Pedagogical Beliefs and Intention of Teaching Using ICT in Uganda's Higher Education Institutions

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Abstract

Though COVID-19 restrictions demonstrated the relevance of using Information Communication Technology (ICT) in education, academic staff are hinged to engage in face-to-face teaching as well as holding on to other related teaching methods associated with how they were taught, how colleagues teach, and even their perception of past successful teaching modes, thereby limiting ICT usage in the lecturing process in Higher Education Institutions (HEIs) in Uganda. This study was carried out to establish the relationship between pedagogical beliefs and behavioral intention to teach using ICT in HEIs in the country. This focus was derived from the realization that pedagogical beliefs are manifested through modes of provision of lectures and the mode of interaction between academic staff and students, which have the potential to trigger the behavioral intention to use ICT in teaching in the HEIs in Uganda. This study centered on three representative HEIs in Uganda; Makerere University, Kyambogo University, and Makerere University Business School. A survey technique was used to collect data from a sample of 322 academic staff members out of a population of 1,916. Correlation and regression analyses were used to analyze the collected data. Findings indicated that pedagogical beliefs, specifically "interaction between students and lecturers," had a significant association with and influence behavioral intention to use ICT for teaching in HEIs in Uganda. Therefore, it is recommended that academic staff members' and students' views be considered before selecting whether to use ICT in the teaching process in HEIs in Uganda.

Introduction

ICT usage is a catalyst for transforming traditional teaching and learning methodologies into dynamic, interactive, and globally connected educational experiences (Akbari & Pratomo, 2022). ICT usage is defined as the application of ICT to promote active and collaborative learning. The core of ICT is comprised of software, hardware, networks, and media, which are primarily utilized to gather, present, process, store, and transmit information via voice, data, text, and images, as well as providing other services (Al-Rahmi *et al.,* 2022). In Uganda, the use of ICT in the learning process in Higher Education Institutions has been noticed in several institutions of higher learning. For instance, at Busitema University, it was established that as far as teaching

and learning are concerned, ICT usage was reported at 55.8% for information management, 36.5% usage about evaluation and problem-solving, 34.6% usage about technical operations, 75% usage about communication and sharing, 43.3% usage about collaboration, and 69.2% usage about creation of content and knowledge (Ujeyo *et al.,* 2022). This has also been experienced in other Higher Education Institutions (HEIs) such as Makerere University and Kyambogo University (Eton & Chance, 2022). The integration of ICT in education has become an advent for Higher education institutions (HEIs) seeking to continuously deliver high-quality education both physically and online in the current digital age (AL-Momani & Rababa, 2022). ICT usage nurtures innovative pedagogical approaches, empowerment of academic staff and students to access and exchange information instantaneously, collaborations, real-time interactions, and transcending geographical barriers, thus enabling the development of a digitally literate workforce (De- Brabander & Glastra, 2021).

A review of the literature shows that few studies have investigated the independent contribution of teachers' pedagogical beliefs to ICT use (Vikas & Mathur, 2022). The available studies have focused on pre-service teachers (Li *et al.,* 2018), primary schools (Bai *et al.,* 2021), and secondary school teachers (Okot, 2023) while others have studied the concepts in other countries like Southern Finland (Pongsakdi *et al.,* 2021), and Hong Kong (Bai *et al.,* 2019). Subsequently, other researchers have conducted similar studies on ICT usage in banking (Abikari *et al.,* 2022). Thus, research on ICT use in Higher education institutions by academic staff in Uganda is limited. The relationship between Pedagogical beliefs and behavioral intention to use ICT in teaching addresses a gap in the literature. This unclear understanding of the relationship may result in practitioners' and researcher's continuous limitation to the use of ICT in teaching which is likely to lead to underutilization of ICT resources yet Higher education institutions spend a lot on the purchase of ICT equipment and infrastructure (Al-Mamary, 2020; Mhokole & Kimaryo, 2023). Considering these research gaps, this study aimed to specifically examine the relationship between the pedagogical beliefs of academic staff and their behavioral intention to use ICT in teaching based on the mode of lecture provision and the mode of teacher-student interaction.

Literature Review

This research study was carried out to establish the status of the behavioral intention to use ICT in teaching as well as to establish the different factors that influence the changes in this behavioral intention (Revythi & Tselios, 2019). It is based on this review conducted that this section was prepared. The documentation of the outcome of this review is presented in three different subsections. The discussion led to a proposal that the realization of the success of the use of ICT in teaching and learning in Higher Education Institutions is hinged on the pedagogical beliefs of both learners and academic staff members of a HEI.

Mode of Provision of Lectures

A lecture is a form of communication between a person who is knowledgeable and another or a group of others who need the knowledge. This communication is also referred to as a talk which is most times a one-way talk. It is commonly given in an educational setting to people who are in a university or tertiary institution. The purpose of a lecture is to transfer knowledge from one person to a group of many others in a classroom setting (Loughlin & Lindberg-Sand, 2022).

There are different ways in which lectures can be provided; face-to-face lectures, class presentations by students (learners), and even lectures using PowerPoint presentations. In all the above, knowledge is passed on from the lecturer to the students. The passing on knowledge from the lecturer to the students is just one part of the story, the other is to ensure that there is effective understanding by the students (Blackburn & Stair, 2022).

The desire to make students understand makes academic staff members find different ways of conducting lectures. At this point, innovation is sought in the lecturing process (Anwar, 2019). It is only through this understanding that learning is considered to have taken place (Fischer & Hänze, 2019). With the growing number of students as well as the desire to use technology in the learning process, lecturers and students resort to using computers in the learning process. This new development enhances the learning process. The online mode of learning was introduced to accommodate the learners who could not physically be in class (Erlangga, 2022). At the inception of online learning, lectures could be recorded and accessed by learners at their own pace. This later developed into having online platforms commonly referred to as learning management systems. These became popular during the COVID-19 lockdown making it possible for learners to learn anywhere and anytime (Bdair, 2021; Coman *et al.,* 2020). Thus, transformation into real-time online learning where learners and academic staff members interact in real-time. The coming of this mode of lecturing made it possible for students and lecturers to engage in virtual classrooms (Mpungose, 2020; Almendingen *et al.,* 2021).

Even after the end of the lockdown, the use of online learning has been going on. Recently, online learning has gradually replaced long-distance learning education. Long-distance learning has been carried out using the model of face-to-face blended with self-learning. However, with the coming of online learning, long-distance learning education has taken on a new mode of delivery to accommodate as many potential and actual learners who wish to get a university education but are limited by distance or time availability to leave the office and go to class (Segbenya & MensahMinadzi, 2022). Though online learning is currently being carried out in many universities and tertiary institutions, face-to-face physical learning in class has not been phased out, thus online learning is currently considered as one more mode of lecturing that both academic staff members and students can consider. It is an addition to the other modes of lecturing that have been used by lecturers and students before (Giannoulas *et al.,* 2021). The different modes of lecturing, therefore, need to be appreciated by the academic staff members and students and hence be used as and when they are found to be appropriate (Bashir *et al.,* 2021). It is this appropriateness that makes the interaction between the lecturers and students in the learning process a healthy one.

Mode of Teacher-Student Interaction

Interaction between a student and a teacher (academic staff member) is an inevitable event as long as the learning process is ongoing. This interaction may be physical, partially physical partially online, or even fully online. Regardless of the mode of interaction that may exist in a learning environment, both a learner and a lecturer have something to gain and something to give. In this context, giving and gaining are associated with things other than the knowledge that the academic staff member gives and the student receives (Kay & Pasarica, 2019). What is key to understanding the learning process is that there are different kinds of academic staff members as

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well as different kinds of students. Beginning with academic staff members, there is a growing tendency for an academic staff member to be felt. This means that there are academic staff members who do not feel that they have given a lecture if they do not see the person who is meant to receive the knowledge. Such academic staff members value face-to-face lectures. To these kinds of academic staff members, learning is felt and has to be appreciated. They value the facial expressions and the whole process of reading the audience to ensure that they are indeed attentive in class (Mardiana, 2020; Mali & Lim, 2021). Though it is important to have good control of a class and even get a feel of it, it is not a reflection that the students are indeed learning. They could be quiet in class because they do not want to be reprimanded. This is associated with the fear that students may have of the lecturer and hence choose to remain quiet when they could have behaved differently if the lecturer was not able to see them (Downing *et al.,* 2020). Considering both cases of interaction from the point of view of an academic staff member, presents two possible alternatives of lecturing, online and face-to-face. There is, however, a need to note that the two alternatives assume that the academic staff member prefers face-to-face lectures. For the case of an academic staff member who prefers online lectures, the aspect of facial expressions and other forms of class control is not considered. The main focus of this kind of lecturer is the delivery of the content to the learners and ensuring that there is understanding by asking a few questions at the end of a lecture (Anwar *et al.,* 2021; Van *et al.,* 2020).

When considering modes of interaction from the point of view of an academic staff member, therefore, there is a need to take into consideration both types of academic staff members, one who prefers online lectures as well as one who prefers face-to-face lectures. This consideration provides room for a good comparison to be made. This is key since the academic staff member needs to feel satisfied that there was work done in the lecturing process (Mardiana, 2020).

Like in the case of academic staff members, students too have their preferences. Some students prefer online interaction while others prefer face-to-face interaction (Ameyaw, 2023). Students who prefer face-to-face lectures rely on physical contact to understand what is being lectured. This is a psychological feeling in the sense that it does not change what is delivered to a student but changes how a student feels about what is delivered to him (or her). It is more perceptual than actual (Alawamleh *et al.,* 2020; Van *et al.,* 2020). Though perceptual, since the objective is to make a learner understand what is lectured, it has to be considered to ensure that the learning indeed takes place (Riaz *et al.,* 2023).

Other learners consider self-motivation as the driving force of the learning process meaning that they love to learn and are ready to put in extra effort to ensure they get to understand in class. This extra effort could be personal reading as well as ensuring that they are always online whenever it is time for a lecture. These kinds of students do not need to be intimidated to remain attentive in class (Blaine, 2019). It is this kind of interaction that helps the learning process to be effective making it important for student-teacher interaction to be properly clarified for the understanding of the learners to be ensured in the learning process (Mali & Lim, 2021).

Pedagogical beliefs and behavioral intention to teach using ICT

Behavioral intention reflects the strength of the desire to do something backed by an underlying behavior or way of doing things (Zhou *et al.,* 2019). Considering that the underlying factor is
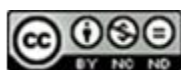
behavior, the strength of this desire and hence intention, keeps changing based on the strength of that behavior (Dinh & Lee, 2021). For instance, an intention to focus in class backed by an underlying inclination to discipline is likely to succeed. This means that the intention to focus or pay attention in class will be enhanced by the good discipline that a person is found to naturally possess. The situation is likely to be different when one does not behave in a disciplined manner (Wang *et al.*, 2019). The relevance of behavioral intention was initially brought to light through the theory of planned behavior (Ajzen, 1991). In this theory, it is emphasized that the intention to do anything in life must be backed by the underlying behavior to realize the performance of that thing (Fishbein & Ajzen, 1980). When there is a mismatch between the intention to act and the underlying behavior of a person to act, the likelihood of success in the act is reduced to zero (Sheppard *et al.*, 1988). Behavioral intention, therefore, is an important concept whenever there are voluntary activities to be carried out either at a workplace or in a social gathering (Qasim *et al.*, 2019; Muslim *et al.*, 2020). Behavioral intention is, therefore, something that must be taken into consideration when making a choice to succeed (Pagliaro *et al.*, 2021).

The idea of triggers suggests that different choices can be taken when triggers are altered (Mertens *et al.*, 2021; Gupta & Duggal, 2021). Students and academic staff are faced with choices to make and maintain over a while depending on the triggers that they face in a learning environment (Wang *et al.*, 2020). These triggers must have been happening over time allowing both academic staff and students to form their opinions that enable them to self-actualization. These opinions are largely composed of beliefs that each group has, based on their experiences in the learning environment. Because these beliefs are associated with the learning process, they are commonly referred to as pedagogical beliefs (Berger & Lê-Van, 2019).

Pedagogical beliefs can, therefore, be considered to be the combination of the modes of lecturing as well as the possible interaction between students and lecturers (academic staff members). The outcome is referred to as a belief because it is based on the interaction between the giver and receiver of knowledge as well as the different modes of lecturing that can be administered in a learning environment (Uchidiuno *et al.*, 2021). Pedagogical beliefs drive the learning process because the process is unique to each learner. What works for one learner may not work for another (Liljedahl & Oesterle, 2020; Batiibwe *et al.*, 2017). The existence of pedagogical beliefs indicates that academic staff can use them to determine how best to attend to their students. Considering that students in one class could require different modes of lecturing as compared to students in another class, there is a need to ensure that there is a balance in using different modes of lecturing (Bashir *et al.*, 2021).

Based on ensuring that the best lecturing mode is used in a classroom environment to ensure effective lecturing and understanding of learners, it is prudent to consider that ICT can only be used in the lecturing process when it is found to be appropriate (Batiibwe *et al.*, 2017). Appropriateness is based on the interaction between academic staff and students which can be ascertained through a deduction approach that the choice of ICT as a learning mode is behavioral (Yeop *et al.*, 2019). Further through the deduction of the available information based on literature, it was hypothesized that pedagogical beliefs have an association with and impact on behavioral intention to use ICT in the lecturing process in Higher Education Institutions (HEIs). Because pedagogical beliefs are measured by modes of lecturing and the interaction between academic staff and learners, the two were also hypothesized to have a significant association with and influence on behavioral intention to use ICT in the lecturing process in   Higher

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Education Institutions (HEIs) (Nguyen *et al.,* 2019). These hypotheses formed the rationale for carrying out this study.

The rationale for conducting this study, as presented in the literature reviewed, was to assess the potential existence of the relationship between pedagogical beliefs and behavioral intention to teach (lecture) using ICT in a setting of Higher Education Institutions (HEIs). The literature suggests the existence of this relationship (Yeop *et al.,* 2019; Nguyen *et al.,* 2019). In the case of Uganda, however, there was a need to ascertain the existence of the relationship using the available data making a driving force for the execution of this research study.

Conceptualization, Hypotheses, and Model Specification
The conceptual framework in Figure 1 shows the hypothesized influence of independent variables on the dependent variable
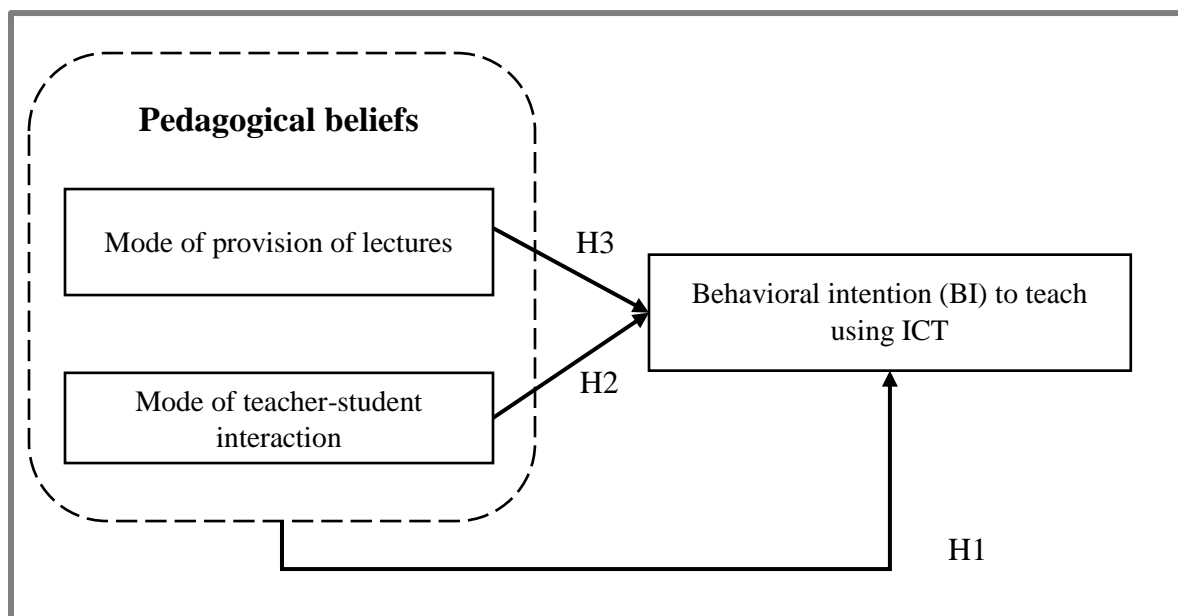

Figure 1: The Conceptual Framework of the Study Variables
Source: Berger and Van, (2019), Jere, (2020), and Moorthy (2019)

The conceptual framework above shows that Pedagogical beliefs; mode of provision of lectures and teacher-student interaction are independent variables (IV) while Behavioral intention (BI) to teach using ICT is a dependent variable (DV). These study variables were derived from the Theory of Planned Behavior of Ajzen (1991) and literature. The Theory of Planned Behavior (TPB) was developed as an extension of the Theory of Reasoned Action, which was earlier formulated by Ajzen and Fishbein in 1980. The TPB is widely used for understanding and predicting human behavior, particularly in the context of decision-making related to environmental behaviors, health behaviors, consumer behaviors, and more. According to TPB, behavioral intentions are determined by three factors: attitude towards the behavior, subjective norm concerning the behavior, and perceived behavioral control (Conner & Armitage, 1998). A favorable attitude and a supportive subjective norm motivate one to engage in the behavior but an actual intention to do so is formed only when perceived control over the behavior is sufficiently strong (Conner, 2020).

In this study, attitude is related to Pedagogical beliefs whereby attitude is derived from beliefs. Perceived behavioral control refers to the perceived ease or difficulty of exhibiting a behavior (Moon, 2021). In this study, this relates to the mode of provision of lectures. Academic staff members have a right to pick on any innovative method of teaching to make a better class (Vlachopoulos & Jan, 2020). Perceived behavioral control incorporates factors such as self-efficacy (belief in one's ability to execute the behavior) and perceived controllability of external factors that may facilitate or hinder the behavior (Vamvaka *et al.,* 2020). Academic staff are more likely to engage in behaviors they perceive as controllable and within their capabilities (Ryan & Deci, 2020). For example, an academic staff may feel confident to pick a particular ICT teaching method if the academic believes that the needed resources to ensure a successful learning environment are present in a HEI (Alam, 2022).

Subjective norms refer to the belief about whether most people approve or disapprove of the behavior. This was tested through the teacher-student interaction. It relates to a person's beliefs about whether peers and people of importance to a person think he or she should engage in the behavior (Widjaja *et al.,* 2020). The beliefs present the gist of the relationships explored in this research study.

The relationships between the study variables are reflected in the study hypotheses. Three hypotheses were tested in this study. The first hypothesis (H1) focused on establishing whether there is a relationship between the pedagogical beliefs of academic staff and their behavioral intention to ICT usage in teaching in Higher education institutions in Uganda. The second hypothesis (H2) focused on establishing whether there is a relationship between the mode of teacher-student interactions and the behavioral intention of academic staff to ICT usage in teaching in Higher education institutions in Uganda, and the third hypothesis (H3) focused on establishing whether there is a relationship between mode of provision of lectures by academic staff and their behavioral intention to ICT usage in teaching Higher education institutions in Uganda. Thus, this study aimed to find out whether these hypotheses are supported or not supported by the study findings.

The conceptualization presented above indicates the need to ascertain the existence of the relationships presented in the model in the case of Uganda. Ascertaining this presents a new dimension in the process of education provision, especially in the Higher Education Institutions in Uganda, thereby presenting a practical scenario of how to encourage learning based on intentions of how to facilitate the learning itself. The idea of focusing on the learning taking place rather than the method used to ensure that learning takes place is also emphasized. This means that the method of learning can always be adjusted based on who is learning and who is facilitating the learning process. This kind of engagement brings to light a new approach to learning that needs to be embraced. It is based on this motivation and conceptualization that the hypotheses below were derived for testing.

The hypotheses were further specified using the mathematical models below;

$$BI = Pb\beta + e \ldots\ldots.................................\ eq\ 1$$

$$BI = MSI\beta 1 + MPL\beta 2 + e \ldots\ldots\ldots\ldots\ldots\ eq2$$

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Where;

BI =   *Behavioral Intention to teach using ICT*

Pb =   *Pedagogical beliefs*

MSI =   *Mode of teacher-student Interaction*

MPL =   *Mode of provision of lectures*

Research Methodology
This study was carried out following the cross-sectional research design in combination with the quantitative research design. The cross-sectional design enabled the researchers to focus on a specific period. In this research, the focus was on the period when there was a noted transition from the use of face-to-face learning to using online learning in Uganda. This was a period between 2019 and 2022, during which the COVID-19 pandemic made it necessary to introduce online learning, whereby ICT was the major facilitating factor. This was intense in 2020 and 2021, though a relaxation of lockdown in 2022 made it possible to have physical lectures hence the need to look at the behavioral intention to use ICT in the teaching and learning processes. The causation nature of this study made it necessary to consider the quantitative research design.

Academic staff members of three Higher education institutions in Uganda were considered to form the population of this study. A total of 1,916 academic staff of the three institutions were considered as the population of the study. These were broken down into 757 from Makerere University (Mak), 612 from Kyambogo University (KYU), and 547 from Makerere University Business School (MUBS) (Kyambogo University HR Manual, 2019; Makerere University HR Manual, 2020; Makerere University Business School HR Manual, 2020). The academics consisted of Professors, Associate professors, Senior lecturers, Lecturers, Assistant lecturers, and Teaching assistants. These HEIs were selected because they have the highest number of academic staff members in Uganda. Additionally, the other institutions in the country benchmark on these three, making the three HEIs a good representation to consider in this study.

Out of the 1,916 academic staff members in the selected public Higher education institutions in Uganda, a sample of 322 academic staff were selected using the cluster sampling technique. The sample size was determined using the Krejcie and Morgan sampling formula (Krejcie & Morgan, 1970). The selected respondents responded to questionnaires given to them in one week and the response rate was 91.3%. equating to 293 academic staff who participated in the survey. The data collection process followed the self-administered questionnaire approach. The collected data was later processed and analyzed using quantitative analysis techniques. The SPSS software with the AMOS Add-In was used to carry out the quantitative analysis.

Analysis
Before testing the hypotheses developed in this research, the data collected was checked to establish whether it was robust for consideration in the data analysis process. This process began with the presentation of the measurement of the variables and their expected outcomes. This is presented in Table 1.

Table 1: Measurement of variables and expected impact

N	Variables	Measurement	Expected Impact	A priori
	Dependent variable			
	Behavioral intention to teach using ICT (BI).	Five-point Likert Scale with coding grading from strongly disagree to strongly agree.		
	Independent variables			
1	Pedagogical beliefs (Pb)	Five-point Likert Scale with coding grading from strongly disagree to strongly agree.	+	$\beta > 0$
2	Mode of teacher - student Interaction (MSI).	Five-point Likert Scale with coding grading from strongly disagree to strongly agree.	+	$\beta_1 > 0$
3	Mode of provision of lectures (MPL)	Five-point Likert Scale with coding grading from strongly disagree to strongly agree.	+	$\beta_2 > 0$

Information presented in Table 1 indicates that a 5-point Likert scale was used for all the variables that were considered in this study. This is an interval measurement approach that was uniformly applied to all the variables to ensure that interaction of the variables was possible when conducting additional analyses. These analyses were conducted and results were obtained as indicated in the subsections below.

Kaiser-Meyer-Olkin (KMO) and Explanatory Factor Analysis

Following the specification of the data measurement approach as presented in Table 1, there was a need to establish the robustness of the data. This was done by conducting the Kaiser-Meyer-Olkin of sample adequacy as well as the Explanatory Factor Analysis (EFA). The KMO was conducted first followed by EFA.

Table 2: KMO and Bartlett's test-pedagogical beliefs

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.677
Bartlett's Test of Sphericity	Approx. Chi-Square	1034.100
	df	28
	Sig.	.000

Source: Primary data

The results presented in Table 2 indicate that data collected about pedagogical beliefs was collected from an adequate sample size. This is based on the KMO coefficient of 0.677 (KMO = 0.677) which is above the threshold of 0.5. Additionally, the results indicate that Bartlett's Test of Sphericity was significant (Sig = 0.000). This means that the data collected was good enough to be considered for Explanatory Factor Analysis (EFA). On this basis, the EFA was carried out. The results from this analysis with regard to data collected about pedagogical beliefs are presented in Table 3.

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Table 3: EFA output-pedagogical beliefs

		Component	
Code	Items	Interaction with students	Mode of provision of lectures
PK1	I know how to offer straight lectures of class content online		.892
PK2	My university assesses my pedagogical competencies regarding the use of E-learning tools		.601
PK8	I focus on the learning outcomes that I want my students to have, when I am in the process of selecting the teaching method for my class		.767
PK3	My university has a policy to promote the use of E-learning tools by academic staff		.922
PK4	There is a special academic department dedicated to the pedagogical use of E-learning tools in my institution	.907	
PK5	I choose a teaching method depending on the type of class I facilitate	.758	
PK6	The way students respond to me in my first lecture is a good indicator of the teaching method I end up choosing for that class	.748	
PK7	I choose a teaching method depending on the subject matter that I want to lecture to my students	.883	
% of variance		*53.692*	*23.180*
Cumulative variance%		*53.692*	*76.872*

Source: Primary data

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 5 iterations.

The results in Table 3 confirm the theoretical conceptualization that is presented in Figure 1. This means that pedagogical belief is constituted by two indicators; "interactions with students" and "mode of provision of lectures". Further to that, the results indicate that the cumulative variance is above 50%. This indicates that the data collected in relation to pedagogical beliefs was good enough to be considered for further analysis as far as its quality was concerned. Behavioral intention was the second variable to be considered in this research study. The KMO results from the analysis of the data collected in relation to behavioral intention are presented in Table 4 .
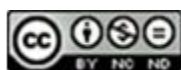
Table 4: KMO and Bartlett's test -behavioral intention

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.755
Bartlett's Test of Sphericity	Approx. Chi-Square	356.026
	df	10
	Sig.	.000

Source: Primary data

Like in the case of pedagogical beliefs, the results presented in Table 4 indicate that the data collected in relation to behavioral intention was collected from an adequate sample of respondents (KMO = 0.755). The data was further tested to establish whether it was of good quality to be considered for EFA. The results in relation to this need are also presented in Table 4 as the outcome of the Barlett's Test of Sphericity. This test was established to be significant (Sig = 0.000) meaning that the data was good enough to be considered for EFA. Based on this, the EFA was carried out. The outcome of this analysis is presented in Table 5.

Table 5: EFA output-behavioral intention

Code	Items	Factor loadings
BI1	I love using computers	.709
BI2	I am addicted to using the Internet	.826
BI3	When there is no internet, I become frustrated	.777
BI4	In this university, the most used modes of communication are WhatsApp and Facebook Messenger rather than direct calls.	.535
BI5	I prefer lecturing online rather than conducting face to face lectures	.689
% of variance		*50.988*
Cumulative variance%		*50.988*

Source: Primary data

Extraction Method: Principal Component Analysis.
1 Component extracted.

Compared with the conceptualization in Figure 1, the results in Table 5 indicate that "Behavioral Intention" as a variable was not composed of more than one indicator. The variance reported as part of the EFA was 50.988% or approximately 51%. This is above 50% meaning that the data collected about behavioral intention was good enough to be considered for further analysis in this study.

Confirmatory Factor Analysis
In addition to the EFA, there was a need to confirm the items to be considered for hypothesis testing. This was done by conducting the Confirmatory Factor Analysis (CFA). This was conducted for the data that was collected about pedagogical beliefs because it had two indicators extracted as the outcome of the EFA. The CFA was conducted using the AMOS software as an Add-In to the SPSS software. The outcome of the CFA is presented in Figure 2 below.
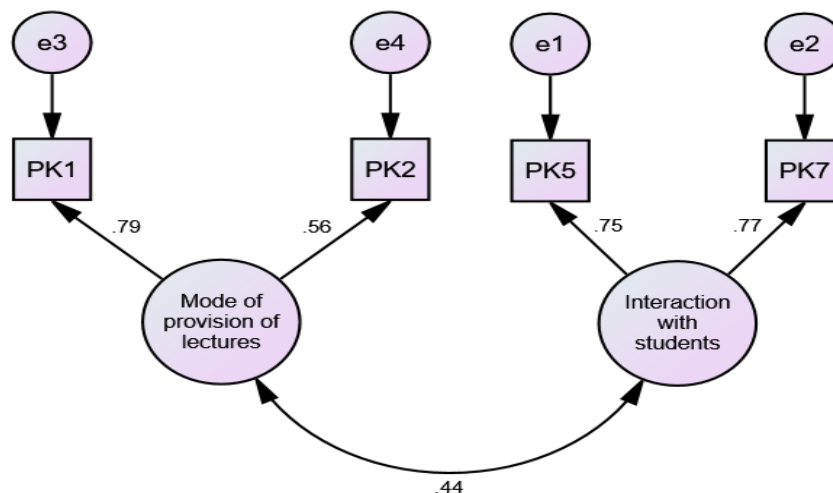
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Figure 2: Confirmatory factor analysis output diagram - Pedagogical beliefs

The results presented in Figure 2 indicate that only four question items remained after conducting the CFA. This was an additional refining process of the data leading to a more robust set of data that was considered in the final analysis of testing the hypotheses. In this refining process, the items were reduced from four to two for each of the indicators as presented in Figure 2 as compared to the output presented in Table 3. The model fit indices in relation to the CFA output were also obtained. These indices are presented in Table 6.

Table 6: Model fit indices–pedagogical beliefs

Statistics	CMIN/DF	GFI	AGFI	RMSEA	NFI	CFI
Values	1.773	0.994	0.970	0.051	0.983	0.992

Source: Primary data

The results presented in Table 6 indicate that the CFA model had a good fit statistically. Based on this fact, the variables as well as the indicators were formulated. These were considered in the final analysis of testing the hypotheses.

Like in the case of pedagogical beliefs, CFA was conducted to further refine Behavioral Intention (BI) as a variable. After the EFA, all the five items were retained into one variable. These were tested in CFA to establish whether the items indeed formed the variable under investigation–behavioral intention. The results from this test are presented in Figure 3 and Table 7.
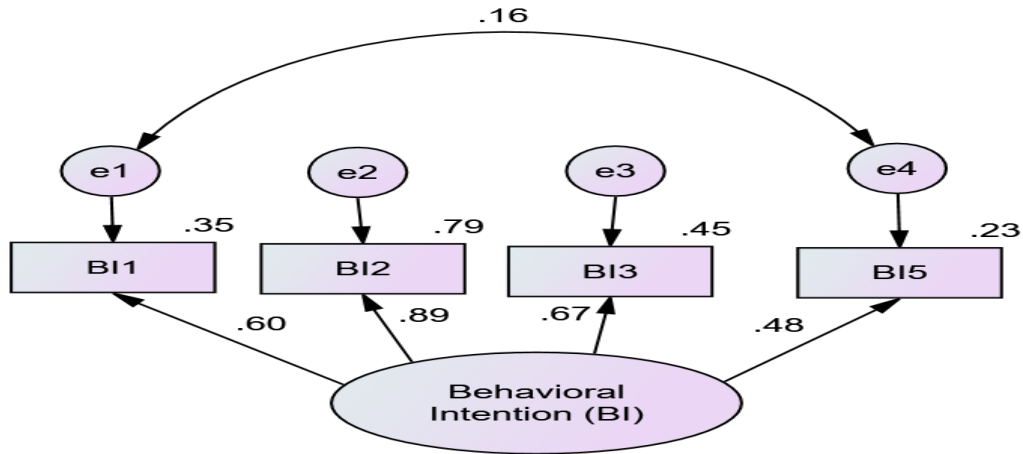
Figure 3: Confirmatory factor analysis output diagram–behavioral intention

After conducting the CFA, one item (BI4) was dropped from the variable. This enhanced the quality of the variable and further made the variable become more robust as far as determining Behavioral Intention is concerned. Dropping one of the items led to this quality enhancement. In relation to the results presented in Figure 3, the results from CFA presented the quality of the model that was derived after the CFA. This quality is presented in Table 7 in form of model fit indices.

Table 7: Model fit indices–behavioral intention

Statistics	CMIN/DF	GFI	AGFI	RMSEA	NFI	CFI
Values	3.553	0.994	0.940	0.094	0.988	0.992

Source: Primary data

The results in Table 7 indicate that the resultant model after CFA for Behavioral Intention had a good model fit. Apart from the RMSEA which is slightly above 0.080, The other indices are within the desired thresholds. These include CMIN/DF < 5, GFI, AGFI, NFI, CFI > 0.9. Based on these results, the new variable of Behavioral Intention was formulated and used in the further analysis in this research.

Testing the Hypotheses Formulated
Correlation and regression analyses were carried out to test the hypotheses. These are the hypotheses that were formulated when conceptualizing the model to be used in this research study. Three hypotheses were considered as indicated below;

> **H1:** *There is a relationship between the pedagogical beliefs of academic staff and their behavioral intention to ICT usage in teaching Higher education institutions in Uganda.*

> **H2:** *There is a relationship between the mode of teacher-student interactions and the behavioral intention of academic staff to ICT usage in teaching in Higher education institutions in Uganda.*

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> ***H3:*** *There is a relationship between the mode of provision of lectures by academic staff and their behavioral intention to ICT usage in teaching Higher education institutions in Uganda.*

Correlation Analysis

This was carried out to test the existence and strength of association between the variables that were considered in this research study. The three variables were considered in this analysis. The first two are associated with pedagogical beliefs while the third is associated with behavioral intention. The results from correlation analysis are presented in Table 8.

Table 8: Results from correlation analysis

	1	2	3	4
Mode of provision of lectures (1)	1			
Interaction with students (2)	.322**	1		
Pedagogical beliefs (3)	.845**	.779**	1	
Behavioral intention (4)	.089	.185**	.163**	1

Source: Primary data
***. Correlation is significant at the 0.01 level (2-tailed).*

The results indicate that both, modes of provision of lectures, as well as interaction with students, have a positive association with the behavioral intention to use ICT for teaching in Higher Education Institutions in Uganda. This is reflected by the positive coefficients of 0.089 and 0.185** for an association between "mode of provision of lectures" and "behavioral intention" as well as between "interaction with students" and "behavioral intention" respectively. Though the associations are positive, it is only the association between "interaction with students" and "behavioral intention" that is statistically significant ($p \leq 0.01$). This association is further stronger than that of "mode of provision of lectures" and "behavioral intention" (r = 0.185 is stronger than r = 0.089).

Though the mode of provision of lectures does not have a significant influence on behavioral intention to select ICT for teaching, when it is combined with interaction with students as a variable and considered as one variable, the correlation results indicate a significant association. The variable that is formed after combining the two variables (mode of provision of lectures and interaction with students) is pedagogical beliefs. Based on the results in Table 8, pedagogical beliefs have a significant association with the intention to select ICT for teaching (r = 0.163; $p \leq 0.001$)

The results from correlation analysis imply that the behavioral intention to use ICT for teaching in Higher Education Institutions in Uganda is more linked to the interaction that lecturers have with their students in class as compared to the mode of provision of lectures. This linkage further suggests the possible existence of the influence relationship. Based on this, there was a need to carry out a regression analysis to establish whether the influence was there.

Regression Analysis

This is a test of influence of the independent variable on the dependent variable. In this study, the independent variable is pedagogical beliefs as represented by "modes of provision of lectures" and "interaction with students". The dependent variable, on the other hand, is "behavioral
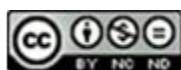
intention". The influence of the independent variable(s) on the dependent variable was tested by conducting the regression analysis. The results from this analysis are presented in Table 9.

Table 9: Regression analysis output

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	3.119	.298		10.483	.000		
Mode of provision of lectures	.030	.057	.032	.532	.595	.896	1.116
Interaction with students	.192	.067	.174	2.862	.005	.897	1.106

Dependent variable:	Behavioral intention to use ICT in teaching
R:	0.187
R Square:	0.035
Adjusted R Square:	0.028
Model significance:	0.006

Source: Primary data

The results presented in Table 9 indicate that both, "mode of provision of lectures" and "interaction with students" influence behavioral intention to use ICT in teaching in Higher Education Institutions in Uganda. The influence presented by the interaction with students is, however, the statistically significant one (Sig = 0.005). The other variable, "mode of provision of lectures", has an influence on the behavioral intention to use ICT for teaching but the influence is not statistically significant. Results further indicated that the data was free from any possible multi-collinearity effect.

Focusing on the entire model, the results revealed that the model was statistically significant (Model Sig = 0.006). The model results further indicated that pedagogical beliefs influence up to 3.5% of changes in behavioral intention to use ICT in teaching in Higher Education Institutions in Uganda. This influence is largely attributed to the interaction between students and their lecturers considering that it is the variable with statistically significant influence on behavioral intention to use ICT in teaching in these Higher Education Institutions.

The results presented from regression analysis indicate that interaction between students and lecturers needs to be given serious attention when there is a need to establish a behavioral intention to use ICT in teaching. This, however, does not mean that the mode of lecturing in these Higher Education Institutions should be ignored.

Considering that the regression analysis output presented in Table 9 focuses on the two constituents of pedagogical beliefs, there was a need to conduct a comparative analysis of the influence of pedagogical beliefs on behavioral intention to use ICT in teaching in Higher Education Institutions in Uganda by focusing on pedagogical beliefs as a single variable. The results from this analysis are presented in Table 10.

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Table 10: Regression analysis output - Pedagogical beliefs

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	3.184	.295		10.776	.000		
Pedagogical beliefs	.203	.072	.163	2.821	.005	1.00	1.00

Dependent variable:	Behavioral intention to use ICT in teaching
R:	0.163
R Square:	0.027
Adjusted R Square:	0.023
Model significance:	0.005

Source: Primary data

The results presented in Table 10 indicate that pedagogical beliefs influence up to 2.7% of the changes in behavioral intention to use ICT in teaching in Higher Education Institutions in Uganda. This is close to the 3.5% presented in Table 8. This means that the comparative analysis confirms the influence of pedagogical beliefs on behavioral intention to use ICT in teaching.

Additionally, the results in Table 10 indicate that the influence of pedagogical beliefs on behavioral intention to use ICT in teaching is statistically significant (Beta = 0.163; Sig = 0.005; Model Sig = 0.005). This means that, when it comes to behavioral intention to use ICT for teaching, pedagogical beliefs should be given significant importance.

Outcome of Hypothesis Testing
In this section, there is a presentation of the findings in line with the hypotheses stated. These findings are in line with the analysis that is reported in this section. In the presentation, there is an indication as to whether the hypothesis is accepted or rejected based on the outcome of the analysis carried out. These results are presented in Table 11.

Table 11: Summary of the results from the analysis

Hypothesis tested	Analysis results	Decision
H₁: There is a relationship between the pedagogical beliefs of academic staff and their behavioral intention to adopt ICT usage in teaching in public higher institutions of learning in Uganda.	r = 0.163** Beta = 0.163 with Sig = 0.005	Accepted
H₂: There is a relationship between the mode of interactions that students have with academic staff and the behavioral intention of academic staff to adopt ICT usage in teaching in public higher institutions of learning in Uganda.	r = 0.185** Beta = 0.174 with Sig = 0.005	Accepted
H₃: There is a relationship between the mode of provision of lectures by academic staff and their behavioral intention to adopt ICT usage in teaching in public higher institutions of learning in Uganda.	r = 0.089 Beta = 0.032 with Sig = 0.595	Rejected

Information presented in Table 11 indicates that, of the three hypotheses, only two were supported and hence accepted. The third hypothesis was not supported by the data and hence it
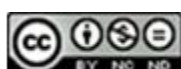
was rejected. Considering that the first hypothesis is composed of the third hypothesis, there is a need to appreciate that pedagogical beliefs are important towards the formation of the behavioral intention to select ICT in the teaching of university students in Higher Education Institutions in Uganda, but only to the extent of the involvement of interaction of students with their lecturers. This is because "interaction with students" is also an indicator (or sub-variable) that forms pedagogical beliefs as the main independent variable in this research study.

Discussion of Findings

Behavioral intention mainly focuses on the strength of the intention leading to the actual action that is intended to happen. In the case of this research study, behavioral intention is focused on the selection of ICT use in the teaching of students in institutions of higher learning. The results obtained indicate that this intention is significantly influenced by the pedagogical beliefs in these institutions of higher learning. The results further revealed that it is the interaction between students and lecturers about how they want to be taught that significantly influences the behavioral intention to select ICT in the teaching of students in these institutions of higher learning. These findings are in line with the findings from the literature material presented by Yeop *et al.,* (2019). The same position was advocated by Bashir *et al.,* (2021) though Bashir further included the need to also focus on modes of lecturing as part of the pedagogical beliefs.

Comparing the results obtained from the review of literature materials, with regards to modes of lecturing, which were considered in the process of conceptualization of the model that was tested in this research study (Batiibwe *et al.,* 2017; Mertens *et al.,* 2021; Berger & Van, 2019; Jere, 2020; Moorthy 2019), it is evident that this research study has been able to present a new dimension based on the results from data analysis. This new dimension indicates that modes of lecturing do not have a significant influence on behavioral intention to select ICT for teaching in higher education institutions in Uganda. Though the focus of the discussion is on the determination of the behavioral intention to select ICT for teaching, the essence is in the selection process. This means that modes of lecturing carried out by a lecturer cannot influence the behavioral intention to select a certain method or tool to be used in the lecturing process.
Ideally, the mode of lecturing used by a lecturer could be an indicative factor that could sway the decision process of both, the students and lecturers, when it comes to the behavioral intention to select ICT for use in teaching in higher education institutions (Nordin *et al.,* 2022). This is, however, not the case in the higher education institutions based in Uganda. This suggests that the lecturers are not persuasive enough to make the students consider selecting what they prefer or the students are exposed to understand that they need to select what makes them understand. Considering that Uganda falls in the category of countries with higher power distance as presented by Hofstede's cultural dimension theory (Uchidiuno *et al.,* 2021; Ntale *et al.,* 2020), modes of lecturing having low influence on behavioral intention to select ICT for usage in teaching and lecturing, presents a new finding in this research study.

Though it is a new finding, caution needs to be taken because it is based on data that was collected in Uganda covering higher education institutions in Uganda. The same may not apply to higher education institutions in East Africa or any other country in Africa (Uchidiuno *et al.,* 2021). There is, however, a need for similar studies to be conducted in these countries by future

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researchers to establish whether the findings obtained in Uganda are also applicable in these other countries in Uganda.

Conclusion and Recommendation

This research study reveals the importance of interaction between students and lecturers when it comes to the determination of behavioral intention to use ICT in teaching in Higher Education Institutions in Uganda. The two groups, lecturers and students, are the key stakeholders in the learning process making it necessary for them to be actively involved when it comes to choosing the method of delivery of a lecture. This participation leads to them owning the method selected and thereby ensuring that the learning takes place as effectively as possible.

It is, therefore, of paramount importance, for the management members of every higher education institution in Uganda, to embrace the need to involve students when it comes to choosing how they should be lectured from the point of view of behavioral intention to make that selection. Judging from the results obtained in this research study, if the management members of the higher education institutions in Uganda embrace the involvement of the students, the best selection will always be made after the behavioral intention to make that selection has been formulated through the interaction and or involvement. Though this is recommended, there is a need to ensure that this involvement is not abused by the students especially considering that there are cases when the students may take a lead in the interaction between them as students and their lecturers.

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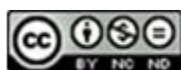
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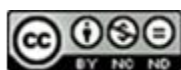
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