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Artificial Intelligence Integration in Teaching and Learning: Investigating Retirement-date and Self-efficacy of in-service Teachers in Higher Education Institutions

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Abstract

Artificial intelligence (AI) technology is recalibrating teaching and learning activities. Higher education institution teachers have different perceptions and different "self-efficacy" on the need to integrate AI to enhance their tasks. This could affect their readiness to embrace AI to develop instructional resources. Moreover, the number of years left for them to spend in the teaching-service could affect how they embrace AI or otherwise. This is a problem because it could affect level of learning satisfaction given to the learners in the digital age. Getting empirical data would help to understand the complexity of the problem and specific actions to take towards solutions. Hence, this study focused on artificial intelligence integration in teaching and learning regarding retirement-date and self-efficacy of in-service teachers in higher education institutions. Online questionnaire on Teachers' AI Self-efficacy (TASQ) with 0.86 reliability co-efficient was used for data collection. Data were analysed with Chi-squire. The results revealed that impact of retirement-dates were not significant on the self-efficacy of the academics. Based on the results, recommendations were made, among others, that conscious advocacy should be embarked upon to encourage teachers to embrace integration of AI in their career practices to increase their professional relevance during their career and post-career.

Keywords: Artificial intelligence, Integration, Retirement-date expectation, Self-efficacy, HEI's

Introduction

Unlocking sustainable development is much dependent on attaining innovative skills and appropriate new technology. Artificial Intelligence (AI) is an area of emerging technology that most technology compliant people are integrating to help make easy their daily tasks, both for official and personal uses. AI is a "Systems that display intelligent behaviour by analysing their environment and taking actions - with some degree of autonomy - to achieve specific goals" (Netherlands Council for Government Policy, 2023). So, AI as a digital technology has the ability to process numerous tasks in a way that would be similar to human intelligence; AI is among the emerging technologies.

Acceptance and integration of technology into teaching and learning is always met with apparent resistance because many stakeholders in education often see it as a potential burden even if the technology is to reduce burden of their task. If the technology is computer driven, the resistance will be more pronounced due to the digital phobia of

many teachers. This was implied by Balić, Grubišić and Granić (2024) as digital readiness gap among different people. Another problem of technology integration in teaching and learning is the level of access that the teachers have to such technology. This will serve either as motivation or discouragement to deploy the benefits that are inherent in the technology to enhance teaching and learning. The resistance to technology in education is found at all levels of education; higher education institutions are also included as teachers in tertiary institutions are not exempted from digital phobia.

Teachers in tertiary institutions who are still active in the teaching service (in- service teachers) are reasonably among multitude of users of AI to facilitate teaching and learning activities; ranging from instructional resource development to instructional content delivery. According to Pozo *et al.* (2021), digital technology has become the mediator of all education. However, teachers should have knowledge on pedagogical contributions of AI-based tools in order to maximise the opportunities of AI in education (Xu, 2020). Teacher's self-efficacy towards AI utilisation is paramount in this matter.

According to Thoring *et al.* (2017) some higher education institutions - HEI's are in the beginning stage of integrating digital Technology into teaching and learning. However, higher education institutions, as post secondary institutions have a number of factors that may affect how technology is integrated whether for teaching or learning. Foremost is the level of access to get the required devices and availability of relevant technical supports to make the resources functional. Another factor is the training being given to make the teachers in higher educational institutions to make them confident on their capability to use the digital devices. Despite that teachers in higher education institutions are highly educated it does not correspondingly translate to being digitally literate. Reasons being that some areas of specialisation are based on technology why many other areas of specialisation are not. Nevertheless, all areas of specialisation could be enhanced with technology integration. As observed by Baimuldina *et al.* (2019), smart technology is essential for teachers' professional development to prepare quality educational resources for instructional delivery.

Yet, there are inhibitions regarding integration of digital technology for teaching and learning in higher education institution, not only because the teachers do not know how to operate the devices but they lack the required skills to purposefully and effectively use the technology to facilitate teaching and learning activities in an efficient way, to achieve instructional goals. Meaning that there are some teachers in higher education institutions who could use some 21st century digital technologies for personal tasks or meeting self-needs but not savvy to use these same technologies to design instructional resources and deliver teaching-learning activities. The challenge is increasing everyday with dynamic advancements in emerging technologies. Meanwhile, Yigezu (2021) submitted that digital technology integration in teaching and learning in higher education institution of learning is important to prepare the citizens for knowledge-based economy.

Furthermore, there are a number of factors that affect the in-service academics regarding their belief in their ability; that is their self-efficacy (Bandura, 1997) to integrate AI in their career practices. Self-efficacy refers to personal belief by an individual in his or her capacity to do what is required to achieve specific level of performance in any task. A person with high level of self-efficacy points to self assurance to handle life challenges better compared to those who have low self-efficacy. Bandura (1997) stated that "people with high assurance in their capability approach difficult task as challenges to be mastered rather than as threats to be avoided". A factor that could impact the self-efficacy of the in-service teachers is the number of years that the teachers will retire from teaching employment (retirement-date). The context of retirement-date is the number of years left for the individual teachers to quit from their active paid employment.

However, in the work environment of the 21st century citizens, there is a lot of AI software with peculiarities on what the AI's could be used to do in education. Apart from using AI's to source for visual resources such as audio resources, audio-visual resources and hypermedia resources to integrate in education, in order to facilitate achieving learning goals, some AI's could be used to generate lesson outlines on any topics, to prepare lesson plans, to generate learning resources and actual learning experiences. As acknowledged by Montebello (2018), as well as Wang & Zhao (2020), profound impact of AI is present in education through AI-based tools such as intelligent tutoring and automated grading systems. Suffice to mention that AI's integration has its attendant challenges such as similarity problem (lack of original thoughts), issue regarding authenticity, deficiency in ethical use, insufficient digital skills and loss of interest in innovative skills development due to over-reliance of human beings on the AI technology. Otherwise, AI's promotes inclusive and productive learning activities with high effectiveness. Substantiated by some empirical studies, AI's provide transformative learning engagements to the students because the technology could adapt to individual learner's needs. Indeed, it is possible to identify the cognitive and emotional needs of learners with the help of AI (Chen *et al.,* 2021); and with AI, learners are provided with personalized support (Mislevy *et al.,* 2020). The support is also offered timely, and thus, learners might be more satisfied with on-time feedback (Zawacki-Richter, *et al.,* 2019).

In this study, the Social cognitive theory of self-efficacy is applicable. This study is rooted in the theory of Social Cognitive Theory of Self-efficacy which has - four "input's" components, one "output" component and Self-efficacy as the "through-put" component. The input components are – Mastery experience/Performance accomplishment (past experience of success on a specific task would make an individual to believe that they will be successful on the task in the future), Vicarious experience (observing others perform could make an individual to make judgments about his/her own capabilities to attempt the same task), Social persuasion (verbal encouragement being provided by the people around you to increase your confidence), as well as Physiological and emotional states; while the only outcome component is "outcome expectancy". According to the proponent of the theory (Bandura, 1997), "Mastery experiences are the most influential source of efficacy information because they provide

the most authentic evidence of whether one can muster whatever it takes to succeed. Success builds a robust belief in one's personal efficacy. Failures undermine it, especially if failures occur before a sense of efficacy is firmly established". Besides, Hussain et al. (2022) Social see persuasion as encouragement or discouragement from others to perform a task; While Capa-Aydin, Uzuntiryaki-Kondakci and Ceylandag (2018) expressed that if individuals believe that others do not think highly of them or do not believe in their ability to complete a task, their self-efficacy is likely to be low.

It is necessary to state that the academics who are participants in this study automatically take the position of trainees; and their "outcome expectancy" should be “to attain the set goals for the training”, this means acquisition of purposeful skills to integrate specific AI’s into teaching and learning to improve learning activities. Nevertheless, the Social Cognitive Theory of Self-efficacy does not attribute it that any person that do better on a task would always be better than other counterparts with less performance on the same. Thus, the focus of this study is to investigate artificial intelligence integration in teaching and learning regarding retirement-date and self-efficacy of in-service teachers in higher education institutions.

Statement of the problem

As a fast-growing technology, Artificial intelligence (AI) has redirected the ways of living and doing things in the society, including the tasks of teaching and learning. In the category of utilization, there are simple as well as complex AI’s. Whether easy or difficult to use the AI’s, individual differences ranging from factor of “readiness gap” to the factor of “capability level” still exist among the users. Teachers or academics in higher education institutions also have different perceptions and different “self-efficacy” on the need to integrate AI to enhance their tasks. This could affect their readiness to embrace AI to develop instructional resources. Moreover, the number of years left for them to spend in the teaching-service could affect how they see the need to develop their capability level to use AI. This could translate to problem of not meeting learning satisfaction of the learners in the digital age. This raises concern to understand the complexity of the problem and specific actions to take towards solutions. Hence, this study focused on artificial intelligence integration in teaching and learning regarding retirement-date and self-efficacy of in-service teachers in higher education institutions.

Objective of the study

The purpose of the study was to investigate how if number of years that academics or teachers will retire from teaching employment would or would not determine the self-efficacy of the academics towards integrating AI technology into teaching and learning.

Research question

The only research question that guided this study was:

How did number of years that academics will retire from teaching employment impact on their self-efficacy towards integrating AI technology in teaching and learning?

Hypothesis

To answer the research question earlier stated, the following three hypotheses were raised.

1. There is no significant difference in self-efficacy of teachers towards integrating artificial intelligence software for teaching and learning, between academics who have a few years to retire and those who have more years to retire from teaching employment.

2. There is no significant difference in self-efficacy of teachers towards integrating artificial intelligence software for teaching and learning, between academics who have a few years to retire and those who have most years to retire from teaching employment.

3. There is no significant difference in self-efficacy of teachers towards integrating artificial intelligence software for teaching and learning, between academics who have more years to retire and those who have most years to retire from teaching employment.

Significance

This study is significant because it will provide empirical data on the necessity for "needs analysis", to understand the entry attributes of the participants who are to be trained; and to make strategic planning that would effectively achieve the goals of the continued professional development training, particularly for the academics to improve teaching and learning in the 21st century.

Methodology

The target population for this study comprises of all the teachers (academics) in tertiary institutions in Lagos state. Purposive sampling method was used to select the 85 participants in this study, who are academics from two higher institutions - a Polytechnic and a University. Using online learning workshop (cohort) approach, the participants were trained on how to use some selected AI tools to carry out literature review, to produce online learning resources that would meet the needs of learning styles of different students – be it text based, audio resource, visual, video, animation, audio-visual and hyper-media resources. The participants were also exposed to AI software that allows online publishing of learning contents. Data were collected using validated online questionnaire - Teachers' AI Self-efficacy Questionnaire (TASQ); it was designed on 4-Likert scale with 0.86 reliability coefficients. For this aspect of the study which is on the number of years that the academics or teachers will retire from teaching employment -

(retirement-date expectation), the data were analysed with inferential statistics of Chi-square.

Results

The results of the analyses are discussed below, in the order that the three hypotheses were earlier stated, to provide answers to the research question via all the hypotheses raised.

Table 1: Chi-Square Analysis of Self-efficacy of Academics with a Few Retirement-Years Date and More Retirement-Years Date

Retirement-Years Date		**Level of Skills Acquired**					
		Low	**Medium**	**High**	**df**	**P-Value**	**Sig.**
Few Retirement-Years Date	count	1	4	16			
	% within Few Retirement-Years Date	4.8%	19.0%	76.2%			
					2	3.362^{F}	.163 ns
More Retirement-Years Date	count % within More Retirement-Years Date	0 0.0%	8 44.4%	10 55.6%			
Total	Count	1	12	26			
	% within More Retirement-Years Date only	2.6%	30.8%	66.7%			

ns = Not Significant at P > .05

As revealed in the Chi-square analysis in Table 1 above, there is no significant difference between Self-efficacy of Academics with a Few Retirement-Years Date and those with More Retirement-Years Date (.163 > .05); thus, the hypothesis 1 is not rejected.

Table 2: Chi-Square Analysis of Self-efficacy of Academics with a Few Retirement-Years Date and Most Retirement-Years Date

Retirement-Years Date		**Level of Skills Acquired**					
		Low	**Medium**	**High**	**df**	**P-Value**	**Sig.**
Few Retirement-Years Date	count	1	4	16			
	% within Few Retirement-Years Date	0.0%	34.8%	65.2%			
					2	3.369^{F}	.139 ns
Most Retirement-Years Date	count % within Most Retirement-Years Date	0 0.0%	16 34.8%	30 65.2%			
Total	Count	1	20	46			
	% within Most Retirement-Years Date only	1.5%	29.9%	68.7%			

ns = Not Significant at P > .05

From the Chi-square analysis in Table 2 above, there is no significant difference between Self-efficacy of Academics with a Few Retirement-Years Date and those with More Retirement-Years Date (.139 > .05); Therefore, the hypothesis 2 is not rejected.

Table 3: Chi-Square Analysis of Self-efficacy of Academics with More Retirement-Years Date and Most Retirement-Years Date

Retirement-Years Date		Level of Skills Acquired		df	P-Value	Sig.
		Medium	High			
More Retirement-Years Date	count	4	10			
	% within More Retirement-Years Date	44.4%	55.6.%			
				1	.515[F]	.569 ns
Most Retirement-Years Date	count % within Most Retirement-Years Date	16	30			
		34.8%	65.2%			
Total	Count	24	40			
	% within Most Retirement-Years Date only	37.5%	62.5%			

ns = Not Significant at P > .05

As could be seen in the Chi-square analysis in Table 3 above, there is no significant difference between Self-efficacy of Academics with More Retirement-Years Date and those with Most Retirement-Years Date (.569 > .05); Hence, the hypothesis 3 is not rejected.

Discussion and Conclusion

As could be seen in the results of the analyses, the number of years that the academics will retire from teaching employment (number of years left for the individual academics to quit from their active paid employment) did not have any impact on the self-efficacy of the academics. The implications of these are that the academics are always ready to acquire new skills to enhance their career practices in their fields. This aligns with the view of Darling-Hammond et al. (2017) that targeting the content and grade level when providing training is better than training teachers on topics without considering how they will be asked to teach. Further on the implication of the findings in this study, the academics would like to be relevant irrespective of the number of years left for them to retire from the active employment. This specifically means that the academics have professional quality of lifelong learning which is a standard that is capable of propelling an individual to even learn what may seem challenging. This opinion supports the assertion of Luan et al. (2020) that AI-based tools have the potential to foster a learner-centred approach; just as Hwang et al. (2020) as well as Shum et al. (2019) stated that AI-based tools provide personalized learning experiences.

Recommendation

Based on the findings of this study, it is recommended that:

1. Irrespective of their retirement-dates expectation, conscious advocacy should be embarked upon to encourage academics to embrace integration of AI in their career practices to increase their professional relevance during their career and preparing for post-career.

2. Irrespective of their retirement-dates expectation, subject targeted training for teachers or academics should be provided to avail them with AI tools that are peculiar to their field or course for career and post-career relevance.

3. Irrespective of their retirement-dates expectation, the concerned authorities should encourage social persuasion among the academics to encourage one another to use or integrate AI's into their teaching and learning tasks while in career service and preparing for post-career relevance.

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