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Relationship between In-service Teachers' concerns and their use of technology, using the Concerns-based Adoption Model

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Abstract

This study assessed in-service teachers' concerns about the use of technology using the concerns-based adoption model in Ibadan North Local Government area, Oyo State, Nigeria. It investigated the relationship between teachers' concerns and their characteristics, specifically age and years of teaching experience. By examining these relationships, the study aimed to provide insights into the factors influencing teachers' adoption and integration of technology in the classroom. The research instruments utilized were the Technology Enabled Learning (TEL) (r=0.86) and the Stages of Concern Questionnaire (SOC) (r= 0.80), while the participants were 95 secondary school teachers selected through the random sampling technique. The relationship between teachers' concerns and their level of use of technology shows a positive relationship (correlation coefficient of 0.24). This relationship is also statistically significant at a 0.05 level ($p<0.05$), indicating that as teachers' concerns decrease, their level of technology use tends to increase. Teachers between the ages of 26-30 years and 36-40 years demonstrated higher mean stages of concern, while teachers below 26 and between 46-50 years exhibited lower mean stages of concern. Teachers with 11-15 years of teaching experience exhibited a higher mean stage of concern, followed by teachers with 6-10 years of experience. On the other hand, teachers with 5 or less than 5 years of experience displayed the lowest mean stages of concern. The relationships between teachers' stages of concern and their characteristics (age and years of experience) using Pearson correlation tests indicate a positive correlation (correlation coefficient of 0.33) between stages of concern and age, signifying that older teachers tend to have higher stages of concern. A negative correlation (correlation coefficient of 0.26) exists between stages of concern and years of experience, suggesting that their stages of concern tend to decrease as teachers' years of experience increase. It is therefore recommended that targeted professional development programs be designed to equip teachers with the skills and confidence to integrate technology into their teaching practices effectively.

Keywords: Concerns-Based Adoption Model (CBAM), Technology Integration, Stages of concern, Teachers' concerns, Teachers' characteristics, and Years of teaching experience

Introduction

The integration of technology into educational settings has become an essential aspect of modern teaching and learning. With the rapid advancement of technology, educators are expected to stay up to date with the latest tools and methods to enhance student learning outcomes. However, the successful implementation of technology in the classroom is often hindered by various factors, including teachers' concerns and attitudes towards technology. As technology is used more often in schools than ever before, opening fresh opportunities for instruction and learning, instructors must actively participate in and accept technology integration in the classroom for it to succeed (Ogwu et al., 2022). Effective implementation techniques and assistance depend on having a thorough understanding of teachers'

concerns as they relate to technology adoption (Caneva et al., 2023). Teachers are expected to develop the appropriate attitudes, identify with innovation, and behave in line with the intended aims of their students (Bitan-Friedlander et al., 2004) so that classroom integration of technology can be seamless. Many implementation research studies emphasize the necessity of teacher acceptability of innovation for successful implementation (Hutchison & Reinking, 2017; Kennedy & Archambault, 2012; Ertmer & Ottenbreit-Leftwich, 2010). However, teachers may be hesitant to accept technology integration if they have concerns about their competence with technology, how to use it, and the consequences of using it (Tondeur et al., 2017; Wang et al., 2019). In Nigeria, research on the use of educational technology often focuses on teacher's perception or readiness to use technology, but few research has turned the spotlight on their concerns. Seeing how technology has advanced in other parts of the world, the Nigerian government implemented the technology in education policy to standardize the use of technology in schools and classroom settings. However, this has not led to any significant increase in integration or use of technology (Dele & Taddese, 2020). The majority of the teachers have a low level of technology knowledge, and they lack the basic skills to use it, even though their attitude toward technology use is positive (Ayotola & Adediran, 2011). If their attitude is positive, it means other factors or concerns are hindering the successful integration of technology in their classrooms (Moemeke, 2019). The Concern-Based Adoption Model (CBAM) offers a thorough framework for comprehending and addressing the issues people have when adopting these new ideas, and it serves as the theoretical foundation for this study (Hall & Hord, 1987). This model takes into account the various levels of concern that people may experience when faced with change, ranging from self-centeredness to the effect on student learning (Sieve, 2015).

The study investigates the relationship between teachers' characteristics, particularly age and years of teaching experience, and their stages of concern with hopes to learn more about the elements that affect teachers' adoption and integration of technology. The results of this study will add to the body of evidence already available on technology adoption in education and offer useful information for teachers, policymakers, and providers of professional development. Targeted interventions and support systems can be built to boost technology integration and enhance educational results by comprehending the issues and traits that affect teachers' complete acceptance of technology.

Theoretical Framework

The genesis of the concerns-based adoption model (CBAM) can be traced back to the seminal work of Fuller in 1969, where he laid the foundation for comprehending the reservations held by users who are expected to carry out an expected change in educational settings. CBAM presents an encompassing framework that shines the light on the educators' emotions, thoughts, considerations, and deep-rooted convictions about integrating technology within their classrooms (Dele, Fasae, & Okoli, 2021). In accordance with the CBAM theory, teachers' concerns possess the power to either impede or facilitate the successful implementation of technological tools in the teaching and learning process because it posits that change unfolds as a gradual process of developmental growth, occurring across distinct stages (Hall & Hord, 1987). CBAM is a comprehensive model that encompasses seven discernible stages of concern that educators navigate as they embark on the transformative journey of embracing technological innovation. The stages are represented in Table 1.

Table 1: Stages of Concern Questionnaire (2001)

Stage of Concern	Typical Statement

0: Unconcerned	"I think I heard something about it, but I'm too busy right now with other priorities to be concerned about it."
1: Informational	"This seems interesting, and I would like to know more about it."
2: Personal	"I'm concerned about the changes I'll need to make in my routines."
3: Management	"I'm concerned about how much time it takes to get ready to teach with this new approach."
4: Consequence	"How will this new approach affect my students?"
5: Collaboration	"I'm looking forward to sharing some ideas about it with other teachers."
6: Refocusing	"I have some ideas about something that would work even better."

The Stages of Concerns questionnaire, which forms an integral facet of the Concerns Based Adoption Model, has been widely employed on a global scale as a guiding framework for the successful assimilation of innovative practices (Hall & Hord, 2020). A study by Baytar et al. (2023) revealed that pandemic-related restrictions, particularly the closure of schools during the lockdown, had significantly altered teachers' perceptions of the value of ICT integration and training. Only 26.1% of the teachers surveyed using the CBAM model said they felt competently effective. Their allocation in accordance with the three levels of the sense of competence questionnaire revealed that 40% use ICT for entry-level tasks, while only 17.3% use it for innovative tasks or transformation. A cross-analysis also demonstrated the effect of ongoing training and ready learning on instructors' perceptions of their level of competence. There were also connections between the sense of competence in using ICT and the following four characteristics: gender, age, teaching experience, and school subject (Baytar et al., 2023).

Wang (2021) conducted a study to understand in-service teachers' barriers to technology integration in higher education. The study investigated four Chinese teachers whom the researcher trained on different levels of digital literacy till they were able to utilize online materials and implement technologies in the classroom. The teachers were then observed, and data was collected over three semesters. The study found that experience in teaching and learning, emotional factors, and competence are all factors affecting in-service teachers' readiness and use of educational technology. These factors fall under the different stages of concerns presented by the Concerns-based Adoption Model (CBAM). Concerning the integration of technology into the teaching process, the study found that these teachers choose online resources that match the way they teach already. Meaning they reached for something familiar and blended it with what they had just learned.

Eloho, Mirka, and Timo (2019) investigated Nigerian teachers' readiness for technology integration. The research investigated the teacher's knowledge required for technology integration in classrooms, focusing on technological pedagogical content knowledge (TPACK). Findings showed that the primary level of knowledge TK, PK, and CK are predictors of the second level of knowledge base-TPK, TCK, and PCK. The study also showed that the TPACK framework is relevant for understanding how these teachers integrate technology into their

classrooms. The data collected from this study showed that 90% of these teachers have mobile devices or basic access to technology, which means there is enough opportunity for technology integration in teaching, but the lack of it might be tied to other concerns suggesting that there is a need for the reinforcement of policies, investments, and strategies by all relevant stakeholders in school governance.

Despite the wealth of research highlighting the unpreparedness or insufficient readiness of Nigerian educators in terms of technology integration within their classrooms', limited attention has been devoted specifically to comprehending the concerns harbored by these teachers (Dele., et al., 2021). This necessitates an in-depth exploration into the subject matter, prompting the present study to investigate the concerns of in-service teachers in Ibadan North Local Government Area regarding the utilization of technology in the teaching and learning process. In light of the findings stemming from these studies (Baytar et al., 2023, Wang, 2021, & Eloho., et al., 2019) and the dearth of comprehensive research addressing the concerns of Nigerian teachers, this study seeks to fill the void. To achieve this objective, a research question has been formulated to serve as the guiding compass for accurately exploring the concerns held by these educators.

Research Question

What is the relationship between the teachers' stages of concern and the teachers' characteristics (age and years of teaching experience)?

Methodology

The present study embraced the survey design as a pragmatic approach for gathering and analyzing quantitative data from the research participants. The researchers aimed to capture a holistic view of the subject matter and obtain a wealth of information from the respondents. The target population for this study comprised teachers from the 94 secondary schools situated in the Ibadan North local government area of Oyo state. To determine an appropriate sample size, a systematic sampling method was employed in conjunction with the Slovin sample size calculation formula. The schools, encompassing both public and private institutions, were stratified based on their geographic zones. The formula was then applied within each zone to calculate the sample size required for accurate representation. The final overall sample size was 95 participants.

Two questionnaires were carefully selected and modified to suit the study's objectives: the concerns-based adoption model Stages of Concern (SOC) questionnaire and the Technology Enabled Learning (TEL) Implementation Questionnaire. The reliability of each instrument was evaluated using Cronbach's coefficient. The SOC questionnaire demonstrated an overall reliability coefficient of 0.80, while the TEL questionnaire achieved a Cronbach's alpha value of 0.86, indicating that both instruments are highly reliable. The TEL implementation questionnaire comprised two sections, but only one session was adopted for the study. The SOC questionnaire was implemented in its entirety, with the term "innovation" replaced with "technology" to maintain consistency and relevance. The questionnaire assessed a total of seven stages of concern, with each stage comprising five items, resulting in a comprehensive total of 35 items to be measured and analyzed.

The collected data were subjected to descriptive analysis to gain insights into the study's variables. Mean scores, standard deviations, and simple percentages were calculated to provide a comprehensive overview of the data. Given that the teachers' concerns were classified as an attitudinal construct, it is important to note that the responses were based on self-reports. The data collection process did not involve direct observation of behavior or actions by the researcher. Instead, the participants themselves provided subjective accounts of their concerns,

thoughts, and attitudes toward the integration of technology in their classrooms.

Results of Findings

Table 2 presents the descriptive statistics of the teachers who participated in this study (n =95).

Table 2: Teachers' Characteristics

Background Information	Frequency	Percentage
Gender		
Male	37	39%
Female	58	61%
Total	95	100%
Age group		
Below 26	8	8%
26 – 30	19	20%
31 – 35	30	32%
36 – 40	22	23%
41 – 45	15	16%
46 – 50	1	1%
Total	95	100%
Years of Teaching Experience		
5 or < 5	67	71%
6 – 10	20	21%
11 – 15	8	8%
Total	95	100%

Table 3: Descriptive table of teachers' stages of concern by Age.

Age Group	N	Mean	SD	SE	95% CI for Mean	
					Lower Bound	Upper Bound
Below 26	8	4.38	0.86	0.18	4.00	4.77
26–30 years	19	5.18	0.43	0.10	4.98	5.39
31–35 years	30	4.62	0.95	0.24	4.09	5.14
36–40 years	22	5.01	0.43	0.15	4.65	5.37
41–45 years	15	4.98	0.61	0.11	4.75	5.20
46–50 years	1	4.00	0.00	0.00	0.00	0.0
Total	95	4.82	0.75	0.08	4.66	5.00

Note: *SD = Standard Deviation, SE = Standard Error, CI = Confidence Interval*

Table 3 shows that teachers between the ages of 26 -30 years have a higher mean stage of concern (Mean = 5.18; SD = 0.426), followed by teachers between the ages of 36 – 40 (Mean = 5.01; SD = 0.427), teachers between the ages of 41 – 45 years had (Mean = 4.97; SD = 0.609), followed by teachers between the ages of 31 – 35 years (Mean = 4.61; SD = 0.946), while teachers between the ages of below 26 years had (Mean = 4.384; SD = 0.864) and the teacher between the ages of 46 – 50 years had the lowest mean stages of concern score (Mean = 4.00; SD = 0).

Table 4: Descriptive table of teachers' stages of concern by years of experience

Years of Experience	N	Mean	SD	SE		
					Lower Bound	Upper Bound
5 or > 5 years	67	4.48	0.90	0.32	3.73	5.23
6–10 years	20	4.53	0.81	0.18	4.15	4.91
11–15 years	8	4.94	0.68	0.08	4.78	5.12
Total	95	4.82	0.75	0.08	4.66	4.97

Note: *SD = Standard Deviation, SE = Standard Error, CI = Confidence Interval*

Table 4 shows that teachers with 11 – 15 years of teaching experience have higher mean stages of concern (Mean = 4.94; SD = 0.68), followed by teachers with 6 – 10 years of teaching experience (Mean = 4.53; SD = 0.81), while teachers with 5 or less than 5 years teaching experience had the lowest mean stages of concern (Mean = 4.48; SD = 0.89).

Table 5: Pearson Correlation Test showing the relationship between teachers' stages of concern and the teachers' characteristics (Age and Years of teaching experience)

		Stages of Concern	Age	Years of Experience
Stages of Concern	Pearson Correlation	1	0.329**	0.257*
	Sig. (2-tailed)		0.001	0.012
	N	95	95	95
Age	Pearson Correlation	0.329**	1	0.611**
	Sig. (2-tailed)	0.001		0.000
	N	95	95	95
Years of Experience	Pearson Correlation	0.257*	0.611**	1
	Sig. (2-tailed)	0.012	0.000	
	N	95	95	95

***. Correlation is significant at the 0.05 level (2-tailed)**

Table 5 shows that a relationship exists between the teachers' stages of concern and their age. This relationship is also significant at a 0.05 level ($p<0.05$), having a correlation coefficient of 0.33. Table 5 also shows that a relationship exists between the teachers' stages of concern and their years of experience. This relationship is also significant at a 0.05 level ($p<0.05$), having a correlation coefficient of 0.26.

Discussion

The research question sought to explore the relationship between teachers' stages of concern and their characteristics, specifically age and years of teaching experience. The findings of the study indicate that there is a significant relationship between the teachers' stages of concern and their age and years of teaching experience. The results also indicated that some of the younger teachers showed a higher intensity of concern than others. This can be associated with the fact that younger teachers in terms of age, are more technology savvy and more likely to embrace the use of technology in the classroom faster than teachers that are older in age.

According to Pieri, Michelle & Diamantini, Davide's (2010) study of young people, elderly, and ICT, there is still a significant digital divide between older people and young users of modern

technology tools. In addition, older people still have a mixed attitude towards the use of modern technology tools and devices, so it's not surprising to see them exhibit a lower level of concern with regard to technology use at the different stages because they are generally not interested in it. Even though younger teachers are more inclined to use technology generally, the general use of technology is different from its use in a classroom or educational setting, so this may be the trigger for higher levels of concern in the other group of younger teachers ages 26-36. The result from the analysis agrees with the findings from the study of Dele, Fasae, & Okoli (2021). Their study revealed that the teachers' age and years of teaching had a significant impact on the levels of concern they expressed at each stage. In another study carried out by Sanchez-Mena, Pareno, and Manzano (2017), it was found that age had an effect on teachers' perceived ease of use of technology. Bearing these findings in mind, we can draw the conclusion that teachers who are younger in age, may show a lesser degree of concern about integrating technology than teachers who are older. This may be because they are more familiar with it in terms of general use, making them less curious to understand what technology integration entails in an educational setting.

On the other hand, older teachers are not convinced that the consequences of integrating technology into the teaching and learning process will have positive effects on their students; they are also more concerned about the lack of information on how to integrate these technologies into their teaching process. This clearly indicates that more attention needs to be paid to this group of teachers. Their worry about being able to meet the demands that the use of technology places on them should be addressed with enlightenment seminars and training. It may also be the other way around because a study carried out by Ismail, Rahida and Arshad, Rozita and Abas, Zakaria (2018) showed that older teachers are more effective than younger teachers in terms of teaching, willingness to embrace new skills and improve the quality of teaching and learning. The years of teaching experience also played a significant role in influencing the teachers' level of concern about technology use.

Teachers with more years of teaching experience had a higher intensity of concern across all the stages than those with fewer years of experience. The results suggest that experienced teachers are more likely to or less likely to show concern about the integration of technology. This is less likely because they may be okay with the use of traditional teaching methods than younger teachers and more likely because they do not want to be left out of anything that can benefit their teaching and learning process better than what they already offer.

The relatively lower standard deviation suggests that the concerns in this group are more consistent across the different stages. This means that teachers with more years of experience have a higher intensity of concern in the consequence, information, refocusing, personal, management, and awareness stages, respectively. Teachers with fewer years of experience may show lower levels of concern because they have not yet fully established a teaching style or method, so they are more flexible and open to introducing new approaches like the use of technology. It won't be far-fetched to conclude that there has not been any direct consideration of how a teacher's age or years of teaching experience affects the integration of technology in the classroom because general training on technology integration is almost non-existent in Nigeria (Mormah & Bassey, 2021).

The findings of this study have shown that age and years of teaching experience are key factors that cannot be ignored. There must be comprehensive and strategic awareness and training programs that consider the years of teaching experience and the age of the teachers now that it has been established that there is a strong relationship between these factors and the teachers' concerns about the use of technology. The findings are also in line with the ones from other studies, so the support offered to teachers should reflect these considerations if visible improvements and developments are to be noticed.

Conclusion and Recommendations

The study concluded that targeted support and professional development initiatives are necessary to address the specific concerns and needs of different age groups and experience levels among teachers regarding technology integration. The

results indicated that teachers aged 26-30 exhibited the highest mean stage of concern scores, followed by those aged 36-40, while the lowest mean stage of concern score was observed in teachers aged 46-50. These findings emphasize the need for age-specific and experience-specific interventions to ensure effective technology integration in the classroom. The study also found a significant relationship between teachers' stages of concern and their years of teaching experience.

Teachers with 11-15 years of experience exhibited the highest mean stages of concern, suggesting that this group may benefit from targeted support to alleviate their concerns. On the other hand, teachers with less than five years of experience showed the lowest mean stages of concern, indicating a potential openness to technology integration that can be leveraged through appropriate training programs.

In conclusion, the study highlights the importance of considering both age and years of teaching experience when designing professional development programs for technology integration. By addressing the specific concerns of different teacher demographics, educational policymakers, and administrators can enhance the adoption and effective use of technology in classrooms, ultimately leading to improved educational outcomes.

Recommendations

1) **Age-Specific Professional Development:** Design professional development programs tailored to the specific needs and concerns of different age groups. Younger teachers may benefit from advanced training on integrating technology into their teaching practices, while older teachers might require more foundational support and reassurance about the benefits and ease of use of educational technology.

2) **Experience-Based Support:** Provide targeted support based on teachers' years of experience. Experienced teachers (11-15 years) who exhibit higher stages of concern should be offered specialized training that addresses their specific worries about technology integration. In contrast, novice teachers should receive introductory training that builds their confidence and skills in using technology effectively.

3) **Ongoing Training and Mentorship:** Implement continuous professional development opportunities that include mentorship programs where experienced teachers can guide less experienced colleagues in integrating technology into their teaching. This approach can help bridge the gap between different experience levels and foster a collaborative learning environment.

4) **Customized Resources and Tools:** Develop and provide age and experience-specific resources and tools that cater to the unique needs of teachers at different stages of their careers. This could include online tutorials, interactive workshops, and access to a support network of peers and experts.

5) **Policy and Investment in Technology Integration:** Advocate for policies and investments that support comprehensive technology integration in schools. Ensure that infrastructure, access to devices, and reliable internet connectivity are available to all teachers, regardless of their age or years of experience.

6) **Regular Assessment and Feedback:** Conduct regular assessments of teachers' technology integration practices and continuously gather feedback to improve professional development programs. This iterative approach ensures the training remains relevant and effective in addressing teachers' evolving concerns and needs.

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