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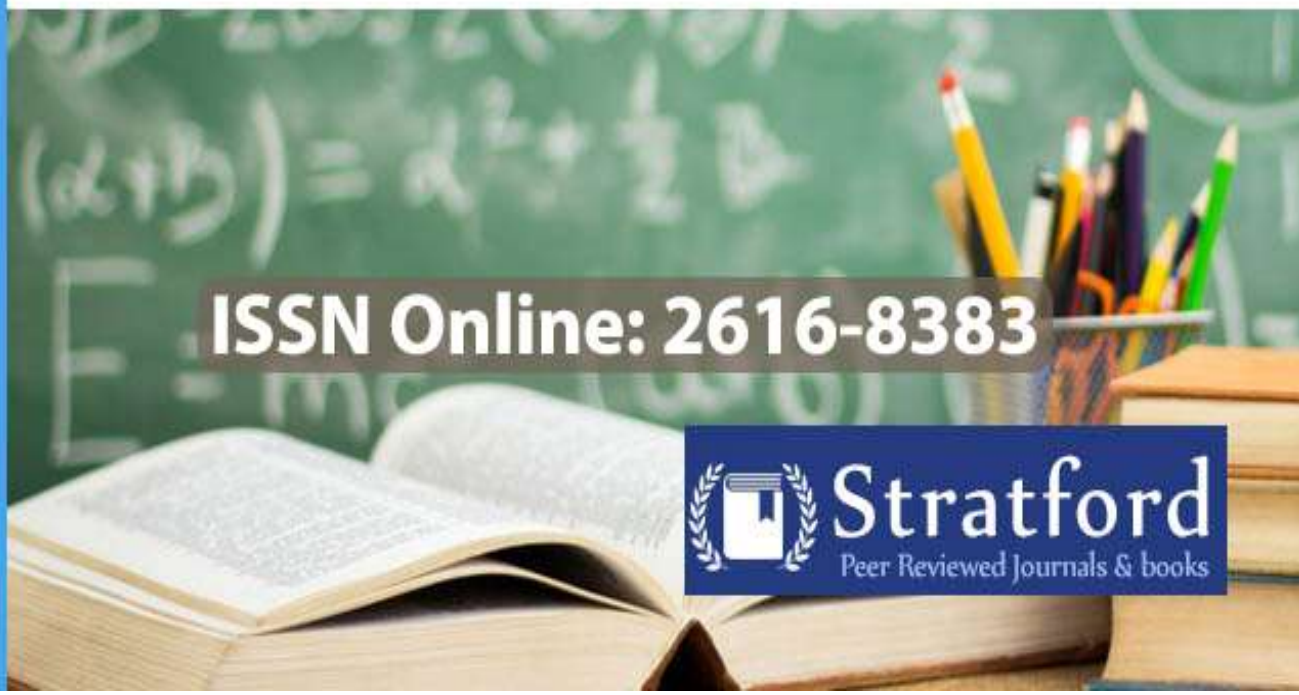

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Ofori-Atta Williams, P. Osei-Poku, Osei Adiyaa

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Exploring the Potential of the Will, Skill, Tool Model in Predicting Pre-Service Teachers and Tutors of Colleges of Education Stage of Adoption of Technology Integration into Teaching and Learning

[*1]Ofori-Atta Williams, [2]P. Osei-Poku, [3]Osei Adiyaa

[1]Kumasi Academy SHS-Kumasi, Ghana; selwillie2018@gmail.com

[2]Faculty of Educational Studies, Kwame Nkumah University of Science Technology, Ghana; patrickoseipoku@gmail.com

[3] SDA Senior High School-Agona/Ash; oseiadiyaa@yahoo.com / oseiadiyaa@gmail.com

[*] Correspondence: selwillie@gmail.com

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Abstract

Studies have demonstrated that will (positive attitudes), skill (technology competency), and tool (access to technology tools) are all needed components for an educator to successively integrate technology into teaching and learning. This research work centered on the will, skill and tool as important procedures for the predictability of technology integration into teaching and learning, announced by the study respondents and calculated by stages of adoption of pre-service teachers and tutors of Colleges of Education in Ashanti Region, Ghana. Quantitative research design which involves survey was used to answer the research question; "How would will, skill and technology tools predict pre-service teachers and tutors stage of adoption of technology integration into teaching and learning at the Colleges of Education in Ashanti Region?" Three hundred and thirty-eight (338) pre-service teachers of College of Education who were in level 200 of the 2019/2020 academic year, offering either Mathematics or Science or Visual art were selected through purposive sampling technique and thirteen (13) tutors were sampled using convenience sampling technique for the study. The participants answered a well validated instruments spread over from the areas of attitudes (will), competencies (skill), access (tool) and technology integration into teaching and learning. The data was analysed using regression analysis. The results revealed that access to technology tools appeared to be stronger predictor of classroom integration of technology into teaching and learning by pre-service teachers and tutors of Colleges of Education in Ashanti Region. That is, predictability of stages of adoption from 0.37 to 0.41(0.37+0.94/2) was realised.

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Keywords: *Exploring, predicting, stages of adoption integrating technology, teaching and learning, pre-service teachers, tutors.*

1.0 Introduction

Technology has been very influential in the development of modern society. Technology has also infused into the discipline of education by affecting teaching, learning, and planning processes. Today's teachers are expected to be technologically literate by incorporating technological tools into their practice. Technology Integration in education refers to the use of computer-based communication, incorporates into daily classroom instructional process. It explains technology-based teaching and learning process that are closely related to the utilization of learning technologies in schools. Yidrim as cited by Pamuk and Perker (2009) postulate that computer Technology will affect almost all jobs in the 21st century; not surprisingly teaching is one of them. According to Dzomeku et al. (2012), computer technology has made it possible for teachers and students to interact through the Internet and have been used to create electronic libraries and catalogues to enhance academic research work. Davidsen and Christiansen (2014), reported that technology integration into teaching and learning is a transformative tool, and its full implementation into the school system is necessary to prepare students for the information which they will inherit. Technology integration in education generally means technology-based teaching and learning process that closely relates to the use of learning technologies in schools. Due to the fact that students are familiar with technology and they will learn better within technology-based environment, the issue of technology integration in schools for teaching and learning process, specifically in the classroom is vital (Ghavifekr and Rosdy, 2015).

With the advent of the new curriculum designed by the National Council for Curriculum and Assessment (NACCA, 2018) in Ghana, information and communication technology form the basis in the entire curriculum. It is imperative that teacher education programs, policy makers and researchers understand how pre-service teachers and tutors at the Colleges of Education in Ghana relate to technology integration into teaching and learning in particular with respect to teachers' attitudes, competencies and access.

The main purpose of this study was to explore the potential of the Will, Skill, Tool Model in predicting pre-service teachers and Tutors of Colleges of Education stage of adoption of technology integration into teaching and learning.

2.0 Literature Review

2.1 The Will, Skill, Tool (WST) model of technology integration

The Will, Skill, Tool (WST) model of technology integration postulates that enhancing an educator's will, skill, and access to technology tools leads to higher stages of classroom technology integration, which in turn help to achieve students learning outcome (Knezek *et al*., 2000). Hence its adoption for the study to ascertain the stage of classroom technology integration into teaching and learning by Pre-service teachers and Tutors at the colleges of Education. Knezek et al. (2000) defines WIIL as the attitude which the teacher has towards ICT usage and integrates it in the teaching and learning process. According to Knezek *et al.* (2000), attitudes vary but the variants should gear towards promoting the intention and the easiness to use technology in the teaching and learning. Another construct on the left hand- side of the WILL, SKILL TOOL focuses on the Skill. The authors define the skill as the ability to use technology tool in the teaching and learning.

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Knezek *et al.* (2000) asserted that a skill is the major predictor of ICT integration in teaching and learning. The authors identify four variants of skill in the second construct. The third and last construct is tool. Which the authors describe as the access to technology tools and technology infrastructure. The authors are of the view that the teacher may have the will and the skill but the availability of technology tools will enable the teacher to integrate technology in the teaching and learning to achieve results.

2.2 Potential of Will, Skill, Tool model in predicting Stage of Adoption of Technology Integration into teaching and learning

Rangaswamy and Gupta (2000) referred to adoption as the decision by people to use technology innovation anytime that they consider using that innovation. Similarly, in the opinion of Rogers (2003), adoption is the decision an individual makes in the use of an innovation as the best alternative available. Rogers (2003) again stated, the process of adoption begins with having the knowledge concerning the innovation and subsequent adoption. A study was conducted by Adjei and Voogt (2011), in Ghana on the topic "Exploring the potential of the will, skill, tool model in Ghana: Predicting prospective and practicing teachers' use of technology". The study focused on the will, skill and tool as essential measures for the predictability of technology integration, reported by the study participants and measured by stages of adoption of teachers in Ghana.

Attempts were made to explore the extent to which these parameters differ among the teachers and also influence technology integration. Well validated instruments spanning the areas of attitudes, competencies, access and technology integration proficiencies were used to collect data from 120 mathematics prospective teachers and 60 practicing mathematics teachers from Ghana. The data was analyzed using regression analysis. The results indicated that lack of teacher anxiety was the most important dimension of attitudes, and that skill is the strongest predictor of classroom integration of technology for the teachers. Significant differences existed between practicing and prospective teachers' computer anxieties, competencies, and access levels. In addition, the findings revealed that the parameters of the Will, Skill, and Tool Model help to predict teacher's technology integration in the classroom.

Agyei and Voogt (2010) postulated that technology competency and skills have positive correlation with the individual's willingness to adopt and use computer – related activities and those who have higher computer competence have low level of computer related anxiety as compared to those who have low level of computer competence result in high computer anxiety (Looney *et al,* 2004, Sang *et al,* 2010).

Among the three constructs that were used in the model to predict classroom technology integration, 'Skill' that is technology competence of the teachers happens to be the strongest predictor of classroom technology usage. The study of Agyei and Voogt (2011) contradicted the earlier study on Mexican teachers (Morales, 2006) which postulated that access to technology tools was the strongest predictor of technology usage.

Earle (2002) found in his work that ICT integration is connected to the concept of wholeness, when all attributes of the system are connected together to become a unit. For example, the two essential components of teaching and learning are content and pedagogy must be put together when technology is used in a lesson. The author again alluded that when students are given a number of ICT tools (e.g. CD ROMs, multimedia, etc.) then the teacher is not integrating ICT into teaching since he/she is not using ICT as pedagogy. Williams (2003) concluded that ICT integration is using

any ICT tool (Internet, e-learning technologies, CD ROMs, etc.) to promote teaching and learning. Williams' definition of ICT integration is adopted with regards to this study.

A number of factors that influence the adoption and technology integration into the teaching and learning have been identified by scholars. Balanskat, Blamire and Kefalla (2007) opined that factors like teacher – level of knowledge, school level and system level have influence on the teachers' integration of ICT into teaching. Other studies added that organizational factors, attitudes towards technology and other factors contribute to teacher integration, (Chen, 2008, Tondeur; van Braak & Valcke, 2007; Lim & Chai, 2008; Clausen, 2007). Neyland (2011) identified factors such as school support in addition to other factors such as teacher competency have effect on the use of online learning in high schools in Sydney.

A study by Ghavifekr and Rosdy (2015), aimed to analyse teachers' perceptions on effectiveness of ICT integration to support teaching and learning process in classroom. A survey questionnaire was distributed randomly to total of 101 teacher s from 10 public secondary schools in Kuala Lumpur, Malaysia. The data for this quantitative research were analysed for both descriptive and inferential statistic using SPSS (version 21) software. The results indicate that ICT integration has a great effectiveness for both teachers and the students. Findings indicate that teachers' well-equipped preparation with ICT tools and facilities is one the main factors in success of technology-based teaching and learning. It was also found that professional development training programs for teachers also played a key role in enhancing students' quality learning.

3.0 Methodology

Study Design and Participants

Qualitative research design which involves survey was used to answer the research question; "How would will, skill and technology tools predict pre-service teachers and tutors stage of adoption of technology integration into teaching and learning at the Colleges of Education in Ashanti Region?" Three hundred and thirty-eight (338) pre-service teachers of College of Education who were in level 200 of the 2019/2020 academic year, offering either Mathematics or Science or Visual art were selected through purposive sampling technique. Thirteen (13) tutors were sampled using convenience sampling technique. Three selected public Colleges of Education (College A, B and C) in Ashanti Region, Ghana, were engaged for the study.

Measures

Data were collected using questionnaire. A questionnaire designed by Knezek and Christensen (1998; 2001), was adopted for the study. The questionnaire sought to provide answers to the research questions stated above. The questionnaire was segmented into three components. The three components are: Teachers' Attitude towards Computer (TAC). The questionnaire the authors designed is a 1 – 17 item Likert differential instrument for measuring teachers' attitude competency. Eight items of the TAC were adopted and used to explore the attitude of the in-service and tutors of Colleges of Education in this research.

2. Access to Technology Tools towards the usage of computers/ Tool on technology integration. These measurement instruments have been tried by many researchers and proven to be reliable.

3. The Technology in Education Competency Survey (TECS) was another construct that was used. According the authors, technology in education competence is a self – report measure of technology competence. The Likert – scale used to collect data for the quantitative analysis had an

original P value of 0.713 which shows high reliability and internal consistency. After piloting it with 50 participants of college students and tutors outside the sampled area gave a P value of 0.723.

Procedure

The participants were educated on the need to respond to the instrument. Effort was made to establish good rapport with respondents which yielded accurate responses willingly by Pre-service teachers and tutors of College of Education. Individual respondents were allowed to independently respond to the instrument. Analysis of data was done using regression analysis. There was an agreement of trust between researchers and respondents as each respondent was given enough information on the relevance of the study which assisted them to make informed decisions.

4.0 Results

4.1 Demographic Characteristics

Although this section did not form part of the research objective, they were used to describe the background of the college and respondents. The results are shown in Table below (Tables 1 and 2):

Table 1: Demographic characteristics for college

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	College A	149	44.1	44.9	44.9
	College B	67	19.8	20.2	65.1
	College C	116	34.3	34.9	100.0
	Total	332	98.2	100.0	
Missing	System	6	1.8		
Total		**338**	**100.0**		

Source: Field Study, (2020)

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Table 2: Demographic Characteristics for Tutors

	Tutors	N	%
Age	36-40	2	5.7
	41-45	14	40.0
	46-50	18	51.4
	51 and above	1	2.9
Gender	Male	28	80.0
	Female	7	20.0
College	A	13	37.1
	B	13	37.1
	C	9	25.7
Qualification	M.A	3	8.6
	MSC	14	40.0
	MPHIL	18	51.4
Subject Area	Art	5	14.3
	Mathematics	15	42.9
	Science	15	42.9
Working period	1-5 years	2	5.7
	6-10 years	21	60.0
	11-15 years	11	31.4
	16-20 years	1	2.9

Source: Field Study, (2020)

Exploring with regression analysis model on how well will, skill, and technology tools could predict teachers' Stage of Adoption (SoA)

A regression analysis model was used to explore how well will, skill and technology tools could predict pre-service teachers and tutors stage of adoption of technology integration in the teaching and learning.

The table 3 presents the regression analysis for the study. The regression analysis model was used to explore how well will, skill, and technology tools could predict teachers' stage of adoption (SoA) of technology integration into teaching and learning. The SoA provides a measure of teachers' stage adoption of technology use in educational practice (Christensen & Kezek 2000b, 2008).

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Table 3: Results on pre-service teachers and tutors' regression analysis for Stage of adoption of technology

	Pre-service				Tutors			
Variable	R^2	Df	F	*P*	R^2	Df	F	*P*
Competencies (skill)	0.71	268	2.480	0.013*	0.197	(1,34)	0.797	0.611
Attitude (will)	0.24	283	1.361	0.239	0.330	(1,34)	2.858	0.320
Access (tool)	0.003	281	0.181	0.948	0.89	(1,34)	0.731	0.578

* P < 0.05

Source; Field Study, (2020)

The following are the results;

The impact of will from regression analysis

From table 3, the R-squared (R^2) for stage of adoption for pre –service and in-service teachers (0.24+0.33/2=0.29) predicted from the TAC attitude scale from above table shows that 29% of variance was found to be attributable to the "will" measures of respondents. The F test; F=2.11, p=0.31(p>0.05) associated with independent variable (will) was not significant.

Impact of Will and Skill Combined

Adding skill measures to the equation, the R^2 for stages of adoption predicted from TAC attitude and TECs measures increased the predictability of stages of adoption of technology from 0.29 to 0.37 (0.29+0.45/2). This means that the predictability of stages of adoption of technology increases from 29% to 37% when "skill" measure was added. The F test: F=0.41, p= 0.30 (p >0.05) was not significant for the model.

Combined Impact of Will. Skill and Access to Technology Tools

Adding measures of access to technology tools for teachers increased the predictability of stages of adoption from 0.37 to 0.41(0.37+0.94/2). This means that the predictability of stages of adoption of technology increases from 37%to 41% when "skill" measure was added. As shown in the model, access to technology tools appeared to be stronger predictor of classroom integration for pre-service and in-service teachers of colleges of education in Ashanti region and supports the assertion that access and availability of technology were other significant barriers to using technology in the classroom (Wellinski, 2008).

The regression analysis verified that 29% of the variance in the stage of adoption is attributable to" will" measures of the teachers at p=0.31. Adding "skills" measures to the equation increased the predictability of the stages of adoption of teaching from 29% to 37% at p=0.30 ("will" =p=0.31," will skill" =p=0.30 and "will+skill+tool" =p=0.41). Additional predictability increased to 41% when "tool" measure was added to the equation at p=0.41. This is in consistent with studies by Morales (2006) but different form Agyei et al. (2011), for whom "will" was the strong predictor of teachers' technology integration.

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Discussion of Results

In exploring the will-skill-tool in predicting pre-service teachers and tutors stage of adoption of technology integration in the teaching and learning, a regression analysis model was used to explore how well will-skill-tool model could predict the teachers' stage of adoption of technology integration of in the teaching and learning. The R- square (R2) for the stage of adoption for pre-service teachers and tutors (0.24+0.33\2= 0.2 9 predicted from the attitude scale shows that 29% of the variance was found to be attributable to the 'will' measures of respondents. The F test; F=2.11, p=0.31 (p>0.05) associated with independent variable 'will' was no significant.

Adding skill measures to the equation, the R^2 for stages of adoption predicted from TAC attitude and TECs measures increased the predictability of stages of adoption of technology from 0.29 to 0.37 (0.29+0.45/2). This means that the predictability of stages of adoption of technology increases from 29% to 37% when "skill" measure was added. The F test: F=0.41, p= 0.30 (p >0.05) was not significant for the model.

Adding measures of access to technology tools for teachers increased the predictability of stages of adoption from 0.37 to 0.41(0.37+0.94/2). This means that the predictability of stages of adoption of technology increases from37%to 41% when "skill" measure was added.

As shown in the model, access to technology tools appeared to be stronger predictor of classroom integration for pre-service teachers and tutors at Colleges of Education in Ashanti region. This was in line with a study conducted by Mexican teachers (Morales, 2006) which postulated that access to technology tools was the strongest predictor of technology usage. But in contrast to studies by Agyei and Voogt (2011); Balanskat, Blamire and Kefalla (2007); Neyland (2011) in which 'Skill' that is technology competence of the teachers happens to be the strongest predictor of classroom technology usage and also contradictory to studies by (Chen, 2008, Tondeur; van Braak & Valcke, 2007; Lim & Chai, 2008; Clausen, 2007) in which attitudes towards technology was a key factor contributed to classroom technology usage by teachers.

5.0 Conclusions

From the study, "access to technology tools" appeared to be stronger predictor of classroom integration of technological tools in teaching and learning for pre-service teachers and tutors at the Colleges of Education in Ashanti region. This suggest that pre-service teachers and tutors at the Colleges of Education stage of adoption of technology integration to teaching and learning in the classroom is depended on "access to technology tools".

6.0 Recommendations

Government and other stake holders of Colleges of education should as a matter of importance make maximum effort to equip the ICT Laboratories at these colleges with enough computers and internet facilities as well as relevant software applications to offer the pre-service teachers and tutors at the colleges, the opportunity to have accesses to use computers in teaching and learning processes as suggested by Ghavifekr and Rosdy (2015). Again, pre-service teachers and tutors are encouraged to acquire their personal computers.

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References

Agyei, D. D. and Voogt, J. M. (2011) 'Exploring the potential of the will, skill, tool model in Ghana: Predicting prospective and practicing teachers' use of technology', Computers and Education. Elsevier Ltd, 56(1), pp. 91–100. doi: 10.1016/j.compedu.2010.08.017.

Balanskat, A., Blamire, R., & Kafal, S. (2007). A review of studies of ICT impact on schools in Europe European Schoolnet.

Clausen, L., (2007). Corporate Communication Challenges 'Negotiated' Culture Perspective. International *Journal of Cross Cultural Management. (7),* 317-332. 10.1177/1470595807083376.

Davidsen, J., & Christiansen, E. (2014). Mind the hand: A study on children's embodied and multimodal collaborative learning around touchscreens. Designs for Learning, 7(1), 34–53. https://doi.org/10.2478/dfl-2014-0010

Earle S., R., (2002). *The Integration of Instructional Technology into Public Education: Promises and Challenges. ET Magazine* Vol. 42, No. 1, January-February, 2002, P. 5-13. http://BooksToRead.com/etp

Ghavifekr, S. & Rosdy, W.A.W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *International Journal of Research in Education and Science (IJRES), 1*(2), 175-191. https://doi.org/10.21890/ijres.23596

Knezek, G., Christensen, R., Hancock, R., & Shoho, A. (2000). *Toward a structural model of technology integration. Paper presented to the Annual Hawaii Educational Research* Association Conference, Honolulu, Hawaii.

Lim, C. P., & Chai, C. S. (2008). Teachers' pedagogical beliefs and their planning and conduct of computer-mediated classroom lessons. *British Journal of Educational Technology*, vol. 39, no. 5, pp. 807–828. https://doi.org/10.1111/j.1467-8535.2007.00774.x

Morales, C. (2006). Cross-cultural validation of the will, skill, tool model of technology integration. Unpublished doctoral dissertation, University of North Texas, Denton, TX.

Neyland, E. (2011). Integrating online learning in NSW secondary schools: Three school's perspectives on ICT adoption. *Australia Journal of Educational Technology, vol. 27*, no. 1, pp. 152-173. https://doi.org/10.14742/ajet.989

Pamuk, S., & Peker, D. (2009). *Turkish pre service science and mathematics teachers' computer related self-efficacies, attitudes, and the relationship between these variables*. Computers & Education (2009), doi: 10.1016/j.compedu.2009.03.004. https://doi.org/10.1016/j.compedu.2009.03.004

Rangaswamy, Arvind & Gupta, Sunil. (2000). Innovation adoption and diffusion in the digital environment: Some research opportunities. New Product Diffusion Models. 75–96.

Rogers, E.M. (2003). **Diffusion of innovations** (5th Ed.). New York: Free Press.

Tondeur, J., Valcke, M., & van Braak, J. (2008). A multidimensional approach to determinants of computer use in primary education: Teacher and school characteristics. *Journal of*

Computer Assisted Learning, vol. 24, pp. 494–506. https://doi.org/10.1111/j.1365-2729.2008.00285.x

Williams, M. D. (2003). Technology integration in education. In Tan, S.C. & Wong, F.L. (Eds.), Teaching and Learning with Technology, pp. 17-31: An Asia-pacific perspective. Singapore: Prentice Hall.