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# The Influence of Instructors Employed Digital Pedagogies on Students' Learning Outcomes: The Case of Selected Higher Learning Institutions in Tanzania

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#### ABSTRACT

Higher learning institutions in Tanzania is among the sectors that has started capitalizing on digital technology in the course of delivering their training programs. In coping with the digital technology dynamics instructors are at the centres of realizing the change and harnessing its potentials in the learning process. The instructors' employed digital pedagogy is of great concern in the process of achieving the desired students learning outcomes. This research article therefore, assessed the influence of instructors' digital pedagogies on students learning outcomes among the selected higher learning institutions in Tanzania. The study is guided by two theoretical models which include Technology Acceptance Model (TAM) as developed and Technological Pedagogical Content Knowledge (TPACK). The study employed cross- sectional design where data were collected once from two different regions. 583 academic staff population with designation starting from tutorial assistant to full professor who are currently engaging in teaching and research activities in the were identified from two selected higher learning institutions in Tanzania. A sample of 237 instructors were selected randomly for this study. Self-administered questionnaire, key informants interview and focus group discussion were employed as data collection tools. The descriptive and structural equation model (SEM) were performed to analyse the data. The findings indicate statistically positive significant influence' of digital pedagogy on students learning outcomes. Specifically the path model analysis indicates that the employment of digital pedagogy contributed the students learning outcomes by 36% s. It is concluded that the digital pedagogy employed by instructors improves students learning outcomes. No significant differences in terms of instructors' digital pedagogy were noticed across institutions and gender and age. However, the instructors' use of some specific digital pedagogy recommended for further improvement as it has little contribution to students learning outcomes.

Keywords: Digital Pedagogy, Higher Learning Institutions, Instructors, Learning Outcomes, Tanzania

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#### I. INTRODUCTION

The digital pedagogy is currently given an attention by scholars in the era of changing teaching platform from face to face to blended or fully online training delivery (Montalvo, 2023). The concern for instructors' digital delivery pedagogies is important because in the blended or fully online mode the learners get in touch with their instructors via digital tools that are used in delivering instructional activities. The key questions is does the employed digital pedagogy support the student learning outcomes considering the fact that the instructors play multiple roles of a course creator, facilitator, motivator and course evaluator.

Traditional face to face instructional activities were clearly guided by leaning framework such as behaviourism, social constructivism and cognitivist. With emerging digital use in training there is concern on the methods employed in delivering instructional activities in enhancing learning outcomes. Digital pedagogy is about knowing when and how to use technology for learning and how to incorporate digital tools to enhance discovery and problem solving, engage learners, and improve the learning experience (Danmuchikwali & Suleiman, 2020)

It has been found that one of the main challenges in online classes was that instructors could not see students since they do not turn on their webcams, and, hence, his lecturing tone can drive into a monotonic rhythm that may result in students losing interest (Ghavifekr & Rosdy, 2015). The digital use challenges seems to be the biggest barrier in achieving the learning process for both instructors and students. The concern for the instructors' digital pedagogy requires to be given more solutions since they guide the learning process to happen.



With regards to the impacts of digital pedagogy on the learning outcomes Väätäjä and Ruokamo (2021) found that instructors, success in blending digital technologies into their teaching is improved by high self-efficacy and strong peer-collaboration skills. Similarly, findings indicate that the impact of the digital pedagogy training depended on teachers' Information and Communication Technology (ICT) confidence level (Montalvo, 2023). Their findings further indicated that teachers who had low confidence in ICT use showed an increased ICT confidence level after the programme, while teachers who already had high confidence in ICT use showed no significant changes in their confidence level.

Merono *et al.* (2021) found that digital pedagogies that is based on TPACK model formulation improve preservice teachers' academic achievement. However, On contrary, it has been found a significant negative effect of the digital semester on student academic success, suggesting that students performed significantly worse after the Covid-19 outbreak caused the University to step away from face-to-face teaching and adapt to remote studies (Tinjic & Halilic, 2020). The study that compared the pass rate percentage of the participants in the online review session with the pass rate percentage of those who did not participate in the online review session indicated that was not a significant increase in the pass percentage rate of the online review session participants when compared to the test takers who did not receive intervention. However, pass rates and average test scores were higher for online review session participants (Jill, 2019).

The study by Chisadza et al. (2021) assessment grades between pre-lockdown and post-lockdown at a South African university indicated that students' performance was positively associated with good Wi-Fi access, relative to using mobile internet data. We also observe lower academic performance for students who found transitioning to online difficult and who expressed a preference for self-study (reading through class slides and notes) over assisted study (joining live lectures or watching recorded lectures). However, the online learning environment varies profoundly from the traditional classroom situation when it comes to learner's motivation, satisfaction and interaction (Bignoux & Sund, 2018).

Technological Pedagogical Content Knowledge framework or model (TPACK) developed by Mishra and Koehler (2006) describes the kinds of knowledge needed by a teacher for effective technology integration. The TPACK framework emphasizes how the connections among teachers' understanding of content, pedagogy, and technology integration of knowledge for effective integration of ICT into teaching and learning. The domains are content knowledge (CK), pedagogical knowledge (PK) and technological knowledge (TK). Mishra and Koehler's TPACK framework acknowledges the significant interplay between a teacher's pedagogical stance, their use of technology and their knowledge of the content of the discipline in which they are teaching. In this way, content is seen as only one element of the overall context of learning and teaching.

The higher learning institutions in Tanzania have witnessed the increase of digital technology in the delivery of instructional activities (Mnyanyi et al., 2010; Mwakyusa & Ng`webeya, 2022). The preparedness of instructors towards instructional delivery using digital means is a subject of concern under the rapid pace of digital integration into higher learning educational context. Considering unsettled findings and scanty review on the application of digital pedagogies in student learning. This study therefore seek to assess the influence of instructors employed digital pedagogies on students learning outcomes in the selected higher learning institutions in Tanzania. The need for this study is based on the fact that such higher learning institutions have started utilizing the digital technology without the clear and informed guideline supported by research findings.

#### 1.1 Statement of the Problem

Tanzania's government recent ICT initiatives in higher learning institutions have improved access to infrastructures, digital content and competent users. However, the digital (ICT) usage among instructors has been reported to be low, and its effectiveness in achieving students' learning outcomes is not clear. The extent of digital use in training is determined by a number of factors including ICT infrastructure (Angeli et al., 2022) digital competence personnel availability (Mattar et al., 2022; Ergül & Taşar, 2023) and digital technology adoption (Puteh et al., 2017): (Mtebe & Gallagher, 2022). Furthermore, the rapid integration of digital technologies into education has transformed teaching and learning practices worldwide; a move where developing countries including Tanzania is required to cope. However, there is a growing concern about the adequacy and effectiveness of instructors' digital training practices in enhancing students' learning outcomes. Although digital tools can enhance personalized learning, boost engagement, and elevate academic performance, their effectiveness largely depends on the instructors' competencies, supporting environment in using them properly (Aziz et al., 2022). Thus necessitated a need to assess the influence of instructors employed digital pedagogies on students learning outcomes

#### **1.2 Research Objective**

To examine the contribution of instructors employed digital pedagogies on students' learning outcomes in the selected higher learning institutions.

## **II. LITERATURE REVIEW**

## 2.1 Theoretical Review

### 2.1.1 Technology Acceptance Model (TAM) and Technological Pedagogical Content Knowledge (TPACK)

The study is guided by two theoretical models based on the study objectives. The first model employed is Technology Acceptance Model (TAM) as developed by Davis (1989). The basic TAM model included and tested two specific beliefs: Perceived Usefulness (PU) and Perceived Ease of Use (PEU). Perceived Usefulness is defined as the potential user's subjective likelihood that the use of a certain system (for example single platform E-payment System) will improve his/her action and Perceived Ease of Use refers to the degree to which the potential user expects the target system to be effortless (Davis, 1989). The belief of the person towards a system may be influenced by other factors referred to as external variables in TAM

The second theoretical model employed in this study is technological pedagogical content knowledge (TPACK) as developed by Mishra and Koehler (2006). The model describes the kinds of knowledge needed by a teacher for effective technology integration. The TPACK framework emphasizes how the connections among teachers' understanding of content, pedagogy, and technology interact with one another to produce effective teaching. The framework state that a teacher depends on three domains of knowledge for effective integration of ICT into teaching and learning. The domains are content knowledge (CK), pedagogical knowledge (PK) and technological knowledge (TK). Mishra and Koehler's TPACK framework acknowledges the significant interplay between a teacher's pedagogical stance, their use of technology and their knowledge of the content of the discipline in which they are teaching. In this way, content is seen as only one element of the overall context of learning and teaching.

#### 2.2 Empirical Review

In low and middle income countries, where access to technology and digital training resources is limited, the disparity in learning outcomes is even more pronounced. The (Limniou, 2021) reported that students in digitally equipped classrooms in high income countries achieve 40% higher learning gains than their peers in less digitally advanced environments. The study by Mtebe and Raphael, (2018) highlights that digital training equips instructors with the necessary skills to deliver content effectively and foster interactive learning environments. Digital literacy among instructors has been identified as a critical factor in the successful implementation of technology-enhanced learning (Timotheou et al., 2023). Conversely, digital training programs have been associated with improved student engagement and academic success, particularly in blended and online learning environments (Li, 2022). With the growing use of technology there is a need to have competent instructors who can manage use of ICT in teaching, learning and proving academic services.

The study by Salema (2023) indicates that only 20% of educators feel adequately prepared to integrate digital tools into their teaching practices, despite 90% acknowledging the importance of digital skills in modern education. Furthermore, studies highlight a significant gap between digital training provided to instructors and the practical skills required for effective classroom implementation. For instance, a survey by Peter (2023) reported that 45% of teachers globally lack access to adequate professional development programs focusing on digital pedagogy.

In many cases, the absence of comprehensive digital training results in suboptimal use of technology, thereby failing to achieve the desired improvements in learning outcomes. For example, a study by (Webb et al., 2020) found that only 30% of digital technology implementations in classrooms led to measurable improvements in student performance, primarily due to insufficient instructor training and lack of alignment with instructional goals. This problem becomes more pressing in the context of global educational inequities.

The study by Graham et al. (2019) explored the role of blended learning, which integrates face-to-face instruction with digital content, on student outcomes in higher education. Their findings revealed that blended learning enhances student engagement and improves academic performance due to its flexibility and interactive nature. Also, Laurillard (2018) examined the implementation of technology enhanced learning environments, such as flipped classrooms and online simulations, on student learning. Therefore, these environments foster deeper understanding and critical thinking among students by enabling active learning practices. Moreover, Chen et al. (2020) studied the impact of digital tools like online discussion forums and collaborative platforms on student learning outcomes. Their research showed that these tools facilitate knowledge sharing, improve collaborative skills, and enhance overall academic performance.





The study by Means et al. (2019) also investigated the effect of digital pedagogies in STEM disciplines, emphasizing the use of simulations and virtual laboratories. The study reported that students exposed to these digital resources performed better in problem-solving and applied learning tasks. Similarly, Inyang and Linus, (2015) and Peter (2023) analyzed the use of mobile learning applications in higher education. Their study found that mobile learning significantly enhances student engagement, providing accessible and personalized learning experiences that improve academic outcomes. Study by Jordan (2018) examined the role of Massive Open Online Courses (MOOCs) in higher education. The study highlighted the effectiveness of MOOCs in providing flexible learning opportunities and improving access to education, particularly for non-traditional learners, though challenges like low completion rates persist. Additionally, Ferguson et al. (2020) explored the use of learning analytics in personalizing instruction and feedback.

Instructors in HLIs in Tanzania do employ digital technology in performing their key functional activities of teaching/training, research and community engagement (Mtebe & Raphael, 2018). Despite the instructors' adoption of digital technology in facilitating training in Tanzania over the years, yet the utilization is not impressive and appealing (Mwakyusa & Ng`webeya, 2022); (Salema, 2023). With a global dynamics increase in digital technology and the outbreak of Covid 19, there is a major concern about instructors digital 'training facilitation competencies and the digital infrastructure usability and framework in achieving training objectives. It is important that the dynamics in technology use need to fit the purpose of educational goals, thus call for a clear framework of digital technology use in enhancing training objectives. Hence press a need to assess the influence of instructors' digital pedagogies in achieving students learning outcomes.

## **III. METHODOLOGY**

The study employed a cross-sectional design (Creswell & Creswell, 2017). The design is chosen since it allows data to be collected at once from different cases (Kumar, 2011). It is therefore fit for this study because the data was collected from two institutions running digital training (online programmes) which are located in different regions at one point in time. Also, cross-sectional design has been proved to be suitable for estimating the prevalence of behaviour in a population (Sedgwick, 2014). In this case the study comprehensively investigated the influence of digital pedagogies on students' learning outcomes.

The study based in the United Republic of Tanzania (URT) specifically the selected higher learning Institutions. URT is a sovereign state made up of the former Tanganyika and Zanzibar. Tanzania is among the five countries in East Africa and lies between latitudes 1 degree and 12 degree south of the equator and Longitude 29 degree and 41 degree Greenwich. Tanzania has about 12 public higher learning institutions, 24 private higher learning institutions (Tanzania Commission for Universities [TCU], 2022). Additionally, the higher learning institutions registered under NACTEVET were about 537. Open University of Tanzania (OUT) which is one among the 12 public higher learning institutions under the TCU and Institute of Accountancy Arusha (IAA) which is among the 537 higher learning institute under NACTEVET are selected for this study. The selection of the two institutions (OUT and IAA) is based on the reasons that they are the among HLIs practicing blended mode and have much experience of employing digital training practices in facilitating HLIs training, whereby digital training among instructors has been reported to be low, and its effectiveness in achieving students' learning outcomes is not clear.

The study population consisted of all employed academic staff of the two selected academic institutions who were engaged in online teaching, regardless of their specialization. The two selected institution is estimated to have more than 583 academic staff with designation starting from tutorial assistant to full professor who are currently engaging in teaching and research activities in the selected higher learning institutions.

#### Table 1

Study Dopulation as Day Salastad Institutions

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S/No	Institution Name	Population	
1	Institute of Accountancy Arusha	260	
2	Open University (Dodoma, Dar es Salaam, Manyara and Arusha)	323	
Total		583	

A sample size of 237 academic staff was derived from an estimated population of 583 employed academic staff from the two selected higher learning institutions based on the Yamane formula of 1967;

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



Where n is the sample size, N population size e is the level of precision. The formula assumes that p=.05 (maximum variability). The desired confidence level is 95% and the degree of precision/sampling error accepted is 5%. Therefore;

$$n = \frac{583}{1 + 583 (0.0025)} \approx 237$$

Every element in the sample was selected by using simple random sampling; where a proportion of population of each selected institution was equally and randomly picked from the employment records through the lottery method. The procedure considers the sampling elements to have homogenous characteristics since all are academic staff. However, the key informants and focus group participants were purposively selected.

## Table 2

Sample Distribution as Per Institution

S/No	Institution Name	Population	Sample Size
1	Institute of Accountancy Arusha	260	$\frac{260}{583} \times 237 = 106$
2	Open University	323	$\frac{323}{583} \times 237 = 131$
Total		583	237

Both primary and secondary data was collected in this study. The primary data collected included sociodemographic characteristics of the respondents, specialization background, years of teaching experience, instructors' employed digital pedagogy impact on learning processes. For the case of secondary data, reports indicating digital tools bought by the institution and instructors digital use records was analysed. Four data collection techniques were employed in collecting the data. These include questionnaire survey, Interview, focus group discussion and observation.

A total of 237 open and closed self-administered questionnaire copies for the selected academic staff was developed to cover the digital perspective in HLIs. The content development of questionnaires was guided by the TPACK and TAM frameworks (Mishra &Koehler, 2006; Davis 1989). A normal five Likert scale was developed for collecting data for to cover the digital pedagogical objective. TPACK customized five Likert scale and the pretesting of questionnaire were carried out to at least five percent of the selected sample size. The selection of the questionnaire has several benefits including: Questionnaires offer an efficient and cost-effective means of gathering data from a large number of participants simultaneously, a crucial advantage when faced with resource constraints. The selection of the questionnaire has several benefits including: Questionnaires offer an efficient and cost-effective means of gathering data from a large number of participants simultaneously, a crucial advantage when faced with resource constraints. The selection of the questionnaire has number of participants simultaneously, a crucial advantage when faced when faced with resource constraints. The selection of the faced from a large number of participants simultaneously, a crucial advantage when faced with resource constraints. The source constraints (Gomm, 2008)

Interviews are highly valuable when researchers aim to explore the depth of information, particularly opinions, perceptions, and views that may be concealed by the respondents (Utibe, 2020). Face-to-face interview was conducted whereby a total of 8 participants was selected for this study as key informants for the interview. For each institution 4 key informants was purposively selected per institution making a total of 8 key informants. The proposed number for the key informants is adequate for data triangulation and saturation purpose. These key informants included heads of departments and deans of faculties who are directly engaged in employing digital pedagogy and digital training.

Millward (2012) stressed that, when managed well, a focus group discussion can produce a broader and more in-depth understanding of an issue or topic because the interaction process stimulates memories, debate and disclosure Four focus group discussions was developed from the selected institutions among the population of the academic staff (different from those who responded to questionnaires) for triangulation purposes. It have been evidenced that 4-6 members of group discussion can provide data saturation point for the sample that has homogenous characteristics (Guest et al., 2016). In this study each group consisted of four members who was selected based on knowledge of the subject matter, gender and confidence to participate in discussions through nomination strategy by their fellow academic staff. The inclusion of both men and women was considered proportionally based on their availability of the two gender as per institution.

The quantitative data were analyzed using descriptive statistics especially percent and frequency were employed in analyzing social demographic data of the respondents. The relationship between the social demographics and digital teaching methodology were analyzed using Kruskal Wallis Test. On the other hand, the influence of digital training methodology were analyzed using structural equation modeling (SEM).Factor reduction approach was employed using standard regression weight whereby 8 items assessing digital pedagogy did not meet the required regression estimates (were below 0.5) thus not included in the analysis. Similarly for the case of student learning outcomes only item was drop as it did not meet the regressions estimates weight.



The removed items include D11- My students are happy with digital materials that I normally share during the learning process, D12- My students are capable of searching learning material via various digital platforms, D13- My students successful join Livestream lecture and discussion understood the lesson as per intended lesson objectives, D14- My students do fill feel confident in asking and answering questions when I teach through digital platform, D15- My student provide correct and immediate feedback when I give the assignment, D16- The students instructors course evaluation general indicate acceptable teaching methodology, D17- Digital pedagogies have enabled me to learn at my own pace, D18- My digital pedagogies have made my students' learning more engaging and interactive. For the case student learning outcomes first item was deleted and entire list was re-numbered

The recorded qualitative data was coded and organized thematically for further interpretation. Significance of thematic analysis has been supported by the work of (Naeem et al., 2023)who emphasised that the analysis is used to identify and analyze recurring themes or patterns within the qualitative data (Naeem et al., 2023). In this study, key themes in the use of digital pedagogy its connection with the learning outcomes emerged during the discussion were systematically analyzed and coherently linked with the quantitative findings since the study adopted mixed approaches

To ensure that the instrument covers all the components and valid information, the entire process of developing the questionnaire was guided by the content validity. This type of validity was ensured through reviewing the previous studies in assessing the adequacy and accuracy of what it measures. Different methods of data collection is employed to ensure validity of the qualitative information (construct validity). In addition, the validity of the qualitative data was ensured by collecting data from the credible sources including government reports and high rigor publication houses. For the case of the interview based data relevancy of the expertise was considered in the selection of the interviewed participants.

Where  $\alpha$  (alpha) coefficient; K the number of items;  $S_T^2$  is the total variance of the sum of the item and the variance of individual item. The reliability analysis results of the items tested indicate acceptable standards for both independent variable (digital training pedagogy (18 Items) and dependent variable (student learning outcomes (9 items) where a Cronbach Alpha ( $\alpha$ ) value were above 0.70 as indicated in table 3.

#### Table 3

Reliability Test for the Items

Constructs and Items	Cronbach Alpha – Coefficient	Composite Reliability	AVE
Instructors Digital Pedagogies	.936	0.871	0.732
Students learning outcomes	0.930	0.773	0.595

#### **IV. FINDINGS & DISCUSSIONS**

## 4.1 Socio-Demographic Characteristics of the Respondents

Three socio-demographic characteristics concerning respondents who participated in the study were established. These include age, sex and name of the institution. The attributes were considered to have influence on the employed digital pedagogy which in turn could have indirect assumed influence on students' learning outcomes. The findings are indicated in table 4 below.

Table 4

Socio-Demographic Characteristics of the Respondents

Variable	Attribute	Frequency	Percent
Sex	Male	160	67.5
	Female	77	32.5
Age category	Below 30	22	9.3
	30 to 39	105	44.3
	40 to 49	85	35.9
	50 to 59	23	9.7
	Above 59	2	0.8
Name of the higher learning institution	OUT	115	48.5
	IAA	122	51.5

The finding indicate more males' participation in this study than females. This indicate that there are male instructors than female in higher learning institutions in Tanzania. The number is attributed to gender historical issues



of few enrolment of females as far as education delivery is concerned in the Tanzania community context. This concur with the study on vital statistics on university education in Tanzania (Tanzania Commission for Universities, 2022)which indicate there are more males than female instructors in higher learning Age wise, the majority of instructors are between age 30 years to 39 years reflecting young aged population of the country. The participation as per selected institution is almost equal in number with IAA leading the figures as per established employment records. The two institutions have the records of integrating ICT in their training delivery. The Kruskall Walis test of differences across the three sociodemographic variables and employed digital pedagogies did not show any significance differences with the implication that they all employ similar digital pedagogies.

With regards to the influence of the employed digital pedagogies on students learning outcomes; the structural equation modelling was employed in the analysis. The model conditions were first tested to assess the required specifications for further analysis. The model fit test include ratio of CMIN/df, goodness-of-fit index (GFI), comparative fit index (CFI), Tucker-Lewis index (TLI), standardized root mean square residual SRMR, and root mean square error of approximation (RMSEA). The detailed results are indicated in table 5.

#### Table 5

Model Fit Statistics				
Fit Indices	Recommended Value	<b>Obtained Value</b>		
CMIN/df	2-6 (exclusive)	2.611		
GFI	$\geq 0.80$	0.862		
CFI	$\geq 0.90$	0.941		
TLI	$\geq 0.90$	0.930		
SRMR	< 0.08	0.046		
RMSEA	< 0.08	0.058		

The structural equation model fit statistics in table 5 demonstrate a good fit to the data, with a CMIN/df ratio of 2.611 falling within the recommended range of 2 to 6. The goodness-of-fit index (GFI) exceeded the threshold at 0.862, indicating an acceptable fit. Additionally, both the comparative fit index (CFI) and Tucker-Lewis index (TLI) surpassed the recommended value of 0.90, with values of 0.941 and 0.930 respectively, suggesting a strong fit between the hypothesized model and the observed data. The standardized root mean square residual (SRMR) was well below the threshold at 0.046, indicating a good fit, and the root mean square error of approximation (RMSEA) was slightly higher than the recommended cut-off at 0.058, suggesting a reasonably close fit. Overall, while the model may benefit from slight improvement in RMSEA, most fit indices indicate that the proposed model adequately represents the relationship between the observed variables and latent constructs.

In sum figure, 1 SEM path mode indicate that there is significant relationship between the employed instructors digital pedagogies (DP) and students learning outcomes whereby the structural equation coefficient estimates reads as 0.38 (S.E. = 0.072, C.R. = 5.235, p <  $0.001^*$ ) as supported by Maximum Likelihood Estimate (MLE) in table 6. This suggests that instructors' digital pedagogies integration into their teaching practices are associated with the improvement of student learning outcomes. This finding underscores the importance of embracing digital tools and methods in instructional practices to enhance student learning experiences and outcomes in higher learning institutions in Tanzania. This findings is supported by the study done by Ndibalema et al.(2024) who indicated there was a statistically significant increase in tutors' level of pedagogical use of ICT competences and domains of professional practice that was associated that more effective and efficient that improved student's achievement.





## Figure 1

SEM Path Model for the Influence of Instructors' Digital Training Pedagogies on Students Learning Outcomes

Note: DP-pedagogy variables that meet conditions (Ind. variable), LO- Students learning outcome variables (Dependent variable). D1- Using ICT improves my performance as an instructor, D2- Using ICT in my job increases my productivity, D3- Using ICT enhances my effectiveness in my job as an instructor, D4- I find ICT to be useful in my job, D5- ICT helps me to do the necessary activities of the class faster, D6- I can easily find the necessary information in ICT, D7- I can broadcast the announcements of the class very fast using ICT, D8- I can make class plans very effectively using ICT, D9- My interaction with ICT is clear and understandable, D10- Interacting with ICT does not require a lot of my mental effort,

H1- The performance of my students is mainly attributed to my use of digital tools in learning process, H2-My students perform well when I conduct training through video sharing, H3- My students do share effectively their assessment through digital tools effectively, H4- For the courses that I teach through digital platforms, they score average to high grades performance in exams, H5- When I teach the courses through digital platform my students gain new knowledge and skills, H6- The students final semester exams for the courses taught through digital tools in most cases indicate good performances, H7- The use of digital pedagogies has improved my students overall academic performance, H8- The use of digital pedagogies has provided my students with opportunities to collaborate with other students. H9- The use of digital pedagogies has made my students learning more fun and enjoyable

Furthermore, MLE further indicate specific items relationship among the variables as indicated by findings in table 6. Specifically, the MLE analysis indicated a strong significant relationship on the item such as Using ICT improves my performance as an instructor. This indicates that instructors who leverage ICT tools in their job experience significantly higher levels of productivity. ICT enables instructors to streamline tasks, automate processes, and access resources efficiently, leading to increased productivity in their teaching roles. The details of the findings are indicated in table 6



## Table 6

 Factor Analysis using (MLE) for Instructors Employed Digital Pedagogies (DP) on Student Learning Outcome (LO)

 Impact of employed Digital Pedagogies (DP)
 Estimate
 S E
 C R
 P

Impact of employed Digital Pedagogies (DP)	Estimate	S.E.	C.R.	Р
Digital Pedagogies	0.376	0.072	5.235	< 0.001*
Using ICT in my job increases my productivity	1.007	0.055	18.258	< 0.001*
Using ICT enhances my effectiveness in my job as an instructor	0.964	0.057	16.881	< 0.001*
I find ICT to be useful in my job	0.926	0.06	15.465	< 0.001*
ICT helps me to do the necessary activities of the class faster.	0.959	0.057	16.909	< 0.001*
I can easily find the necessary information in ICT.	0.877	0.054	16.311	< 0.001*
I can broadcast the announcements of the class very fast using ICT.	0.945	0.064	14.68	< 0.001*
I can make class plans very effectively using ICT.	0.909	0.057	15.946	< 0.001*
My interaction with ICT is clear and understandable	0.94	0.062	15.155	< 0.001*
Interacting with ICT does not require a lot of my mental effort	0.785	0.091	8.648	< 0.001*
Using ICT improves my performance as an instructor	1.000			

The findings is also supported by focus group discussion whereby one of the discussant has this to say.

.....I have used digital pedagogy in delivering instructions in my class over the years and I can employ different pedagogical skills successfully....

This implies that the instructors have abilities to employ digital pedagogy in delivering instructions in their classes. They expressed the ability to effectively plan class activities using digital application and efficiency in job. This initiative need to be embraced and up scaled to other higher learning institutions in Tanzania. The finding concur by the study done by Machumu et al (2022) reveal that Instructors' possessed several ICT teaching skills and experiences used in facilitating student-teacher learning. These comprise the use of internet based digital content, resources, word processing and PowerPoint presentation skills. The other studies that supported the finding include Mollel et al (2022); Gikandi (2020) and (Kliachko, 2014) who generally stated that a digital pedagogical approaches occur through social interaction with the assistance of computers and the internet.

Furthermore, the results demonstrated a substantial positive impact of utilizing ICT on instructors' effectiveness in their teaching roles, with a coefficient estimate of 0.964 (S.E. = 0.057, C.R. = 16.881,  $p < 0.001^*$ ). This implies that incorporating ICT tools and strategies enhances instructors' ability to deliver content, engage students, and facilitate learning effectively. ICT provides instructors with diverse instructional opportunities, such as multimedia presentations, interactive activities, and collaborative learning platforms, contributing to their overall effectiveness in the classroom. Additionally, the analysis revealed a significant positive association between perceiving ICT as useful in instructors' job roles, with a coefficient estimate of 0.926 (S.E. = 0.060, C.R. = 15.465,  $p < 0.001^*$ ). This suggests that instructors who recognize the utility of ICT in their teaching practices are more likely to integrate digital tools and resources into their instructional activities. The findings is supported by Manyengo (2021) study who revealed that there is some use of technology in the classroom, particularly in accessing learning content and in assessing student learning.

However, the findings indicated a notable positive effect of ICT on expediting necessary class activities, with a coefficient estimate of 0.959 (S.E. = 0.057, C.R. = 16.909,  $p < 0.001^*$ ). This implies that ICT facilitates the efficient execution of various teaching tasks, such as lesson planning, resource sharing, and communication with students. By streamlining administrative and instructional processes, ICT enables instructors to optimize their time and focus more on facilitating meaningful learning experiences for students. The findings is supported by George et al (2023) who observed that ICTs have helped the faculties gain more confidence and make each lesson more fun and interactive for the students.

The instructors in selected in higher learning institutions demonstrated strong technological knowledge compared to pedagogical content as depicted by TPACK model. Most of the items that did not reach the required model SEM model analysis are related to specific digital pedagogy including livestream lecture method, question and answers approach and discussion approach. This suggest that the instructors have not mastered the digital technology in such approaches or may lack innovation in such applications. Similar observation was noted by Istrate (2022). who posits that there is a difference between digital pedagogy and teaching online and that digital pedagogy was not a mere work of relocation but rather using the digital to innovate further, where digital pedagogy would work around limitations of digital platforms, using it as a portal to expand the learning environment and increase mindful teaching. Therefore modification of TPACK model is suggested by classifying such pedagogical content with respective technology to obtain better fit for purpose of enhancing students learning outcomes.



## V. CONCLUSION & RECOMMENDATIONS

#### 5.1 Conclusion

Digital pedagogies are utilized by instructors' in selected higher learning institution in Tanzania. The instructor possess more technological knowledge as far digital pedagogy is concerned. Positive significant relationship emerges between employed digital pedagogies by instructors and students learning outcomes. This implies that the digital pedagogy employed by instructors successfully support the delivery of the instructions that enhances learning process among students. However, some specific digital pedagogies did not show significant relationship attributed to the mastery of the technology by instructors as far as the respective pedagogies is concern. Other, possible implication is the transfer of the approach from traditional face to face may require and modified version of its content as far as digital technology use is concerned.

#### **5.2 Recommendations**

Since the overall percent of the influence is below 50%, therefore more technology use training and exposure/orientation to higher learning instructors is recommended as far as digital pedagogy in training is concerned. Such improvement will enhance the respective students learning outcomes. This will only be achieved when higher learning institutions have developed ICT usage/integration policies in training programs. This goes hand in hand with empowering students by providing them facilitative infrastructure including internet and associated infrastructure.

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