Investigating The Benefits Of Incorporating Technology In Instructional Curriculum: Pre-Service Teachers' Perspectives From Ghana

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Abstract: The use of technology has gained worldwide recognition in all professions. Teachers have resorted to several technology tools to enhance the work they do in the classroom and to facilitate the understanding of what they teach their students to enhance easy recall and for students to remember what they learn in class.

The use of technology tools in the classroom in Ghana has not received much attention from teachers because of challenges with respect to technological infrastructural development. However, with the inclusion of technology in the teacher colleges of education curriculum, new teachers are being trained to incorporate technology into classroom instruction to change the face of teaching and make learners more eager to learn by bringing the understanding of concepts much more clearly to students.

The study adopted a mixed method approach to bring to light, the perspectives of teacher trainees and tutors in colleges on the benefits both the teacher and the learner stand to gain in using technologies to deliver instruction in the classroom. It came to light that although there are challenges pre-service teachers tend to face in terms of access to such technologies, they still do their best to include technologies in their lessons whenever possible. This is because of the fact that learners tend to do well on instruction received on lessons delivered using technology as compared to lessons delivered without using technology based on their experience in using both approaches in the classroom.

Keywords: Technology, instruction, benefits, curriculum.

I. INTRODUCTION

Technology acceptance in education has been encouraged by its useful influence on education delivery, quality and support. For this reason, Christie, Hickey, Kindfield and Horwitz (2002) and Ansyari (2012) purposefully advocate for technology at the core of life-long learning, learner-centered education, off-campus course provision and improved educational co-operation. Without doubt technology use enables students to create understanding, obtain useful and enhanced capabilities as they cultivate high order thinking and problem-solving skills (Madge & O'Connor, 2004). This is essentially linked to the fact that technology enables variations in educational processes, permits easy access to more electronic resources, partnership and activity of clusters of students, and offers the opportunity for the teachers to give discrete assistance to their students (Uibu & Kikas, 2008). With the ability of technology to bring about alterations in established processes, it also principally provides student's all-time learning adventures (Debande & Ottersten, 2004).

Several studies show statistical evidence that technology can improve attainment in subjects (Burnett, 1994). United Kingdom's (UK) major impression investigation demonstrates a rise in subject accomplishment via technology use in English, science and design, and technology (Burnett, 1994). Similarly explicit technology usage, such as interactive whiteboards in the UK, had a constructive consequence on pupils' attainment in reading ability, mathematics and science tests compared to learners in other institutions. Technology use particularly enhanced the attainment of low achieving learners in English and effect was paramount on writing.

Other impression studies in the United Kingdom that considered technology influence from a cost-effective perspective, endorses technology investment influences clearly on educational attainments in basic institutions, mainly in literacy but not in numeracy (BESA, 2002). On a multinational level, the inquiry of the Programme for International Student Assessment (PISA) organized by the Organization for Economic Co-operation and Development (OECD) outcomes show that persistent use of computers by learners is linked to improved outcomes in numeracy in PISA findings. The results in national tests demonstrate that technology is capable of making a huge difference. The use of the internet in teaching and learning is an essential condition to profit from innovative technologies for education. It brings about notable advances in learners' attainments in national tests written at age 16. Generally, proof from the UK research appraised indicates that performance rises accordingly with the integration of technology into instruction (Childs, Sorenson & Twidle, 2011). Institutions with advanced stages of electronic-maturity reveal an added speedy growth in educational attainments as compared to the less advanced ones.

Generally, studies examining technology effects on students' accomplishments, for instance the e-learning Nordic report (Rasmussen, 2008) gave a positive picture of technology use with educators persuaded that learners' course associated scores and elementary aptitudes (calculation, reading and writing) along with school attainments improved (Clark, 1999). A vast majority of studies confirmed broader affirmative advantages of technology use in educational fields (Cox & Graham, 2009). The fact that technology improves a more student-centered learning methodology is frequently associated to significant advantages of technology use. Technology can also be advantageous to intellectually strong and weak learners in addition to students with exceptional needs. A lot of activities which teachers called collaborative simply drawn in learners working together with one another instead of cooperatively tackling a challenge (Davidson, 2000).

Technologies by their very nature are tools that advance and help individual education. The use of technology in learning situations, by itself works as a vehicle for change in this capacity. Learners making use of technologies for educational intents develop positive attitudes towards it (Jonassen & Reeves, 1996). As they use technology as aids to their learning, the effect of the technology on assisting the way learners learn will persist to improve. If indeed technology contributes to higher attainment in students, then there is the need to train pre-service teachers to incorporate technology into instruction without any delay. Again, if indeed the use of technology enhances students' attainments in their educational pursuit, then there is no excuse that today's teachers teach without its use. However, using technology for delivering instruction in the classroom can only materialize if all stakeholders for teacher education come to accept that as a fact. Thus one of the objectives of this investigation was to establish pre-service teachers' understanding of technology integration and ascertain their views on the benefits of technology use to the teacher as well as the learner.

OBJECTIVES OF THE STUDY

The main objective of this study was to investigate into the perspectives of pre-service teachers in the colleges of education in Ghana with regards to the use of technology in teaching and learning and the benefits associated with its use. This is because there is a clarion call on all teachers to use as much as possible, technology to deliver instruction as this helps to improve learners' attainments in their studies (Veen, 2012).

II. METHOD

Mixed method data collection strategy was used allowing for both quantitative and qualitative data to be collected. The use of the multimethod in the study was premised on the belief of triangulation that seeks to ensure that the researcher uses more than one measurement procedure and invariably enhances trust in findings (Creswell, 2003). Besides, this strategy for data collection allows for deeper insight into the problem at hand. It also helps in offsetting the weaknesses in one method with the other.

III. PARTICIPANTS

The participants for the study were final year students from eight colleges of education in Ghana. Random selection was done to ensure the results of the study could be generalized to the population under study. Four tutors with more than three years teaching and supervision experience were drawn for the qualitative sample through the purposive sampling procedure as participants from the eight colleges. They were interviewed with a semi-structured interview guide. Also, four student focus groups consisting of not less than ten students selected were interviewed with another semi-structured interview guide. This was to solicit from both of them, their perspectives on the investigation.

IV. DATA AND ANALYSES

The data that were collected were cross-checked and cleaned to ensure that no mistakes existed in the responses and that the information provided was suitable. The quantitative data was analyzed using Statistical Package for Social Sciences (SPSS) to process and analyze the questionnaires. Quantitative data was analyzed statistically by use of descriptive statistics (Mean, Standard Deviation, Percentages and Frequencies). The in-depth interviews (IDIs) were analyzed manually. The data from the IDIs were transcribed, categorized under specific themes and subthemes and used for the analysis. Researcher personally carried out all interviews to ensure that the required data were collected to help improve credibility and answer the research questions in the study. Again, researcher personally analyzed the interview data that were collected.

V. RESULTS

The results for both types of data are as presented below.

Statement	SD	D	U	A	SA	Total	M	ST.D
I have access to different technologies to be used in teaching and learning	52 (12.5)	94 (22.5)	74 (17.7)	140 (33.6)	57 (13.7)	417 100	3.13	1.202
I am able to use different available technologies	15 (3.4)	45 (10.8)	89 (21.3)	204 (48.9)	63 (15.1)	416	3.62	.980
I use technology in my teaching to promote active learning	30 (7.2)	84 (20.1)	63 (15.1)	170 (40.8)	70 (16.8)	417 (100)	3.40	1.189
I use technology to enhance instruction	36 (8.6)	80 (19.2)	68 (16.3)	169 (40.5)	64 (15.3)	417 (100)	3.35	1.200
I use technology to improve student learning	28 (6.7)	51 (12.2)	60 (14.4)	184 (44.1)	94 (22.5)	417 (100)	3.64	1.155
I use technology in my teaching to promote problem solving on learners	32 (7.7)	56 (13.4)	67 (16.1)	186 (44.6)	75 (18.0)	416 (99.8)	3.52	1.159
I always try to use technology where possible in all my lessons	34 (8.2)	69 (16.5)	51 (12.2)	188 (45.1)	74 (17.7)	416 (100)	3.58	2.358
I use technology in my teaching to make learning more fun	34 (8.2)	78 (18.7)	72 (17.3)	178 (42.7)	54 (12.9)	416 (99.8)	3.34	1.163
I use the internet to enhance my teaching and learning	78 (18.7)	81 (19.4)	62 (14.9)	137 (32.9)	58 (13.9)	417 (100)	4.01	.977
I use e-learning platforms to promote teaching and my own learning	73 (17.5)	91 (21.8)	69 (16.5)	128 (30.7)	56 (13.4)	416 (99.8)	4.08	.973

SD: Strongly Agree; D : Disagree; U : Uncertain; A : Agree; SA : Strongly Agree; M : Mean; ST.D : Standard Deviation (Mean : 1 – 2.4 Low; 2.5 – 3.4 Moderate; 3.5 – 5 High)
Table 1: Responses on pre-service teachers' access to, identification of varieties of technologies and use

For access to different technologies that could be used in teaching and learning, 47.3% (n=197) of respondents confirmed to having access to different types of technologies to be used in teaching and learning in the classroom. Respondents' ability to use different technologies available had majority of them (64%, n=267) confirming to using different technologies for instruction. 57.6% (n=240) agreed to using technology to promote active learning in students, a positive indication that pre-service teachers use technology to promote learning in their students. Majority of pre-service teachers (55.8%, n=233) agreed to the use of technology in the classroom to enhance instruction. Again, it was common amongst respondents (66.6%, n=288) that they used technology to improve upon students' learning. A total of 62.6% (n=261) agreed to using technology to promote problem solving in their learners constituting the majority of respondents using technology to promote problem solving skills in learners.

In trying to integrate technology where possible in all lessons, 62.8% (n=262) agreed to that assertion. It came out that majority of pre-service teachers (55.6%, n=232) agreed to using technology in their teaching to make learning more fun for learners. The calculated mean (standard deviation) for this variable was 3.34(1.163) establishing that using technology to make learning more fun for learners was fairly high. The use of the Internet was very popular among pre-service teachers as 56.8% (n=195) confirmed using the internet as a tool to enhancing teaching and learning. In all, 41.7% (n=174) rated their use of social media platforms for teaching and learning as poor with a mean (standard deviation) of 2.93(1.279) indicating a disagreement that pre-service teachers use social media platforms in teaching and learning. However, the use of e-learning platforms to enhance teaching and learning was good (44.1%, n=184) with an average score of 3.01(SD=1.329).

QUALITATIVE RESULTS ON PRE-SERVICE TEACHERS' BENEFITS OF USING TECHNOLOGY FOR TEACHING AND LEARNING

To answer the research question, student focus group interviews as well as semi-structured tutor interviews were held. During the interviews, themes and sub-themes bothering on pre-service teachers' perspectives on the benefits of incorporating technology into instruction was sought. The main themes and sub-themes are presented in Table 2 below.

Themes	Sub-themes	Related issues
Identification of technology tools, their availability for use and benefits for teaching and learning	Technology tools	Technology tools included desktop computers, laptop computers, projectors, printers, calculators, smartphones, tablets, slide presentations, microphones, audio devices, the internet, microwave dishes and scanners.
	Tools and equipment	The use of tools and equipment to solve problems confronting humans day-to-day. E.g. smartphones, computers, etc
	Availability of technology tools	Insufficient tools in colleges, public schools unlike in private institutions. Mentioned here mostly were equipped computer laboratories and the internet.
	Use of technology tools	Teachers do not use it where it is not available. Reasonable to expect teachers to use technology in teaching because the working world is now digital.
	Expectation to technology use	Reasonable to expect teachers to use technology for its enormous benefits and changing trends.
	Benefits of technology use in instruction	Audio-visual nature of videos helps meet learning styles of most learners. Makes work of teacher much easier. Improves learners' ability to remember lessons. Improves test scores of learners. Maintains and catches attention of learners during lessons.

Table 2: Themes and sub-themes on pre-service teachers' benefits of incorporating technology into instruction

VI. TECHNOLOGY TOOLS

Both tutors and pre-service teachers were asked to state the kind of technologies they usually use with their students. Their responses noted items such as desktop computers, laptop computers, tablets, scanners, printers, projectors, smartphones, microphones, audio devices, the internet, slide presentations, graph boards, calculators, email, web-based training, computer-based training, network equipment including routers, switches, cables and microwave dishes.

Mostly, because the syllabus specifies the kind of tools we ought to use to teach our students, which of course are mostly computer-based resources, we use desktop computers a lot. So our computer laboratory is well resourced with desktop computers. We also have a projector that helps us to teach in the lab. (T4)

Pre-service teachers, however, felt the technology tools they use to teach their students on teaching practice were many. They said they sometimes had to borrow projectors from their colleges in order to teach very important topics if they make written requests way ahead of time indicating the time and day they want to use them. This happened in places where pre-service teachers were practicing in schools closer to their colleges. One of them had this to say:

The technologies we usually use when on teaching practice include calculators, laptop computers, and smartphones. If we need a projector, because the school where we practice is closer to our college, we could write officially to the college and indicate when we need it and they provide us with it for use. We do this if we have a very important topic to teach. If we are lucky, we get it even though we don't get it always because our colleagues from other schools also come for it. (SFG2, PS9).

Pre-service teacher participants therefore, used technology in teaching whenever the tools were available for instruction even though technology tools were very limited.

VII. TOOLS AND EQUIPMENT

Participants saw technology as mostly tools and equipment designed by humans to aid in carrying out daily activities to make life easier for humans. One tutor said:

Technology can be seen as tools and equipment that assist humans in carrying out their day-to-day activities and making life more convenient. E.g. The use of smartphones allows one to make calls to reach out to millions irrespective of wherever one is, as long as there is reception for the network. (T2)

It was the view of most tutors interviewed, as well as that of pre-service teacher participants, that technology involved mostly the use of tools and equipment to carry out work in a much easier way as a result of increasing research and scientific knowledge which is moving the world now. They indicated that even the old equipment used to carry out such tasks has seen considerable improvement to make work even less difficult and efficient than when such tools were invented. This is what one pre-service teacher had to say:

Through technology, the world has seen a lot of improvement in the way of how humans do things. Research led to an improvement in reducing our electricity bills because now, we use energy-efficient bulbs that consume less energy as compared to what was being used not too long ago. (SFG3, PS 11)

Participants were of the view that technology comes by way of tools and equipment to aid humans in carrying out day-to-day activities in an efficient manner which was not the case not too long ago.

VIII. AVAILABILITY OF TECHNOLOGY TOOLS

The researcher sought to find out if pre-service teachers used any of the different types of technologies identified. Tutors said a lot about pre-service teachers and their use of technology for instruction. Almost all the four tutors were confident pre-service teachers were using technology for their instructional delivery subject to their availability. It was common to see participants speak about the fact that most private schools, which charge computer fees, have the ICT facilities and pre-service teachers who get the chance to do practice or internships in those institutions use them because of their availability. Tutors were of the view that same facilities were unavailable in government schools because of lack of funds and government commitment. A tutor from one of the selected colleges had this to say:

Teacher trainees are equipped to teach with technology but the problem has always been with the availability of ICT tools in schools where they go to do their internships or posted to work after school. My personal observation is that most private schools visited to supervise our students on teaching practice have computer labs because the proprietors charge students for using the facility. There are always computers and projectors for use. In some cases, they even have internet connectivity where trainee teachers can use to do research before lessons. (T2)

There was a common view among participants that technology resources were unavailable in most schools and this was the main hindrance to the use of technology for instruction. Some students, regardless of this challenge, still did their very best to integrate technology into their teaching. Given below were some of the views of pre-service teacher participants in the interviews:

I usually make good use of pictures from the internet and by so doing, I think I have integrated technology into my teaching. (SFG2, PS9)

For me, I always use my personal laptop to teach. When I am teaching something like MS Word, I can't teach it in abstract so I always go the classroom with my laptop to teach my students. (SFG3, PS12)

I always use my mobile phone to download pictures on topics and show them to my students in class. (SFG1, PS3)

Pre-service teachers did not mince words about the use of technology in the classroom and the availability of instructional tools in schools.

We hardly use technology to teach because unlike our colleagues who are in the private schools, we lack such facilities here (in the public/government schools) and this makes teaching very difficult for us. (SFG1, PS4)

Most pre-service teacher participants who taught in government schools complained of the lack of technology

tools and equipment in such schools and cited that as a major hindrance to their competitive use of technology for instruction and for their professional development.

VIII. PRE-SERVICE TEACHERS' USE OF TECHNOLOGY FOR INSTRUCTION

From Table 2, it can be noted that pre-service teachers use technology tools to deliver instruction whenever they were available. Even though some tutors were of the view that pre-service teachers' training to integrate technology into instruction was very limited, they were still compelled to use technology in teaching once the tools were available. One respondent had this to say:

……throughout the week, students only have just a session of less than two hours to learn a lot about technology and you know technology takes a lot of time to learn. Students have to learn the practicals as well as the theory but considering the amount of work to be done per the syllabus before writing their exam, it's impossible so most tutors don't get the time to give student teachers the practical skills they need to teach with technology. This, sometimes makes it difficult for students to integrate technology into their lessons. They only do what they feel they can. (T1)

Participants complained of the limited time available for pre-service teachers to learn to teach with technology from college. That notwithstanding, pre-service teachers did their best by inculcating technology into their instruction whenever and wherever they got the opportunity during teaching practice. Tutors however, hoped for more time for teaching and learning technology for instruction both for themselves and pre-service teachers.

In the light of the issues raised above, the researcher further probed whether it was reasonable to expect teachers and pre-service teachers today to integrate technology into instructional activities. Both tutors and pre-service teachers acknowledged that it is very important and very reasonable to expect teachers in class today to integrate technology in their instructional activities. One tutor had this to say:

It is very reasonable. You know technology rules the world now so it is very reasonable to be abreast with time. If I have my own way, I would get all teachers who fail to use technology for instruction sanctioned if only they (technology resources) are available. (T2)

Another tutor remarked:

Yes, very reasonable. If I have a way, I would recommend that all teachers use technology for instructional purposes because the students they teach are now in the digital age. (T4)

Pre-service teachers equally felt it was very reasonable for teachers of today to use technology for instructional purposes citing reasons such as taking care of needs of students because of the multimedia aspects of technology being very advantageous to meet the audio and visual needs of students, among others. One thing that became obvious from the interviews with the students was that they observed the world was changing digitally so if teachers failed to use technology, they would be denying their students a lot of opportunities. To

them, using technology for instruction could help to get maximum benefits of the school curriculum.

IX. BENEFITS OF TECHNOLOGY USE FOR INSTRUCTION

Researcher probed participants on the benefits of incorporating technology into teaching and learning. On this, most tutors were of the view that the audio-visual nature of videos used in teaching and learning met the learning styles of most pre-service teachers that was equally applicable to the learners taught by pre-service teachers in the classroom. Some of them had this to say:

……….remember, some people learn by hearing whilst others learn by seeing. Others learn best by listening and watching at the same time. By the power of using videos in instruction, all these learning styles are met. T4

The use of technology is able to help meet the learning styles of most learners. Computers make use of both audio and visual effects which help meet the needs of most learners. T1

I like using the computer and projector to teach difficult topics which students find most difficult to remember. The use of technology helps a lot in this regard. T3

Pre-service teachers could not agree more as they shared same views with their tutors. They reiterated that by using technology to deliver instruction in the classroom, per the audio-visual nature of computers, the needs of even the deaf and blind are met. This is evident in the comment:

Computers have the ability to play sound so even blind students can learn from specially prepared materials with audio to aid their learning. For this reason, teachers must look for materials to aid their delivery of instruction based on the needs of their students (SFG2 PS9).

Pre-service teachers and their tutors talked about incorporating technology into instruction and how this makes the work of the teacher that easy. They claimed the use of technology makes the work of the teacher much easier. This is what one pre-service teacher participant had to say:

Sometimes, certain topics are best taught using computers. Imagine you have to teach a topic like fertilization in plants to your students. Instead of doing so much talking in the classroom, you can simply get a video of it and show it to your class. This makes your students observe exactly what happens during the fertilization process saving you that long talk which may even end up confusing some of your students (SFG4 PS18).

Thanks to "YouTube", there are a number of videos that can be downloaded and used in teaching most topics at different levels of education. The only thing to do is to download the videos and show them to your class. This saves a lot of time and makes the work of the teacher much easier (SFG2 PS7).

Tutors praised pre-service teachers who use their own laptops to show videos of lessons delivered to learners by using computers. They said pre-service teachers recognize the importance of using technology to deliver lessons because they found that as an easy way to deliver instruction whiles making the work of the teacher much easier. One of them had this to say:

ICT student-teachers are doing very well by using computers to deliver their instruction in the classroom. Mostly on supervision when they are on teaching practice, you find them delivering instruction using their own laptops or borrowed laptops. To them, it is very difficult to teach a topic like "Microsoft Word" application to students because it has to be practical. T2

Participants again were of the view that the use of technology in lessons enables learners to remember what they learn quite easily. They said technology which makes use of visual effects helps improve the retentive memory of learners. One pre-service teacher participants retorted:

The use of computers helps my students remember virtually everything I teach them. A case in point is when I had the opportunity to show them a clip of how libation is made. After some time, they were able to recall exactly how libation is made without missing a point. (SFG1 PS3).

To pre-service teachers, the use of technology to deliver instruction must be encouraged in the classroom to both in-service teachers and student-teachers on teaching practice as this helps improve learners' ability to recall lessons.

One fascinating experience shared by tutors and pre-service teachers was that the use of technology helped improve the test scores of their learners. Tutors especially those from the ICT department in college claim test scores of pre-service teachers taught using technology always looked good as compared to courses delivered without using technology. A tutor shared this experience:

Surprisingly, student-teachers' test scores are good when taught using technology. Whiles I keep recording high scores of my students in tests, my colleagues from other departments keep complaining about low test scores from their students. I am tempted to say that it is my use of technology that brings out the difference! T1

Pre-service teachers on the other hand feel that the constant use of technology to deliver instruction can help boost the test score of learners. They claim that it makes learners remember whatever they learn quickly because they tend to observe and see things better with technology. These are some comments:

I did a test and showed my mentor the papers and the scores of students which amazed her. All she could say after seeing the test scores was that it was my use of computers that is making the difference. (SFG3 PS14)

I always try to use computers in teaching because of my college experience. I think I do better on subjects taught using technology at college than subjects taught without using computers. So anytime I go on teaching practice, I try to use computers to teach because it has a lasting effect on the minds of my students. They tend to perform well when taught using computers. (SFG1, PS3).

Some pre-service teachers claimed because technology is not that common especially, their uses in the classroom, more learners tend to pay attention to instruction when used to deliver instruction in the classroom. A common observation from pre-service teachers is summarized in the comment given by one of them:

The use of technology for instructional delivery fascinates learners. They tend to pay more attention in class than in the traditional way of classroom instruction. This helps maintain

silence during instruction thus making lesson delivery very smooth and easier for teachers. (SFG4, PS20)

In all, pre-service teachers enumerated a number of benefits and called on all teachers to try and incorporate technology into their teaching and learning activities which they believed, would go a long way to assist both the teacher and the student in instructional delivery.

X. DISCUSSION

Pre-service teachers affirmed knowing what technology is and went on to state some of the benefits both teachers and learners derive from using technology in the classroom for instructional purposes. Ertmer (2005) states that pre-service teachers see technology as anything concrete and purpose driven to assist in teaching and learning. In this study, there was an overwhelming acknowledgement by pre-service teachers of knowing what technology is. They mentioned the different kinds of technologies available for use in instruction which included computers, calculators, smartphones, projectors, graph boards among others as some of the technologies they rely on to deliver instruction. Stobaugh (2002: 18), in his study, stated that pre-service teachers define technology as the "ever changing electronic tools that aid people with instant access to educational, entertainment and online resources". The findings of this study validate Stobaugh (2002) findings that pre-service teachers know and can identify different technologies available to be used for instructional purposes. In the same study by Stobaugh (2002, p.21), pre-service teachers observed that technology is "any piece of equipment that allows for digital media/communication like projectors, computers, smartboards, etc. or tools which are used to serve a purpose". The findings of this study established pre-service teachers' belief that technology abounds and has enormous benefits for instructional use. Thus, if pre-service teachers can identify technologies and their uses, as well as their benefits for instructional purposes, it confirms Cuban (1995) study findings which noted that a teacher's knowledge of technology affects how technology will be taken seriously and made use of in the classroom.

Pre-service teachers felt that the use of calculators and graph boards in Mathematics lessons enhanced the accuracy of results obtained and made the work of the teacher much easier. They believed that using technologies in lessons enabled learners to study what they are taught in the classroom much easier as compared to what transpires in a typical traditional classroom. This concurs with what Mong (2013), who studied pre-service teachers' involvement with technology integration, and revealed that technology integration is the incorporation of technology into classroom instruction to enable learners to study topics through a range of media sources.

The findings in this study revealed that technology use enables learners to create an understanding of facts, concepts, and principles to obtain useful and enhanced capabilities as they cultivate higher order thinking and problem-solving skills. This is because the integration of technology in lessons helps in unearthing and understanding of issues which otherwise would have been difficult for learners. This

confirms findings made by Madge and O'Connor (2004) that the use of technology eases the burden on learners who struggle to understand lessons which hitherto would have been difficult to comprehend. The findings made in this study confirm Kaiser Foundation (2003) revelation that using different kinds of technologies met challenges posed by learners who use more sophisticated technologies at earlier ages.

It is generally believed that pre-service teachers, with a strong technology applications background, tend to experience greater success with technology integration once they have good pedagogical and content knowledge foundations. This study's quantitative data shows that pre-service teachers' daily use of computers for instruction was poor. This contradicts Baeur and Kenton's (2005) findings that the most common use of technology in a teacher training college institution was PowerPoint since PowerPoint applications can only be used with computers and handhelds. From the qualitative data however, it emerged that pre-service teachers used PowerPoint for presentation whenever computers were available in the schools where they practiced, and during on-campus teaching practice as well. Perhaps it is the absence of computers in most public/government schools that pre-service teachers alleged their use of PowerPoint was poor from the quantitative data.

Another major finding of this study related to the use of the internet for teaching and learning. Pre-service teachers claimed good use of the internet which supports findings of the UCLA Center for Communication Policy (2003) reporting that internet usage is highest among those between the ages of 12 – 18 (97% online) followed by those in the 19 – 24 age category (87%). By UCLA policy, it is estimated that a 21-year old has more or less exchanged 250,000 emails, instant messages and phone text messages and has used over 5000 hours playing computer games, 10,000 hours using a cell phone, 3500 hours online carrying out studies or blended online learning. Pre-service teachers, in this study (mostly in the 18-24 age category), however reported poor use of social media platforms to enhance learning which contradicts the findings of the UCLA (2003) report.

Pre-service teachers in this study reported limited access to technology tools both at home and at college. This might have accounted for their poor use of social media platforms to enhance their learning. Apparently, pre-service teachers demonstrated good use of e-learning platforms to enhance teaching and learning which agrees with Godfrey's (2001) suggestions that pre-service teachers can reach out to their colleagues easily and more effectively as they get the opportunity to share ideas on teaching and learning information using email.

Pre-service teachers and tutors enumerated a number of benefits both teachers and learners stand to benefit from the use of technology to deliver instruction. The study found that learners tend to benefit from instruction delivered by the use of technology because of the audio-visual nature of it. This confirms what Ansyari (2012) found in a study conducted to evaluate a professional development programme for technology integration to enhance English Language teaching where it was reported that learners pronunciation and spelling of English words got improved with the use of carefully prepared audio-visual materials to improve their English Language development as this helped to meet the learning styles of most learners on the programme. This study equally found that the work of teachers is made easier with the incorporation of technology which endorsed Das (2010) findings that most teachers claim their work was made easier with the use of technology thus their decision to always resort to its use in teaching. A number of studies (e.g. Almohaissin, 2006; Fogleman, McNeill & Krajcik, 2011, Gronseth, Roman, Abaci & Plucker, 2012; Kelly, 2008) reveal that learner memory of recalling lessons is improved dramatically when taught using technology. They said it makes learners remember lessons faster whenever the need arises. In this study, it was confirmed that learners tend to remember stuffs taught using technology which is in agreement with earlier studies such as given above. Martinovic and Zhang (2012) and; Anderson and Davidson (2011) in their study revealed the test scores of learners taught using technology improved remarkably as is the case in this study. This study indicated that both student-teachers and learners in schools where pre-service teachers taught using technology recorded improvement in test scores and thus called for technology integration in all lessons where available. It was found in this study that students paid attention in classes where technology was used which concurs with the findings made by Drent and Meelissen (2008) when they studied factors obstructing or stimulating teacher edited videos as data for inquiry.

XI. CONCLUSION AND RECOMMENDATIONS

Although pre-service teachers indicated having access to different available technologies, they complained of non-availability of other technology tools, apart from computers which were available but not in adequate quantities for pre-service teachers to have a one-to-one computer-student ratio in colleges. Pre-service teachers revealed that computers and projectors were available in college for their technology training but were absent in schools where they practiced for their professional preparation and development. However, they used them where they were available. There was a positive indication of numerous benefits of incorporating technology into instruction to benefit both teachers and learners. Some of these included meeting the learning styles of learners, improving remembrance of concepts taught with technology, improving test scores of learners among others. There is therefore no gainsaying about the fact that based on these findings, technology use in the classroom must be encouraged.

The findings of the study indicate an immense necessity to re-examine the way teachers use technology in the classroom for instructional delivery. This calls for both policy and practical considerations. With regards to policy, the various stakeholders such as the Ministry of Education, National Council for Tertiary Education, the Curriculum Research and Development Division of the Ghana Education Service would need to develop policy guidelines for properly resourcing schools with technological infrastructural development. These changes in policy would enable the government to budget for and provide technology resources

whilst being supported by NGOs and corporate organizations. Practically, the findings should help stakeholders address the problems which are preventing teachers from incorporating technology into instruction and enable them to make the necessary modifications to established practices required for the successful implementation of technology use in schools. This would invariably result in a remarkable reduction in teachers failing to incorporate technology into instruction to realize the set objectives of the global call by UNESCO (2008) on all teachers to use technology for instruction because of its enormous benefits in the field of education.

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