean = 3.94) was also high. In addition, the results indicated that overall digital teaching competence (mean 3.97) was high. The lecturers also indicated that their digital competence was high in all aspects, i.e. course design competence (mean = 378), digital technical competence (mean = 4.09), course communication competence (mean = 3.96) and time management competence (mean = 4.06).

The AVE values in Table 2 for convergent validity revealed that the different constructs assessed the variables of teachers' self-efficacy and digital teaching competence. This is due to the fact that all AVE values were above 0.5, which is the lowest level. This implies that the indicators of the various measures were appropriate (dos Santos & Cirillo, 2021). The HTMT ratio of correlations evaluated discriminant validity by determining whether the investigated components were independent, hence capable of independently predicting the dependent variable. The HTMT is a reflective test that determines if a model's measures are independent, in which case their indicators define one particular construct (Roemer et al., 2021). The HTMT correlations (Table 2) for all the constructs were below 0.90, which is the limit. Therefore, discriminant validity was attained (Hair Jr et al., 2021). This means that the outcome variable of lecturers' self-efficacy (instructional methods, student management and engagement) in online classes could be predicted by digital teaching competence (course design competence, digital technical competence, course communication competence, and time management competence).

Measurement model 2

Measurement model two (Table 3) includes reliability values of the measures in terms of Cronbach's alpha (α) and composite reliability (CR), and collinearity values for the independence of the constructs. While the reliability values show internal consistency in the indicators, collinearity values show independence of the measures.

Table 3: Reliability and collinearity values

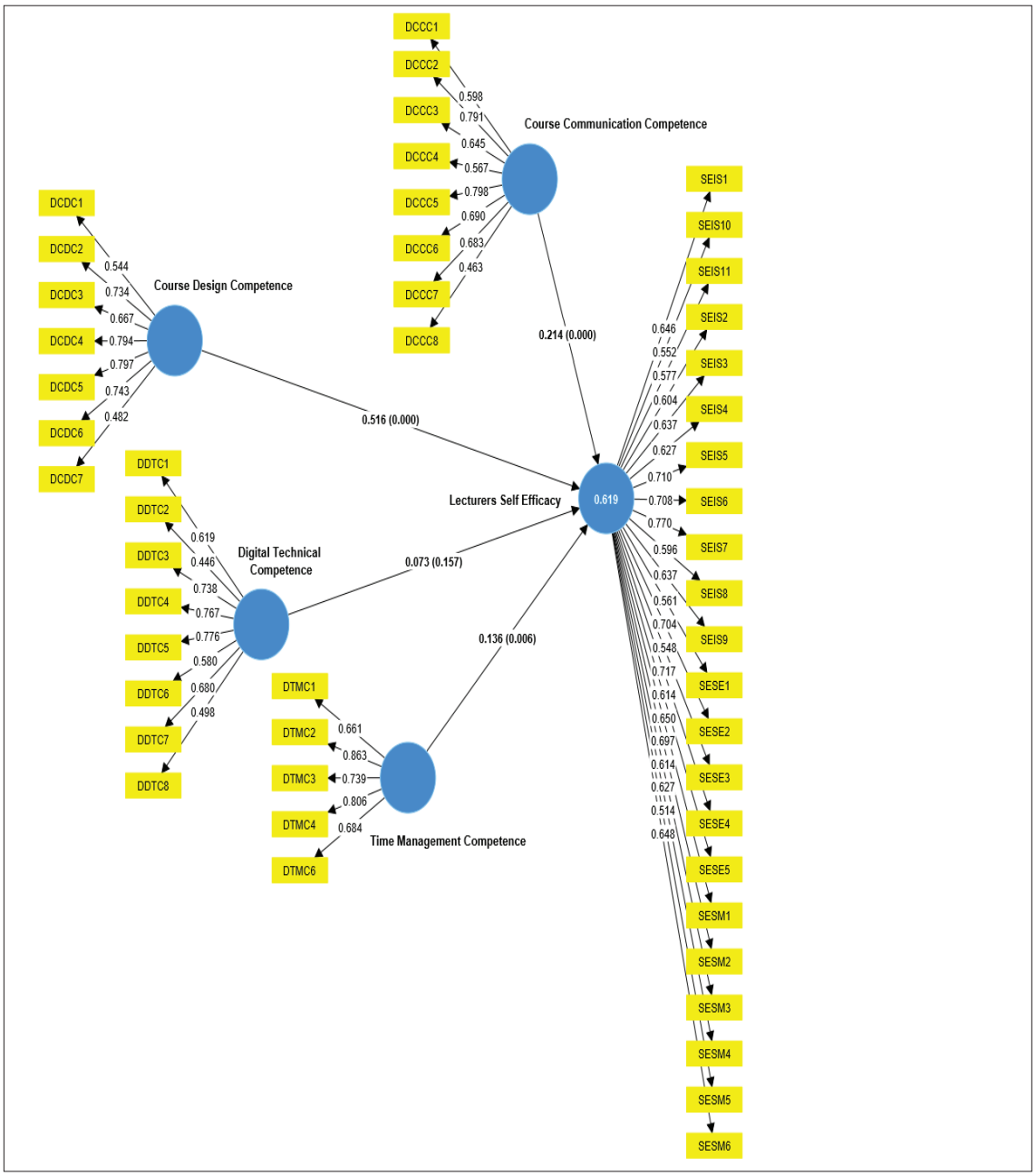
Lecturers Self-Efficacy	α	CR	VIF
Classroom Management	0.840	0.843	1.607
Instructional Methods	0.788	0.795	1.555
Student Engagement	0.766	0.783	1.366
Digital Teaching Competence	α	CR	VIF
Course Communication Competence	0.804	0.810	1.627
Course Design Competence	0.805	0.830	1.508
Digital Technical Competence	0.738	0.749	1.523
Time Management Competence	0.810	0.818	1.606

Reliability results in Table 3 show that for both Cronbach's alpha (α) and composite reliability (CR) the values were above the minimum of 0.70. This means that the indicators of the measures of the variables were reliable. Besides Chronbach's alpha, composite reliability was established because the former is highly sensitive and decreases reliability levels of the indicators since it presumes that their characteristics are similar across the population. Nonetheless, composite reliability is more tolerant since it takes into account external characteristics, allowing a greater variety of indicators to become reliable (Hair Jr et al., 2021).

Digital teaching competence and lecturers' self-efficacy in online classes' structural equation model

To establish the influence of digital teaching competence on lecturers' self-efficacy in online classes, a structural equation model was developed. Figure 1 displays the structural equation model.

Figure 1: Digital teaching competence and lecturers' self-efficacy in online classes' structural equation model



The structural model (Figure 1) reveals that for the constructs of course design competence (DCDC), digital technical competence (DDTC) and course communication competence (DCCC) measuring digital teaching competence, all the indicators were retained because their factor loadings were above the minimum of 0.40 (Hair Jr et al., 2017). However, for time management competence (DTMC), indicator five (DTMC 5) was dropped. With respect to the dependent variable of lecturers' self-efficacy in online classes, for the construct of instructional methods indicator 12 (SEIS 12) was dropped. However, for the constructs of classroom management

(SESM) and student engagement (SESE), all the indicators were retained, hence they measured the constructs. The retained indicators were deemed to be appropriate measures of the different constructs. The model tested the hypotheses to the effect that course design competence (H1), digital technical competence (H2), course communication competence (H3) and time management competence (H4) have a significant influence on lecturers' self-efficacy in online classes. The results are summarised in the structural equation model estimates table (Table 4).

Table 4: Structural model estimates for digital teaching competence and lecturers' self-efficacy in online classes

	β	T	P
Course Design Competence Lecturers' Self-Efficacy	0.516	13.233	0.000
Digital Technical Competence Lecturers' Self-Efficacy	0.073	1.417	0.157
Course Communication Competence Lecturers' Self-Efficacy	0.214	4.519	0.000
Time Management Competence Lecturers' Self-Efficacy	0.136	2.755	0.006
R2 = 0.619			
Adjusted R2 = 0.614			

The structural model values in Figure 3 and Table 4 indicate that while course design competence ($\beta = 0.516$, $t = 13.233$, $p = 0.000 < 0.05$), course communication competence ($\beta = 0.214$, $t = 4.519$, $p = 0.000 < 0.05$) and time management competence ($\beta = 0.136$, $t = 2.755$, $p = 0.006 < 0.05$) had a significant positive influence on lecturers' self-efficacy in online classes, digital technical competence ($\beta = 0.073$, $t = 1.417$, $p = 0.157 > 0.05$) had a positive but insignificant one. R^2 showed that digital teaching competence explained 61.9% ($R^2 = 0.619$) of the variation in lecturers' self-efficacy in online classes. Adjusted R^2 indicated that the three significant digital teaching competence measures, namely course design competence, course communication competence and time management competence, explained 61.4% (adjusted $R^2 = 0.614$). The coefficient of determination (R^2) implies that 38.1% of the variation in lecturers' self-efficacy in online classes was accounted for by factors other than digital teaching competences. While hypotheses one, three and four (H1, H3 and H4) were supported, hypothesis two (H2) was rejected.

Discussion

The results for H1 indicated that course design competence had a significant positive influence on lecturers' self-efficacy in online classes. This finding supported the findings of previous scholars (Brinkley-Etzkorn, 2020; Baroudi & Shaya, 2022; Badiozaman & Segar, 2022; Martin et al., 2019; Steinert et al., 2006). This means that lecturers who have the capacity to design online courses have self-efficacy in online classes. However, the results for H2 revealed that digital technical competence had a positive but insignificant influence on lecturers' self-efficacy

in online classes. Nonetheless, this finding is contrary to the findings of previous scholars (Adiyarta, 2018; Basantes-Andrade et al., 2020; Baroudi & Shaya, 2022; Mailizar & Fan, 2020; Liu et al., 2022; Sorochinsky, 2021), who all indicated that the relationship was positive and significant. However, it can be inferred that, in the context of the study, digital technical competence was not very imperative for lecturers' self-efficacy in online classes.

The results for H3 showed that course communication competence had a significant positive influence on lecturers' self-efficacy in online classes. This finding is consistent with the findings by Adeleke (2022), Chang and Hu (2017), Okoli (2017), Badiozaman and Segar (2022), and Martin et al. (2019). This means that course communication competence is essential for lecturers' self-efficacy in online classes. Further, H4 indicated that time management competence had a significant positive influence on lecturers' self-efficacy in online classes. This finding concurred with those of Badiozaman and Segar (2022), Bryson and Andres (2020), Kebritchi et al. (2017), Roddy et al. (2017), Martin et al. (2019) and Rajab et al. (2020). Therefore, time management competence is vital for lecturers' self-efficacy in online classes.

Conclusion

The discussion above led to the conclusion that the capacity to design online courses is imperative for lecturers' self-efficacy in online classes. This is so when lecturers can have the capacity to orient new students to online classes, develop measurable learning objectives for each online lesson, and come up with activities that provide student opportunities for online interaction. Also, this is so when lecturers can organise instructional materials into modules delivered online, can create instructional content for students, and generate online assignments and tests. It was also concluded that course communication competence is essential for lecturers' self-efficacy in online classes. This is especially so when lecturers can communicate to students online, create and moderate online discussion forums, use synchronous web conferencing tools and engage students' in asynchronous discussions. In addition, this is when lecturers are able to prompt responses to students' questions, share open educational resources, and communicate expectations about student behaviours and compliance regarding academic integrity policies.

Further, time management competence is vital for lecturers' self-efficacy in online classes. This is when lecturers are able to schedule time to design a course for online classes, create a timetable facilitating online courses, deliver the required knowledge for the session to students in the allotted time, and manage time in delivering online lectures. This is also when lecturers are able to follow strict deadlines to encourage submission of assignments, and to provide fast feedback after submission of assignments. On the other hand, digital technical competence is not very imperative for lecturers' self-efficacy in online classes. Therefore, lecturers' self-efficacy in online classes is not dependent on high ability to effectively use the hardware tools required for online classes, effectively use software tools, and solve the problems encountered while in online classes tools personally. In addition, lecturers do not need high ability to easily navigate the online teaching hardware and carry out basic computer operations.

Recommendations

The study recommends that university managers should develop lecturers' capacity to design online courses. This should include equipping them with knowledge to orient new students to online classes, develop measurable learning objectives for each online lesson, and design activities that provide students with opportunities for online interaction. Also, university managers' have to equip lecturers with knowledge to organise instructional materials into modules deliverable online, and to create instructional content and online assignments and tests. University managers should also develop the online course communication competence of lecturers. This should include developing their capacity to communicate to students online, to create and moderate online discussions, use synchronous web conferencing tools and engage students' in asynchronous discussions. Also, the capacity of lecturers to always be prompt in responding to students' questions, share open educational resources, communicate expectations about student behaviours, and develop compliance guidelines on academic integrity policies.

In addition, university managers should sensitise lecturers to the importance of time management competence. The sensitisation should include making them understand the importance of scheduling time to design the course for online classes, making timetables to facilitate the online courses, delivering the required knowledge for the session to students in the allotted time, and managing time in conducting/delivering online lectures. In addition, lecturers should be sensitised to the importance of being able to follow strict deadlines, and of providing fast feedback to students. However, university managers should not overemphasise the digital technical competence of lecturers. This should involve equipping them with minimal ability to effectively use the hardware tools required for online classes, to effectively use software tools, and to solve the problems encountered while in online classes personally. In addition, this should involve equipping them with minimal ability to easily navigate the online teaching hardware and carry out basic computer operations.

Limitations

This study demonstrates how enhancing the digital teaching competences of lecturers can influence their self-efficacy in online classrooms. However, there are limitations that emerged that can be addressed by future research. For instance, contrary to Adiyarta (2018), Basantes-Andrade et al. (2020), Baroudi and Shaya (2022), Mailizar and Fan (2020), and Sorochinsky (2021), this study reported that digital technical competence of lecturers insignificantly contributed to their self-efficacy in online classrooms. Therefore, future researchers should further test this hypothesis to confirm or disconfirm its authenticity in the context of universities in Uganda. In addition, the study involved only public universities. Thus, it is imperative that future research should extend to private universities. Furthermore, this study was only quantitative, thus limiting in-depth exploration of the study problem. Therefore, future research should involve qualitative methods.

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Appendix: Study Instrument

Construct	Item	Measure
Section A: Demographics		
Demographics	BP1	Sex (1 = Male, 2= Female)
Profiles (BP)	BP2	Age group (1 = Up to 39; 2) 40- 49; 3) 50 and above).
	BP3	Educational level (1= Bachelor Degrees; 2 = Masters, 3 = PhD)
	BP5	Years worked at the University (1 = Less than one year, 2 = 1 but less than 5 years, 3 = 5 but less than 10 years, 4 = More than 10 years)
Section B: Lecturers Self-Efficacy in Online Classes		

Instructional Methods (SEIS)	SEIS1	I am able to stimulate students to think, analyze and reason in online classes
	SEIS2	I involve students in collaborative learning in online classes
	SEIS3	I am able to involve students in discussions during online classes
	SEIS4	I easily engage students in question and answer during online classes
	SEIS5	I am able to encourage students to contribute to learning during online classes
	SEIS6	I make students participate in discussions during online classes
	SEIS7	I am able to get to each student during online class
	SEIS8	My online lecturers are interesting to students that most of them hardly miss
	SEIS9	My students are convinced that they can effectively learn even in online classes
	SEIS10	I have empowered my students to value online learning
	SEIS11	I am able to foster individual student creativity in online classes
	SEIS12	I assess students' assignments online
Classroom Management (SESM)	SESM1	I able to control disruptive behaviour during online classes such as failure to adhere to outline policies for posting online
	SESM2	I make my expectations about student behaviour clear in an online class
	SESM3	In my online classes am able to make students to follow the established rules
	SESM4	I am able to balance discussions during online discussions for equitable students' participation
	SESM5	In my online classes, students follow my expectations; standards and course rules
	SESM6	I make students behave responsibly during my online classes

Student Engagement (SESE)	SESE1	I effectively respond to questions from online students
	SESE2	I am able to make learning interesting during online classes
	SESE3	I make my students look forward for our online classes
	SESE4	My students fully participate in online lectures activities
	SESE5	I am able to engage passive learners in an online class
	SESE6	I effectively respond to questions from online students
Section: Digital Teaching Competence		
Course Design Competence (DCDC)	DCDC1	I create an online course orientation for every new group of students
	DCDC2	Develop measurable learning objectives for each on line lesson
	DCDC3	Design learning activities that provide student opportunities for online interaction (i.e. discussion forums)
	DCDC4	Organise instructional materials into modules/units deliverable online
	DCDC5	Create instructional content students can access (i.e. uploads, lecture videos, demonstrations, video tutorials, recordings)
	DCDC6	Use different teaching methods in the online environment (collaborative activities, discussions, presentations)
	DCDC7	Create online assignments and tests

Digital Technical Competence (DDTC)	DDTC1	I effectively use the hardware tools (computer, tablet, camera, etc.) required for online classes
	DDTC2	I make presentations (PowerPoint) when delivering instruction in class
	DDTC3	I effectively use software tools (Microsoft word and internet) required for online classes
	DDTC4	I solve the problems that I encounter while in online classes tools myself (such as disruption of display, controlling background noise of students and keeping the screen clear among others)
	DDTC5	I easily navigate the online teaching hardware by successfully creating, uploading and delivering online lectures
	DDTC6	I carry out basic computer operations (e.g. files and folder management, document creation and editing)
	DDTC7	Use online collaborative tools (i.e. Google Drive, Dropbox, Google classrooms, WhatsApp)
	DDTC8	Share open educational resources with students (e.g. uploading content)
Course Communication Competence (DCCC)	DCCC1	I make communication/announcements/email reminders to students
	DCCC2	I create and moderate discussion online forums
	DCCC3	I use synchronous web conferencing tools or carry out activities done live online (e.g. Zoom, Google meeting and others)
	DCCC4	I engage students asynchronous discussions that is not done live online (pre-recorded lectures, recorded video demonstrations, and reading and writing assignments among others)
	DCCC5	Provide prompt responses to students' questions
	DCCC6	I share open educational resources (e.g. using WhatsApp, emails, Google classrooms and university platforms)
	DCCC7	Communicate expectations about student behaviours (netiquette)
	DCCC8	Communicate compliance regarding academic integrity policies

Time Management Competence (DTMC)	DTMC1	I schedule time to design the course for online classes prior to delivery
	DTMC2	Schedule a time table to facilitate the online course
	DTMC3	I deliver the required knowledge for the session to students in the allotted time
	DTMC4	I manage time in conducting/making online lectures (i.e. starting and ending lectures on time/uploading on time)
	DTMC5	Provide fast feedback after submission of the assignment
	DTMC6	I allocate myself time for training to learn new strategies for online lectures