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Physics Tutors' Self-Efficacy and use of Information and Communication Technology (ICT) for Research Activities in the Colleges of Education in Ghana

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ABSTRACT

Background: Self-efficacy in the use of ICT refers to a person's belief in their ability to succeed in the use of ICT in the teaching, learning and assessment process as well as research purposes.

Purpose: The incorporation of ICT into teaching, learning and assessment, and for research purposes is a powerful tool that promotes the teaching-learning environment in several ways. This study was aimed at investigating Physics Tutors' self-efficacy (PTSE) level towards ICT integration into teaching, learning, assessment and research in the various Colleges of Education (CoE) in Ghana.

Methods: A Four-point Likert Scale Questionnaire was used to obtain quantitative data from 16 physics tutors sampled from the 16 Science and Mathematics Colleges of Education in Ghana. The data obtained was analyzed based on a number of factors such as historical inclination towards the use of ICT among other things.

Results: The findings from the study however reveled that most physics tutors accept and believe that the use of ICT in teaching physics significantly improves on teaching and learning. However, many of the Physics Tutors believe that there isn't enough support in terms of logistics and training from the various stakeholders such as institutional heads, supervisors and even colleagues in the usage of ICT in teaching and learning physics

Conclusions: It is concluded that the overall PTSE towards ICT integration in the CoE is above average (2.6 on a scale of 4).

1. Introduction

Self-efficacy according to Psychologist Albert Bandura is an individual's trust in their capacity to be successful in a particular endeavor. Bandura defines these beliefs as elements of how people think, behave and feel (Bandura, 1995).

The incorporation of ICT into instructional delivery and learning is a powerful tool that promotes the teaching-learning environment as it progresses the process (Aydin, Gürol and Vanderlinde, 2016; Buabeng-Andoh, 2012), enhances students' achievement (Dibaba and Babu, 2017; Kisirkoi, 2015), improves student-centered learning (Fructuoso, 2015) and makes a difference when it comes to the quality of education (UNESCO, 2017). Due to this, more consideration is being given to ICT incorporation in the instructional delivery and learning process, both in developed and developed countries around the world (Aydin and Gürol, 2016).

Over the past couple of decades, the way we access, share and organize information and knowledge has radically changed mostly due to the introduction of information and communication technology (ICT). This has also resulted in changes in the way we teach in our various schools (Arnseth & Hatlevik, 2010).

In recent times, ICT use in education has been significantly highlighted due to its numerous capacities to contribute effectively in educational practice. It can for instance, contribute to improve access and equity in education. It can also contribute to the improvement of teachers' professional development (DP) and ensure efficient administrative management in education. One other significant role that ICT integration plays in education is the significant improvement in the quality of teaching and learning (Hepp, Hinostroza, Laval, & Rehbein, 2004). There are numerous studies that show and support the positive relation between ICT

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integration in education and the quality of education, even though the level of the positive effect may vary in different situations or studies.

The skills, knowledge, attitude and confidence in one's ability to use ICT tools can hinder the ICT incorporation as decisions teachers' take when it comes teaching-learning process and classroom practices are impacted by their beliefs and most importantly self-efficacy in incorporating ICT use (Hew and Brush, 2007; Alhassan, 2017; Kazan and ELDaou, 2016; Letwinsky, 2017). As a result, to be able to tackle this effectively and explore the reasons why this may be the case in the Colleges of Education (CoE) in Ghana, it is significant to envision ICT integration in education through the eyes of the Tutors' self-efficacy.

Being able to identify the sources of this, is important as it provides more information and understanding of how physics teachers come up with their beliefs in using ICT for teaching physics.

When these foundations are understood, it results in strategies for growing self-efficacy as a result of the understanding gained and as a result there will be more integration of ICT in teaching.

Bandura's self-efficacy theory describes the four foundations of self-efficacy as verbal or social persuasion, relayed experiences, mastery experience and individual's mood, stress, fatigue, aches and anxieties.

Mastery experience is explained as ones understanding of their personal former, genuine experience in executing a specific duty. According to Bandura, an ineffective mastery experience will deteriorate a person's self-efficacy whiles a successful mastery experience will strengthen it and as a result the way people will deduce their past practices will define their self-efficacy beliefs. As a consequence, intermittent shortcomings are unlikely to affect one's beliefs if the person cultivates the habit of high self-efficacy as a result of frequent success (Uzuntiryaki, 2008).

According to Bandura (1986, 1997) relayed experience is the second most influential source of self-efficacy. Relay experience has to do with how an individual evaluates or assesses their personal abilities in comparison to that of others.

When it comes to teachers, they notice the accomplishments and disappointments of others, such as colleague teachers, superiors, etc. and compare their performance and the performance of such individuals and in this way they are making judgements concerning their personal ability to undertake certain tasks. As a consequence, there is certain degree of certainty by which their beliefs will be altered to follow a particular model of success or failure by an amount they feel comparable to the model in that particular area (Schunk, 2001).

Also verbal/social persuasions like encouraging statements concerning a person's performance might change their perception. According to Bandura verbal persuasions can add to fruitful performance if the praise is contained within right boundaries. Verbal persuasions are the most powerful after mastery experience (Wise and Trunnell, 2001). For instance, encouragement from a supervisor to add an ICT tool to your teaching portfolio may improve a Physics Tutors' self-efficacy to do so.

Finally, Bandura say's an individual's mood or feelings are also influential in informing the person's self-efficacy beliefs (Bandura, 1997). Solid emotional responses are good sources of anticipated accomplishment or disappointment with people attributing physiological states to an efficacy perception. This is because people develop a sense of competence in response to positive emotions whiles similarly, negative emotions like anxiety, fright, stress, depression, etc can reduce self-efficacy beliefs.

2. Statement of the Problem

Little is known of Teacher's beliefs about their self-efficacy in the use of ICT in Ghana. Therefore, an investigation into teachers teaching experiences on their beliefs into the integration of ICT into teaching, learning and research and the sources of these beliefs is very relevant as it can provide valuable information for policy framing in Ghana.

The result of the study can therefore help make changes when it comes to the way physics is learnt and taught in the various Colleges of Education (COE) in Ghana. It can also help shape how Tutors go about preparing for teaching and learning in Ghana.

The proliferation of social media tools and applications and multimedia tools and devices in general has brought about a lot of change when it comes to how people are informed or get information especially the youth.

As a result of this, the majority of student teachers admitted into the various Colleges of Education (CoE)

are increasingly becoming competent in the usage of various ICT tools for studying. It is therefore expected that Tutors' similarly are skilled in the use of these tools for research and hence for teaching.

Consequently there is a need to recognize the issues that impact the self-efficacy beliefs of Tutors when it comes to incorporating ICT tools for teaching and learning. Giles and Kent, (2016) believe that self-efficacy beliefs are a credible pointer of ones likelihood to use a concept throughout their careers (Giles and Kent, 2016). Therefore understanding and sourcing Tutors self-efficacy beliefs is a significant determinant in assessing their ability to use these technological tools for teaching and learning.

3. Purpose of the Study

This work is directed towards exploring Physics Tutors' self-efficacy (PTSE) levels in the incorporation of ICT tools in their teaching and research for facilitation of learning in the various Colleges of Education (CoE) in Ghana. To address the research aim, the study will try to find answers to the following research questions:

- At what level is Physics Tutors' knowledge base and skill in the use of ICT for general purposes, for academic work and specifically for teaching Physics?
- How do these Physics Tutors' behave, think and feel about ICT use in the teaching of Physics?
- What kind of support do Physics Tutors' get from various stakeholders in education for the teaching of Physics in the CoE?

These would be accomplished by obtaining answers to a number of sub-questions under the three main items listed above**.**

4. Literature Review

When we talk about ICT incorporation in academics, we simply mean technology-based training which is connected to the usage of electronic technologies in the classroom (Ghavifekr and Rosdy, 2015). It comprises the use of laptops, software, projectors, the internet and other digital content in the classroom for teaching, purposely to enrich the teaching-learning experience (Hew and Brush, 2007; Unal, Yamac, and Uzun, 2017).

Self-efficacy meanwhile can be explained as a person's confidence in their own competency to undertake required tasks to come out with the desired outcome successfully (Bandura, 1997; Skaalvik and Skaalvik, 2010; Yamamoto and Yamaguchi, 2016). According to Schunk and Pajares (2009), when people aren't confident in their own ability to produce the anticipated outcomes through their actions, they tend not to be enthused enough to carry out these actions.

Therefore, a high self-efficacy offers a large enough motivation to meet persons' set targets and helps a lot in dealing with setbacks (Bandura, 1993; Harrison et al., 1997).

Skoretz (2011) defines Self-efficacy in ICT incorporation as the belief one has in him or herself to incorporate ICT effectively in the teaching-learning process. Teacher who have low ICT self-efficacy might me more teacher-centered when it comes to teaching in the classroom whiles teachers with high self-efficacy in incorporating ICT use might be more student-centered in teaching; using different approaches and digital content (Henson, 2001; Perkmen and Pamuk, 2011; Gilakjani, 2013). Knowledge and skills alone are not enough to change a teacher's attitude except they have the self-assurance that they are able to assist learning through obtained ICT skills. This shows that teachers' ICT self-efficacy guide or in some way sway them to incorporate ICT in their academic processes (Yamamoto and Yamaguchi, 2016; Bakar, Maat & Rosli, 2018; Raphael and Mtebe, 2017).

Many studies have been completed that show the link between self-efficacy and ICT integration in a teaching-learning environment (Akgun, Ozgur and Cuhadar, 2016; Alt, 2018; Aslan and Zhu, 2015; Bakac and Ozen, 2017; Birisci and Kul, 2019; Cavanagh and Ma, 2018; Ceylan et al., 2014; Lailiyah and Cahyono, 2017; Letwinsky, 2017; Raphael and Mtebe, 2017; Rigi, 2015; Sari, 2016; Valtonen, Kukkonen, Kontkanen, Mäkitalo-Siegl, Sointu., 2018; Yagci, 2016; Yamamoto and Yamaguchi, 2016). These studies found that self-efficacy in incorporating ICT use impacts teachers' capacity to incorporate technological know-how into their teaching-learning experience.

Giles and Kent (2016) studied the level of self-efficacy in incorporating ICT use of 28 teachers of a college of education in the USA by applying a qualitative design. They concluded that about 93 % of the participants incorporated technology into their teaching-learning experience. The percentage of the teachers with high self-efficacy towards selection and use of ICT in the teaching-

learning environment was 68%. A similar study was conducted in Turkey by Aslan and Zhu (2015).

They came out with the conclusion that about 93% of the student teachers incorporated technological know-how in their work, whiles some 68% of them have high self-efficacy and this enabled them to implement ICT tools in their teaching.

Both Aslan and Zhu (2015) and Birisci and Kul (2019) conducted studies in Turkey on the self-efficacy of teachers. In Aslan and Zhu's case, 782 teachers formed part of the quantitative study with 15 teachers chosen for the qualitative data. It was concluded that previous knowledge about ICT skill has a concrete impact on ICT integration for teachers. Birisci and Kul, on the other hand, had 174 participants for data collection and used a correlation study model for their studies. In their conclusion, they found that teachers who had a high level of ICT self-efficacy had a positive correlation with techno-pedagogical skills and ICT integration.

Again, Yamamoto and Yamaguchi (2016) also established out from their research in Mongolia conducted using 838 school teachers, that positive behavior of an organization towards ICT integration plays a huge role in a teacher's ICT self-efficacy.

5. Methodology

The research design was a survey carried out in the 16 Science and Mathematics Colleges of education in Ghana. It was meant to elicit views of physics tutors on the use and integration of ICT in teaching, learning, assessment and research and to obtain useful data on their self-efficacy with regards to the use of ICT.

5.1. Participants

The participants of this study were 16 Physics Tutors randomly sampled; at least one physics tutor from 24 physics tutors in the 16 Sciences and Mathematics Colleges of Education (CoE) in Ghana. Twelve of the participants were male physics tutors whiles the other 4 were female physics tutors.

5.2. Instrumentation, Data Collection and Procedure

The study made use of a quantitative method to collect the data. This involved the use of questionnaire containing a total number of 20 important questions constructed by experts drawn from the University of Education, Winneba, Ghana and University of Cape Coast, Ghana for participants to answer. The 20 questions were structured under 3 different sub-scales/ categories, namely; Support (S), perceived ease of use (PEU) and performance expectations (PE). Of the 20 questions/items, seven were under the sub-scale of Support, nine items relating to the second sub-scale (perceived ease of use) and the remaining four items relating to the last sub-scale (performance expectations).

Some of the questions under the sub-scale of support include "Has your school provided you with a laptop (or tablet PC, netbook, notebook) for your own use this school year or previous year?" and "In the past two school years, have you undertaken professional development in the following areas?" and others.

Some of the questions under the sub-scale of perceive ease of use (PEU) include: "How often do you use a computer for activities other than work?" and "For how many years have you been using computers and/or the internet at any school?"

Some of the questions under the sub-scale of performance expectations (PE) include: "The usage of ICT in the teaching and learning of Physics helpfully influences students:"

Data for the study was collected via a survey based on the scale for ICT integration (with 1 being the lowest and 4 being the highest).

5.3. Data Analysis

The quantitative data examined whether Physics Tutors' self-efficacy towards ICT is impacted by a number of factors. Comparison of change in self-efficacy beliefs towards ICT use were made based on a number of factors, such as historical inclination towards ICT use, support from supervisors and other stakeholders. The instrument adopted for this study is the 4-point Likert Scale ranging from 1(strongly disagree) to 4 (strongly agree).

The Physics Tutor self-efficacy was divided into three sub-sections under:

a. Support (S): Questions or statements here were put to solicit responses from participants in terms of how much support they get from colleagues, subordinates, supervisors, Heads of Departments, Principals and others at their college when it comes to using ICT tools/devices. Support is not only limited to devices but could also be in the form of professional development (PD) training in the area of ICT.

b. Perceived ease of use or Previous Experience with ICT (PEU): This sub-scale sought to obtain data from participants in terms of how comfortable they are when it comes to the use of ICT tools/devices. It was not meant to enquire into how they use it in teaching or in their specified teaching areas but also in their general use of ICT for other activities including research as well as browsing or using mobile phones to shop online.

c. Performance expectations (PE): Performance expectations sought participants' view of how impactful they feel ICT usage affects the outcome of their teaching and how it affects the performance of the student teachers they handle.

Each of these sub-sections had several questions which sought to ascertain the level of self-efficacy the Physics Tutors have when it comes to the use of ICT and its integration with reference to the teaching of Physics. Table 1, below shows a part of data instrument used for collecting the data.

Table 1: Data instrument for Performance Expectation.

Question (Construct)	Item
Do you consider ICT use during Physics lessons has a positive impact on the following?	**PE 2**
ICT use in teaching and learning Physics positively impacts on students':	**PE 3**
To what extent has ICT sharpened your skills in teaching physics in relation to the following?	**PE 4**

Quantitative data was explored to answer levels of Self-efficacy. The quantitative data was then subjected to descriptive data analysis using SPSS and the means and standard deviations of each of the three sub-scales and that of others were computed. Also, the mean and standard deviation of the overall Physics Tutor self-efficacy (PTSE) was calculated. Other data analyses were performed and observations made based on the data available.

6. Results and Discussion

Table 2: Mean and Standard Deviations of the three sub-scales measuring PTSE.

Scale	N	Mean	Standard Deviation
Support (S)	16	1.8	0.6
PEU	16	3.0	1.2
PE	15	3.1	0.5
PTSE		**2.6**	**0.8**

Mean and standard deviations of the three sub-scales and the overall PTSE (Physics Tutor Self-Efficacy) toward ICT integration are shown in Table 2. The mean for PEU (perceived ease of use) and PE (performance expectation) were both high whiles the mean of Support was very low and mainly accounted for the average placement of the overall PTSE at a mean value of 2.6 on a scale of 4.

Many of the Physics Tutors believe that there isn't enough support in terms of logistics and training from the various stakeholders such as supervisors (Principals, Head of Departments, etc.) and even colleagues in the usage of ICT in teaching Physics. For instance in terms of provision of laptops for teaching, only 25% of Physics Tutors answered Yes, to being provided with laptops by their College with the majority of 75 % answering No. Again in terms of support when it comes to other device such as projectors, interactive whiteboards (IWB), etc. majority of Physics Tutors answered "No". This can be clearly seen in Fig. 1 below.

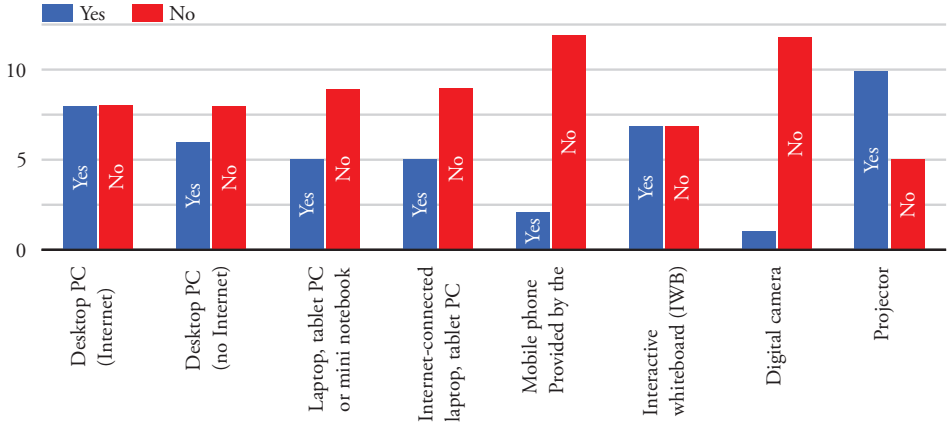

Figure 1: ICT devices/tools as support for the teaching and learning of Physics.

Generally, support was categorized into two sub-sections namely: support in terms of ICT device/ tools for teaching Physics (SA) such as laptops, IWB, projectors, etc. and support in terms of professional development (PD) in the form of ICT training to aid in the teaching of Physics (SB). The results is as expressed in Table 3.

Table 3: Mean and Standard Deviations of PTS in terms of ICT devices (SA) and ICT PD (SB).

Support	N	Mean	Standard Deviation
SA	16	1.7	0.3
SB	15	2.0	0.8

As can be seen from Table 3 support in terms of ICT devices for the teaching of Physics (SA) is very low (1.7 on a scale of 4) whiles support in terms of professional development (PD) training in ICT is around average (2 on a scale of 4). The SB was evaluated by using constructs such as can be seen in the Table 4 below.

Table 4: Data Instrument for Support in terms of ICT Professional Development (PD).

Construct/ Question in terms of Support	Item (SB)
Have you embarked on any professional development (DP) program in the subsequent areas over the past two academic years (internet, word, etc.)?	SB1
How long has your involvement been in total during the last two school years in the above mentioned professional development (PD) opportunities?	SB2
How has your usage of ICT in teaching Physics been poorly influenced by the following? Tick one box for each row	SB3

Therefore even though various Colleges organise ICT trainings for Physics Tutors, the requisite support in terms of ICT devices or tools (laptops, IWB, projectors, Wi-Fi, etc.) required for the implementation and sustenance of the skills obtain is generally not available. And this is responsible for the low mean obtained when it comes to support in terms of ICT.

Generally, most Physics Tutors are comfortable in the usage of ICT tools/devices as can be seen from Table 1. The efficacy of Physics Tutors' in terms of PEU is around 3 on a scale of 4. This is pretty high and represents a considerable level of comfort in the usage of ICT with more than 75% of Physics Tutors stating that they use ICT for other activities other than teaching. Most Physics Tutors on the average have been using PC to teach Physics for at least 3 years or more with more than 50% of the Physics Tutors confirming that they currently use a PC to teach Physics for more than 50% of the time in Class. This is as shown in Fig. 2 below.

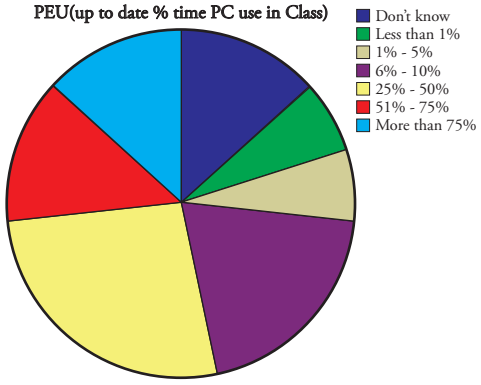

Figure 2: Up to date Perceive Ease of Use (PEU) of PC in Class.

Most Physics Tutors feel the use of ICT is significant and helpful for themselves and the student teachers in lesson preparation, classroom delivery and student learning. For example when the question, "To what extent do you disagree or agree with each of the following statements about the use of ICT to teach Physics?" was asked, 93 % of them agreed that it is significant to use ICT for both exercises and practise and also for students' to study in an independent manner whiles all of them (100 %) agreed to the importance of ICT when it comes to retrieving information and for working collaboratively.

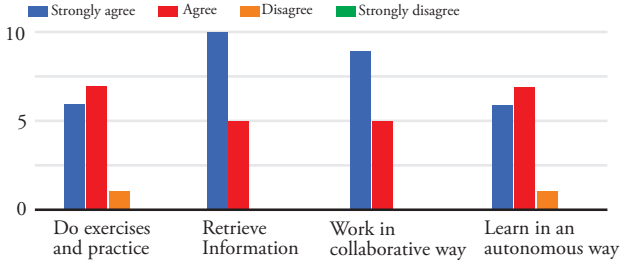

Figure 3: Performance Expectations (PE) of ICT in terms lesson preparation, delivery and learning.

100% of the Physics Tutors feel that the usage of ICT in the teaching and learning of physics clearly has a positive influence on the students' motivation, achievements and that it prepares them well to be able to live and work effectively in the 21st century. 87% of them feel that ICT usage influences students' higher

order thinking skills (such as critical thinking, problem solving, etc.) and their transversal skills (learn-to-learn, social competence, etc.) with Physics Tutors agreeing (approximately 3 being agree on a scale of 4) that ICT has sharpened their skills in terms of lesson delivery, content knowledge, instructional resources, additional reading material, and lesson assessment as can be seen in Table 5, below.

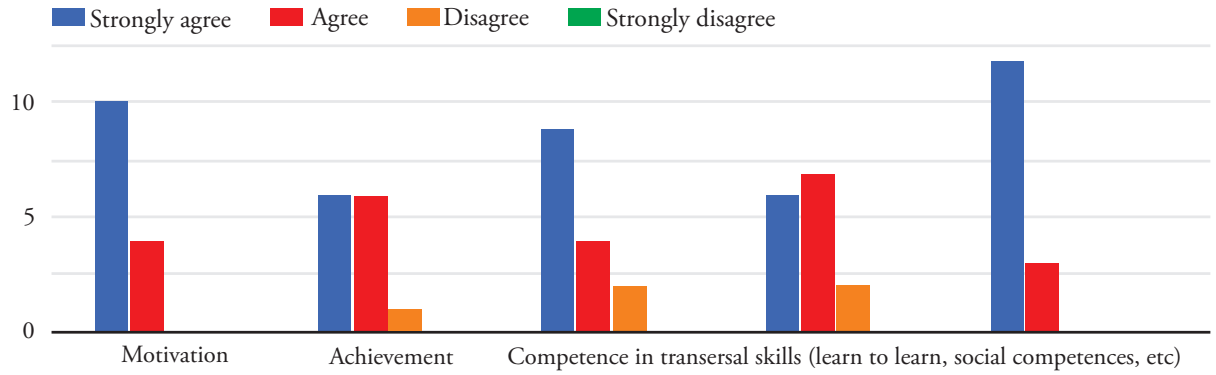

Figure 4: Performance expectations of ICT in terms of student teacher performance.

Therefore most Physics Tutors accept and believe that the use of ICT for teaching Physics significantly improves on the performance of the teaching and the outcome.

Table 5: ICT sharpening skill for teaching physics.

Performance Expectation (PE)	N	Mean	Standard Deviation
Lesson Delivery	14	2.7	1.2
Content Knowledge	14	3.2	1.1
Instructional Resources	14	2.9	1.1
Additional Reading Material	14	2.9	1.2
Lesson Assessment	14	2.6	0.9
Total		**2.9**	**1.1**

From the results obtained from the data, it is very clear that the major factor that has negatively affected Physics Tutors' self-efficacy in incorporating ICT use is support in terms of ICT devices/tools (SA). And this in general brings down the overall support mean due to the fact that support in terms of professional development (PD) itself is average. If by some means the support in terms of ICT was to improve to even an average level, it will appreciably improve the general support and hence the overall PTSE.

Conclusion

This study was conducted to find out Physics Tutors' self-efficacy in incorporating ICT use in their teaching and research in the various Colleges of Education (CoE) in Ghana. In the end it is concluded that the overall PTSE towards ICT integration is above average (2.6 on a scale of 4). What this means is that the average physics tutor in the science college of education in Ghana is barely confidence when it comes to adding ICT tools/devices or implementing ICT skills to the teaching of physics in their class.

This value could be considerably improved if the support given to Physics Tutors in terms of ICT professional development (PD) and specifically the support given in terms of ICT devices/tools such as laptops, Wi-Fi, projectors, etc. is improved. When this is done, it will in turn positively affect the mean value of support (S) and improve the PTSE towards ICT integration as well. Stakeholders in education (such as leadership of the individual colleges of education, departmental heads, ministry of education, etc.) are urged to do more in terms of support for Tutors. Not only in the areas of PD or provision of devices/tools for teaching purposes but other areas which might contribute to their confidence in being able to use ICT effectively when it comes to the teaching-learning process. When this is done, it will go a long way in improving the PTSE.

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1. Kofi Owusu-Sekyere – Manuscript writing, editing and data analysis
2. Assem Humphrey-Darkeh – Manuscript writing and data analysis

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Declaration

It is an original data and has neither been sent elsewhere nor published anywhere.

References

Akgün, F., Özgür, H., & Çuhadar, C. (2016). Investigation of Techno-pedagogical Educational Qualifications of Teacher Candidates and Students of The Pedagogical Formation Program. *Journal Of Adıyaman University Institute of Social Sciences*, *24*, 837-872. https://doi.org/10.33200/ijcer.623668

Alt, D. (2018). Science teachers' conceptions of teaching and learning, ICT efficacy, ICT professional development and ICT practices enacted in their classrooms. *Teaching and Teacher Education*, *73*, 141-150. https://doi.org/10.1016/j.tate.2018.03.020

Arnseth, H. C., & Hatlevik, O. E. (2010). Challenges in aligning pedagogical practices and pupils' competencies with the information society's demands: The case of norway. In Cases on interactive technology environments and transnational collaboration: *Concerns and perspectives* (pp. 266-280). IGI Global. https://doi.org/10.4018/978-1-61520-909-5.ch014

Aslan, A., & Zhu, C. (2015). Pre-Service Teachers' Perceptions of ICT Integration in Teacher Education in Turkey. *Turkish Online Journal of Educational Technology-TOJET*, *14*(3), 97-110. http://www.tojet.net/articles/v14i3/14310.pdf

Aydin, M. K., Gürol, M., & Vanderlinde, R. (2016). Evaluating ICT integration in Turkish K-12 schools through teachers' views. *Eurasia Journal of Mathematics Science and Technology Education, 12*(4), 747-766. https://doi.org/10.12973/eurasia.2016.1227a

Bakaç, E., & Özen, R. (2017). Examining preservice teachers' material design self-efficacy beliefs based on their technological pedagogical content knowledge competencies. *Ahi Evran University Kırşehir Faculty of Education Journal (KEFAD), 18*(2), 613-632. https://files.eric.ed.gov/fulltext/EJ1134392.pdf

Bakar, N. S. A., Maat, S. M., & Rosli, R. (2018). A systematic review of teacher's self-efficacy and technology integration. *International Journal of Academic Research in Business and Social Sciences, 8*(8), 540-557. https://10.6007/IJARBSS/v8-i8/4611

Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of social and clinical psychology, 4*(3), 359-373. https://doi.org/10.1521/jscp.1986.4.3.359

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational psychologist*, *28*(2), 117-148. https://doi.org/10.1207/s15326985ep2802_3

Bandura, A. (1997). The anatomy of stages of change. *American journal of health promotion: AJHP*, *12*(1), 8-10. https://doi.org/10.4278/0890-1171-12.1.8

Bandura, A. (Ed.). (1995). Self-efficacy in changing societies. *Cambridge university press.* https://doi.org/10.1017/CBO9780511527692

Birisci, S., & Kul, E. (2019). Predictors of technology integration self-efficacy beliefs of preservice teachers. *Contemporary Educational Technology*, *10*(1), 75-93. https://doi.org/10.30935/cet.512537

Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using ICT*, *8*(1). https://www.learntechlib.org/p/188018/.

Dibaba, W. (2017). The role of effective integration of ICT in education, especially in primary and secondary education of remote settings. *International Journal of Advanced Research in Computer Science*, *8*(9). http://dx.doi.org/10.26483/ijarcs.v8i9.4923

ELDaou, B., & Kazan, S. (2016). The Effect of ICT Training on the Science Teachers' Self-Efficacy, Attitudes, and Students' Academic Performance in Inclusive Schools 2015. *World Journal on Educational Technology: Current Issues*, *8*(3), 148-164. https://doi.org/10.18844/wjet.v8i3.550

Ersoy, M., Yurdakul, I. K., & Ceylan, B. (2016). Investigating Preservice Teachers' TPACK Competencies Through the Lenses of ICT Skills: An Experimental Study. *Education & Science/Egitim ve Bilim, 41*(186). https://10.15390/EB.2016.6345

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*, *1*(2), 175-191. https://files.eric.ed.gov/fulltext/EJ1105224.pdf

Gilakjani, A. P. (2013). Factors Contributing to Teachers' Use of Computer Technology in the Classroom. *Universal Journal of Educational Research, 1*(3), 262-267. https://10.13189/ujer.2013.010317

Giles, R. M., & Kent, A. M. (2016). An investigation of preservice teachers' self-efficacy for teaching with technology. *Asian Education Studies*, *1*(1), 32. https://doi.org/10.20849/aes.v1i1.19

Hennessy, S., Harrison, D., & Wamakote, L. (2010). Teacher factors influencing classroom use of ICT in Sub-Saharan Africa. *Itupale online journal of African studies*, *2*(1), 39-54.

Henson, R. K. (2001). Teacher self-efficacy: Substantive implications and measurement dilemmas. https://files.eric.ed.gov/fulltext/ED452208.pdf

Hepp, P., Hinostroza, J. E., Laval, E., & Rehbein, L. (2004). Technology in schools: Education, ICT and the knowledge society (pp. 30-47). World Bank, Distance & Open Learning and ICT in Education Thematic Group, Human Development Network, Education. http://mirror.unpad.ac.id/orari/library/library-ref-eng/ref-eng-3/application/education/ICT_report_oct04a.pdf

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational technology research and development*, *55*(3), 223-252. https://doi.org/10.1007/s11423-006-9022-5

Kisirkoi, F. K. (2015). Integration of ICT in education in a secondary school in Kenya: A case study. http://Hdl.Handle.Net/123456789/6913

Lailiyah, M., & Cahyono, B. Y. (2017). Indonesian EFL teachers' Self-Efficacy towards Technology Integration (SETI) and their use of technology in EFL teaching. *Studies in English Language Teaching*, *5*(2), 344-357. http:// 10.22158/selt.v5n2p344

Letwinsky, K. M. (2017). Examining the Relationship between Secondary Mathematics Teachers' Self-Efficacy, Attitudes, and Use of Technology to Support Communication and Mathematics Literacy. *International Journal of Research in Education and Science*, *3*(1), 56-66. https://files.eric.ed.gov/fulltext/EJ1126703.pdf

Ma, K., & Cavanagh, M. S. (2018). Classroom ready? Pre-service teachers' self-efficacy for their first professional experience placement. *Australian Journal of Teacher Education (Online)*, *43*(7), 134-151. https://search.informit.org/doi/10.3316/ielapa.789564914636026

Noguera Fructuoso, I. (2015). How millennials are changing the way we learn: the state of the art of ICT integration in education. RIED. Revista Iberoamericana de Educación a Distancia. https://www.redalyc.org/pdf/3314/331433041003.pdf

Perkmen, S., & Pamuk, S. (2011). Social cognitive predictors of pre-service teachers' technology integration performance. *Asia Pacific Education Review*, *12*(1), 45-58. https://doi.org/10.1007/s12564-010-9109-x

Raphael, C., & Mtebe, J. S. (2017). Pre-Service Teachers' Self-Efficacy Beliefs towards Educational Technologies Integration in Tanzania. *Journal of Learning for Development, 4*(2), 196-210. https://files.eric.ed.gov/fulltext/EJ1149184.pdf

Rigi, A. (2015). Enhancing Iranian EFL in-service teachers' self-efficacy beliefs for technology integration, *International Journal of Language and Linguistics. 3*(5), 307-312.

Sari, S. D. P. (2016). Benefits of ICT based learning Media in language learning Indonesia. In Proceedings National Seminar on Educational Technology. https://media.neliti.com/media/publications/172483-ID-none.pdf

Schunk, D. H. & Zimmerman, B. J. (1998). Self-regulated learning, from teaching to self-reflective practice. New York: The Guilford Press.

Schunk, D. H., & Pajares, F. (2009). Self-efficacy theory: K. R. Wenzel & A. Wigfield (Eds.), Handbook of motivation at school (pp. 35–53). Routledge/Taylor & Francis Group.

Skaalvik, E. M., & Skaalvik, S. (2010). Teacher self-efficacy and teacher burnout: A study of relations. *Teaching and teacher education*, *26*(4), 1059-1069. https://doi.org/10.1016/j.tate.2009.11.001

Skoretz, Y. M. (2011). A study of the impact of a school-based, job-embedded professional development program on elementary and middle school teacher efficacy for technology integration. https://www.learntechlib.org/primary/p/39898/.

Sun, Y., Strobel, J., & Newby, T. J. (2017). The impact of student teaching experience on pre-service teachers' readiness for technology integration: A mixed methods study with growth curve modeling. *Educational Technology Research and Development*, *65*(3), 597-629. https://doi.org/10.1007/s11423-016-9486-x

Ünal, E., Yamaç, A., & Uzun, A. M. (2017). The Effect of the Teaching Practice Course on Pre-Service Elementary Teachers' Technology Integration Self-Efficacy. *Malaysian Online Journal of Educational Technology*, *5*(3), 39-53. https://files.eric.ed.gov/fulltext/EJ1150409.pdf

Uzuntiryaki, E. (2008). Exploring the sources of Turkish pre-service chemistry teachers' chemistry self-efficacy

beliefs. *Australian Journal of Teacher Education (Online)*, *33*(6), 12-28. https://search.informit.org/doi/10.3316/informit.799252485289435

Valtonen, T., Kukkonen, J., Kontkanen, S., Mäkitalo-Siegl, K., & Sointu, E. (2018). Differences in pre-service teachers' knowledge and readiness to use ICT in education. *Journal of Computer Assisted Learning*, *34*(2), 174-182. https://doi.org/10.1111/jcal.12225

Wise, J. B., & Trunnell, E. P. (2001). The influence of sources of self-efficacy upon efficacy strength. *Journal of Sport and Exercise Psychology*, *23*(4), 268-280. https://doi.org/10.1123/jsep.23.4.268

Yagci, M. (2016). Effects of Pre-Service Information Technologies (IT) Teachers' Thinking Styles on Their Use of Information and Communication Technology (ICT). *Educational Research and Reviews*, *11*(2), 48-58. https://10.5897/ERR2015.2551

Yamamoto, Y., & Yamaguchi, S. (2016). A study on Teacher's Self-efficacy for promoting ICT integrated Education in primary school in Mongolia. *Journal of international cooperation in education, 18*(2), 1-15. https://www.researchgate.net/publication/312059616

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