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NEXUS AMONG TEACHERS' ENGAGEMENT VARIABLES, PERCEIVED EASE OF USE AND ATTITUDE TO USE OF ARTIFICIAL INTELLIGENT IN PUBLIC SECONDARY SCHOOLS, OSUN STATE, NIGERIA

BY

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Abstract

Quests for quick response and timely solutions to varieties of problems facing human races have called for use of Artificial Intelligence. It was against this background that the study examined the relationship between Teachers' Engagement, Perceived Ease of Use and Attitude to use of artificial intelligence in public secondary schools in Osun State. Expo facto design of correlational type was adopted for the study. The population is comprised of all teachers in public secondary schools in Osun State. Four hundred teachers were sample from the online respondents. Two instruments were used: Teachers' Engagement and Perceived Ease of Use of AI Scale As well as Teachers' Attitude to use of Artificial Intelligence Questionnaire. Both instruments were validated using Cronbach Alpha with reliability coefficient of 0.91 and 0.78 respectively. Multiple regressions were used to analyze data collected. It was found that attitude to use of AI accounted for by the predictor variables is approximately 88.7% and it is significant. Three independent variables contributed significantly to prediction model at 0.05 Alpha level. The findings show that there is a relationship between the independent variables and Teachers' Attitude to use of AI in Secondary Schools. It was recommended that AI technology should be made available in the schools to encourage Teachers' Engagement and improve Teachers' Attitude to its usage.

Keywords: Artificial intelligence, engagement, attitude, teachers, perceived

Introduction

In recent times, the quests for quick response and timely solutions to varieties of problems facing human races have called for use of various technologies virtually

in all human endeavours. Technologies are now part and parcel of human activities, particularly in communication, teaching and learning. The crucial roles played by the teachers in the creation, regeneration and communication of knowledge and ideas make it more important for the teachers to key into the evolution of myth of technologies and fully engage in its uses. In particular, the use of machines, computers and robotic devices as teaching aids, even as the teacher representative. These devices are considered more important and imperative for the teacher to ease the classroom tasks; therefore, teachers need to adequately familiarize him/herself with the use of the machines to facilitate learning, particularly in this era of Artificial Intelligence. Nikolopoulou, Gialamas, Lavidas, and Komis (2021) opined that intention and readiness to teach and use Artificial Intelligence in classrooms is imperative since teachers' acceptance and disposition could be a pointer to their interest in teaching with technology could be established, therefore examine their attitude to the use of artificial intelligence is vital to the sustainable development in teaching and learning practices. Artificial Intelligence is highly based on computer science concepts; it is an interdisciplinary field that makes it transcend across subjects. The trans-disciplinary nature of Artificial Intelligence further increases the interest it currently generates globally; it plays a significant role in driving growth and innovation across industries, including the education sector (Ayanwale, Sanusi, Adelana, Aruleba and Oyelere 2022). With the increasing utilization of Artificial Intelligence in almost every facet of human lives, its adoption to classroom practices should not be overlooked, therefore the attitude of the managers of the classroom to the use of Artificial Intelligence is worth investigating.

The availability of technologies in particular, Artificial Intelligence is considered to have higher impact on the attitude of teachers to it usage, usually the availability of the technology induced the habit of its usage. The variation in the availability of technology in the schools may hinder the attitude to the use of Artificial Intelligence and this may affect their level of thinking on how ease they can use artificial intelligence to assist their task on the job, which this study termed perceived Ease of Use. Meanwhile the myth of rapid growth of artificial intelligence prompted some phobia to some later adopter of technology in education (Jinadu 2019) and this may affect the attitude to its uses. Also, the reasons for the variation in the expertise in the usage as pointed by researches include the reasons such distance to the centre, shortage of electric power supply, poor standard of living, low income, poor funding, poor literacy level as some of the challenges of technology in the country side towns (Li and Huang 2020, Ogunode, Okwelogu and Olatunde, 2021, Lin and Van, 2021). In nutshell, the perceived use of artificial intelligence is considered as a significant role in the attitude of the teacher to the teaching of computer-based subjects, and this may affect their attitude to use of Artificial

Intelligence. In the real terms of expertise in the uses, availability plays a significant role in the ways teachers are skillful in the use of the ICT facilities. Meanwhile a user's subjective belief that a system or technology is easy to use is subjected to availability of the technology in the users' environment; therefore, perceived ease use of ICT is the degree to which a person believes that using a particular system would be free of effort (Davis 1989). And perceived ease use of any technology is subjected to the availability of the technology, which usually encourages persistence and engagement. Meanwhile, the availability of the facilities is perceived to influence the usage, which is expected to encourage engagement. Therefore, availability of resources influences engagement, and engagement also affects the attitude to technology. People, particular teachers, could be engaged socially, emotionally or intellectually. This study considers teachers' engagement at three levels, social, emotion and intellectual.

Literarily, engagement refers to the degree of attention, curiosity, interest, optimism, and passion shown to a particular concept or activities, which motivates the person to act and progress in such concept or activities (Ali and Hassan. 2018). Engagement is perceived as energy in action, it represents the connection between an individual and the activity in which they are involved (Appleton, 2017). Engagement is a multi-dimensional construct; this study considers Intellectual engagement, emotional engagement and social engagement. Intellectual engagement is creative ability or focus resulting in a deep personal commitment to exploration or investigation over a sustained period. Intellectual Engagement is perceived to be at the heart of good teaching; therefore, it is often the first item educators identify when describing the classroom environment and learning experiences of a teacher (Danielson, 2021). Intellectual engagement is more than being busy or on task, it involves the use of several senses but majorly thinking ability. Hence intellectual engagement is perceived to affect attitude to any action or reactions, for example, use of projector. Notwithstanding, the knowledge that is the basic factor of intellectual engagement is always perceived to be positively related to emotion. Relevant and rigorous learning activities determine the level of intellectual engagement and thereafter affect the state of mind towards the use of a particular technology, then affect how engaged the emotion or feelings towards the use, which is known as emotional engagement. Emotional engagement refers to the feeling, attitude, and perception towards learning, and the learning environment (Sheard. 2010; Yazzie-Mintz and McCormick 2012). Emotional engagement focuses on the extent and nature of positive and negative reactions of students to teachers, classmates, academics, and school. It is a construct that explains the enjoyment and interest identified as indicators that involve emotion. Emotional engagement is a factor that contributes effectively to academic achievement. literature reviewed that teachers with higher emotional engagement participate

effectively in their academic activities, and they are positively motivated to use of varieties of teaching aids to facilitate teaching and learning (Al-Alwan, 2014; Weiss and Garcia 2012; Purdul, Chege, and Thinguri, 2014, Perry, 2008; Abbing, 2013). Emotional engagement is also found to be the predictor of the teacher's participation in the school activities in most first-generation universities in Kenya (Rodriguez and Boutakidis 2013).

Literatures equally pointed to the fact that emotional engagement contributed significantly to the teacher social interaction in their workplace, and it is one of the strongest factors affecting teacher job performance (Ali and Hassan, 2018). Emotional engagement has positive and significant effects on the teachers' classroom management and their relationship with students. Studying frequently found that emotional engagement contributes significantly to motivation (Wormington, Corpus, and Anderson, 2011; Martin and Dowson, 2009; Sagayadevan and Jeyaraj, 2012). Meanwhile classroom activities are expected to be interactive, and the interaction fosters social relationship among the teachers and the students, also social interaction is usually assisted by the emotions. Teachers with stable emotional engagement are expected to be socially interactive, such could be said to be socially engaged. Social engagement can be defined as the interactions between the teachers and their peers, between staff and students, between students and environment that bring about attention, curiosity, interest, optimism, and passion to involve in activities. Social engagement motivates the person to act and progress in the concept of interest and other interested activities; it is an enactment of potential ties in real life activity (Mohd Nazan, 2017). Social engagement generally refers to as involvement in your community, interacting with others, and feeling connected to a larger group. Research has shown the kind of social interactions that teachers maintain with students and schools' facilities within their academic community and this influenced their connectedness, social capital and influence their attitude to available technology in the schools (Johnson and Verdicchio, 2017; Terzi, 2020, Katsarou, 2021). Social engagement influences their access to resources that facilitate academic success usually from peers and academic community (Katsarou, 2021). Social engagement also helps to build relationships and friendship, strengthen sense of belonging and purpose, allows individual to maintain physical and mental health, reduces stress and anxiety, and contributes to lifestyle.

Nevertheless, studies have established the relationship between the use of technologies and teaching effectiveness; also, several studies examined the relationship between use of computer technologies and the teaching effectiveness (Li and Huang, 2020). Huffman (2013) opined that use of technology plays a significant role in social networking, knowledge sharing and effective teaching.

Ayanwale, Sanusi, Adelana, Aruleba, and Oyelere, (2022) explained that Artificial Intelligence Anxiety is one of the critical issues that the proliferation of this technology brings. And the teacher anxiety of Artificial Intelligence is perceived to have serious implications on the attitude to it usage. Similarly, Li and Huang, (2020) pointed out that the use of Artificial Intelligence has a significant relationship with classroom effectiveness. Therefore, studies have related and investigated Artificial Intelligence on education and other Human Endeavour, but it seems there are dearth of literatures on teachers' engagement and teachers' use of Artificial Intelligence. Consequently, this study investigated the relationship among teachers' engagement variables, perceived ease use of AI and teachers' attitude to the use of Artificial Intelligence.

Research questions

1. What type of relationship exists between Teachers' engagement variables (intellectual engagement, emotional engagement and social engagement), Perceived Ease of Use and Attitude to use of AI and Teachers' attitude to use of Artificial Intelligence in Public Secondary Schools?
2. Does the obtained regression equation resulting from the set of predictor variables; Teachers' engagement variables (intellectual engagement, emotional engagement and social engagement), Perceived Ease of Use and Attitude to use of AI allow a reliable prediction of Teachers' attitude to use of Artificial Intelligent in Public Secondary Schools?
3. Which of the predictors is/are most influential in predicting Teachers' attitude to use of Artificial Intelligent in Public Secondary Schools?
4. Are there any predictor variables that do not contribute significantly to the prediction model of the study?

Methodology

The study adopted expo facto design and correlational type, the population comprises all teachers in Public Secondary Schools in the Osun State. A total number of 423 teachers filled in a voluntary online Teachers' engagement scale and Teachers' attitude to use of Artificial Intelligence questionnaire. 400 responses were helpful for analysis. Two instruments were used for the study; Teachers' engagement scale and Teachers' attitude to use of Artificial Intelligence questionnaire, Teachers' attitude to use of Artificial Intelligence was adapted from the study of Simone Grassini (2023). Both instruments were validated using Cronbach Alpha, with reliability of 0.91 and 0.78 respectively. Multiple regressions were used to analysis data collected.

Result

Research question 1

What type of relationship exists between Teachers' engagement variables (intellectual engagement, emotional engagement and social engagement), Perceived Ease of Use and Attitude to use of AI and Teachers' attitude to use of Artificial Intelligence in Public Secondary Schools?

Table 1:

Correlation Matrix of correlation among the variables

Coefficient Correlations[a]						
Model			Perceived Ease of Use	Intellectual engagement	Social engagement	Emotional engagement
1	Correlations	Perceived Ease of Use	1.000			
		Intellectual engagement	-.047	1.000		
		Social engagement	.061	-.542	1.000	
		Emotional engagement	.036	-.845	.171	1.000

a. Dependent variable: Attitude_to_use_of_AI

Table 1 presents the correlation matrix of location of the school, teachers' intellectual engagement, teachers' social engagement, and teachers' emotional engagement. It was revealed that Emotional engagement has significant positive relationship with social engagement ($r = .171$; $p < .05$), also Intellectual Engagement ($r = -.845$; $p < .05$) and Perceived Ease of Use ($r = .036$; $p < .05$). The independent variables all revealed significant relationship, the mean the variables are all related to one another, this corroborates the findings of Ali and Hassan (2018) that established significant correlation between students' social engagement and intellectual engagement.

Research question 2

Does the obtained regression equation resulting from the set of predictor variables; Teachers' engagement variables (intellectual engagement, emotional engagement and social engagement), Perceived Ease of Use and Attitude to use of AI allow a reliable prediction of Teachers' attitude to use of Artificial Intelligent in Public Secondary Schools?

Table 2:
Model Summary of Regression Analysis of Teachers' Engagement Variables, Perceived Ease of Use and Attitude to use of AI and Teachers' Attitude to Use of Artificial Intelligence

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.942[a]	.887	.886	2.20705

a. Predictors: (Constant), location, intellectual_engagement, social_engagement, emotional_engagement

Table 3:
Analysis of variance of Teachers' Engagement Variables, Perceived Ease of Use and Attitude to use of AI and Teachers' Attitude to Use of Artificial Intelligence

ANOVA[a]						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	15063.834	4	3765.959	773.126	.000[b]
	Residual	1924.076	395	4.871		
	Total	16987.910	399			

a. Dependent Variable: Attitude_to_use_of_AI
b. Predictors: (Constant), Perceived Ease of Use, intellectual_engagement, social_engagement, emotional_engagement

Table 2 and 3 present the model summary and ANOVA representatively. The multiple regression correlation coefficient (R) showing the linear relationship between Teachers' engagement variables (intellectual engagement, emotional engagement and social engagement), Perceived Ease of Use and Attitude to use of AI and Teachers' attitude to use of Artificial Intelligent in Public Secondary Schools as shown in Table 2 is 0.886, the multiple R^2 is 0.942, and Adjusted R square value is 0.886. This means that the variation in Attitude to use of Artificial Intelligence accounted for by the predictor variables is approximately 88.7% and it is statistically significant. Moreover Table 3, shows the analysis of variance of the multiple regression data. This produced an F-ratio of f(4,399) = 773.126 and found it to be significant at 0.05 Alpha level. The result corroborates the findings of Johnson and Verdicchio (2017), Terzi (2020) and Katsarou, (2021) that there is significant positive correlation between teachers' attitude and the maintenance of available technology within schools; it is also in line with the opinion of Ayanwale (2020) and Darayseh (2023), that teachers' attitude to Artificial intelligence and the acceptance of Artificial intelligence in teaching science.

Question 3: Which of the predictors is/are most influential in predicting Teachers' attitude to use of Artificial Intelligent in Public Secondary Schools?

Table 4:

Relative contributions of Teachers' Engagement Variables, Perceived Ease of Use and Attitude to use of AI to Teachers' Attitude to Use of Artificial Intelligence

Model		Coefficients[a] Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-5.610	.686		-8.173	.000
	Intellectual Engagement	.589	.040	.714	14.798	.000
	Emotional Engagement	.106	.031	.139	3.381	.001
	Social Engagement	.105	.021	.128	4.883	.000
	Perceived Ease of Use	.140	.222	.011	.632	.528

a. Dependent Variable: Attitude to use of Artificial Intelligence

Table 4 shows the contribution of each of the independent variables to the prediction model and to the 88.7% of the variation of Teachers' attitude to use of Artificial Intelligent. Three of the independent variables contributed significantly to the prediction model at 0.05 Alpha Level. These variables are intellectual engagement ($\beta = .589$; $t(395) = 14.798$; $p < .05$), emotional engagement ($\beta = .106$; $t(395) = 3.381$; $p < .05$) and social engagement ($\beta = .589$; $t(395) = 4.883$; $p < .05$). The findings show that intellectual engagement, emotional engagement and social engagement to Teachers' attitude to use of Artificial Intelligent in Public Secondary Schools. Table 4 shows that Intellectual Engagement, Emotional Engagement and Social Engagement contributions are significantly correlated. The finding supported the opinion of Al-Alwan, (2014) Weiss and Garcia (2012) and Purdul, Chege, and Thinguri, (2014) that students with higher emotional engagement participate effectively in their academic and they positive attitude to schooling. Ayanwale, Sanusi, Adelana, Aruleba, Oyelere (2022) concluded that attitude towards Artificial Intelligence contributes to the teachers' intention to the use of Artificial Intelligence. Also, Li and Huang (2020) found that teachers' knowledge of technology particularly social media correlates the social engagement. Rodriguez and Boutakidis (2013) also found emotional engagement to be the predictor of the teacher's participation in the school activities.

Research question 4

Are there any predictor variables that do not contribute significantly to the prediction model of the study?

Table 4 revealed that Perceived Ease of Use ($\beta = .140$; $t(395) = .632$; $p < .05$) does not contribute significantly to the prediction model for the Teachers' Attitude to the use of Artificial Intelligence. This contradicts the finding of Nguyen, Chu, Tran, Pham, Nguyen and Nguyen, (2022) that the location and usage play a significant role in the availability and attitude of teachers to use of technological instruments for classroom activities.

Discussion of Findings

Artificial intelligence has come to stay to solve varieties of human problems, and Education is one of human Endeavour that is confronted with many challenges. Without an iota of doubt, Artificial Intelligence is perceived to play a significant role in this area. Meanwhile, this study contributed to literature in this area. The study examined the teachers' engagement, Perceived Ease of Use and Attitude to use of AI and the teachers' Attitude to the use of Artificial Intelligence in public schools in Osun state. The findings of the study revealed that the variables of the study (intellectual engagement, emotional engagement, social engagement, Perceived Ease of Use and Attitude to use of AI and Teachers' Attitude to use Artificial Intelligent) are correlated; the findings corroborate the findings of Ali and Hassan (2018) that established significant correlation between social engagement and intellectual engagement. Moreover, the study revealed that, teachers' engagement significantly predicted their Attitude to the use of Artificial Intelligence. The finding supported the outcome of the study of Johnson and Verdicchio (2017), Terzi (2020) and Katsarou, (2021) that there is significant positive correlation between teachers' attitude and the maintenance of available technology within schools; it is also in line with the opinion of Ayanwale (2020) and Darayseh (2023), that teachers' attitude to Artificial intelligence and the acceptance of Artificial intelligence in teaching science.

Also, the findings revealed that intellectual engagement, emotional engagement and social engagement contributed significantly to the prediction of Teachers' attitude to use of Artificial Intelligent in Public Secondary Schools. The finding supported the opinion of Al-Alwan, (2014) Weiss and Garcia (2012) and Purdul, Chege, and Thinguri, (2014) that students with higher emotional engagement participate effectively in their academic and they positive attitude to schooling. Ayanwale, Sanusi, Adelana, Aruleba, Oyelere (2022) concluded that attitude towards Artificial Intelligence contributes to the teachers' intention to the use of Artificial Intelligence. Also, Li and Huang (2020) found that teachers' knowledge of technology particularly social media correlates the social engagement. Rodriguez and Boutakidis (2013) also found emotional engagement to be the predictor of the teacher's participation in the school activities.

But Perceived Ease of Use does not contribute significantly to the prediction in the model of the Teachers' Attitude to the use of Artificial Intelligence. This contradicts the findings of Nguyen, Chu, Tran, Pham, Nguyen and Nguyen, (2022) that usage plays a significant role in the availability and attitude of teachers to use of technological instruments for classroom activities. Also, the finding supports the study of Brown (2015), that expertise in the use of technology has no significant implication on the attitude of the teachers to the use of computers for the classroom activities.

Conclusion

Based on the findings of this study, Teachers' Engagement variable, schools' location and attitude to use of Artificial Intelligence are significantly related. Teachers' engagement significantly predicted their attitude to the use of Artificial Intelligence. It was equally concluded that teachers' intellectual, emotional and social engagement predicted significantly to the teachers' attitude to the use of Artificial Intelligence. But the finding shows that Perceived Ease of Use does not predict the Teachers' Attitude to the Use of Artificial Intelligence.

Recommendation

1. It was recommended that Artificial Intelligence technologies should be made available in the schools to encourage Teachers' engagement and improve Teachers' attitude to their usage. And irrespective of the teachers' level of expertise in AI.
2. schools as well as the school owners should provide enabling environment(s), to encourage teachers' social, emotional and intellectual engagement to assist their attitude to use Artificial Intelligence.

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