UNIVERSITY OF EDUCATION, WINNEBA

CHALLENGES AFFECTING TEACHER ATTITUDES TOWARDS ICT INTEGRATION IN PHYSICAL EDUCATION TEACHING AMONG TEACHERS OF SENIOR HIGH SCHOOLS IN THE WESTERN REGION

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2019

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A thesis in the Department of Health, Physical Education, Recreation and Sports, Faculty of science, submitted to the School of Graduate Studies in partial fulfilment

of the requirement for the award of the degree of
Master of Philosophy
(Physical Education)
in the University of Education, Winneba

MARCH, 2019

DECLARATION

Student's Declaration

I, Appiah Martin Benjamin declare that this Thesis, with the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and that it has not been submitted, either in part or whole, for another degree elsewhere.

Signature: …….....……

Date: …….....…….……

Supervisor's Declaration

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of Thesis as laid down by the University of Education, Winneba.

DR. JATONG BABA (Principal Supervisor)

Signature: …….....……

Date: …….....……

PROF. J.O AMMAH (Co-Supervisor)

Signature: …….....……

Date: …….....……

ACKNOWLEDGEMENTS

I wish to acknowledge with gratitude my indebtedness to all the staff of the Department of Health, Physical Education, Recreation and Sports (HPERS) of the University of Education Winneba for their encouragement and constructive criticism during the period of my study, especially Dr. Jatong Baba and Professor Jonathan Osbert Ammah, my supervisors, for their commitment. I would also want to acknowledge Mr. and Mrs. Adu Yeboah (Adenta- Frafraha) and my brother, Isaac Appiah Ngissah (Asankrangua), not forgetting Mr. and Mrs. Gyekye Biney (Tarkwa) for all the financial support, my success story cannot be told without them. I am very grateful for all your support and encouragement.

Finally, to all other concerned people, colleagues and friends who in one way or the other aided me in producing this work, God bless you all. May they enjoy the fruit of long life and prosperity.

DEDICATION

This work is dedicated to my precious mother; Diana Appiah Bentuma (St. Joseph Senior High School-Sefwi Wiawso).

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

AAPHERD-	American Association for Health, Physical Education, Recreation and Dance
TAM -	Technology Acceptance Model
TPCK-	Technology Pedagogical Content Knowledge
TK-	Technology Knowledge
CBA-	Classroom Base Physical Activity
CDC-	Center for Distance Control
CK-	Content Knowledge
DDR-	Dance Dance Revolution
DIT –	Diffusion of Innovation Theory
TCK-	Technology Content Knowledge
IIT-	Integrated Information Technology
ISIE-	International Society for Innovation Education
KISS-	Kinder-Sports Students
NASPE-	National Association for Physical Education
NCATE-	National Council for Accreditation of Teacher Education
TAC-	Technology Across the Curriculum
TGAC-	Technology Guidelines Advisory Committee
PCK-	Pedagogical Content Knowledge
PE -	Perceived Enjoyment
PEIE-	Physical Education Innovation Education
PEU -	Perceived Eased of Use
PK-	Pedagogical Knowledge
PLAY-	Promoting Lifestyle Activity for Youth
PU -	Perceived Usefulness
RIPPLES-	Resources, Infrastructure, People, Policies, Learning, Evaluation and Support
TAM -	Technology Acceptance Model

ABSTRACT

The study was designed purposively to investigate the challenges affecting attitudes towards information technology integration in Physical Education teaching among teachers of Senior High Schools in the Western Region of Ghana. Descriptive design was adopted in carrying out the research. Seventy-eight (78) Physical Education teachers were sampled using the census sampling technique. Secondary Physical Education Teacher's Attitudes and Information Technology Practices Inventory (SPEAITPI), with a 5-point Likert scale format, was used to collect data. The instrument was subjected to content and construct validation procedures and a reliability test which yielded a Cronbach Alpha coefficient of 0.85. Five (5) research questions guided the study. Data were analyzed using frequency counts, percentages, mean scores, and standard deviation. The reliability scores for the four scales were; (a) Physical Education teachers' perceptions of relevance/ importance of information technology (α = 0.69); (b) Physical Education teachers' information technology proficiency and use (α = 0.76); (c) Contextual factors (α = 0.67); and (d) Physical Education teachers' teaching styles/beliefs (α = 0.73). Results showed Perception of Importance revealed higher means (M = 4.29, SD = 0.60) than all other variables examined in the study. This showed that teachers had positive attitude towards information technology in Physical Education. One major recommendation was that teacher education universities in Ghana should review their curriculum so that information technology can be included in the curricula to provide adequate training for graduate Physical Education teachers to gain confidence in applying information technology in teaching.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Education is key to development while integration of Information, Communication and Technology (ICT) into education is the key to complement and generate support to teachers‘ professional development and students‘ learning skills. The integration of technology in teaching and learning can take place not only in the classroom but also from anywhere and at any time. Continuous ICT integration will enhance the use of educational resources and improve the quality of education. However, the integration of technology in teaching and learning requires the adoption of positive attitude towards it, knowledge on technology and commitment of teachers. Moreover, a teacher with information technology skill is one of the important criteria for teachers in the 21st century education (Bates, 1999).

One of the requirements for acceptance, delivery, and using of information technology in an educational system is the attitude of both teachers and students during instructional hours. Several studies on technological activities in teaching have often addressed teacher attitude and possible reasons behind teacher resistance in integrating technology in teaching (Ogden et al., 2010). Studies have shown that, the more positive teachers‘ attitude are towards information technology in teaching becomes, the more they tend to use it (Abort, 2000).

One area in which ICT use has not become customary, but of great potential, is in Physical Education. Although information technology has been developed, yet, its use is not common in Physical Education due to limitations such as; lack of training, personal comfort levels, availability of equipment, space and time (Martin, 2003).

Physical Education teachers can thus integrate ICT by preparing, generating, administering, and reporting information such as fitness scores, class participation, or motor skill rubric grades more efficiently for both students and teachers (Posner, 2004). In addition to a normal everyday information technology use, Physical Education programmes can be structured based on the enhancement of content-specific technology. Hence, Physical Education teachers can include the use of information technology to design information letters, student‘s portfolio and suitable skill practice for teaching (Gibbone, Rukavina & Silverman, 2010). Teachers can utilize information technology through fitness assessment databases, Physical Education Department Web pages, content-based software programmes, multimedia systems and visual presentations. Digital videos, exergaming equipment and other fitness-related devices may be integrated into daily assignments and unit planning (Mohnsen, 2006). For instance, in the 2012 London Olympic Games and the 2014 Commonwealth Games, the technology used by coaches and athletes for technique analysis and field notes, reinvigorated the nation‘s love for sport. According to a post by International Olympic Committee (IOC) of March 20, 2012 as cited by Clearing House Technology (2013), commentators used touchscreen technology for the first time ever during each and every event at the Olympic Games which meant real-time results were being delivered at high speed.

There is much concern that our current education system is not prepared to produce the skilled and creative workforce required for us to maintain our standard of living in a globally integrated economy. In response, policy makers have begun to promote a more integrated approach to teaching in programs that depend on a variety of different funding sources. Physical Education is one of such programs which aims at developing the cognitive, affective and psychomotor level of individuals who

undertake the programme. Therefore, the need to integrate information technology into classroom learning is very important as it seeks to improve on-task behaviour during academic instruction.

Teacher attitude is a factor associated with combining series of technological activities. Nishta (2010) stated that both positive attitude about using information technology and adopting several technological innovations in combination are accepted precursors for effective use of ICT in teaching. Additional factors that influence attitude are self-efficacy, social norms, and external demands among others. Teachers‘ attitude toward a particular programme is significantly associated with adopting a whole lot of learner-centred activities, particularly for secondary education teachers (Motshegwe & Batane, 2015). Hence, along with attitude, the quality and quantity of training received by the teacher are strong indicators of information technology (Abort, 2000; Ogden, et al., 2010). Additional factors that may influence information technology use include: teaching styles which the teacher is comfortable with, and the educational context.

Teachers may be constrained by factors such as access to equipment, training, personal comfort levels, availability of equipment and time. These barriers within a teachers‘ context may hinder efforts and meaningful use of information technology even when the value of technology integration is widely accepted (Gibbone, et al., 2010). Though the integration of information technology use variables has been identified for classroom teaching, the variables have not been studied for Physical Education teachers for some time now. It is important to investigate such information because there is no data-based information to understand what is necessary for programme modification, equipment selection or effectiveness of technology use.

Hence, the study examined challenges affecting teacher attitudes towards ICT integration in Physical Education teaching at the Senior High Schools in the Western Region of Ghana.

1.2 Statement of the Problem

Information, Communication and Technology has influenced teaching, yet very little is known about its use and predisposition by Physical Education teachers in the Western Region. The attitudes of Physical Education teachers towards the use of information technology and its use in the classroom may be a possible explanation. Many Physical Education teachers in the Western Region of Ghana face challenges when using information technology in teaching. Increasingly, they still use the dogmatic, ways of teaching which are obsolete in the new 21st century, in which information technology has become the pronounced form and easy way of teaching and knowledge impartation. Physical education teachers find it difficult to update themselves with the current technologies and devices which could be observed in our classrooms today (Edna & Francis, 2012).

Information Technology can be used by Physical Education teachers for preparing, generating, administering, and reporting of information such as fitness scores, class participation, or motor skill rubric grades, introduction of a new skill, generation variety of interesting physical activities which can be completed for students more efficiently (Posner, 2004). Teachers can assess information technology by various avenues such as fitness assessment databases, Physical Education Department Web pages, content-based software programmes, multimedia systems and visual presentations. Digital videos, exergaming equipment and other fitness-related devices may be incorporated. Hence, Physical Education teachers need to be equipped with

updated knowledge on technology usage in their teaching that will make them adapt to the changing world.

While technologies have been found useful within education, studies indicate that teachers do not feel prepared to use information technology in their instruction (McGowen, 2003).

If information technology is integrated effectively in the teaching and learning of Physical Education, not only will it facilitate curriculum delivery, practical lessons but also help assess student‘s progress and follow-up of student‘s learning activities (Mintah, 2007). Therefore, there is the need to investigate challenges affecting teacher attitude towards ICT integration in the teaching of physical education in the Western Region. Additionally, it was also intended to investigate the teachers attitude regarding the impact of information technology education on teaching and learning activities in physical education.

1.3 Purpose of the Study

The study aims at enhancing professional development in Physical Education through the identification of teachers‘ concerns and their degree of ICT knowledge for both personal preparation and curricular applications. This improvement can translate into better teaching, and in due course impact student achievement in Ghanaian Senior High Schools.

Additionally, the study is designed to investigate Physical Education teacher‘s attitude towards information technology integration in the teaching of Physical Education in the Western Region. It is important to investigate such information because there is no data-based information to understand what is necessary for programme modification, equipment selection, or the effectiveness of information technology use.

1.4 Research Objectives

The following objectives were the focus of the study:

1. To examine the rate of information technology usage by Physical Education teachers at Senior High Schools in the Western Region.
2. To explore the level of proficiency of the Physical Education teachers with regards to information technology usage at Senior High Schools in the Western Region.
3. Identify the contextual factors affecting technological usage in the teaching of Physical Education in Senior High Schools in the Western Region.
4. Examine Physical Education teacher‘s perceptions regarding the use of information technology in the teaching of Physical Education at Senior High Schools in the Western Region.
5. To identify specific strategies to boost ICT integration in Physical Education for PE teachers in the Western Region.

1.5 Research Questions

In line with the objectives stated above, the following research questions were formulated to guide the study:

1. What is the rate of information technology usage by Physical Education teachers at Senior High Schools in the Western Region?
2. What is the level of proficiency of the Physical Education teachers with regards to information technology usage at Senior High Schools in the Western Region?
3. What contextual factors affect technological usage in the teaching of Physical Education in Senior High Schools in the Western Region?
4. What are the Physical Education teacher‘s perceptions regarding the use of information technology in the teaching of Physical Education at Senior High Schools in the Western Region?
5. What specific strategies are needed to boost ICT integration in Physical Education for PE teachers in the Western Region?

1.6 Significance of the Study

The results of this study will help Physical Education teachers develop a positive attitude towards the use of information technology usage in their lessons and would give a better understanding of Physical Education teachers‘ attitude and what influences their technology use. This can provide useful information for practitioners, administrators, and teacher preparation programmes. The results of the study would aid policy makers in developing educational policies and modules that would help integrate technology in the teaching of Physical Education and also help in modifying the curriculum and teaching strategies based on what Physical Education teachers know about technology.

This study would add to the body of research regarding conditions for ICT integration and would provide further knowledge of attitude components and current practices pertaining to Physical Education teachers‘ views and teaching practices.

1.7 Delimitation of the Study

The study was delimited to a sample of Physical Education teachers from Senior High Schools in the Western Region. The sample for this study was drawn from six (6) different zones in the Western Region to avoid prejudice of perception.

1.8 Limitations of the Study

Limitations are aspects of the study that negatively affect the results for the generalization of the study but which a researcher has no direct control over. The first limitation was the sample size. Generally, the sample size should be large for the purpose of generalization to a larger context. As reported by Creswell (2003), that, survey data is self-reported information, reporting only what people think rather than what they do and so there is also a risk that Physical Education teachers with an interest in information technology would be more likely to voluntarily choose to complete the survey than Physical Education teachers whose interest in information technology was less.

1.9 Operational Definition of Terms

Attitude: Refers to positive or negative feeling or mental state of Physical Education teachers on ICT integration.

Content Knowledge: Knowledge of the subject matter that is to be taught or learnt.

Contextual Variables: Factors affecting the successful integration of ICT.

Challenges: Hindrances affecting people in the discharge of their duties.

Implementation: Refers to the process of usage of information technology.

Pedagogy: Refers to the steps and methods Physical Education teachers follow on ICT integration during teaching.

Pedagogical Content Knowledge (PCK): What Physical Education teachers know on how to integrate technology information into their teaching.

Pedagogical Knowledge (PK): Physical Education teachers' knowledge about how to integrate various technological strategies into teaching.

Technology Information: Refers to both the tools, such as computers and internet, as well as skills, techniques and knowledge required to effectively perform a given task.

Technology Content Knowledge (TCK): Physical Education teachers' knowledge about ICT integration.

Technology Pedagogical Content Knowledge (TPCK): The various methods Physical Education teachers use in integrating technological information during teaching.

Technology Integration: Process of blending ICT in the teaching of Physical Education.

1.10 Organization of the Study

The first chapter is the introductory part of the study, consisting of the background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, operational definition of terms and organization of the study. The second chapter deals with review of literature relevant to the study. The third chapter discusses the methodology of the study. The fourth chapter deals with data collection, data analysis and interpretation. The fifth chapter provides a summary of the findings, the conclusions drawn from the findings and recommendations emanating from the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Overview

This chapter constitutes the review of both empirical and theoretical data on the topic under investigation. The chapter provides an extensive review of current and relevant literature in this particular field of study. The study reviewed books, journals, and articles and lastly conducted webs-based searches of scholarly materials. The empirical review takes a critical look at works people have already done on the topic while the theoretical review constitutes a comparison of factors on information technology integration and its influence on the teaching of Physical Education. The review covers the following:

- Theoretical Framework of Information Technology Integration
  - Technology Acceptance Model (TAM).
  - General Diffusion Theory
  - Self-efficacy
  - Learning Theory of Constructivism
  - Technological Pedagogical Content Knowledge (TPACK)
- The Conceptual Framework
- Conceptualization of Technology and Physical Education Teaching
  - Approaches to Technology Integration
- Impact of Technology on Sports, Physical Education and Physical Activity
  - Fitness Software and Physical Education Teaching
  - Computer Technology
  - Online Physical Education
  - Technological Devices
  - Technology to Measure Physical Activity

- Interactive Video Games
- Persuasive Technology
- Technological Advancements in Sports Equipment
- Technological Advancements on Clothing and Wearables
- Technological Advancements in Sports Facilities
- Media, Broadcasting and Communication

- Contextual Variables Factors Influencing Technology Integration
  - Perceptions on the Integration of Technology
  - Overcoming Barriers
- Summary of Reviewed Literature.

2.1 Theoretical Framework of Information Technology Integration

Frameworks and theories help us make sense of what we already know and what is still unknown. They provide us with direction and guidance as we try to understand how things work. Though technology is ubiquitous, it has become an integral part in this generation and its definition is quite imprecise. Mahar, Murphy, David, Golden, Shields, & Raedeke (2006) posited that technology is broadly defined to include tools or techniques that are used for practical purposes. Mills and Tincher (2003) described technology as a teaching tool design by teachers to combine available resources to produce desired teaching outcomes of students, to solve problems, fulfil needs, or satisfy wants. Mills and Tincher (2003) and Mahar et al. (2006) Koehler and Mishra (2009) and McCrory (2009) agreed that the definition of technology implies both the tools, such as computers and internet, as well as skills, techniques and the knowledge required to effectively perform a given task. The definition of technology covers analog and digital technologies as well as old and new technologies (Koehler & Mishra, 2009), and conventional tools that have been used for science teaching for

decades (McCrory, 2008). There are many theories about technology integration. One of these theories is the Technology Acceptance Model.

2.1.1 Technology acceptance model

Technology Acceptance Model (TAM) has become a robust and powerful model for predicting user acceptance and has also become a key factor in helping to explain and predict user behaviour of technology systems (Jong &Wang, 2009; Hsia & Tseng, 2008; Teo, Luan, & Sing, 2008).

In a recent study of technology systems, Park (2009) posited that, one's actual use of a technology system is influenced directly or indirectly by the user's behavioural intentions, attitudes, perceived usefulness of the system, and perceived ease of the system. Attitudes usually show themselves through one's behaviour and can influence an individual's choice of action and response to challenges (Sam, Othman & Nordin, 2005). According to this model, attitude is a critical driver of technology adoption. In addition, external variables affect the intention and actual use through mediated effects on perceived usefulness and perceived ease of use (Park, 2009). The model is illustrated diagrammatically in Figure 1.

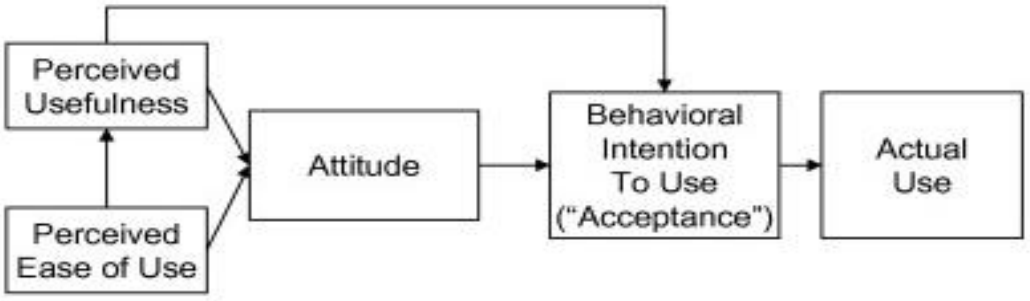

Figure 1: Technology Acceptance Model (Davis, 1989)

Wixom and Todd (2005) assert that ―Technology Acceptance Model provides guidance on how to influence usage through design and implementation" (as cited in Motshegwe & Batane 2015, p.85). For instance, the model provides guidance on how to influence usage through design and implementation" (as cited in Motshegwe & Batane 2015, p.85). For instance, the model provides feedback on usefulness and ease of use, but leaves room for researchers to explore other variables that might influence adoption depending on the research context. As Park, Lee, and Cheong (2007) posited that it is necessary to explore other constructs that would enrich the explanation of users' acceptance of technology systems. This study employed another variable that was believed to play an important role in Physical Education teachers' decision to adopt technology beyond what the TAM suggests, thus self-efficacy.

2.1.2 Self-efficacy model

Self-efficacy is the measure of one's own ability to complete tasks and reach goals (Ormrod, 2006). According to this concept, when people believe that they have the capability to successfully implement the behavioural action, they are more likely to engage in the behaviour; meaning that they have high self-efficacy.

In terms of technology information, self-efficacy plays a crucial role in professionally guided and self-guided behavioural change strategies. Jaradat and Faqih (2014), pointed that self-efficacy is an important factor to consider when determining whether people will adopt new strategies. According to them, even if people are convinced about the benefits that a new technology may offer, if they are not confident in their own ability to use the new technology, they may not use them. Self-efficacy is regarded as an important precursor to peoples' attitudes. A study by Bates and Khasawneh (2007) indicated that when students have successful and positive

experiences with similar technologies, their self-efficacy for using those types of technologies increases. Several research studies have been conducted specifically on technology self-efficacy (Anderson, Groulx, & Maninger, 2011; Edutopia, 2013; Seferoğlu, 2007).

Technology self-efficacy of teachers has an influence on the learning experiences created for learners and on the learners‘ perceptions of their own technology self-efficacy (Seferoğlu 2007). That is, lack of confidence by teachers to use technology in their instructional activities can contribute to the learners‘ inabilities to use technology. He argues that because the academic staff role is to guide learners, they should feel secure in themselves when using technology. Technology self-efficacy has an effect on technology-related behaviours such as the willingness to acquire technology skills, integrate technology, and hold positive attitudes towards technology (Teo, 2009; Sam, et al., 2005). Conversely, a high level of technology anxiety is negatively related to acquiring technology skills or the resistance to the use of technology (Simsek, 2011; Shu, Tu, & Wang, 2011).

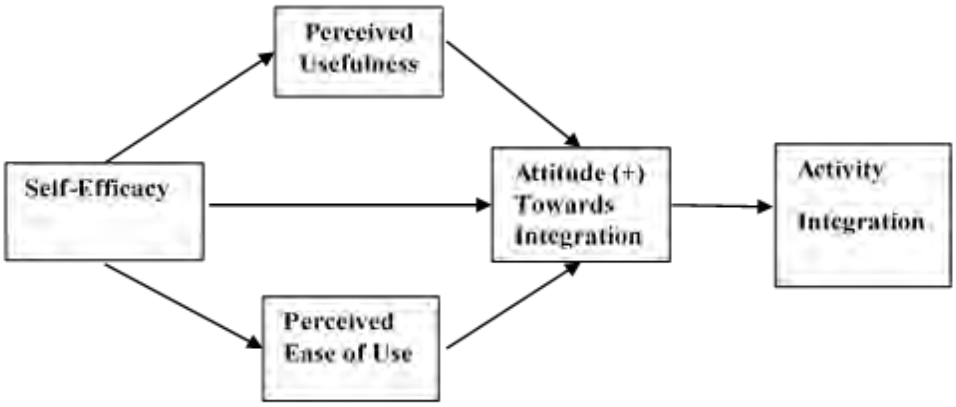

Figure 2: Self-Efficacy Model (Gibbone, Rukavina & Silverman, 2010)

Self-efficacy is expected to influence the Perceived Ease of Use and the Perceived Usefulness of the technology, which in turn is expected to influence the Physical Education teachers‘ attitudes toward technology. Fig. 2.2 is the Self-Efficacy Model that incorporates the elements of the TAM and additional constructs. Positive attitude should subsequently lead to the integration of technology by the Physical Education teachers in their teaching.

2.1.3 Learning theory of constructivism

The learning theory of constructivism is an important part of information technology integration. Knowledge creation through collaboration and inquiry is a major affordance of technology information integration. Integrating technologies into teaching allows the construction of knowledge to become more student-centred rather than teacher-centred because student-centred activities enhance understanding and retention of information (Hardy, 2006).

Education teachers are in the position of teaching students who have never known life without information communication and technology. It is expected that Education teachers understand and can assist students in linking specific physical fitness knowledge and concepts to measuring, interpreting, and prescribing appropriate fitness activities (Juniu, Harris, & Hofer, 2012).

It is important that Education teachers use technology information as a tool to enhance effective delivery in the classroom. Research shows that using one style of teaching to K-12 environments alone, does not necessarily improve learning. What matters most to implementing mobile learning is how students and teachers use technology to develop knowledge and skills and that requires training. Successful

information and technology integration for learning goes hand in hand with changes in teacher training, curricula, and assessment practices (Edutopia, 2013).

When planning instruction, Education teachers should identify learning goals and activities first and then choose appropriate educational technologies to enhance the experience (Juniu et al., 2012). This leads to selecting suitable technology that will support the lesson plan in ―practical and useable ways" (Juniu et al., 2012). The National Association for Sport and Physical Education (NASPE) believes that technology integration can be an effective tool for supplementing instruction when used appropriately. Maximizing participation and success is important when integrating ICT (NASPE, 2009) and will promote student motivation and increase participation (Gibbone, Rukavina & Silverman, 2010). It is important not to design instruction around the technology alone but to strategically implement the technologies based on how the teacher plans and to the needs and level of leaners (Juniu et al., 2012). The use of information technology will also be partially determined by its affordances and constraints (Juniu et al., 2012). A quality physical education program will appropriately implement technology to enhance teaching and learning (NASPE, 2009) while maintaining a maximum level of activity in the class rather than focus on the skill of using the technology.

2.1.4 Diffusion of innovation theory

Diffusion of Innovation (DIT) Theory, developed by E.M. Rogers in 1962, is one of the oldest social science theories. It originated in communication to explain how, over time, an idea or product gains momentum and diffuses (or spreads) through a specific population or social system. The end result of this diffusion is that people, as part of a social system, adopt a new idea, behaviour, or product. Adoption means that a person

does something differently than what they had previously (i.e., using a new information technology, acquire and perform a new behaviour, etc.). The key to adoption is that the person must perceive the idea, behaviour, or product as new or innovative. It is through this that diffusion is possible.

The DIT tackles the proliferation of abstract concepts and ideas, technological information, and factual practices in a social structure. Despite the commercial success of Innovation, a recent survey by Anis (2009) exposed that 34% of users stopped using them over six to twelve months after acquisition. Dishman, Motl, Sallis, Dunn, Birnbaum, Welk, Bedimo-Rung, Voorhees & Jobe (2005) tackled this problem and proposed three directions for design: ―designing for different levels of _readinesses, designing for multi-layered and playful goal setting, and designing for sustained engagement". However, we foresee the need for additional research that can understand the long-term use of certain innovation on some activities.

Adoption of a new idea, behaviour, or product (i.e., "innovation") does not happen simultaneously in a social system; rather it is a process whereby some people are more apt to adopt the innovation than others (Anis, 2009). Researchers have found that teachers who adopt an innovation early have different characteristics than teachers who adopt an innovation later (Dishmn et al., 2005). When promoting an innovation to a target population, it is important to understand the characteristics of the target population that will help or hinder adoption of the innovation. This is why it is very paramount to adopt and integrate technology to suit the abilities and competency level of students and according to Rogers (2003) there are five established adopter categories, and while the majority of the general population tends to fall in the middle categories, it is still necessary to understand the characteristics of

the target population. When promoting an innovation, there are different strategies used to appeal to the different adopter categories just like when a teacher is integrating activities into his/her teaching.

Innovators - These are people who want to be the first to try the innovation. They are venturesome and interested in new ideas. These people are very willing to take risks, and are often the first to develop new ideas. Very little, if anything, needs to be done to appeal to this population.

Early Adopters - These are people who represent opinion leaders. They enjoy leadership roles, and embrace change opportunities. They are already aware of the need to change and so are very comfortable adopting new ideas. Strategies to appeal to this population include how-to manuals and information sheets on implementation. They do not need information to convince them to change.

Early Majority - These people are rarely leaders, but they do adopt new ideas before the average person. That said, they typically need to see evidence that the innovation works before they are willing to adopt it. Strategies to appeal to this population include success stories and evidence of the innovation's effectiveness.

Late Majority - These people are skeptical of change, and will only adopt an innovation after it has been tried by the majority. Strategies to appeal to this population include information on how many other people have tried the innovation and have adopted it successfully.

Laggards - These people are bound by tradition and very conservative. They are very skeptical of change and are the hardest group to bring on board. Strategies to appeal to

this population include statistics, fear appeals, and pressure from people in the other adopter groups.

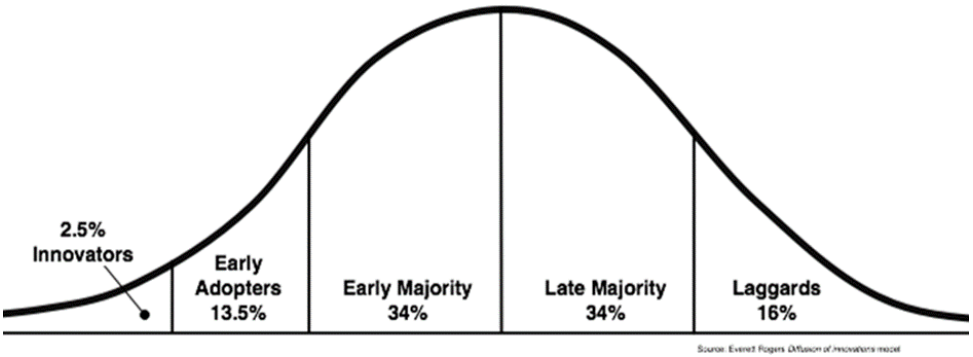

Figure 3: Diffusion Innovation Theory (Davis, 2003)

According to Davis (2003) the stages by which a person adopts an innovation, and whereby diffusion is accomplished, include awareness of the need for an innovation, decision to adopt (or reject) the innovation, initial use of the innovation to test it, and continued use of the innovation. There are five main factors that influence adoption of an innovation, and each of these factors is at play to a different extent in the five adopter categories.

Relative Advantage - The degree to which an innovation is seen as better than the idea, program, or product it replaces.

Compatibility - How consistent the innovation is with the values, experiences, and needs of the potential adopters.

Complexity - How difficult the innovation is to understand and/or use.

Triability - The extent to which the innovation can be tested or experimented with before a commitment to adopt is made.

Observability - The extent to which the innovation provides tangible results.

2.1.5 Theory of reason actioned and planned behaviour

The theory of reasoned action (Fishbein & Ajzen, 1975) states that individual performance of a given behaviour or activity is primarily determined by a person's intention to perform that behaviour or activity. This intention is determined by two major factors: the person's attitude toward the behaviour (i.e., beliefs about the outcomes of the behaviour and the value of these outcomes) and the influence of the person's social environment or subjective norm (i.e., beliefs about what other people think the person should do, as well as the person's motivation to comply with the opinions of others). The theory of planned behaviour (Ajzen, 1999) adds to the theory of reasoned action the concept of perceived control over the opportunities, resources, and skills necessary to perform a behaviour. Ajzen's concept of perceived behavioural control is similar to Bandura's (1999) concept of self-efficacy—a person's perception of his or her ability to perform the behaviour (Ajzen, 1999). Perceived behavioural control over opportunities, resources, and skills necessary to perform a behaviour is believed to be a critical aspect of behaviour change processes.

2.1.6 Technological Pedagogical Content Knowledge (TPCK)

The debate about information technology in education has shifted from whether it should be used in the classroom to how it should be integrated into teaching and learning more generally (Angeli & Valanides, 2009). Earlier attempts to use information technologies in teaching and learning focused on technological skilss and good demonstration skills to pre-service teachers (Angeli &Valanides, 2005).

However, educators have recognized that two alone did not serve them well in the pursuit of integrating information technology into teaching with (Chai & Lim., 2011; Angeli &Valanides, 2009). Hardy (2010) asserted that both pre-service and in-service

teachers agreed that technological skills alone are not sufficient to prepare and enable them to effectively teach with innovation. However, the commitment level of the teacher, and how to apply technological pedagogies to teaching are all variables to consider. There has therefore been the realization that ~~t~~technology integration in and of itself is not a transformative mechanism rather an instruction tool invoked by teachers to reconstruct the subject matter from the knowledge of the teacher into the content of instruction" (Angeli & Valanides, 2009).

Successful appropriate technology integration as argued by Harris and Hofer (2009), is not dependent on the smart use of educational technologies but rather based on curriculum content and the processes through which students learn such content. This realization has brought about a shift from just teaching technological pedagogies to pre-service teachers to facilitating how to encourage and value teaching that incorporates the knowledge of integrating information technology into teaching. Thus, it has become pertinent that teachers develop and nurture an overarching conception of their subject matter with respect to technology and what it means to teach with information technology as suggested by Niess (2005). Koehler, Matthew, Mishra, & Punya (2008) argued that the heart of good teaching with information technology consist of content, pedagogy, and suitable technology and the relationships between them.

Research indicates that effective technology integration with specific subject matter requires teachers to apply their knowledge of curriculum content, general pedagogies, and technologies (Koehler et al., 2008). Yet, technology is viewed as a separate set of knowledge and skills that must be acquired by teachers in relation to the content and pedagogy of a certain subject. Otte and Benke (2006) addressed the focus on

pedagogy in technology use by stating that change in instruction is a matter of pedagogy, and a how-to approach cannot adequately ensure change. The authors highlighted online instruction showing its many applications in face-to-face instruction. They stated that in order to maintain the focus for teaching and learning, teachers need to embrace and support new approaches to education, whether in an online classroom or face-to-face with a commitment to both quality pedagogy and to the goals and mission of the institution. Thus, no matter the mode of delivery, the quality of the pedagogy and how technology can enhance learning while changing the way teachers teach, is of extreme importance.

In a study on the use of appropriate technology in teaching, Okojie, Olinzock and Okojie-Boulder (2006) noted that technology integration process is not currently viewed as tied to teaching and learning, but is rather viewed too narrowly. The authors stated that technology integration should facilitate learning as a part of the instructional process and should not be labelled on as an end in itself. In addition, technology integration process involves developing learning objectives, instruction strategies, feedback, and assessment strategies which found that excuses for not using information technologies to support instruction are valid. This excuse includes shortage of computers, lack of training and fear of computer use.

Increasingly, because Physical Education is usually taught in a gymnasium or outdoors, it is important for teacher education programmes to prepare teachers to infuse appropriate technology in a way that will support the pedagogical strategies used in those settings (Susana, Miri & Dit, 2013). Physical education teachers are expected to know how computers and other technological devices can contribute to data collection for the analysis of sport skills, assessment of student learning, and

evaluation of health-related physical fitness (Susana et.al, 2013). This includes using exercise equipment to assess physical activity (e.g., accelerometers, heart rate monitors, pedometers, interactive dance machines), body composition (e.g., bioelectrical impedance devices, electronic skin-fold calipers), and movement and motor-skill performance (e.g., Dartfish). There are also a number of software packages used to record and analyze physical fitness, physical activity levels, and nutrition habits, such as TriFit, FITNESSGRAM, and Activitygram. PE Manager is another application used in physical education to track student performance via rubrics, tests, and assignments on a mobile device (Woods et al., 2008). Other ways include the use of the internet to solicit enough activities on specific contents to suit the ability levels of students and to improve their demonstration skills.

It must be emphasized that even though information technology was not specifically stated within this framework, it does not mean that it was not considered (Mishra & Koehler 2006). The reason is that technology in traditional classrooms were often commonplace tools and were not considered technologies. However, the use of information communication and technologies has changed in the sense that they have become more available and diverse and that they have a broader potential to change the nature of the classroom. The authors explained that technologies can make content more accessible and comprehensible and should play a critical role in both content knowledge as well as pedagogical knowledge. Based on the latter, it was proposed that technology should be added as a third knowledge system (Fig. 2.7). Mishra and Koehler (2006), enhanced Shulman‘s framework to articulate the relationship between content, pedagogy, and technology and outline these as pedagogical content knowledge (PCK), technological pedagogical knowledge (TPK), pedagogical content

knowledge (PCK), and the completely combined technological pedagogical content knowledge (TPCK) (Fig. 2.4).

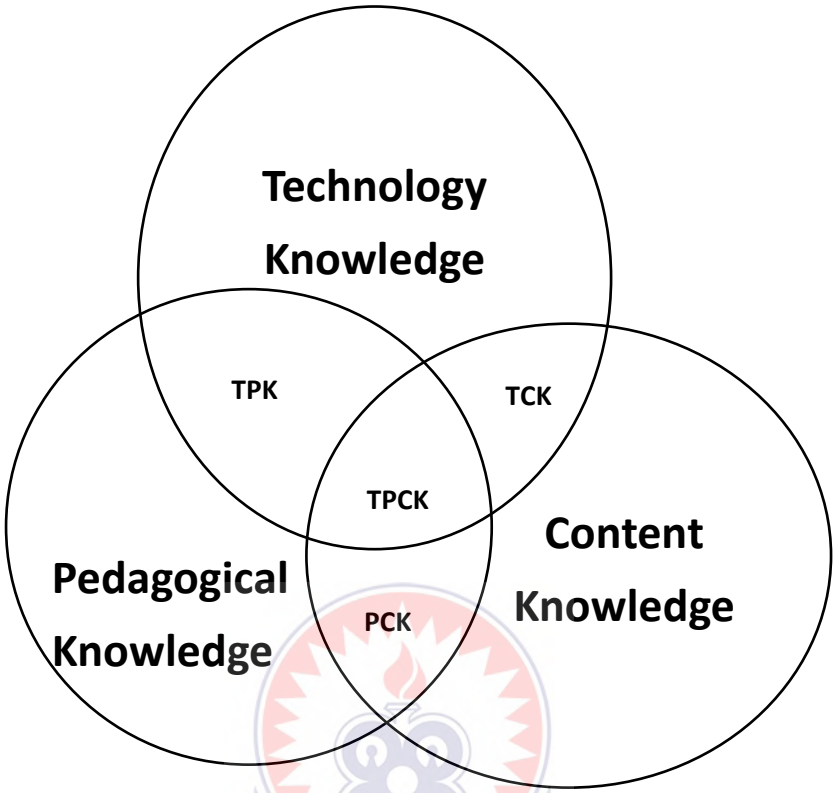

Figure 4: Technology Pedagogical Content Knowledge (TPCK). Content, Pedagogy, and activity integration, overlap to create four more types of knowledge (Koehler et al., 2008).

While such a relationship is deemed to be complex in nature, inappropriate use of information technology in teaching can greatly affect teaching and learning. Scholars agree that information technology should not be treated as a separate entity and effective teaching constitutes an understanding of how technologies relates to the content and pedagogy (Hayes & Silberman, 2007; Koehler et al., 2008). When investigating information technology integration within teacher education programmes, it is vital to understand the relationships that occurs between such knowledge systems as well as how they are developed. Before outlining specifically

what is missing in most diffusion models as described before, each knowledge system is explained in relation to the instruction of pre-service Physical Education students.

Content knowledge (CK) is the knowledge about a subject that is to be taught. For example, the content within an anatomy course will be different from a course in health concepts. Before teachers can teach a student about health topics, the teacher must have knowledge of the subject.

Pedagogical knowledge (PK) is the knowledge about the processes and practices of teaching and learning. Within Physical Education Innovation Education (PEIE), Physical Education teachers must provide general information about how classrooms are managed and organized, how lessons are developed and implemented, and how students are evaluated. Such pedagogical knowledge is universal to education and can be applied to any subject whether it is Physical Education or Mathematics. It requires that students obtain an understanding of the developmental theories of learning and how such are applied within the classroom.

Pedagogical content knowledge (PCK) is the type of knowledge related to pedagogy that is specific to a certain subject. For example, pre-service teachers in Physical Education often take a course in teaching elementary PE as well as teaching secondary PE because it involves knowledge of specific teaching strategies that include appropriate representations in order to address the needs specific to diverse learners.

Technology Knowledge (TK) is the knowledge about certain technological devices such as computers, Internet, video, and many others. This involves not only knowing what these devices do but also knowing how to apply them in teaching to achieve results. The NCATE guide for PETE states that teacher candidates should

demonstrate mastery of current technologies (NCATE, 2009). In order to entice such mastery in PE teacher candidates, faculty should not have certain knowledge of basic technologies such as computers and projectors but also about technologies that may be used to increase physical activity levels such as heart rate monitors or pedometers and demonstration skills to make the teaching of Physical Education more interesting and enjoyable.

When one begins to learn how such devices are used within their discipline, they develop *technological content knowledge* (TCK). Teacher Education teachers realize that different technologies can be used for different purposes within the realm of teaching Physical Education. This may include knowledge of how the Fitness Gram can be used to assess and report the fitness level of the students as well as using the internet to improve on demonstration skills.

Technology Pedagogical Content Knowledge (TPCK) goes beyond content, pedagogy, and activities and requires an understanding of pedagogical techniques that use technologies in constructive ways to teach content (Koehler et al., 2008). The argument that Koehler et al. (2008) provide is that there is no single technology solution that applies to every teacher, every course, or every view of teaching. Effective teaching therefore must hold an understanding of the relationship between the content, pedagogy, and the particular technology. From a technocratic perspective, one may simply have to demonstrate their proficiency with current specific existing technology. However, this view reflects the separation of technology integration, content and pedagogy and observes technology as a single identity. Viewing technology integration within isolation does not constitute quality teaching (Koehler et al., 2008). Studies have shown that teaching integration within a separate course within teacher education does not provide future teachers with the experiences they

need to effectively integrate technologies within their lessons (Parfitt & Eston, 2005). It is for this reason that organizations such as the International Society for Innovation in Education (ISIE), the National Council for Accreditation of Teacher Education (NCATE), the American Association for Health, Physical Education, Recreation and Dance (AAHPERD), and the National Association for Physical Education (NASPE) have moved from teaching basic skills to integrating technology within the overall curriculum.

According to the NCATE standards (NCATE, 2007), Physical Education teachers should use information technology integration to enhance learning and to enhance personal and professional productivity. More specifically, the 2008 National Initial Physical Education Teacher Education standards (AAHPERD/NASPE, 2008) state that teacher candidates will demonstrate knowledge of current trend of suitable technologies that match the competence level of students by planning and implementing learning experiences that require students to appropriately use technology to meet lesson objectives. These standards indicate that teacher education programmes must integrate technologies within all courses in order to provide authentic learning experiences where pre-service teachers can learn to create lessons that appropriately integrate activities.

2.2 The Conceptual Framework

The model which is based on Wozney, Venkatesh and Abramy‘s (2006) model specify the causal linkages between factors, and users‘ attitude and actual technology adoption behaviour. The model suggests that users integrate information technology when they overcome the factors that influence the integration of information tchnology (Sirad, 2001). The conceptual framework (Fig. 2.5) of this study is based on the adapted model by Sirad (2001).

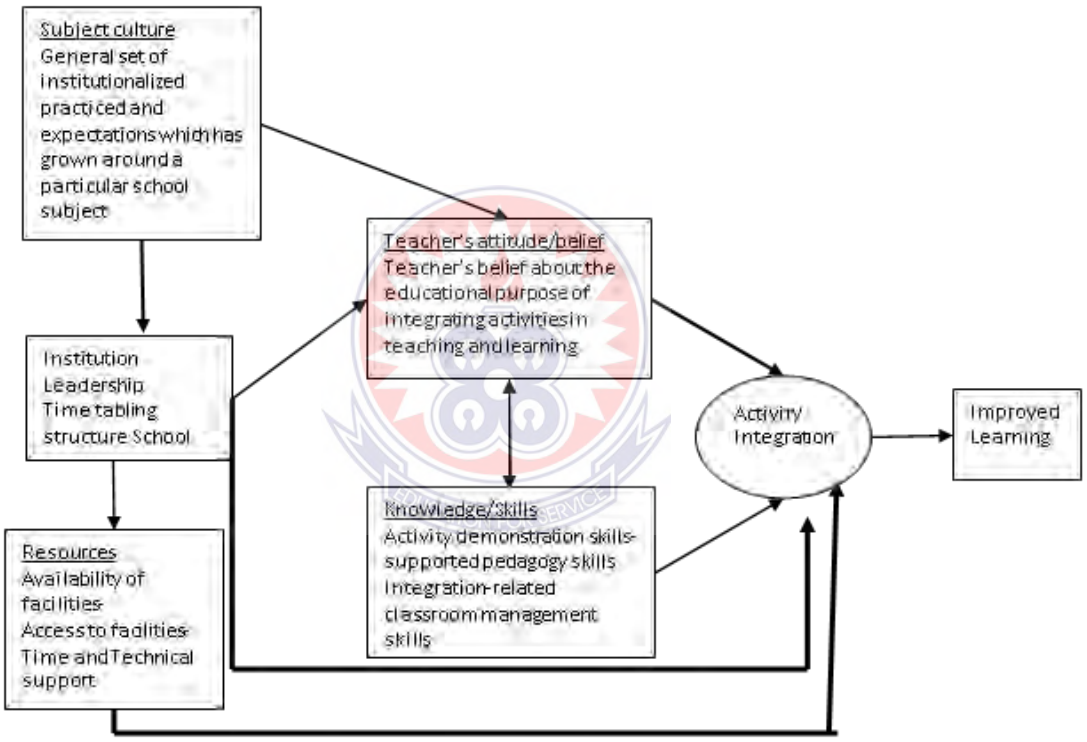

Figure 5: The Adapted Model of Technology Integration (Wozney, Venkatesh and Abramy, 2006)

2.3 Conceptualization of Information Technology Process and Physical Education Teaching

Student learning is at the heart of the literature on integrating information technology into instruction. Brown (2006) examined how students learn, how they solve problems and what gives them a sense of meaning and self-worth. Twentieth Century learning was compared to 21st Century learning. Brown (2006) asserted that 20th Century learning is based on building knowledge that can be called upon when needed. He called it ―demand-pull" learning and stated that in a slow-changing world this approach was effective. Twenty-first Century learning was characterized as ―supply-push" with a focus on learning through enculturation and on collateral learning which, when employed, broadens learning for students.

The need for schools to adopt information technology into their curriculum in order to prepare students for the 21st century was examined by Hildebrand (2009). Results of the study showed that administrators' technology skills were greater than those of teachers and that they viewed their technology beliefs higher than those of teachers. She concluded that schools need to make sure students are engaged in instruction, so their understanding and retention would increase. Similarly, Mills and Tincher (2003) conducted a study on technology integration in classrooms in a school district in a small town. The researchers discussed literature around themes of technological fluency, modelling technology use, stages of technology integration, and characteristics of exemplary computer-users. Results indicated that discrepancies exist between integrators and operators. Teachers knew how to use technology, but not how to use them to deliver instruction. The researchers concluded that change was needed to prepare students for life in the 21st century and more important than training in

using hardware and software, teachers needed to learn how to use technology to enhance student learning.

Physical Education classes are incorporating technology as a means of improving class involvement and enthusiasm. Technological innovation has long been fused with sports both on and off the field and, due to the explosive growth of mobile technology, sports analysis applications have now become more affordable and accessible to the everyday user. As a result, PE teachers are capitalising on this availability and are looking to mobile technology solutions to enhance class time with pupils. Baia (2009) examined how faculty were motivated to integrate technology into their teaching. The researcher tested the hypothesis that each faculty‘s commitment to pedagogical quality was a strong predictor of instructional technology adoption. In other words, faculty who believe that technology can enhance student learning in their discipline will be more likely to use technology in their teaching. However, their intent to use technology is predicted by their beliefs about instructional technology.

Increasingly, Georgina and Hosford (2008) noted that faculty are being pressured to include technology in their teaching. They studied relationships between technological competence and its integration into pedagogy. They found that the perceived value of using technology affected frequency and the extent of its use and concluded that technology alone does nothing to enhance pedagogy; successful integration is all about the ways in which technology tools are used and integrated into teaching. Similarly, Windschitl and Sahl (2002), found that while there was abundant research on teachers‘ use of technology in the classroom, not many studies have been conducted on laptop initiatives and their impact on the integration of technology. The purpose of their multi-case study on teachers at a middle school

which had recently instituted a laptop initiative was to look at how and why teachers used technology in different ways over a period of time. Three overarching questions were at the base of this study. These included questions of (a) how personal history and beliefs influence technology use in instructional practices; (b) how teachers come to adopt their practices; and (c) the relationships between the prevalence of technology and whether it influences teachers‘ implementation of the constructivist pedagogy.

2.3.1 Approaches to information technology integration

The use of technology as a learning tool has swung its way into multiple aspects of teaching; from using iPads to help understand logarithms in mathematicss to distributing homework via laptop to SMS on mobile phones and now to the uptake of digital technology in Physical Education. Technology integration in this context refers to the use of technology resources such as computers, data projectors, video conferencing, VCRs and television sets, the Internet, Learning Management Systems, PowerPoint, Social Media, etc. in instructional activities, and in the management of a course as a whole (Motshegwe & Batane, 2015). According to Staub (2009), adoption is not only the choice to accept an innovation, but also the extent to which that innovation is appropriately integrated within a specific environment. Instructors have to develop a culture that embraces technology and regard it as part of their everyday work.

Motshegwe and Batane (2015), also painted the picture that technology adoption is achieved when the use of technology is a daily occurrence where instructors do not stop to think about using technology tools. Integrating technology into classroom instruction means more than teaching basic computer skills and software programmes

in a separate computer class. Effective technological integration must happen across the curriculum in ways that research shows, will deepen and enhance the learning process. In particular, it must support four key components of learning: active engagement, participation in groups, frequent interaction and feedback, and connection to real-world experts (Motshegwe & Batane, 2015). Effective technology integration is achieved when the use of technology is routine and transparent and when technology supports curricular goals (Motshegwe & Batane, 2015).

The approaches of integrating technology have changed over the years. As more technologies are used within the field of Physical Education, teacher Education teachers are looking at different ways to diffuse the technologies within the teacher education programmes. Initially, courses in computer technology were the focus of technology development of teacher education programmes (Reiser & Dempsey, 2007). Later, realizing that using technology is context specific, some universities offered specific courses on technology in Physical Education (Mohnsen, 2005).

Since 2009, the new standards for teacher education ask for a more integrated approach to infusing technology in Physical Education (Mears, et al., 2009). However, research shows that different approaches still exist to integrating technology in teacher education (Castelli & Fiorentino, 2008). Surry, Ensminger, and Haab (2005) outlined a holistic approach to implementing technology in higher education, which they call RIPPLES. RIPPLES is an acronym that stands for resources, infrastructure, people, policies, learning, evaluation, and support. This model focuses on reducing implementation barriers and suggests that in order to integrate technology in higher education institutions, one must have the financial resources to invest in technology, the hardware, software, facilities, the network

capabilities to focus on technology, the right people on board and the end users in mind, the policies and procedures in place to support the use of technologies, a culture which views technology as responding to specific learning goals, processes for continual assessment of the technology, and finally training, technical support, pedagogical support, and administrative leadership. All such factors can influence the integration of technology.

Bielefeldt (1999) did a study to find the factors that contribute to high capacity technology users and found six common factors that aid the integration process: (1) commitment to integration, (2) professional development opportunities, (3) including technology specific course requirements, (4) integration of technology in field experiences, (5) high level of facilities and support, and (6) adequate funding. Gillingham and Topper (1999) mentioned four approaches: single courses approach (Hargrave & Hsu, 2000), technology infusion (Morley, 1999), student performance assessment (Jones & Garrahy, 2001), and case-based integration (Gillingham & Topper, 1999). The single course approach uses a core technology course with lectures and lab demonstrations that teach teacher candidates the understanding of integrating technology in education. Several books exist that can be used in Physical Education teacher education technology courses (Felker & Bradley, 2009; Castelli & Fiorentino, 2008; Mohnsen, 2008).

The student performance approach places most of the responsibility of learning different technologies on the student rather than the instructor. At different times in their program, students are to demonstrate technology competency. This method allows both students and faculty to learn together. However, this method is difficult to assess the performance of the students (Gillingham & Topper, 1999). The case study

approach links theory to practice. Teachers model the use of technology in their teaching and students reflect upon that knowledge by examining a variety of case studies. Because the case study approach is based on reading and reflecting, students may have difficulty transferring that knowledge into real practice (Gillingham & Topper, 1999).

Finally, full integration of technology exists when a whole program is designed to be infused with technology (Castelli & Fiorentino, 2008). Each course integrates technology where needed. Instructors model the use of technology and students practice their use in the classroom. This approach can assist students in incorporating technology in their teaching experiences but it is limited to the technology competencies of the instructor (Lindauer, 2004). Modelling the technology within teaching and across curriculum is often a best practice to technology infused instruction as reported by many researchers (Castelli & Fiorentino, 2008; Mitchell & McKethan, 2003).

An earlier study by Moursund and Bielefeldt (1999) investigated the approaches to technology training in teacher education programmes and found that the single course approach had a low correlation with technology competency to the integration of technology into methods courses and teaching. They identified 5 recommendations in their report: 1. Instructional technology (IT) instruction should be integrated into all classes, 2. Institutions should engage in technology planning that focuses not only on facilities but on the integration of IT in teaching and learning, 3. Student teachers need more opportunities to apply IT during field experiences under qualified supervision, 4. Faculty should be encouraged to model and integrate technology, 5. In order to provide models for change, researchers, professional societies, and education

agencies should, on an ongoing basis, identify, study, and disseminate examples of effective technology integration that reflect the current needs of both teacher education and K-12 schools (Moursund & Bielefeldt, 1999).

A study done by Beyerbach, Walsh, and Vannatta (2001), examined the integration of technology in K-12 schools and teacher education programmes and found that technology integration methods should be introduced earlier in the program so that teacher candidates can develop their technology competency over several years. This strengthens the notion that when teachers are comfortable with technology, they are more likely to integrate known and new technologies into their teaching (Castelli & Fiorentino, 2008).

2.4 Information Technology and Physical Education Teaching

The need to prepare teachers to implement technology into teaching and learning in teacher education programmes has been stressed by the release of a set of technology standards by the U.S. National Council for Accreditation of Teacher Education (NCATE) and the International Society Technology Education (ISTE). As stated in the ISTE standards, Effective teachers apply the National Educational Technology Standards for Students (NETSS) as they design, implement, and assess learning experiences to engage students and improve learning; enrich professional practice; and provide positive models for students, colleagues, and the community" (NCANTE, 2008).

A report called –Redefining Teacher Education for Digital Age Learners", delivered to the USA Congress in October, 2010, provided a list of recommendations from education stakeholders for the transformation of teacher education programmes (Carroll & Resta, 2010) including the use of the most current and innovative

technology in teacher education programmes and application of research on pedagogical practices to support teachers‘ technology integration in the classroom.

Technology is an important assessment tool. It aids teachers in managing traditional assessment, as well as provides opportunities to develop alternative assessments. This becomes important when trying to reach all learners and consider all of the multiple intelligences. Technology can be used as an advocacy tool. As the push to decrease or completely eliminate Physical Education programmes gains more momentum, it becomes necessary to show its worth in the overall education process.

New and creative ways of presenting instruction and participation in Physical Education are being afforded by the use of technology. To boost student motivation and engagement in lessons, teaching methods have to evolve and move away from traditional approaches within the classroom towards technology integration approaches. Rapid technological development is making it easier to move technology into the Physical Education learning environment with the use of wireless technology, projection systems, and activity monitoring devices (NASPE, 2009).

The International Society for Technology in Education (ISTE) created technology standards for teachers and students. The National Council for Accreditation of Teacher Education (NCATE) and the National Association for Sport and Physical Education (NASPE) have used such standards to set their own guidelines for effective technology inclusion in Physical Education teacher education programmes. NAPSE (2009) put forth a position statement to encourage the introduction and application of technology in Physical Education. It is noted that Physical Education environments use a variety of technologies to enhance the activity level and skill development of K-12 students. However, in spite of the potential to transform the field of education,

evidence exist that Physical Education teachers are less likely to use technology than their subject-matter counterparts (Mears, Hansen, Fine, Lawler, Mason & Richardson, 2009).

In order to encourage Physical Education teachers to become proficient in using technology, NASPE (2009) outlined four guidelines for appropriate use of instructional technology in Physical Education: 1) The use of instructional technology in Physical Education is designed to provide a tool for increasing instructional effectiveness, 2) The use of instructional technology in Physical Education is designed to supplement, not substitute for, effective instruction, 3) The use of instructional technology in Physical Education should provide opportunities for all students, versus opportunities for few, 4) The use of instructional technology in Physical Education can prove to be an effective tool for maintaining student data related to standards-based curriculum objectives. (Mears, et al., 2009) NASPE recommends that Physical Education teachers use information technology to enhance learning as well as their own personal and professional productivity (Baert, 2011). Research indicated however that pre-service teachers do not feel prepared to integrate technology into Physical Education (Liang, Walls, Hicks & Clayston, 2006).

2.5 Impact of Information Technology on Physical Education and Sports

When investigating the use and integration of technology in Physical Education teacher education, it is imperative to examine the technologies currently available in Physical Education for instruction. Surveys have shown the positive impact technology has on the learning process. A survey of more than 2,600 U.S. college students concluded that applying technology to education helps them reduce stress

(45%), improve confidence (46%) and efficiency (57%), while also helping students to better prepare for class (67%) (LaMaster, Williams, & Knop, 1998).

Recent developments in sporting technologies have created a variety of products aimed at improving and increasing athletic performance. The health and well-being of performers can be maintained and observed, and injuries treated, through the production of technologies such as heart rate monitors, pedometers and body-fat monitors. The use of these has given individuals greater knowledge of the body and its ability to absorb exercise, which in turn has allowed athletes to train and compete in sports to a much older age. There is abundance of literature on how to integrate technology into the teaching of physical education. Physical Education journals have published articles related to the implementation of technology, as well as provided ideas related to the use of an assortment of innovative technologies such as the Internet (Elliot, Stewart, Stanec, McCollum & Stanley, 2007), exergaming (Hicks & Higgins, 2010), and tablet PC's (Nye, 2010).

Strategies, a journal for Physical and Sport Education teachers, offered a 6-part technology series that reviewed the potential technologies on how to enhance instruction within PE and PETE (Baert, 2011; Mears, 2010; Mears & Hansen, 2009). While the potential uses of technology will continue to expand in the areas of instruction, monitoring, data recording, video, and communications, one may ask whether or not Physical Education faculty will be able to apply and model these technologies in practice. Due to the fact that there is not much evidence regarding the use of technology by PETE faculty, this section briefly reviewed the tools most commonly written about in professional and empirical Physical Education journals. There are many good options available to Physical Education teachers in regards to

technology. Many of these technologies are easily accessible and are easily incorporated into the curriculum without major changes. Currently, research is geared towards developing technologies that impact sports performance.

2.6 Technological Devices and Physical Education

2.6.1 Interactive video game technology

Considerable evidence has been produced defining barriers to achieving technology into teaching. The question to how teachers breaks these barriers in the pursuit of technology integration remains. A relatively new technique becoming more evident in the field of teaching and coaching is the use of video games activities as a model of instruction.

Interactive video games activities are of particular interest because they have been shown to be very effective teaching tools (Swing & Anderson, 2008). Success using interactive video games activities has been recorded in such diverse domains as classroom education, marine training, and certain surgical procedures. In sport, studies conducted in football, baseball, ice hockey, and tennis have shown improvements to speed and accuracy of decision making through perceptual training (Corbett, Koedinger, & Hadley, 2001). As stated before, decision making teaching is significantly affected by knowledge. Therefore, evidence suggests that the use of videos comprising of variety of interactive activities in teaching is an effective instrument in obtaining declarative and procedural knowledge in physical education.

Simulation and games have a place in the Physical Education curriculum. Game activities such as Dance, Dance Revolution and FX Cycles create opportunities for students to be physically active as well as the opportunity to enjoy doing it. These types of game activities are engaging to students and may also be combined with

other technologies to enhance the experience (Corbett et al., 2001). Appealing to the love of video activities, teachers can spark student‘s interest in Physical Education by integrating gaming activity systems to gym classes. Physical Education teachers also help to beat childhood obesity, which has been called one of the most serious public health challenges of the 21st century. Although interactive video activities like Dance Dance Revolution (DDR), Wii Sports, and Wii Fit were designed to create more engaging activity play, studies show that these activity games increase energy expenditure and may produce positive health benefits (Chamberlin, Gallagher & Graves, 2008).

According to Trout & Zamora, (2005) Dance Dance, Revolution is a video game activity with a floor pad controller that has a grid of arrow panels. Because dancing is a good aerobic activity, DDR has been used to promote physical activity and weight loss in obese children and adults. Corbett et al. (2001) reported that energy expenditure of participants playing the DDR video game activity depends on their experience. On average, DDR was classified as a moderate-intensity (47%) reserve and 10.5 kcal•min−1) activity. For inexperienced participants, DDR was equivalent to light intensity (18% VO2 reserve and 4.8 kcal•min−1).

Wii Sports is a home video game activity that uses a wireless, handheld remote controller to detect movement in multiple dimensions while mimicking sport activities. The games include tennis, golf, bowling, and boxing. Although playing Wii Sports will not burn as many calories as actually playing the sport, Wii bowling, tennis, golf, and boxing games increased energy expenditure by 2% compared to sedentary computer games (Chamberlin et al., 2008). Also, energy expenditure and

heart rate were significantly greater in Wii boxing (3.2 METs), bowling (2.2 METs), and tennis (2.4 METs) compared to values in sedentary (1.4 METs) gaming.

In 2008, Wii Fit was launched by Nintendo. This interactive video game activity offers over 40 training activities categorized into four areas: aerobics (e.g., hula hoops and running), strength training (e.g., lunges and leg extensions), yoga, and balance training. This exercise game uses the handheld Wii remote controller and a balance board peripheral for some of the activities (e.g., running in place and yoga poses). According to Chamberlin et al. (2008) teachers and physical educators can benefit from such integrated device as they can incorporate into their area of specialization.

Many fitness centres, schools, and senior centres are now offering interactive activities to promote physical activity of children, adolescents, and older adults. These interactive activities are well suited for playing alone or with others, require little training or skill, provide an alternative to exercising in bad weather, and may serve as a transition to actually participating in sport and physical activities (Chamberlain et al., 2008). Baert (2009), reported that interactive video game activity cycling significantly increased steady-state heart rate and energy expenditure compared to traditional cycling at constant, submaximal workloads; the two forms of cycling (traditional and interactive video game cycling) resulted in similar ratings of perceived exertion.

In a literature review on interactive video games activities in physical and health education written by Swing & Anderson (2009), there was support within the literature that interactive video games can have benefits to Physical Education. While Exer-gaming is not a new concept, video games activities such as DDR and the Wii have revolutionized Exer-games as means to enhance physical activity levels. The

latest definition as defined on the Interactive Fitness and Exer-gaming wiki states that Exer-gaming is the positive exertion experience gained by combining exercise and activities and multimedia gaming (software and hardware) (Trout & Zamora, 2005). Swing & Anderson (2009) however asserted that teachers who can apply these in their teaching are the ones who have undergone series of ICT training to upgrade themselves. According to him such teachers have the confidence in blending such devices in their instruction.

Dance Dance Revolution, Xbox Kinect, and the Nintendo Wii demand physical activity and make students more active, social and competitive. Engaging, they speak the language of Millennials, transforming their attitude toward exercise and, therefore, improving cardiovascular system and strength. Positive gains to elevating the heart rate levels and increasing energy expenditure have been shown in a variety of studies using

DDR, a well-known dance simulation activity by Konami Corporation where the player is required to dance to a variety of songs, guided by watching scrolling directional arrows on the screen, which correspond to arrows on the pad that he/she has to step upon in synchronization with the music (Baert, 2009). According to Mears (2009) teachers can integrate this type of video game activity into their teaching to kill boredom of students and to encourage maximum participation of the students as each and every student would want to try their hands on the activity. The use of Exer-gaming in schools to enhance Physical Education and physical activity among students has been encouraged by several authors (Mears, 2009; Trout & Zamora, 2005).

Pilot studies done by Trost, Fees & Dzewaltowski, (2008) indicated the potential benefits of Exer-gaming with students who are overweight and unmotivated. Exer-activities boosted their confidence levels and engaged them in cardiovascular exercises that helped them lose weight (Trost et al., 2008). Their study suggested that Exer-activities have the following benefits: (a) helping populations who most need them, such as overweight children and adolescents, improve their physical condition, (b) enjoyable tools for complementing traditional PE activities, (c) increasing the motivation to exercise, (d) promoting physical activity, (e) improving fitness levels, (f) favouring an understanding of physiological concepts and movement principles, (g) enhancing motor skills, (h) sport-specific training, (i) accommodating of both low- and high-ability students by offering several difficulty levels, (j) allowing self-practice in a less threatening and competitive environment than that of traditional team based PE activities, and (k) promoting social interactions and teamwork through multiplayer modes (Baert, 2009).

In another development, Fiorentino-Holland and Gibbone (2005), used the Virtual Gym, a software that simulates actual game play to which students must respond physically, to promote physical activity, enhance motor skill proficiency, and broaden their understanding on movement concepts and principles. Hayes and Silberman (2007) echo the potential benefits of sport video games for Physical Education.

Each of the technology activities discussed provide ways to aid in the assessment of student skills and knowledge. In a broad sense, activities can be used to help make assessment more manageable (Mintah, 2007). Quick and easy assessment, with the ability to record and store data over time, is beneficial to teachers and students. These activities allow teachers to create alternative assessments or ask students to apply

knowledge or create something in a real-world context using newly gained information. This engages students in meaningful learning, which involves higher-order thinking, rather than rote learning, which involves the memorization and regurgitation of information (Mintah, 2007). This allows teachers to gain a broader and perhaps more accurate picture of student learning. Activity integration is a valuable asset to any Physical Education program. It is a powerful instructional tool, an assessment tool, and an advocacy tool. It engages students, making the learning fun and meaningful (Hayes & Silberman, 2007).

It is an undeniable fact that, all models of instruction have strengths and weaknesses, and interactive video games activities are no exception. The number of strengths interactive video activities offer outnumber the weaknesses. In the midst of many, the literature highlights two strengths of interactive video activities that make them very effective teaching tools. The first of these two attributes are the ability of interactive video games activities have to capture and hold attention through an emphasis on perceptual cues (Swing & Anderson, 2008). A study designed to use video games activities to enhance the control of force in putting demonstrated the use of perceptual cues. Chamberlin et al. (2008) stated that a golf interactive video game activity may not provide proprioceptive inferences for putting, but they can give sufficient visual cues to enhance force control in this skill. Interactive video games help a person learn appropriate cues for various situations that can be related to possible real-world situations. Therefore, a person is more inclined to use proper cues/response during a real-life situation resembling the situations learned from the video game activities.

Another advantage of interactive video activity is that they offer clear objectives for the learner. This is important because these objectives/goals can be adapted to skills and knowledge of the student (Swing & Anderson, 2008). The game activities can also be adapted to each individual student learning ability and pace of learning, which helps ensure that they learn the goals and objectives of the situation. Interactive video activities provide realistic situations, and allows the individual student to react within its context. In an interactive video activity, the student may not respond appropriately or make the correct decision, but they receive immediate feedback. This feedback enables them to rethink their decision and ultimately lead to the correct response in a similar situation. The repetition and feedback of interactive video activities allow a student to learn correct decisions (accuracy) in the context of the game and use the learned information for future reference. Along with this learned accuracy, the repetition of the situational decision-making leads to making faster decisions. Integrating video activities into teaching may help the accuracy of decisions made by students, but it most likely has an effect on how fast a student can make decisions (Anderson et al., 2011).

According to Swing and Anderson (2008), additional strengths to using video games activities as a teaching tool includes; improvement in hand-eye coordination, fast and precise feedback, feeling of competence, creates networking in mind/knowledge structures, reduce minimal equipment/facility requirement, improves teachers' demonstration skills, improves fitness level of students, self-paced learning, motivating, achieve mastery, over learning/Repetition and a host of others.

2.6.2 Fitness software and physical education teaching

Nutrition and Fitness are probably the most important features which can affect an athlete‘s performance in sports. Technology such as software programmes are being used to monitor and analyse an athlete‘s nutrition and fitness levels in much more accurate ways than previously. Physical Education teachers can incorporate technological devises such as iPads, tablets, smartphones through a variety of approaches. Everyday tasks such as preparing and administering information (fitness scores, class participation, motor skills, etc.) can be done more efficiently with the use of iPads in the physical education classroom. According to Lilla, Catapano, Darby, Brachio and Morote (2012), Youtube, iPod, and cell phone software has been very beneficial in teaching dance. Penrod (2005) suggested that it is time for dance Education teachers, particularly in universities, to address how the dance curriculum can be infused with technology to fully embrace dynamic interactions between the arts and sciences to benefit everyone, particularly emerging young dance artists. Other uses of iPad in the Physical Education class include:

1. The iPad as a Communication Tool
2. The iPad as a Classroom Management Tool
3. The iPad as a Tool for Instruction, Self-Assessment and Feedback
4. The iPad as a Tool for Assessment
5. The iPad to Store Teacher Resources

There is no limit to the list of applications available on smartphones and tablets, especially regarding health, fitness, and diets. These applications are perfect for tracking the performance of Physical Education students and applying their development towards future lesson plans. Integrating digital devices, fitness software and applications into the classroom serve to improve learning and boost good study

habits. Fitness software is becoming a valuable tool in Physical Education programmes. Subject-specific software is available for anatomy, body composition, dance, assorted sports, and other fields (Mohnsen, 2001). Various fitness software programmes allow teachers to input and track progress over time.

It is expected that Physical Education teachers understand and can assist students in linking specific physical fitness knowledge and concepts to measuring, interpreting, and prescribing appropriate fitness activities (Juniu, et al., 2012).

Many programmes include an option to print reports for students to see and share with parents. Software programmes such as the FITNESSGram can be beneficial in assessing both the teacher and the students (Silverman, 1997). The FITNESSGram was designed for children by the Cooper Institute for Aerobics Research (CIAR) as a way to measure the fitness levels of youth (Dorman, 1998). While teachers record fitness data and generate report cards for the students, it provides the teacher with feedback that can assist in the instruction. If parents are able to see the long-term success and benefits of their students in Physical Education, it gives the programme more value. The ability to see results over time can also be a powerful motivator for students. If students can see how what they are doing is affecting them, learning becomes more meaningful. In addition, there is software that will help teachers and students to create portfolios. The long-term tracking of student fitness components is not only valuable in assessing student performance, but it also allows teachers to evaluate the overall effectiveness of their program and make changes accordingly. Programmes that are constantly reflecting and adapting to meet student needs develop into strong programmes, giving it more value than those that do not. This may be a factor when administrators consider which programmes to keep and which to cut.

2.6.3 Computer technology

The use of computer-assisted instructional software in physical education remains largely unexplored but offers some interesting possibilities. McLean (1996) has reviewed a number of computer-assisted physical education instructional software and has provided the phone numbers or URLs for retrieving the programmes from the Internet and there are more than might be expected. The use of computer-assisted instruction can be used for disciplinary knowledge (e.g. Physics of Sport), activity (e.g. Interactive Volleyball) and fitness (e.g. Exercise for Life). Physical Education teachers integrate computer technology through a variety of approaches. These approaches include the use of word processing, content-based software programmes, desktop publishing, databases, web pages, multi-media systems and visual presentations (Mohnsen, 2008).

The internet is a valuable resource in which students can be self-directed and work independently. Teachers can create a Webquest, an inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the Internet (Woods, Shimon, Goc & Jensen, 2004). Webquests, provide a means of integrating computer technology into Physical Education classes in order to enhance student learning. A Webquest allows students to utilize internet websites to locate information regarding a real-world authentic task. For example, students could be assigned the task of understanding the connection between volleyball and aerobic and anaerobic exercise. Students would find evidence through web sites on aerobic and anaerobic exercise and apply this information to the sport of volleyball. From the information found, students could create exercise routines using volleyball activities and then apply this information during the volleyball unit. By utilizing what the

students have found, the meaningfulness and interest for the activity could be enhanced (Cothran & Ennis, 1999).

Webquests can be short-term and long-term. Either type of webquest can be implemented in Physical Education settings without interfering too much with physical activity time. By their very nature, short-term webquests would not replace too much activity time, and could be assigned as homework to be completed outside of class. When thinking about webquests to be completed outside of class, considerations must be made regarding student access to technology outside of school. Teaming with other teachers and using long-term webquests as a means of cross-disciplinary integration is a way to avoid conflicts with student activity time. Webquests are not only useful for student outcomes, but provide opportunity for collaboration among teachers. Collaboration may change the image of the physical educator in the eyes of their colleagues, who may better understand the role of Physical Education as it relates to student learning and achievement in other subjects. The ―buy in" factor with other teachers again becomes important when promoting the program of the physical educator. Both types of webquests can also serve as alternative learning activities for students who are temporarily unable to participate in physical activity due to medical or other reasons (Woods, Shimon, Karp, Jensen, 2004). Research in online learning shows that students can learn as effectively as in face-to-face instruction (Bennett & Green, 2001).

No longer are students stuck in the monotony of taking notes and being expected to retain the information, but now they are open to the abundance of methods in which they can discover the information on their own. In one study carried out in Iran, the author stated that, ―Research findings indicate that using of information and

communication technology has been effective to a high extent on increase in educational motivation, enhancement of question- making skill, enforcement of research spirit, increase in curricular scores and in total on educational improvement of third grade secondary school students." (Mintah,2003; Lilla, et al., 2011).

When conducting a study on examining examples of technology implementation in Physical Education teacher education programmes, LaMaster (1998) noted that Email, the Internet and Web pages and electronic portfolios were beneficial in the instruction of Physical Education (Baert, 2011). Traditionally, chalkboards were used in the gymnasium to display information, but projection systems, smart boards and wireless transmission (WiFi and Bluetooth) have paved the way for new methods to display and transfer information (Mears, et al., 2009). Additional information regarding the use of portfolios and the internet was also provided (Mills & Tincher, 2003). The authors observed that students use the Internet frequently to complete research assignments and electronic portfolios were used to measure student learning. In PETE, teacher candidates have indicated that creating an electronic teaching portfolio was useful to master technology skills, demonstrate what they learned, and help them find jobs.

The issue of justifying the integration of technology into the teaching of Physical education is well supported in literature. Gibbone *et al*, (2010), investigated the integration of technology in secondary Physical Education classes. The most accessed items in schools were: school and district websites, email, Internet search engines, word processing, and digital videos/You Tube. The PE teachers reported that word processing, computer generated hand-outs, homework, tests, Internet search engines, educational CD ROM/DVD's, and electronic grading were the tools they used most

frequently. On the other hand, teachers reported that they least used tools such as wikis or blogs, podcasting, IEP software, Polar Tri-Fit Technology, advanced website design, spreadsheet software, active video games, digital portfolios, Smart Boards and educational management software. This indicates that even though such tools have been found useful within Physical Education, current PE teachers do not use them.

2.6.4 Online physical education

In the field of Physical Education there is the current explosion of online Physical Education courses. The Florida Virtual School (www.flvs.net) has offered online PE since 1997 yet in 2004 it bloomed with an enrolment of 4500 students. While Florida Virtual Schools mainly offer PE and Health courses for high school students, it is currently developing online courses for middle year students. Online courses offer the type of interactive student/teacher exchange that occurs in the face-to-face classroom through the use of blogging, chats and/or e-mail (Stover, 2005).

NAPSE outlined the guidelines for online Physical Education in a position statement (NASPE, 2009). They preferred a hybrid or blended approach where online modules are combined with physical activity. One of the challenges noted was the preparation of effective online PE teachers. In order to teach online, PE teachers should have adequate professional pedagogical and technological knowledge in order to provide a supportive online learning environment. By modelling a mixture of computer applications in class, teachers may be open to exploring the field of online education.

2.6.5 Handheld Computers / PDA / Tablet PCs

Desktop programmes such as Microsoft Excel, Web and CD-ROM software can allow for the collection of data using hand-held computers or tablet PCs, with the ability to transfer results to desktop systems quickly. Handheld technologies can assist physical

Education teachers with class management, fitness testing, and assessment and are favoured for their quick and easy access to input data and calculate formulas (Dorman, 1998).

In a study involving the use of PDAs in Physical Education, Wegis (2008), found several benefits such as: (a) keeping attendance; (b) storing and retrieving fitness test scores; (c) filing electronic lesson plans; (d) keeping inventory; (e) grading; (f) tracking student physical activity levels; (g) recording student performance in the various learning domains (e.g., psychomotor, cognitive, and affective); (h) performing assessments of various skills and behaviours associated with learning; and (i) expanding available resources via internet capabilities.

Tablet PCs have proven to benefit classroom instruction in several ways: (a) digital note-taking, (b) annotation of presentation materials, (c) mark-up of students _assignments and (d) improvement in students _attention and comprehension in class (Wise, Toto, & Lim, 2006; Anderson, 2004; Berque, Johnson, & Jovanovic, 2001;). In physical education, tablet PCs have the capability to become mobile devices that students can use in the gym. During Physical Education, students can use tablet PCs to learn, interact, and collaborate with peers on learning experiences about and around their movement (Nye, 2010; Gubacs, 2004).

2.6.6 Persuasive technological activities

Persuasive technology is defined as a computer application that is intentionally designed to change a person‘s attitude or behaviour (Straub, 2009). These types of instruction adopt technological tools (e.g., pedometer or balance board, treadmill), media (e.g., video, audio, or both), and social interaction (e.g., playing with another person) to persuade individuals to adapt a behaviour without their knowledge.

Although the DDR was not developed specifically to promote physical activity, it has changed exercise attitudes and the behaviour of children and youth using principles of persuasive instruction. Dance-Dance Revolution uses video, music, and a dance platform to capture interest and engage children in the activity without their being fully aware that they are exercising. The emerging field of persuasive technological activities has enormous potential for promoting physical activity and healthy behaviours (Baert, 2009).

2.7 Teacher Attitude and Information Technology Usage

Physical Education teachers can integrate technology through a variety of approaches. Preparing, generating, administering, and reporting information such as fitness scores, class participation, or motor skill rubric grades for both students and teachers are completed more efficiently (Posner, 2004). There are a number of factors that contribute to Education teachers' decisions about whether to use technology when planning and teaching. This study focused on four distinct variables pertaining to physical Education teachers; perceptions of relevance and importance of technology; teaching style; technology proficiency; and context. The influences on technology use involve both the structures of attitude and practice. The formation of attitudes can provide an understanding of teachers' decisions and perceptions (Lee & Solmon, 2005). Attitude may serve to explain decisions teachers apply to teaching and how they prepare to teach with technology (Lumpe & Chambers, 2001). Teachers' attitudes and experience are factors associated with computer use (Vannatta & Fordham, 2004; Christensen, 2002).

Some researchers (Kumar & Kumar, 2003; Abbott & Faris, 2000) have suggested that teachers‘ attitudes toward technology could be improved by integrating technology into teacher education course work. Furthermore, teacher preparedness contributes to teacher attitude, and the research suggests that teachers‘ attitude toward computers are very important to the integration of technology in the classroom (Russell, O‘Dwyer, Bebell & O‘Conner, 2003). Therefore, if teachers have a good attitude toward technology, they will use technology (Milbrath & Kinzie, 2000; Gabriel & MacDonald, 1996; Marcinkiewicz, 1996).

However, the way teachers view using computers in their classes is an important issue as a positive approach can help them to be more effective while teaching in a computer lab. There might be teachers who have negative attitudes towards using computers in their classes. Both a positive attitude about technology and technology skills in combination are accepted precursors for effective use of technology (Migliorino & Maiden, 2004; Christenson, 2002). Other factors that influence attitude are self-efficacy, social norms, and external demands among others.

In a study on attitudes and perceptions and how technology use for participants were affected, Ertmer, Gopalakrishnan, and Ross (2001), compared what they found with best practices described in the literature. The authors concluded that there is not one technology, resource, or vision that would explain exemplary teaching with technology but that it was dependent on an individual‘s strengths and perceived needs of students in their classrooms. They also concluded that discrepancies exist as to the comparison with commonly published best practices and it remains unclear why they exist.

Similarly, Basinger (2000) saw the need to examine the learning process of teachers as they integrated technology into their instructional practices. Basinger found that teachers experienced stages of growth in using technology where the focus moved from self-use to how to use the technology for greatest impact on learning. Teachers were no longer thinking about how to use the technology, they were using it to meet their needs. Once they moved through the process of designing, developing and delivering an application, they were able to see the effectiveness of the technology in helping students learn. Tabata and Johnsrud (2008) also found attitude to be a factor in use of technology. The study's purpose was to examine teacher technology use and teacher attitudes toward technology and distance education in a large 10-campus system. The researchers surveyed faculty teaching distance education courses and learned that as faculty acquired technology skills, their self-confidence was strengthened to continue and to learn more. Results of their survey showed that instructors' skill in using technology, attitude toward technology and/or distance education, ability to adapt, all had an impact on their use of technology in the classroom or participation in distance education. The researchers recommended further study looking at the roles of faculty attitude, values, and use of technology specifically in teaching distance courses.

2.8 Contextual Variables / Factors Influencing Technology Integration

When studying technology integration into teacher education programmes it is vital to understand the barriers that hinder the facilitation of technology infusion as well as the enabling factors that ease the process. Identification of factors that promote or inhibit teachers from possessing a positive attitude towards the integration of technology is useful information to obtain (Migliorino & Maiden, 2004; Christensen, 2002).

Although technology has attractive potentials for improving teaching of physical education, it also has challenges especially in developing nations like Ghana in the world. Physical education teachers are not technology compliant. Reports indicated that many do not still appreciate the use of technology in teaching and learning and complaint. The inclusion on iPads in the Physical Education has great potential, although there are two main hindrances for its use. The first hindrance is the way that administrators and school district authorities overlook the technology needs of Physical Education (PE): they are either unaware of the technology possibilities within PE or they experiment financial restraints.

In the study conducted by Gibbone et al., (2010), the authors reported budget restraints as the most profound barrier to technology integration in the Physical Education learning environment. The second hindrance to the use of iPads in PE is that most physical Education teachers may not know how to implement technology into the curriculum without taking away from activity time (Pyle, & Esslinger, 2014).

A study investigating the technology preparation of Physical Education preservice teachers revealed that teacher candidates do not feel prepared to be technology proficient in order to teach in this digital age (Liang et al, 2006). The authors stressed the need for programmes to adopt a curriculum wide technology plan that not only covers computer literacy content but also focuses on specific physical and health education software and hardware. Some teachers are hesitant to implement technology into daily lessons because it disrupts the natural order of the classroom (Burns, 2002).

Barriers to technology use are perhaps the most common topic of discussion on technology at an educational institution. The decision by Physical Education teachers to reject or adopt technology in their teaching is a complex issue that remains a challenge for many institutions of higher learning. According to Brickner (1995) one of the obstacles to integrating computers into schools is related to teachers‘ beliefs about teaching, beliefs about technology, their established classroom practices and unwillingness to change.

In another dimension, Moursund and Bielefeldt (1999) found that instructional technology competencies are positively correlated with the implementation of a technology plan and the best predictor of technology integration is the level of technology proficiency. In a study conducted by Lindauer (2004), of 534 colleges/universities with a Physical Education teacher education program, 93.5 % of the respondents stated that their institution integrated technology into the overall curriculum, yet only 26.5% indicated that the institution possessed a technology integration plan. Other researchers (Davis & Fill, 2007; Haughey, 2007; Hayes & Silberman, 2007) have found technology plans to be an integral part of the successful adoption of technology into the curriculum.

The level of integration of PETE Education teachers can have an impact on whether K-12 Physical Education teachers will integrate technology; therefore, it is important to provide evidence of such studies. Research also indicates the importance of pedagogical beliefs and attitudes in the selection and integration of technology (Vannatta & Fordham, 2004; Christensen, 2002; Zhao, Pugh, Sheldon, & Byers, 2002). Evidence shows that beliefs and attitudes of pre-service teachers play a role in the successful integration of technology (Hardy, 1999; Wallinger, 1997). Teachers‘

willingness to devote time to learning and implementing technologies can play a role in the integration of technology (Vannatta & Fordham, 2004).

Other challenges include technical support and budget on the procurement of technological devises. Administrative, technical, and financial supports are also factors that can facilitate the diffusion process (Persichitte, Caffarella & Tharp, 1999). The lack of technology implementation may be related to budget concerns as software and hardware for teaching physical activity is costly (Hayes & Silberman, 2007). Kerr (2005) stated that even though there is evidence about the benefits of technology integration, many issues may impede that process such as: how easy the hardware is to use, how well it is supported in schools, how well and organized the circumstances on which technology is brought to bear, how well designed is the software, how well prepared and confident a teacher is in his/her ability to work using technology in a technology-rich environment, how student learning will be appropriately assessed, and how ready parents and community are to accept new models of learning and assessment.

Constant change in technologies and the resistance to change have also been factors that limit the level of integration of technology (Martin, 2003). Shuldman (2004) pointed out that a great deal of accumulated evidence has identified obstacles that impede teachers' ability to adopt and integrate technology into their teaching. These obstacles include the lack of time, expertise, access, resources, and support. He argues that the most inhibiting factor to successful inclusion of technology in the classroom is the lack of understanding of technology integration by teachers. He states that is related to the fact that the impact of technology integration on student learning only appears after teachers have sufficient skills, a clear understanding of how various

technologies can be used as cognitive tools, and if they are able to merge technology experiences into their daily practice (Shuldman, 2004).

Multiple factors contribute to classroom teachers‘ use of technology, and the reasons they integrate it into their professional practice. For example, the way in which teachers perceive relevance or importance of technology in curricula has been shown to predict computer use (Kanaya et al., 2005). Likewise, the value of technology demonstrated by other teacher‘s influences teachers‘ technology usage (Albion & Ertmer, 2002). Although discipline specific technology has been developed, generally, technology inclusion has not become a common place in Physical Education due to limitations like lack of training, personal comfort levels, availability of equipment, and space and time (Martin, 2003).

Other factors identified (Liu & Szabo, 2009; Christensen, 2002; Beyerbach, Walsh & Vannatta, 2001; Gillingham & Topper,1999) that appear to be inhibiting the integration process of technology in teacher education include; 1) Lack of time to learn the technology, 2) Limited access to hardware, software, and support, 3) Insufficient leadership, 4) Lack of common vision or rationale for technology use, 5) Limited training and support for faculty, 6) Faculty resistance, 7) Lack of funding, 8) Level of fear and hesitancy from students, 9) Lack of understanding of technology, 10) Lack of faculty expertise, and 11) Lack of a department wide technology plan. Studies revealed that despite a high infiltration of various technologies in educational settings, effective utilization of these resources in learning is still an uphill battle for many schools and colleges around the world (Oye, Salleh, & Iahad, 2011; Moser, 2007).

A possible hindrance to acceptance and implementation of technology in an educational system is attitude of both teachers and students towards their use. Studies on educational technology have often addressed teacher attitude and possible reasons behind teacher resistance to integrating technology use to their practice (Wentworth 1996). Studies have shown that, the more positive teacher‘s attitude towards technology use in instruction becomes, the more they tend to use technology. Having a positive attitude towards technology has been shown to be associated with increased classroom use of technology (Moursund & Bielefldt, 1999).

The influences on technology use involve both the structures of attitude and practice, thus the formation of attitudes can provide an understanding of teachers‘ decisions and perceptions (Lee & Solmon, 2005). Attitude may serve to explain decisions Education Teachers apply to teaching and how they prepare to teach with technology (Lumpe & Chambers, 2001). Teachers‘ attitudes and experience are factors associated with computer use (Vannatta & Fordham, 2004; Christensen, 2002). Both a positive attitude about technology and technology skills in combination are accepted precursors for the effective use of technology (Migliorino & Maiden, 2004; Christenson, 2002). Additional factors that influence attitude are self-efficacy, social norms, and external demands among others.

Teachers‘ technical proficiency and frequency of professional application are significantly associated with computer use, particularly for secondary Education Teachers (Becker, 2001). Hence, along with attitude, quality and quantity of technology training are strong predictors of technology use (Vannatta & Fordham, 2004). Additional factors that may influence technology use include teaching styles with which the teacher is comfortable and the educational context. Contextual factors

can shed light on how teachers interpret their role, respond, and make sense of their work based on their conditions (Lumpe & Chambers, 2001).

Teachers may be constrained by factors such as access to equipment, training, personal comfort levels, availability of equipment, and time. For educational practices to benefit from technology in an optimum way, a number of factors need to be taken into consideration. Two of these are technological infrastructure and teachers, the implementers of curricula (Nishta, 2012).

Similar to Nishta's assertion, Chai and Khine (2006), as cited in Teo, Chai, Hung and Lee, (2008) argued that teachers' technology use is influenced by factors which can be classified in two broad categories, external environmental factors and the personal teacher characteristics. Also, Chou (2003) deepened the picture that, two among the several factors of limited or no use of computers and Internet are lack of knowledge and skills as well as insufficient technological equipment.

Studies on why teachers do not practice what they believe regarding technology integration were conducted. Chen (2008) saw that in several studies barriers to technology use were investigated, however, none of the studies focused on teacher beliefs and how they interact with other factors in influencing the integration of technology. The purpose of their study was to explore how teachers‘ pedagogical beliefs aligned with their practices and to understand the inconsistencies between beliefs and practices. The researcher found that all participants used technology for personal or administrative use and for planning instruction, but very few saw that technology could help them reach instructional goals. Faculty did not feel that technology could adequately deliver quality, pedagogically-sound teaching which would result in student learning. Teachers scored high on use of and perception of the

importance of technology in their teaching, but did not demonstrate that same commitment to using technology in the classroom. Chen reported three categories of factors explaining the inconsistencies, including external factors, teachers' limited understanding of constructivism, and other beliefs which conflicted with the pedagogical beliefs they expressed. However, key to the findings of the study was how these factors interacted together to cause the inconsistencies.

Further, Wan (2009), found that faculty at one university were not taking advantage of technology training and that misconceptions about technology prevented its integration. Wan found that teachers' beliefs shaped their instructional goals and perceptions including barriers to technology use. Many participants viewed computer technology as a "tool in a teacher's toolbox". However, those who learned and used technology saw changes in their approach to teaching, but not a change in the heart of what they taught. They viewed technology as a tool allowing better communication with the purpose of helping the students learn and be successful. Wan contended the participants experienced improved teaching and learning materials; mastery of teaching objectives, and enhanced learning processes.

A study by Groves and Zemel (2000), showed that faculty responsible for preparing the future workforce were not using instructional technology in their own teaching. The purpose of their action research case study was to look at attitudes, interest in technology, and use of instructional technology by faculty and Graduate Assistants (GAs) at a Research institution in the Southeast part of the United States. The study made use of a survey delivered by campus mail to faculty and GAs. Responses from 66 faculty and GAs were used to determine technology use and perceptions of expertise of technology use in a teaching setting. Groves and Zemel (2000) found that

the use of technology is related to several factors‘ faculty considered important to critically important including; the availability of equipment, training, ease of use, level of confidence using a technology, and colleagues‘ use of the technology. Additionally, participants were asked about the importance of technology in teaching. More than 46% responded that it was important or critically important to teaching. The need for an action plan was apparent (Groves & Zemel 2000). They created a resource site to address the findings of the factors that influenced the use of technology at that institution, primarily that of training.

In a study of literacy teachers to investigate the integration of technology into instruction, how instructional technology affects learning literacy skills, obstacles and challenges literacy teachers face, how literacy teachers define and the importance they place on instructional technology and to identify the practices of teachers who do not use instructional technology related to those who do, Hutchison (2009) identified two factors that affect technology integration: lack of resources such as time, equipment, training and teachers lack of understanding about what technology integration involves. Teachers need to understand the power of technology in teaching and be provided with the incentive, equipment and training to use it effectively.

A study was conducted to investigate barriers to the integration of instructional technology into higher education. Variables studied included planning and support; infrastructure, expenditures, integration and overall impressions. Results were that the barriers were affecting successful integration (Surry, Ensminger & Haab, 2005). The authors found correlations in five areas: 1) A college‘s technology infrastructure and the technological competency of recent graduates; 2) A college‘s technology infrastructure and faculty efforts to integrate technology into their teaching; 3)

Technology expenditures and satisfaction with the college‘s technology infrastructure; 4) Technology expenditures and faculty efforts to integrate technology into the classroom; and 5) Faculty use of technology and the technology competency of recent graduates. All five findings are significant to a college/university‘s goals. Future research was suggested to focus on the refinement of the model developed through this study. Hardin (2006) also looked at how well teachers‘ attitudes predict levels of technology integration into the classroom. She investigated whether perceived support from the administrator as the instructional leader was related to teachers‘ levels of technology integration into the classroom. Findings showed that teachers‘ attitudes did predict levels of technology integration and that administrators viewed technology mainly as a support tool—supplemental to educational uses and also viewed their role in technology integration as a provider of funding.

Perhaps the most striking findings were those of Williams (2009) who believed that there was little awareness about the role that unreliable technology plans had on teachers‘ use of technology in the classroom. Results revealed that more than 90% of responding teachers stated that they would use technology more if it were more reliable and if better support was available.

2.9 Perceptions on the Integration of Technology

Technology has accounted for many changes in education. These changes range from the method instruction is delivered to the attitudes on how learning occurs to the amount of collaboration and knowledge sharing between teachers. Teaching and learning with technology has had a significant positive effect on student outcomes when compared with traditional instruction (Waxman, Lin, & Mitchko, 2003).

Several studies examined teachers‘ beliefs and how they shape their instructional goals and their perceptions of technology use as well as barriers or difficulties in integration. Teachers‘ beliefs about technology, how valuable it is to student learning, how the barriers affect them—all have an impact on what they do with technology. According to Silverman (1997), it is important to consider the attributes and attitudes of the teachers when technology integration is evaluated. In order to understand the integration process, it is vital to study the perceptions of teachers about preparation programmes, professional development, and their current practices related to their integration methodology (Gibbone, 2009; Scott & Hannafin, 2000). Depending on teaching preferences and instructional beliefs, individual teachers may include technology more often and differently than others (Albion & Ertmer, 2002; Judson, 2006). Teachers' beliefs are related to their intended actions and have as a result been identified as an underlying predictor for curricular decisions (Kulinna, Silverman, & Keating, 2000). Teachers‘ perceptions affect their educational philosophy, the learning and teaching goals they aim for, and it can distinguish how they teach (Behets & Vergauwen, 2006; Kulinna et al., 2000).

Positive attitudes toward technology have been significantly linked with an individual's amount of experience with technology (Migliorino & Maiden, 2004; Christensen, 2002). Other studies also concluded that teachers' attitude and experience are factors associated with technology use (Scott & Hannafin, 2000; Vannatta & Fordham, 2004). Research indicates that positive attitudes increase the prospect for achievement in any academic endeavor, and negative attitudes make achievement of competency less likely (Yildirim, 2000). In a study investigating Physical Education teachers‘ perceptions towards technology, LaMaster (1998), found that teachers have positive attitudes and high self-efficacy scores related to using word-processing skills.

Russell (2007) investigated Physical Education teachers‘ knowledge, experience and anticipated usage of nine specific exergames in Physical Education. The study indicated that younger teachers have more positive attitudes towards technology than older teachers. In addition, Russell et al. (2003) pointed out that if teachers perceive lack of knowledge to use technology, they are less likely to try it out in their practice. This finding is evidence of the importance of adequate training in technology to elevate the positive attitudes of teachers in regard to enriching the gymnasium with technology.

The process of successful integration of technology depends on factors such as: self-confidence, self-efficacy, and the willingness to change (Vannatta & Fordham, 2004). However, simply using technology tools may not predict innovative practices (Gibbone, 2009). It is crucial to evaluate the entire technology learning process to grasp the full scheme of successful technology infusion.

2.10 Strategies to Boost Information Technology Integration in Physical Education Teaching

Information technology integration is widely accepted amongst physical education teachers but barriers experienced by physical education teachers within their learning environments may hamper efforts and meaningful use (Gibbone et al., 2010). Preparation and strategic planning are needed to overcome barriers (Gibbone et al., 2010) such as financial and accessibility constraints, time and training needs.

1. *Financial and accessibility constraints:* Budget concerns effect the ability to purchase a desirable amount of equipment and technological devices for teachers and or students to use (Gibbone et al., 2010). Teachers are less likely to integrate technology in their learning environment when there is limited access to equipment

(Woods et al., 2008). Woods et al. (2008) suggested that budget planning needs to happen to upgrade current knowledge. Grant writing is another way to secure funds for purchasing technology devices. Teachers can also try ‗improvisation' approach and take advantage of free applications and resources around the immediate environment.

2. *Time: Learning to Technology in class takes time*. Physical education teachers, particularly elementary teachers who are limited with class time, are concerned with the time commitment it takes to use technology (Woods et al., 2008). Staying active and focusing on skill development is preferred over the inactivity that can come with the use of information technology (Woods et al., 2008). Accordingly, they suggested that to save time, integration must be easily understood and operated; thus, it is age appropriate. Teachers must spend time thinking about classroom management and how they will be able to maximize on task time and minimize waiting time (Beyerbach et al., 2015). Planning before class as well as having appropriate support during class is also important for minimizing inactive time during class.

Teachers should be offered professional development to obtain an increased comfort level using technology. Familiarity with information technology will allow teachers to anticipate possible troubleshooting that may be needed during class time. Effective teacher training should also include time-saving features that the integration affords (Woods et al., 2008). Technical failures can happen when integrating. Being flexible with classroom management can help alleviate the elevated stress level that technical issues may cause (Fox, 2001).

3. *Training needs:* Integration is often placed into a learning environment without providing training for the teacher (Woods et al., 2008). Many teachers do not have a proper and effective understanding of how to integrate information technology properly, in this case technological devices such as Fitness Gram, into physical education (Woods et al., 2008). Moshen (2005) observed that ~~–a~~ teacher's decision to integrate technology is based heavily on the level of support they receive, their own beliefs about integrating technology for learning," (p.1118).

Teachers need to have the opportunities and the skills to integrate technology (Woods et al., 2008). Therefore, participating in professional development activities will help a teacher gain the confidence and skills needed to integrate technology in physical education. Peer support through modelling (Gibbone et al., 2010), mentoring and communities of practice (Fox, 2001) also play an important role in providing teachers with the skills for successful technology integration.

2.11 Summary of Reviewed Literature

The speed at which change is occurring in technology and the wealth of information at our fingertips provides a challenge and an opportunity for 21st Century learners. A review of the literature revealed an opportunity to expand on existing literature in examining the practices of instructors who are teaching with information technology. Attempts have been made to discuss the relevance of the three theories of Technology Integration to this study; Diffusion of Innovation Theory (DOI), Technology Acceptance Model (TAM), and Self-Efficacy. The theoretical framework reviewed provided a powerful model for predicting individual's motives for acceptance and also a key factor in helping to explain and predict user behaviour of instructional integration of technology. Additionally, it addresses the necessity to find out what

specific technologies are included and how they are integrated. This related literature reviewed provided evidence to what technology integration within teacher education means and how it can be examined. Thus, it established that if Physical Education must move along the line of technology inclusion of the 21st century, there is the need for it to be integrated from the school in the curriculum of teaching Physical Education.

CHAPTER THREE

METHODOLOGY

The chapter is organized under the following headings: research design, population of the study, sample and sampling techniques, instrument used for the study, validity and reliability of the instrument, data collection and data analysis procedures.

3.1 Research Design

The study used the descriptive survey design. The justification for the use of this design was because the information gathered from the study are to be used in describing the phenomenon in detail and for diagnosing the problem identified. The survey design was chosen also because a survey permits the gathering of information from a sample of people relatively quickly and inexpensive (Creswell, 2003). Creswell (2003) also noted that a survey study can be done in a short time in which investigators administer a survey to a sample or to the entire population of people in order to describe the attitudes, opinions, behaviour s or characteristics of the population. Survey was also deemed appropriate for the study as the current views, attitudes and opinions of Physical Education teachers will therefore be sampled. It also has the potentiality of providing a lot of information that will be gathered from the respondents.

3.2 Population of the Study

The population of the study comprised all Physical Education teachers in the Western Region which was seventy-eight (78) from fifty-one (51) public Senior High Schools in the Western Region consisting of twelve (12) in the Sefwi Zone, (eight) 8 in the Tarkwa zone, twelve (16) in the Sekondi Zone, fifteen (21) in Takoradi Zone, twelve (12) in Nzema, and nine (9) in Asankrangua Zone.

3.3 Sample and Sampling Techniques

The census sampling technique was adopted to select all the seventy-eight (78) Physical Education teachers who teach at Public Senior High Schools in the Western Region for the study. The reason for the inclusion of all the population as the participants of the study was that the accessible population was relatively small and also to get a true measure of the population. Berg (2001) added that when the population is small and the researcher can access/collect responses from all respondents in that population, selecting the entire population is ideal. Cohen, Manion and Morrison (2003) as cited in Avoke (2005) also opined that adopting the whole population for the study involves all members within the population of interest and that, it is possible to get deep insights into the phenomenon the researcher is interested in. They also share the common view that it is easier to get a sample of subjects with particular characteristics when a researcher purposively includes all the population as participants. However, Avoke (2005) instigates that if the list of the population is incomplete or a large (or even small) proportion of members choose not to take part in the research, the ability of the total population sample to allow the researcher to make analytical generalisation can be severely compromised.

3.4 Instrument for the Study

After a careful review of appropriate literature and considering expert judgment, questionnaire was chosen to gather the data for this study. The questionnaire was adapted from the Secondary Physical Educators' Attitudes and Information Technology Practices Inventory (SPEAITPI) developed by Gibborne et al., (2010) to measure Physical Education teachers' attitudes towards information technology usage during Physical Education teaching. The Secondary Physical Educators' Attitudes and Information Technology Practices Inventory (SPEAITPI) was a 36-item online

questionnaire which was adapted to 30 similar items to suit the population of the study who are mainly Physical Education teachers. This instrument measures four stages of concern: (a) Physical Education teachers‘ perceptions of relevance/ importance of information technology with eight (8) sub-items, (b) Physical Education teachers‘ information technology integration proficiency and use with five (5) sub-items (c) Contextual factors with five (5) sub-items (d) Physical Education teachers‘ teaching styles/beliefs with six (6) sub-items. The questionnaire items centered on the guiding research questions for the study. Other survey items included demographic questions, specific strategies to boost information technology integration in the classroom, information technology usage, and awareness of technology equipment.

The SPEAITPI Questionnaire (Gibbone et al., 2010) consists of 35 items and uses a five-point Likert scale that ranges from _Strongly Agree‘ (5) to _Strongly Disagree‘ (1). The SPEAITPI contains two sections: A and B. Section A provides data on the demographic information of respondents such as age, gender and teaching experience, among others, while Section B had items that address the research questions of the study. Participants were asked to choose the appropriate degree to which their concerns are true of them. Higher numbers indicate a higher level of concern while lower numbers indicate a lower level of concern.

According to Creswell (2003) the general benefits for which a questionnaire is included in a study are: consistency of presentation of questions to the respondents, the assurance of anonymity for the respondents and the less time it takes to administer the instrument. The questionnaire was also found to be appropriate for this study

because of the probability that it is the most common data collection instrument used in educational research as it is more familiar to respondents (Creswell, 2003).

3.5 Validity of the Instrument

Validity of a test instrument is the soundness or appropriateness of the study instruments or procedures used to measure the variables. Validity of instrument was established through content and construct validation procedures. Content validity focuses on how much a measurement tool represents every single element of a specific construct and asks whether a specific element enhances or detracts from a test or the research question (Dzakadzie, 2015). Onivehu and Asare (2002) deepened the picture that content validity is when test instrument contains contents such as theme, wording and format of test task being measured. In this study, content validity was established through the review of the instrument by the researcher‘s supervisor who is familiar with the constructs being measured and later submitted to senior lecturers handling Statistics for clarity of language and for interpreting the meaning behind the questions. The questionnaire was revised based on the comments and suggestions of the experts. For example, under the attitude section of the instrument, the items were initially ambiguous and poorly constructed but it was later modified to increase content validity. Construct validity focuses on how well test items interrelates with other tests or theoretical concepts (Onivehu & Amoah, 2002). In this study, construct validity of test instrument was dependent on theories of attitude and information technology integration. The items were finally vetted and approved by the supervisor for content and construct validation.

3.6 Reliability of the Instrument

Reliability of a study instrument is the consistency of the instrument in producing the same or similar results given the same condition on different occasions. In this study, the reliability of the instrument was established by using pilot test and collecting data from thirty (30) Physical Education Teachers drawn from the Cape Coast Municipality. Using the Cronbach's alpha model, the reliability coefficient of the instrument was calculated at $\alpha = 0.85$. The reliability of scores for each factor in the four scales of the survey were (a) Physical Education teachers' perceptions of relevance/ importance of information technology integration ($\alpha = 0.69$); (b) Physical Education teachers' information technology integration proficiency and use ($\alpha = 0.76$); (c) Contextual factors ($\alpha = 0.67$); and (d) Physical Education teachers' teaching styles/beliefs ($\alpha = 0.73$); These figures indicate good internal consistency as reliability coefficients of approximately .60 or greater are considered adequate according to social science literature (Loewenthal, 2004).

3.7 Data Collection Procedure

An application for permission to conduct this study in the Western Region was sent to the Regional Education Service Directorate (PE Department) requesting permission to gain access to the Physical Education teachers in the region to facilitate the study. The letter stated the objective and purpose of the study and the need for the participants to give their consent to be co-operative in the data collection process (Appendix C).

This ethical practice in research as suggested by Creswell (2002) and Warburton et al. (2002) is a necessary procedure to respecting the site where the research takes place and gaining permission before entering a site in the data collection process. The Regional PE Coordinator granted permission for contact to be made with respondents

and called all the Zonal PE Coordinators to inform them to assist in providing the data sought.

To establish a close relationship with the teachers during the Zonal sports meeting, a short meeting with the Physical Education teachers was held to seek their maximum support for the study. Respondents were given a brief on the main purpose of the study and their concerns were addressed. Respondents were further assured of complete confidentiality of the data gathered from them. The participants were therefore given the questionnaires to be completed and retrieved within a week. Zonal Coordinators were tasked to retrieve the completed questionnaires for submission to the researcher.

3.8 Data Analysis

Data analysis is the ordering and breaking down of data into constituent parts and performing of statistical calculations with the raw data to provide answers to the research questions guiding the research.

This study employed simple descriptive statistics consisting of frequency counts and percentages for all the demographic variables especially and research questions using SPSS version 20. Further analysis was done for Mean and Standard Deviation scores for the four scales of the Physical Education teacher‘s attitudes and integration inventory.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents the data analysis, findings and discussion of results. The first part of this part presents the background information of respondents. The other part of this involves the quantitative analysis of data obtained through the SPEAITPI questionnaire to ascertain PE teachers' attitudes and practices towards information technology integration process. Data was gathered from a total sample of 78 teachers. Descriptive statistics such as frequencies, percentages, means and standard deviation of the data collected were presented.

4.1 Results of the Demographic Information

The demographic characteristics of the respondents centred on their gender, level of education, teaching experience and location of school. The frequency distribution tables which comprised frequencies and percentages were used to present the demographic data of the respondents. A summary of the participants' demographic characteristics are shown in Table 1- 4 below.

Table 1: Respondents' Gender

Gender	Frequency	Percentage (%)
Male	69	88.5
Female	9	11.5

Findings from Table 1 above shows that majority of the respondents (88.5%) were males with only 11.5% being female teachers.

Table 2: Respondents' Educational Background

Level of Education	Frequency	Percentage (%)
Diploma	2	2.6
First Degree	45	57.7
Master's Degree	31	39.7

Table 2 explained the level of education of the participants. The participants had varied professional qualifications with only 2.6% having qualifications below the graduate level whiles the rest of them (97.4%) were university graduates with either a first degree (57.7%) or a master's degree (39.7%).

Table 3: Respondents' Teaching Experience

Teaching experience	Frequency	Percentage (%)
1-5 years(s)	2	2.6
6-10 years	25	32.1
11-15 years	31	39.7
16-20 years	11	14.1
21 years and above	9	11.5

The results from Table 3 above shows level of accumulated years of teaching experience of participants, majority of whom had between 6-15 years teaching experience, representing 71.8%, while the number of teachers with 1-5 years teaching experience was insignificant (only 2), 20 others were veterans with over 15 years teaching experience (25.6%).

Table 4: Geographic Location of Schools where Respondents Teach

Location of school	Frequency	Percentage (%)
Rural	31	39.7
Sub-Urban	28	35.9
Urban	19	24.4

Results from Table 4 shows that 31of the educational institutions are in rural locations (39.7%) whiles the rest are either in urban or sub-urban locations (60.3%).

4.2 Research Question One 1: What is the rate of information technology usage by Physical Education teachers at Senior High Schools in the Western Region?

This research question sought to ascertain the rate of information technology integration usage by Physical Education teachers. Test items 1-5 on the SPEAITPI questionnaire were designed to capture participants‘ knowledge on the use of information technology integration in teaching physical education lessons. Teachers were to demonstrate their knowledge on information technology integration by indicating the extent to which they agree or disagree with issues on how they adopt information technology in their teaching. The responses of the participants were subjected to descriptive analysis in the form of frequencies, percentages and statistical means for each of the five items on the level of information technology integration usage by PE teachers and the results presented in Table 5 below.

Table 5: Rate of Information Technology Use

Variables	Knowledge (%)	Accessibility (%)	Confidence (%)	Teaching Purpose (%)	Non-Teaching Purpose %
Internet Related tools	80	37	86	28	83
General Computer Software	60	34	36	32	74
General Computer Hardware	50	20	22	19	78
Physical Education Specific Computer Software	17	9	7	18	66
Physical Education Specific Computer Hardware	14	4	13	17	69

Note: Multiple responses were acceptable within the five categories for each item.

Results in Table 5 revealed that majority (80%) of respondents had knowledge of internet usage. However, only 28% of respondents use the internet in their Physical Education lessons. Sixty percent of respondents indicated that they have adequate knowledge of general computer hardware while 36% feel confident with their current abilities of general computer software. The results indicated that the most known and accessed piece of information technology in this study was internet related tools. Teachers indicated that they feel most confident in using internet for personal purposes.

4.3 Research Question Two: What is the level of proficiency of the Physical Education teachers with regards to information technology usage?

The second research question sought to ascertain the level of proficiency of the Physical Education teachers with regards to information technology usage. Descriptive statistics comprising frequencies and percentages were determined. The data from Table 6 below reveal that respondents in this study generally uses the knowledge of information technology for their personal benefits.

Table 6: Level of Access to Information Technology

Type of Technology	Personal-Use	Percentage (%)	Teaching Purpose	Percentage (%)
Smart Phone	81	90	5	7
Tablet	15	14	4	4
iPhone/ iPad	3	3	2	2
Laptop Computer	71	67	3	5
Projector	1	2	1	1
Digital Camera	4	4	0	0
VCD Player	3	3	0	0
Internet	0	0	0	0

Results in Table 6 revealed that about 90% of respondents have smart phones for personal use, yet, only a few (7%) use smart phones for professional work. About 67% indicated that they have laptop computers for personal-use, however, only 5% use them for teaching purposes. While 14% of the respondents in this study have tablets for personal-use, about 15% of Physical Education teachers in this study occasionally or rarely use any modern information technology in teaching Physical Education content. On average, respondents in this study have one or two computers, smart phones/tablets available for personal-use. However, only a few of them use them for teaching purposes. This implied that, respondents have knowledge of the

various technological devices such as tablets, smart phones, projectors, etc. for personal-use but are unable to use them in their physical education lessons. Information Technology integration would be successful when respondents are taught how to use technological knowledge for teaching purposes.

4.4 Research Question Three: What contextual variables affect information technological usage in teaching Physical Education at Senior High Schools in the Western Region?

This question sought to identify the contextual variables that affect information technology integration usage in the teaching of Physical Education at Senior High Schools in the Western Region. The data from Table 7 below indicated that respondents generally had peculiar problems with regards to the usage of information technology integration application.

Table 7: Contextual Variables Associated to Teachers' Information Technology Use

Applicable Barriers	Yes (%)	Most Challenging Barriers	Yes (%)
Funding	91.3	Funding	88.9
Class Size	70.5	Class Size	75.6
Lack of training	60.2	Lack of training	71.1
Administrative support	60.4	Administrative support	62.2
Internet down/ unavailable	64.8	Internet down/ unavailable	74.4
School support System	62.1	School support System	65.6
Other	56.7	Other	41.1

The results in this study indicated that funding (91.3%) was the most profound barrier, followed by Class size (70.5%) and internet down/unavailable (64.8%). The table further revealed that participants believed school support system (62.1%), lack

of administrative support (60.4%), and lack of training (60.2%) all affected their integration of information technology during Physical Education classes. This implies that majority of schools/teachers cannot afford to use information technology based on the high cost of technological equipment and their funds cannot sustain its scope.

4.5 Research Question Four: What are the perceptions of Physical Education teachers regarding the use of information technology in the teaching of Physical Education at Senior High Schools in the Western Region?

The fourth research question sought to ascertain the perceptions of Physical Education teachers regarding the use of information technology integration process. Descriptive statistics comprising frequencies, means and standard deviation scores for each of the four attitude packages (Importance/Relevance, Information Technology Proficiency, Contextual Variables and Teaching Style/Belief) were determined.

Table 8a: Respondents Attitudes Regarding Importance / Relevance

SN	Attitude Items	SD		SA		N	Mean	SD
		F	%	F	%			
6	Information Technology can enhance the quality of Physical Education teaching.	28	35.9	50	64.1	78	**4.62**	**0.74**
7	I use a variety of learning methods for students in Physical Education.	3	3.8	75	96.2	78	**4.19**	**0.79**
8	Having more technological ideas available would increase my use when teaching Physical Education.	60	77.0	18	23.0	78	**4.28**	**1.03**
9	After learning something about information technology, I attempt to implement it during Physical Education classes.	54	68.2	24	31.8	78	**4.01**	**0.94**
10	Information Technology training has been a positive experience for me.	4	5.1	74	94.9	78	**4.06**	**9.99**
11	I would consider information technology when redesigning my curriculum.	7	9.0	71	91.0	78	**4.01**	**0.84**
	Average of mean/Average of SD						**4.29**	**0.60**

Table 8a captures information about the attitude of teachers‘ on the perception of the relevance of information technology integration. The results reveal a positive perception by all the teachers**.** The table shows the mean and standard deviation scores which ranges from 4.00 (SD = 0.81) to 4.56 (SD = 0.50) showing homogenity in the positive attitude of participants towards information technology integration (M = 4.29, SD = 0.60) with a high frequency range between 66 and 78. An examination of Table 8a shows that all 78 participants asserted that the quality of PE teaching has improved as a result of information technology integration usage because some of them (69) had adopted a variety of learning activity methods for students in Physical Education. The table also shows participants almost unanimously (96.2%) believe knowledge of information technology integration would enhance its usage in class with 74.6% indicating that the more they learn something on information technology integration, the more they would feel the need to implement them in class. Table 8a further shows that 70 participants acknowledged that in-service training on information technology integration has been very positive to them since integration application depends on their skill level. Most participants (94.9%) would consider information technology integration when redesigning their scheme of work, and they feel ready to make an effort to apply variety of technological activities within their physical education instruction in the near future.

Table 8b: Respondents Attitudes towards Information Technology Proficiency

SN	Attitude Items	SD		SA		N	Mean	SD
		F	%	F	%			
6	I feel confident with my current ability to adopt technological activities for teaching during Physical Education classes.	28	35.9	50	64.1	78	**4.30**	**0.81**
7	Most technological application is frustrating to use for Physical Education without help.	3	3.8	75	96.2	78	**3.58**	**1.11**
8	Information Technological problems makes me feel tense when using technology.	60	23.0	18	77.0	78	**3.82**	**0.94**
9	Using Information Technology to teach Physical Education is enjoyable for me.	54	31.8	24	68.2	78	**1.89**	**0.92**
	Average of mean/Average of SD						**3.39**	**1.04**

Table 8b provides information about teachers' attitude on information technology proficiency on the teaching of Physical Education. An examination of the result from the table shows that even though majority (50) of the respondents feel confident with their current ability to adopt technological activities for teaching during Physical Education classes, 96.2% of them believed most technological application is frustrating to use for Physical Education without help. Additionally, 77.0% of the participants feel tense with information technology problems while about 68.2% of them enjoy the use of information technology usage in Physical Education teaching.

Table 8c: Respondents Attitudes towards Contextual Variables

SN	Attitude Items	SD		SA		N	Mean	SD
		F	%	F	%			
6	I am expected to be knowledgeable in using information technology for teaching Physical Education.	0	0.0	78	100	78	**4.56**	**0.50**
7	In my school, most Physical Education teachers use information technology when teaching.	31	39.8	47	60.20	78	**3.54**	**0.90**
8	I know of many Physical Education teachers who use information technology during Physical Education classes	62	79.4	16	20.60	78	**2.40**	**0.92**
9	I have enough technological equipment appropriate for my class size.	18	23.i	60	76.9	78	**3.63**	**0.94**
10	I can easily access technological resource personnel in my school.	48	61.6	30	38.4	78	**2.85**	**1.14**
	Average of mean/Average of SD						**3.45**	**0.89**

Table 8c provides information about teachers' attitude on contextual variables of information technology integration process. Results from the table shows that even though all the participants (78) asserted that teachers are expected to be knowledgeable in using information technology integration method to teach, 60.2% of them are aware of colleagues applying technology integration during Physical Education classes. Additionally, 61.6% of the participants still feel inadequate in their ability to access technological resources in their school since about 79.4% of schools in the research area do not have enough technological resources for an information technology integration programme.

Table 8d: Respondents' attitude towards teaching styles /belief

SN	Attitude Items	SD		SA		N	Mean	SD
		F	%	F	%			
6	Information Technology takes time away from more important concerns.	28	35.9	50	64.1	78	**3.03**	**1.35**
7	Information Technology accommodates personal learning styles.	3	3.8	75	96.2	78	**4.35**	**0.64**
8	It is difficult using Information technology to teach Physical Education.	60	77.0	18	23.0	78	**2.59**	**0.90**
9	Behaviour management affects my decision to use information technology in Physical Education.	54	68.2	24	31.8	78	**2.96**	**1.07**
10	Technology use promotes student's motivation/participation in Physical Education class.	4	5.1	74	94.9	78	**4.46**	**0.60**
11	Technology use facilitates the teaching of Physical Education lessons.	7	9.0	71	91.0	78	**4.38**	**0.60**
	Average of mean/Average of SD						**3.63**	**0.86**

Results from Table 8d indicate that the minimum and maximum mean and standard deviation scores for the attitude items under teaching style/belief ranged from 2.59 (0.90) to 4.46 (0.60), whereas the frequency scores ranged from 3 (3.8%) to 75 (96.2%) participants with an average mean and standard deviation of 3.63 and 0.86 respectively. Results from the table indicates that participants generally exhibit positive attitude towards the test items on teaching style/belief. While 75 participants feel information technology integration accommodates personal learning styles, 18 of them however believe using information technology integration to teach is cumbersome even though Sixty (60) participants believe that using information technology to teach in Physical Education would not be difficult task to accomplish. The table further reveals that 94.9% of the research participants agreed to the use of technology integration because it promotes students' motivation/participants in PE lessons while 31.8% were of the view that behaviour management affects their integration plans. Table 8d additionally shows that majority of the participants (71)

agreed to the use of information technology integration because it enhanced the teaching of PE. An examination of the mean and standard deviation scores from Table 8d shows a stronger agreement among participants portraying a positive attitudes towards information technology integration because of the belief that the process: a) accommodates individual learning styles (M = 4.35, SD = 0.64, N = 75); b) facilitates teaching (M = 4.38, SD = 0.60, N = 71); c) promotes students motivation/participation (M = 4.46, SD = 0.60, N = 74). At the same time participants explained the difficulty they encounter adopting the method to teach in their classrooms (M = 2.50, SD = 0.90, N = 60) while at the same time behaviour management in class affects their ability to apply technology integration in teaching physical education (M = 2.96, SD = 1.07, N = 54) making them take time away from more important concerns (M = 3.03, SD = 1.35, N = 50).

Research Question Five: What specific strategies are needed to boost activity integration in Physical Education for PE teachers in the Western Region?

The data in Table 9 below shows that almost all participants agreed to the test items on the questionnaire. The table reveals further that all 78 participants agreed that policy makers should review the current guidelines on information technology integration in the school environment as well as recommending to appropriate authorities to review and identify major gaps in knowledge concerning the application of information technology in Physical Education lessons. All the participants further suggested that schools should be supplied with technological equipment such as the provision of internet facilities and that PE teachers should ensure that technological information are used to the advantage of students by teachers and not self.

Table 9: Specific Strategies to Boost Information Technology Integration

No.	Statement	SD		D		U		A		SA		M
		F	%	F	%	F	%	F	%	F	%	
31.	Policy makers should review the current statues of information technology and the school environment.	0	0	0	0	0	0	37	47.4	41	52.6	**4.5**
32.	Information technology must be reviewed to identify major gaps in knowledge concerning the use of technological devices in Physical Education lessons.	0	0	0	0	0	0	40	51.3	38	48.7	**4.5**
33.	Schools must be supplied with technological equipment to enable PE teachers to be more creative in the classroom.	0	0	0	0	0	0	31	39.7	47	60.3	**4.6**
34.	PE teachers should ensure that technological information obtained are used to the advantage of students but not self.	0	0	0	0	1	1.3	30	38.4	47	60.3	**4.6**
35.	technology integration in Physical Education should be considered in all school related decisions	0	0	0	0	1	1.3	40	51.3	37	47.4	**4.5**
36.	Monitoring Physical Education and opportunities for Information Integration in Schools.	0	0	0	0	0	0	39	50.0	39	50.0	**4.5**

Results from Table 9 also shows that all participants believe that to specifically boost information technology integration in schools, this process should be considered in all school-related decisions and that there should be continual monitoring on the process in Physical Education as well as the creation of opportunities for information technology integration in teaching.

4.6 Discussion of Findings

The study was conducted to explore challenges affecting the attitude of PE teachers in the Western Region towards information technology integration in the teaching of Physical Education. The study adapted test items from the SPEAITPI questionnaire used by Gibbone et al., 2010 to gather data on Physical Education teachers' attitude and practice towards information technology usage in teaching Physical Education.

Results in research question one indicated that the most known and accessed piece of information technology for respondents in this study was internet related tools. Results also revealed that teachers indicated that they feel most confident in using internet for self-use. These results were supported by Gibbone et al. (2010), who concluded that the most frequently used items were, smart phones, computers, tablets and the Internet, so it is likely that most teachers were using these items for personal use and not for instruction. The findings also support the study by Beyerbach, Walsh, and Vannatta (2001), who proposed that information technology integration methods should be introduced earlier in the programme so that student teachers can develop their technology competency over several years. This strengthens the notion that when teachers are comfortable with technology, they are more likely to integrate several technological activities into their teaching (Castelli & Fiorentino, 2008).

The results in research question two indicated that more than 70% of Physical Education teachers in this study had one or two computers and smart phones/tablets available for personal-use whereas just a few use them for teaching purposes. Results of this current study is consistent with studies by Brickner (1995), that one of the obstacles against integrating technologies into schools is related to teachers' beliefs about teaching, beliefs about information technology, their established classroom

practices and unwillingness to change. Results also agreed with findings of Williams (2015), who observed that a possible reason for this kind of attitude might be because they do not feel confident enough and feel a need to be trained about the use of technologies in teaching.

Results in research question three showed that funding was the most profound barrier, followed by class size, school support. This result is in line with Gibbone, et al., (2010), who reported budget restraints as the most profound barrier to information technology integration in the Physical Education learning environment. Barriers reported in literature (Park & Ertmer,2008; Friedman, 2006) were consistent with those revealed by this study, which found that budget concern was most problematic and this led to limited equipment and/or resources. Concerns about budget translate into the ability to purchase desirable equipment and software appropriate for teachers' and/ or students' use Gibbone et al. (2010). Class size was the second most challenging barrier reported by participants in this study for not using information technology. Participants acknowledged limited space and allocated time as barrier militating against plans towards information technology integration. Further evidence also shows that high costs of technological devices distort participants' integration techniques as there are not enough funds to cater for information technology integration process in the various schools. The results further reveal that inadequate innovation by participants affects their integration approach. This result corroborates with the findings of (Gibbone, et al., 2010) who reported that class size as a barrier that may be due to teacher's perception of the amount of information technology equipment needed for their students as opposed to the number of students in their class. Support by school and administrators did not seem to be occurring in this study for Physical Education teachers, so lack of peer support may have had an effect on

low information technology usage in schools. The findings agree with Surry, et al., (2005), that support by school authorities were barriers affecting successful integration of information technology. Several barriers seem to pose integration difficulties for teachers based on the results of this study and other studies have reported similar findings with teachers in other fields (Franklin, 2007; Friedman, 2006; Brzycki & Dudt, 2005).

The findings in research question four revealed that even though Physical Education teachers had limited use of information technology, they had positive attitudes about technology use for teaching Physical Education. The result of this present study is in line with the findings of LaMaster (1998), that teachers had positive attitudes and high self-efficacy scores related to using computer technologies. The positive attitude of Physical Education teachers towards information technology use corroborates with the findings of Migliorino and Maiden (2004) and Christenson (2002) who concluded that both a positive attitude about information technology and technology skills in combination are accepted precursors for effective use of information technology. The result also agreed with Moursund and Bielefeldt (1999), that having a positive attitude towards information technology has been shown to be associated with increased classroom use of technology. This confirmed that, Self-efficacy is the measure of one‘s own ability to complete tasks and reach goals (Ormrod, 2006). According to this concept, when people believe that they have the capability to successfully implement the behavioural action, they are more likely to engage in the behaviour; meaning that they have high self-efficacy. Information technology self-efficacy has an effect on technology-related behaviours such as the willingness to acquire technology skills, integrate technology, and hold positive attitudes towards information technology (Sam, et al., 2005; Teo, 2009). They also hold a consensus that, people

develop positive attitude towards an object when at least they have a fair idea about the object.

Results further indicated that Physical Education teachers in the Western Region are faced with contextual variables towards information technology integration. The results were supported by Martin (2003), that information technology inclusion has not become a common place in Physical Education due to limitations like lack of training, personal comfort levels, availability of equipment, and space and time. This assertion is similar to that of Kerr (2005) who stated that even though there is evidence about the benefits of information technology integration, many issues may impede that process.

Results from the attitudes of teachers on the perception of relevance of the information technology integration process shows that participants have a positive perception of the process. The findings further identified qualitative improvement in the teaching of Physical Education as a result of information technology usage by teachers because of the adoption of variety of information technology methods by majority of participants and as a consequence, the more teachers adopt information technology integration, the more they feel the need to implement the process in class. A few in-service training opportunities on information technology integration has been very helpful to teachers since their skill level has seen marked improvements.

Results from research question five eventually reveals that effective teaching and delivery must make use of the available resources to achieve its stated aims and objectives. These resources are in the form of books, money, teaching and learning materials (TLMs) as well as those that promote positive attitude of teachers towards information technology application. The findings support the study of Gillingam and

Topper (1999) who suggested that one way of making children learn to their maximum in order to achieve stated aims and objectives of education is the integration of information technology into teaching.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter examined how key findings and themes which emerged from this study were compared and contrasted with those obtained from previous studies. It also looked at how the study's findings might be used to support or apply to the theoretical framework discussed in the literature review. The summary and conclusions drawn from the study as well as recommendations are also presented. Suggestions for further study and contribution to knowledge are also presented.

5.1 Summary of the Study

The study was conducted to explore challenges affecting the attitude of PE teachers in the Western Region towards information technology integration in the teaching of Physical Education. The study adapted the SPEAITPI questionnaire (Gibbone et al., 2010) to gather data on Physical Education teachers' attitude and practice towards activity usage in teaching Physical Education. Literature on the topic was reviewed under the following headings: Theoretical Framework of Information Technology Integration, Conceptual Framework, Conceptualization of Information Technology and Physical Education Teaching, Information Technology in Sports Development, Teacher Attitude, Practice and Information Technology Usage, Contextual variables/ factors and technology use and Summary of Review of Related literature. The design for the study was descriptive survey. The study adopted the census sampling technique to select the entire population (78) Physical Education teachers in the Western Region.

The findings in research questions one indicated that the most known and accessed piece of information technology tool for teachers in this study was their internet related tools. Results further revealed that teachers indicated that they feel most confident in using internet for personal purposes. The findings in research two indicated that more than 70% of Physical Education teachers in this study had one or two computers and smart phones/tablets available for personal-use whereas just a few use them for teaching purposes. Results in research question three showed that funding was the most profound barrier, followed by Class size, school support. The findings in research question four revealed that even though Physical Education teachers had limited use of information technology, they had positive attitudes about information technology use for teaching Physical Education. Findings in research question five revealed that effective teaching and delivery must make use of the available resources to achieve its stated aims and objectives.

5.2 Conclusion

The use of modern technological learning tools such as the internet to design and collect refined information for teaching has swung its way into multiple aspects of teaching in Physical Education and Sports. Based on the results, the study expressed that knowledge in using most technology is yet limited and the application of information technology in Physical Education lessons in schools in the Western Region is still low. Although some schools in the research setting have internet available for personal-use, few of them use it for gathering information on technology integration techniques for teaching purposes.

Results of this present study shows that while information technology integration has been found useful in education, studies indicate that some teachers are reluctant to apply technology integration in their instruction (McGowen, 2003). If information technology are integrated effectively for the teaching and learning in Physical Education, not only will it facilitate curriculum delivery, and practical lessons but also help assess students‘ progress and follow-up of their learning activities (Mintah, 2007). It will also indirectly increase and improve student‘s sports performance as physical education and sports are highly correlated activities.

It was also shown that access to information in terms of internet usage was more acceptable and pronounced while the knowledge of the use of the internet in collecting information on technology integration for teaching purposes was inadequate. Although respondents felt confident about their skills and perceived technology usage to be important, increased application of information technology for teaching Physical Education is not likely unless the challenges identified are catered for such as budgeting, class size, limited space, allocated time, lack of school support, inadequate innovation plan and many others, which are perceived hindrances in many schools. Thus, information technology integration into teaching may be applied if Physical Education teachers are given opportunities coupled with appropriate resources and training.

5.3 Recommendations

The following recommendations have been made based on the findings from this study:

1. Senior High Schools in the Western Region must be equipped with internet facilities to help teachers improve on their methodological skills in teaching.
2. The PE teacher education programmes in the universities should be reviewed so that information technology can be included in the curricula to provide adequate training for graduate Physical Education teachers to gain confidence in applying information technology in teaching.
3. The Western Regional Education Office should organise in-service training seminars and workshops on information technology education to help Physical Education teachers acquire the skills needed to integrate technology into the classroom.
4. Physical Education teachers in the Western Region need more time and opportunities to apply information technology during field experiences under qualified supervision to improve information technology integration method of teaching.
5. A review of the policy that bars students from owing mobile phones in schools is needed so that basic integration technology procedures can be employed by teachers in the teaching and learning process.

5.4 Suggestions for Further Studies

Future research should explore a comparative study of PE teachers‘ information technology use in Ghana.

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APPENDIX

Questionnaire for Physical Education Teachers

UNIVERSITY OF EDUCATION, WINNEBA

PHYSICAL EDUCATION TEACHER'S ATTITUDES AND INFORMATION TECHNOLOGY PRACTICE INVENTORY (PETITPI)

Dear Sir/ Madam,

I am a Master of Philosophy student in the Department of Health, Physical Education, Recreation and Sports in the above named University. I am conducting a survey on challenges affecting teacher attitudes towards information technology integration in Physical Education teaching at Senior High Schools in the Western Region.

I would be very grateful to have you participate in this study. Please, be assured that any information given is solely for the purpose of the research and would be considered as confidential.

Thank you,

…….

Appiah Martin Benjamin

SECTION A

Instruction: Please respond by ticking [√] in the appropriate box for the response applicable to you.

- **Gender**

  1 Male ☐

  2 Female ☐

- **Level of Education:**

  1. Diploma ☐

  2. First degree ☐

  3. Master's Degree ☐

  4 Any Other ☐

- **Teaching experience**:

  1 1-5 year(s) ☐

  2 6-10 years ☐

  3 11-15 years ☐

  4 16-20 years ☐

  5 20 years and above ☐

- **Location of school**:

  1 Rural ☐

  2 Sub-Urban ☐

  3 Urban ☐

- What are the applicable Barriers and most challenging Barriers you face as a Physical Education teacher in using Information Technology for teaching?

Instruction: Kindly tick [√] the correct box applicable to you (multiple responses).

Applicable Barriers			Most Challenging Barriers		
	Yes	No		Yes	No
Lack of training			Lack of training		
Administrative support			Administrative support		
Budget Constraint			Budget Constraint		
Size of class			Size of class		
School support			School support		
Internet down/ unavailable			Internet down/ unavailable		
Other			Other		

- Which of the information technology use variables based on items by type as Physical Education teacher are particularly used on clustering items?

Instruction: Kindly tick [√] the appropriate box applicable to uses.

S/N	Items type	Knowledge		Accessibility		Confidence		Teaching purpose		Non-Teaching purpose	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
1.	Internet Related tools										
2.	General Computer Software										
3.	General Computer Hardware										
4.	Physical Education Specific Computer Software										
5.	Physical Education Specific Computer Hardware										

a) List the type (s) of information technological devices you possess and use for self and teaching in
class…….....
.....

b) Self Use Yes [ ] No [ ]

For Teaching Yes [ ] No [ ]

SECTION B

The following is a list of statements that may be used to express teacher attitudes on activity integration in Physical Education teaching at Senior High schools in the Western Region.

Instruction: Read each statement carefully and respond by ticking [√] the answer that most accurately represents your thinking and feeling. You are required to either _Strongly Agree', _Agree', _Uncertain', _Disagree' or _Strongly Disagree' with each statement.

PERCEPTION	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
7. Information technology can enhance the quality of Physical Education teaching.					
8. I use a variety of learning methods for students in Physical education.					
9. Having more accessible technology would increase my usage of information technology when teaching Physical Education.					
10. After learning something about information technology, I attempt to implement it during Physical Education classes.					
11. Information, Communication and Technology training has been of positive experience to me.					
12. I would consider Information Technology when redesigning my lesson notes.					
13. I make an effort to apply a variety of technological activities within my Physical Education instruction.					
TECHNOLOGY PROFICIENCY					
14. I feel confident with my current ability to adopt technological activities for teaching during Physical Education classes.					

15. Most information technological application is frustrating to use for Physical Education without help.					
16.Information Technological problems makes me feel tense when using technology.					
17. Using Information Technology to teach Physical Education is enjoyable for me.					
CONTEXTUAL FACTORS	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
18. I am expected to be knowledgeable in using information technology for teaching Physical Education.					
19. In my school, most Physical Education teachers use information technology when teaching.					
20. I know of many Physical Education teachers who use information technology during Physical Education classes.					
21. I have enough technological equipment appropriate for my class size.					
22. I can easily access technological resource personnel in my school.					
23. My suggestions for staff development activities are valued by my school administrators.					
TEACHING STYLE/ BELIEF					
24. Information Technology takes time away from more important concerns.					
25. Information Technology accommodates personal learning styles.					
26. It is difficult using Information technology to teach Physical Education.					

27. Behaviour management affects my decision to use information technology in Physical Education.					
28. Technology use promotes student‘s motivation/participation in Physical Education class.					
29. Technology use facilitates the teaching of Physical Education lessons.					
SPECIFIC STRATEGIES TO BOOST INFORMATION TECHNOLOGY INTEGRATION	**Strongly Agree**	**Agree**	**Uncertain**	**Disagree**	**Strongly Disagree**
30. Policy makers should review the current statues of ICT integration and the school environment.					
31. Information Technology must be reviewed to identify major gaps in knowledge concerning integration of technology in Physical Education lessons.					
32. Schools must be supplied with technological equipment to enable PE teachers to be more creative during PE lessons					
33. PE teachers should ensure that they do use information technology to the disadvantage if their students during lessons					
34. Information Technology integration in Physical Education should be considered in all school related decisions.					
35. Monitoring Physical Education and opportunities for Activity Integration in Schools.					