

The Use of Information and Communication Technology in Physical Education in the United States

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Abstract

The integration of technology in learning has seen different Information Communication Technology techniques being used in various subjects. However, the use of technology in Physical Education has not been given much attention as compared to the other subjects, especially in elementary schools. When the picture is narrowed down to the elementary level, then the question regarding how quality and effectiveness could be guaranteed emerges. The objective of this research was to determine how ICT is used in PE in elementary schools in the United States.

Keywords: ICT, Physical education, Elementary Education

Título: El uso de las tecnologías de la información y comunicación en educación física en las escuelas primarias de los estados unidos.

Resumen

La integración de la tecnología en el aprendizaje ha visto diferentes técnicas de tecnologías de la información y la comunicación utilizadas en diferentes asignaturas. Sin embargo, el uso de la tecnología en Educación Física no ha recibido mucha atención en comparación con las otras asignaturas, especialmente en las escuelas primarias. Cuando nos centramos en la escuela primaria, surge la pregunta sobre cómo se puede garantizar la calidad y la efectividad. El objetivo de esta investigación fue determinar cómo se utilizan las TIC en educación física en las escuelas primarias de los Estados Unidos.

Palabras clave: TIC, educación física, educación primaria.

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1 INTRODUCTION

The onset of ICT (Information Communication Technology) implementations in education dates back to the beginning of teaching machines allowing the programming of behavior-based learning to enhance the process of instruction delivery (Ekberg & Gao, 2018). The decision to include ICT in education has been based on the need for efficiency, adaptability, and quality. Therefore, over the years, new methods have been discovered, and applications and tools meant to improve outcomes have been included in teaching and learning.

With the appearance of technology, including ICT in education will always be associated with several challenges, which will require comprehensive analysis to guarantee the desired results. While other limitations have evolved over the years, the lack of a system that recognizes the centrality of ICT skills in learning through appropriate rewards and incentives could remain a significant challenge. Drawbacks to ICT-based learning is not only a problem depicted in the United States' system but also other countries such as the United Kingdom, and other developed countries have witnessed several hurdles when seeking to implement ICT in teaching and learning. However, the use of frameworks that guarantee effective preparation of educators to be in a position of identifying, studying, and disseminating appropriate technologies has been the approach towards mitigating the existing challenges.

One of the critical areas of education that has been characterized by the implementation and incorporation of ICT innovations is in teaching Physical Education (PE). Physical Education is a dynamic component of learning and is equally impacted by the changes in technology. The current shift to a dynamic approach to physical activity has taken the center-stage in the United States and across the globe (Sliwa et al., 2017). The desire to achieve the best outcomes in line with the role of Physical Education as a component of learning has contributed to the development of programs that articulate the tenets of teaching PE. Looking beyond the importance of physical activity to devise an approach to motivating the learners and seeking a more rewarding experience has become part of PE goals. Muscular stability, reducing the level of blood lipids and blood pressure, mitigating obesity, and enhancing mental activity are some of the expected outcomes.

However, achieving these goals requires a comprehensive approach to instruction delivery and exercising. ICT has been used to improve performance evaluation in PE by documenting data to establish patterns and assess deviations.

Lawson (2010) noted that the use of these advanced technologies could be the solution to achieving a high level of participation and understanding among pupils. Through visuals and animations, students are in a position to understand the physiology of the human body as well as the health needs, which could be attained through PE. Software and applications emerge every moment, which generates additional dimensions associated with the usability of ICT in PE.

As more technological changes occur, the use of ICT in PE poses several questions and objectives. The appropriate frameworks that could improve performance remains a significant concern. The training of educators and achieving the balance between the resources and the students' needs also characterize the inclusion of ICT in PE (Cardellino & Leiringer, 2014). However, the existence of challenges also initiates the development of prevention measures and mitigation strategies. Therefore, the use of technology in teaching and improving physical activity has become one of the areas attracting scholarly analysis. Evidence-based evaluations have been focused on investing the challenges and the level of adaptability of the critical implementations in PE. Moreover, the dimension of attitudes and perspectives of both the students and teachers is equally essential. The existing resources and long-run funding of the programs to enhance quality and experience of learners and the appropriateness of training that educators receive is also part of the emerging factors that are currently associated with the use of ICT in PE (SHAPE America, 2016).

1.1. Study Objectives

The primary objective of the study is to determine the implications associated with the use of Information Communication Technology in elementary Physical Education in the United States. The other objectives associated with the primary objective were essential in providing the baseline for thematic evaluation of the topic under investigation. They included the following.

- i. To determine the ICT methods currently used elementary PE in the United States.
- ii. To evaluate the challenges associated with the use of ICT in elementary PE in the United States.
- iii. To determine the level of preparation and perception of teachers and students that are associated with the use of ICT in elementary PE in the United States.
- iv. To highlight the policy and curriculum implication emanating from the use of ICT in elementary PE in the United States.
- v. To highlight the future trends and considerations characterizing the use of ICT in elementary PE in the United States.

2 LITERATURE REVIEW

2.1 Challenges Associated with Physical Education in the United States

While it is evident that the PE policies and regulatory frameworks in the United States are robust, several challenges characterize the current status. Achieving a national uniformity is a significant concern for the country because of the various PE policies adopted in different states. The approach to legislation and regulation of the curriculum requirements is different from one state to another (SHAPE America, 2016).

Furthermore, Zhu et al. (2010) noted also that the overemphasis on recreation rather than science-based education had created a tendency of laxity among learners and educators. PE is a subject like any other, which requires attention and planning. The instructors are required to work with the students to guarantee knowledge acquisition and application.

2.2 ICT in Physical Education in the United States

The declarations of the National Association for Sports and Physical Education (NASPE) in 2009 saw the integration of technology in PE as a requirement for schools. The National Council for Accreditation of Teacher Education (NCATE) echoed a similar concern by calling on educators to adopt the international standards defining how technology could be

used to enhance PE. States in the U.S. have aligned the international standards and requirements to meet the specific structure and environment of the schools within their jurisdiction. According to Maers et al. (2009), NASPE produced the position statement in 2009 to encourage the use of technology-based tools and methods to improve the teaching and learning of PE. An innovative culture has sparked the teaching process in K-12 classes (Dawson, Heathcote, & Poole, 2010). In fact, Mears et al. (2009) pointed out that the declaration by NAPSE ignited a culture transformation where the focus was the shift to activity level and skill development. Nevertheless, the changes were occurring amid the existence of a strong inclination towards the use of traditional methods to teaching and learning associated with PE as opposed to the other subject areas in elementary schools (Vahey & Crawford, 2002).

The existence of a declining tendency to the integration of technology in PE led to the development of guidelines, which have been used in ICT-based implantation in lien with teaching and learning PE. The inclusion of technology was to be embraced as a tool designed to enhance the level of effectiveness in PE (NASPE, 2008). Such a provision allowed the instructors to consider ICT as an enhancement rather than a replacement of the existing frameworks. NASPE was also categorical to affirm that the use of technology in PE was to be viewed as a supplement and useful tool to improve the experience of teachers and learners and reduce the burdens associated with the traditional methods. Moreover, NASPE also pointed out that the use of technology in PE was to focus on creating learning opportunities and new experiences for each student. Therefore, NASPE expected that ICT was not to be applied in PE such that only a few students enjoy the benefits emanating from the digitalized programs and activities. Furthermore, attention was to be drawn towards an advanced approach to the evaluation and assessment of learners (NASPE, 2008).

Based on the guidelines, schools have exhibited significant changes geared towards the improvement of students' experiences during the PE lessons (Eberline & Richards, 2013). The Shape of the Nation report – 2016 revealed that the issue of funding and equipment was part of the factors that featured in the evaluation that the organization carried. While schools are required to evaluate the available equipment and resources, only the state of South Carolina out of the 50 states and the District of Columbia was found to be implementing this requirement (SHAPE America, 2016). The appropriateness of the equipment, as well as their adaptability to the external changes such as technology and the needs of the learners, contribute to the success of PE. The state of Oregon was also found to have a plan in place for the assessment of the facilities used for PE lessons. One of the major contributing factor to skewed ICT implementations in PE in the United States has been the inadequate funding, which has been caused by the lack of proper planning and outsourcing (Eberline & Richards, 2013; Ekberg & Gao, 2018). Less than 25% of the 50 states and one district included in the Shape of the Nation – 2016 report had a proper framework for extra funds meant to improve the success and impact of technology-based PE (SHAPE America, 2016).

2.3 Innovations in ICT used in PE

Different devices have been invented to assist in achieving the desired level of efficiency in physical activity. Such changes have encouraged educators to seek the best tools and methods that could improve the level of practicality of PE. A variety of software and machines have been tested in the classroom and outside to determine their suitability. Over the years, some of the technologies have proved to be essential towards enhancing the experience of learners. While some of these tools have been associated with a high cost of PE, the outcomes have been linked to a higher participation level and motivation among teachers and students. Worth pointing out is that the use of technology in PE is focused on two major factors: the ability to increase the assessment variables and the need to enhance the experience of learners through engagement. The following technology tools and methods are commonly adopted in PE in the United States: pedometers, smartwatches, heartrate monitors, smartphone applications, video cameras, interactive whiteboards, computers and videogames.

2.4 Preparing Teachers to Embrace ICT use in PE in the United States

The preparation of teachers is an essential factor for the success of education (Hauge, 2015). One of the key areas where the United States has invested is the training of education professionals. The local and national government has been keen to ensure that the success of education should not be impaired through the lack of appropriate skills and competence among instructors (Garrahy, 2015). In such a case, a special training curriculum for teacher training exists in all the fields. In physical education, the nature of expertise required to ensure health benefits, body fitness, and safety calls for comprehensive training of instructors. PE teachers are different from the other fitness trainers since they are required to prepare the learners to adopt a lifetime behavioral change, discipline, and routine that will guarantee their

fitness and health. Three training factors define the PE professional development among teachers. The need to ensure effective curriculum implementation and school support is an essential component of teacher training. The desire to improve the pedagogical perception of learners as well as the focus on long-term results and adaptation to existing changes are part of the consideration for instructors.

The Shape of the Nation – 2016 report pointed that the majority of the states that were evaluated had set guidelines and necessary qualifications that each educator is expected to attain. Each of the states in the country has a comprehensive guideline for the PE, which includes the level of qualification for each instructor (SHAPE America, 2016). The segregation of the requirements of each school level is not practiced in each region; however, 35 states have set the requirements for elementary PE teachers. In most cases, attention has been given to the middle and high school levels. Through training, the instructors are prepared to teach the students the essence of physical activity and help them to understand their body physiology. The two elements enable learners to comprehend why PE is included in the daily routine (SHAPE America, 2016; Gao et al., 2017). On the other hand, the teachers are also prepared to assist in achieving behavioral change among the children by imparting social skills and encouraging interaction among learners. Other factors included in the preparation of educators is the need to enhance the skills necessary for a different understanding and implementation of safety measures.

Moreover, the other component of training emanates from the Physical Education Teacher Education (PETE) program structure. The body has structured the training into three significant models and at least five other conceptual dimensions. With the introduction of technology, several ICT elements have been included in the training process to prepare the teachers to embrace the changes in classroom spaces (Lonsdale et al., 2016). While the training is meant to prepare the instructors to understand their role in PE, teachers are expected to be innovative and critical to adapt the acquired knowledge to the respective learning environment. Support from initiatives and the national government has contributed to improved training experiences. Cases, where graduates participate in community-based programs through collaboration with other disciplines such as medicine, has become common practice in the country. Nevertheless, the existence of challenges cannot be ruled out because of the lack of adequate resources in schools as well as the training institutions.

2.5 Possible Technology-Based Shortcomings Characterizing ICT Use in PE

In the United States, several limitations and challenges have characterized the integration of technology PE. The success of the PE instructors is therefore affected by the existing barriers, which in turn, jeopardizes the fitness and health outcomes of K-12 learners (Haughey, 2007; Hayes & Silberman, 2007). The lack of time needed to learn the new and emerging technologies affects the ability of teachers to integrate the use of technology in PE fully. Whenever the curriculum that is used to train teachers fails to allocate enough time for learning technology-based innovations in teaching and learning, then the level of effectiveness of the adopted technologies in schools will decline. The accessibility factor is another fundamental element that contributes to the existing challenges. Limited access to technology hardware such as computers, interactive whiteboards, projectors, video cameras, and pedometers affects the integration of technology in PE across significant states. Availability of software designed to accommodate the specific environment in the school as well as the needs of the learners affects the extent to which technology is used in teaching and learning physical activity. Technical and resource-based support is another critical factor noted among significant school districts in the United States.

Moreover, leadership is another determinant factor in education. In the United States, the national and local government plays a central role in education leadership. Non-governmental organizations also contribute towards the success of the sector. The nature of leadership influences the policy and regulations that are adopted. Leadership also determines the decisions made regarding the management and allocation of funds.

Lack of a common goal, which is geared towards achieving the assessment and fitness objective for each learner, is another limitation that is affecting the integration of technology in PE. Schools without a rationale for technology integration and a long-term vision for the implementations being carried out have failed to meet the needs of the society as well as that of learners and instructors.

Furthermore, the lack of appropriate and enough training and support for instructors affect the level of their competence. Through the PETE programs, the country has tried to achieve the best skill integration that is essential for ICT integration. However, other factors such as the inclusion of skill-based experiences for each graduate affects how they

blend to school's environment and withstand the challenges they encounter. Resistance to change is also critical as the tendency to traditional method is also common among schools. In fact, the Shape of the Nation – 2016 report pointed out how some schools opted for exemptions rather than following the specified guidelines (SHAPE America, 2016).

The commitment of students and their level of motivation is also hindering most schools from achieving the best outcomes. The other factor that is critical is the lack of support from parents or guardians. Some of the devices are expensive, and some parents are not willing to spend to acquire the necessary tools. For example, the school could acquire the whiteboards, video cameras, and computers; however, a parent may hesitate to purchase smartwatches, phones, or pedometers for their kids. Since the integration of technology in education is a collaboration affair, lack of involvement and commitment from one party will affect the nature of the outcome.

3 METHODOLOGY

3.1 Research Questions and Theoretical Hypotheses

The study was based on five significant questions that emanated from the objectives that had been highlighted in the introductory chapter. The following are the generated questions that informed the evaluation process throughout the study.

- i. What are the ICT methods used elementary PE in the United States?
- ii. What are the challenges associated with the use of ICT in elementary PE in the United States?
- iii. What is the level of preparation and perception of teachers and students that are associated with the use of ICT in elementary PE in the United States?
- iv. What are the policy and curriculum implications emanating from the use of ICT in elementary PE in the United States?
- v. What are the future trends and considerations characterizing the use of ICT in elementary PE in the United States?

Each question was designed to focus on a particular theme that characterized the topic. The need for a focused assessment also led to the development of the proposed qualitative hypotheses. The hypotheses were developed from the objectives or questions by linking the postulates of the theories defining this research. The theoretical framework identified three modern theories that linked ICT to learning tools, environment, and the teacher-student relationship. The following therefore formed part of the hypotheses that guided the study.

- i. The study hypothesized that although several ICT methods that could be used elementary PE exist, most schools have not implemented a framework that incorporates these technologies at the elementary level.
- ii. The study also postulates that there exist several challenges associated with the use of ICT in elementary PE in the country such as financial constraints, leadership, and training; however, various measures could be adopted to mitigate these challenges.
- iii. The researcher also expected to find that the country has invested in the training and preparation of teachers to embrace ICT use in PE. Nevertheless, what is being done is not enough when compared to other subjects where ICT has been integrated. Moreover, the perception of teachers and students also impact the nature of outcomes associated with the use of ICT in elementary PE in the United States.
- iv. The study also hypothesized that the integration of ICT in elementary PE has significant policy and curriculum implications, which should be given the required attention to ensure that the schools, teachers, and student work together to achieve sustainable and long-term results.
- v. The first four hypotheses led to the fifth postulate that the current status of PE in the country requires a proper approach to the integration of ICT at the elementary level. The gaps, challenges, and existing potentials could be used to predict the future trends and considerations. Such move will ensure that the state education leaders prepare to face the future changes to accommodate the required progress.

3.2 Data Collection and Analysis

The data associated with this study was majorly secondary data. The data was obtained from the published annual reports from the Department of Education, PETE, Shape of the Nation, and scholarly database. The information was gathered based on the objectives of the study where the focus was to determine the specific dimensions that relate to the use of ICT in elementary PE in the United States.

4 RESULTS AND DISCUSSION

4.1 Major ICT Technologies and Methods Being Implemented in Elementary PE

4.1.1 Video Cameras, Interactive Whiteboards, and Computers

This study found that video cameras, interactive whiteboards, and computers were used in most of the elementary schools in the US. Video cameras have been preferred because of their wide range of options for use. Video cameras show skills and motion and can be used later to motivate and demonstrate the right practices as well as to develop the comprehension of pupils in line with the subject knowledge. Children can also re-examine their moves, for instance, they can examine and advance their games tactics, steps in their gymnastics, dancing styles, more so if they are capable of watching their performances in slow motion or from a different viewpoint through the use of interactive whiteboards. The research also noted that still and video cameras have also been useful in emphasizing on one's accomplishments within the study. Teachers find this approach convenient because they can crop, edit the video footage and images in a slideshow or DVD player.

The findings of this research have been depicted in work of other scholars. For example, a survey was conducted by Doherty et al. (2012) on the physical activity behaviors of university staff both in the USA and New Zealand using wearable cameras. The findings of this study also show that the cameras can also be used as an evaluation and learning tool and as for managing the classroom. Besides, they can also assist in the making of activity cards, tests, and demonstrations, also, to enable the tutor to simplify specific skill to strengthen and illustrate for better understanding.

4.1.2 Pedometers

The findings of this study show that pedometers were predominantly used in the elementary schools of US. This systematic review found out that pedometers were the most reliable measurement tools since it minimized the bias intrinsic in the survey methods and is useful in large groups of people. The study underscored the fact that precise measurements of physical activity are significant in the determination of the present level of physical activity, examining compliance with the guidelines on physical activity, and determining the relationship between physical activity and health. These outcomes are also evidenced in the study by Sirard and Pate (2001) on the assessment of the physical activity of children and adolescents which show that pedometers were the most used tool in the measurement of physical activity. Sirard and Pate (2001) on the evaluation of physical activity in children and adolescents using pedometers show that the use of a pedometer application like Nike Plus program in physical education enabled the teachers, parents, and pupils to track their progress about their activity level and their health. The report was extracted by the adolescent students in the study from the Nike plus website and used to improve their fitness, ICT skills, and set goals to test themselves. This information was also useful to parents in that they could detect any early sign of lifestyle diseases and take appropriate corrective measures.

4.1.3 Smartwatches, Heartrate Monitors, Smartphones, and Computer Games.

The study also found that some of the ICT approaches were not used in the elementary schools in the US except in secondary schools and higher institutions of learning (Hollis et al., 2017). For instance, heart rate monitors were only found to be useful in specified higher academic institutions where there are specialized persons and where there are standard facilities such as laboratories. Similarly, smart watches and mobile smartphone applications were also not used at the elementary level because of the various institutional policies and the fact that the elementary school children cannot adequately comprehend their use. Also, computer games were only found to be used in higher levels of education

and not at the elementary level. There is limited evidence regarding how computer games have been modified to increase physical activity at elementary level.

4.2 Teachers' Attitudes, Perceptions, and Competence Regarding ICT Use in PE

4.2.1 Attitudes and Perceptions

The findings of this study reveal that most of the teachers in the elementary schools in the US were motivated to use ICT in PE whereas a much higher number of them felt that it was an additional problem to the already existing burden. The study outcomes also show that such teachers ended up not showing any interest in learning ICT and as a result, they ended up demoralizing the few interested teachers.

The study also illustrated that most of the teachers use the computer lab to play computer games, read the daily newspaper through the internet, or check on social media. This implies that the attitudes and perceptions of teachers about ICT use in PE have made the teachers to underestimate the benefits of using ICT in PE, but instead they regard it extra workload. Korte and Hüsing (2007), Smith, Rudd, and Coghlan (2008), and McCormack (2010) found that majority of the teachers were of the idea that the use of computers in the class did not add any important advantage to the pupil but rather an additional burden to the teacher.

However, this is contrary to the minority teachers who appreciate the significance of using ICT in PE. The study also demonstrated that such teachers with positive attitude and perceptions used computers to help them in assessments and class instructions during PE (Kirkham et al., 2017). Furthermore, the study findings showed that positively minded teachers prepared lesson plans with the help of ICT skills and efficiently integrated the skills during PE. Consistent outcomes were echoed by Balanskat et al. (2006) who emphasized that ICT has been found to be significantly helpful to teachers during the preparation of lesson plans which made them more efficient because of its ability to share resources with other teachers within or outside their school.

4.2.2 Competence

The results of this review discovered that most of the teachers in elementary schools in the US were averagely competent about the use of ICT in P.E. this can be attributed to the thought that it is entertained by most of the teachers that they are not qualified to competently use ICT in class.

This survey also revealed that the level of competency of teachers ultimately affects the implementation or integration of ICT in elementary schools in the US. Sijmilar outcomes are evidenced by the study of (Rosenfield & Martinez-Pons, 2005) that shows that the successful use of ICT in the classroom is substantially dependent on the mastery skills of the teacher in ICT. This is because effective integration of ICT into PE requires that teachers should acquire learning experiences relevant to their areas of teaching so that they can exercise, replicate, adapt and effectively implement.

The study outcomes show that incompetency in ICT skills are as a result of the lack of knowledge and skills in essential ICT among teachers. This is caused by the attitudes and perceptions of the teachers towards ICT. This finding is in agreement with that of Ang'ondi (2013) who found those teachers who lowly self-rated themselves about the use of ICT were much less assertive about the use of computers. This was common among those who were in their first time as career teachers and the more experienced ones (Lindberg, Olofsson, & Fransson, 2017).

The results also demonstrated a positive relationship between the use of ICT and competences. Sorgo, Verckovnik, and Kocijancic (2010) ascertained a strong association between the frequency of the use of ICT, attitude and the competence of the teacher. The scholars determined that the competence of the teacher and self-assertiveness be determinants of the application and experience of ICT. This was further confirmed by another survey because those teachers that had experience in the use of computers were more inclined to integrate ICT in PE as opposed to those that were non-experienced (Lindberg, Olofsson, & Fransson, 2017). The findings of this study revealed that the use of ICT in PE in the elementary schools of US is low. Moreover, the introduction of ICT in physical education has not adequately transformed the methods of delivery in elementary schools in the U.S. implying that majority of the teachers have not moved from teacher-oriented coaching to student-oriented PE.

4.3 Policy and Curriculum Implications of ICT use in Elementary PE

This research found four significant aspects associated with the use of ICT use in PE in line with the curriculum and policy requirements at national, state, and district levels. These four factors have been elaborated below.

4.3.1 Improving Policy Environment

The study found that the use of ICT in elementary PE has significant consequences on the policy and curriculum implementations. Technology can be used to improve the policy environment in PE. The primary policy framework requires that each school provide an environment that will guarantee at least 150 minutes of physical activity in grades K-12. This research found that the use of technology can assist institutions and PE teachers to achieve this goal (Monnat, Lounsbery, & Smith, 2014). On the other hand, this study noted that the school districts and their respective schools require a high level of inclusion and participation. Through the use of technology, this policy can be efficiently implemented in all states. Technology provides a comprehensive framework where each learner can interact and benefit from the available expertise of teachers. For example, the use of interactive boards will ensure that the learners get enough out of the videos displaying the essential fitness skills. One of the factors noted as a part of the existing challenges was the issue of schools seeking waivers from the authority. In fact, the study pointed out that some schools had been exempted from the national requirement. However, this study found that the use of computer-based assessment could allow the PE teacher to measure different aspects of physical activity and include the results in the performance portfolio of each child. Such an advantage can be adopted to reduce cases of waivers and exemptions.

Since the national PE requirement calls for the teachers to include class time and participation credits for each learner, cases where some students seek exemption have emerged. However, as noted in this study, the use of technology provides alternatives such as interactive and motion-based computer games, which can be adapted to ensure that those students who cannot participate in outdoor activities are in a position to participate and get credits requirements needed in PE. Since the policy framework is rigid regarding exemptions and substitution, it is important to focus on measures that will ensure that all students are included in the physical activity (Palakshapaa et al., 2015). On the other hand, another notable policy-based impact noted in this research was the issue of class size. Larger class size is linked to inefficiency and huge workload for teachers. Moreover, the incorporation of technology in other areas of learning lead to smaller and manageable classes. The PE policy calls for school administrators to adopt the class size for other subjects in PE lessons (Monnat, Lounsbery, & Smith, 2014). This research found that technology can be used to achieve a student-centered approach to PE. A smaller class could be used to ensure that the instructors give each student special attention as well as a personalized assessment, which guarantees progress.

4.3.2 Advancement of Curriculum

Moreover, the other implication is the advancement of the curriculum. The PE curriculum requirement is clear. Each school and school district is required to have a comprehensive and written PE curriculum for grades K-12. The focus while preparing this curriculum is the need for a sequential approach to learning the essential skills in physical activity. In fact, the localized curriculum is developed from the national and state standards to ensure that they are aligned to the expected outcomes for each grade. One of the major national goals is to ensure that technology is integrated at each level of learning. This research found that while few number of states have adopted the use of technology in PE lesson, the provision for regular curriculum update at school and district level is a potential that can be tapped to ensure that ICT use is a compulsory part of the curriculum. Through technology, schools stand a higher chance of meeting the state and national targets of inclusion and participation of learners at the elementary level. This study noted that instead of focusing on exemption and substitution, schools can use curriculum updates to modify performance metrics to meet the needs of students.

4.3.3 Enhancing Instruction Appropriateness

Another policy and curriculum implication associated with the use of ICT in PE as depicted in this research is the ability of technology to enhance the appropriateness of instruction. This research found that the success and impact of PE in the country depends on the nature and manner of instruction being delivered. In PE, the use of instructional practices is common when seeking to improve the skills and knowledge that learners acquire. On the other hand, the deliberate practices are also encouraged. However, the most significant need is the support and commitment of teachers towards

the achievement of support goals and objectives (Odum et al., 2017). In fact, continuous assessment is central to PE instructional appropriateness. This research found that technology can be used to enhance the nature of instructions by personalizing the lessons through differentiated learning for each student. Such an achievement will depend on the interpretation of the assessment results of the participants. Moreover, ICT could be adopted at the elementary level to ensure that active engagement, modification of outdoor activities, and establishing frameworks for self-monitoring and self-assessment are geared towards the needs of each learner.

4.3.4 Providing a Framework for Student Assessment

The Shape of the Nation – 2016 report indicated that student assessment is essential in PE. In fact, the report pointed out that school districts and schools in the United States should ensure that the assessment frameworks align to the national and state PE standards as well as the grade-level outcomes that have been documented (SHAPE America, 2016).

While operating according to the underpinning protocols remains a critical consideration in PE, the process of assessing physical activity is another thing altogether. This research found that the use of ICT in PE at elementary level could be the ultimate solution to assessment dilemmas. For example, recorded accounts of outdoor activities could be used to ensure that the teacher includes the specific details of participation for each student. Such a provision is not possible with the traditional methods. Moreover, this research also noted that the evaluation of movement through motion sensors is important when instructors are seeking to determine how students are motivated during the PE lessons. Technology also ascertains the evidence-based requirement needed when giving performance credits to learners.

4.4 Challenges and Limitations of ICT use in Elementary PE

According to this study, the implementation of ICT in elementary PE in the US has been hampered by several challenges ranging from the government, students, stakeholders, and teachers. This study identified ten main obstacles that derail the successful use of ICT in elementary PE in the US. These are elaborated below:

This study found that variability in access to primary technology hardware such as computers, interactive whiteboards, projectors, video cameras, and pedometers and technical assistance substantially affected the use of ICT in PE in the elementary schools in the US. This is because access in the US varies according to the state where the school is located. The ratio of pupil to the computer is not up to standard. This finding is consistent with those of Korte and Hüsing (2006) who identified accessibility problem such as an absence of internet and freezing while using the netbooks as the main limitations in the adoption of ICT in teaching.

The lack of assistance about the use of ICT in a school environment was also noted as a challenge in the use of ICT in elementary PE. Most of the teachers complained of the lack awareness and comprehension in the advantages of ICT to learning and how to practically implement the outlining policies to class (Pourkarimi & Zare, 2016). This was contributed by other factors such as lack of adequate time on training and testing with ICT, little amount of class time and curricular limitations. The study found that the time allotted does not allow the teachers to use ICT in PE effectively because the curriculum that is offered to teachers does not factor in the extra time that is consumed by the integration of emerging technologies. Similar outcomes were found by Banaji et al. (2010) also showed that most of the European governments emphasize on the acquisition of ICT tools like video cameras, computers among others without providing for the necessary training and maintenance schedule so that they can be efficiently implemented.

The low levels of confidence in teachers were another limitation that was evident from the findings of this study. This is due to the attitudes and pre-conceived ideas in the minds of the teachers that the integration of ICT into PE is a bother to an already existing burden. This makes them not only unprepared but unwilling to use ICT in the classroom to aid in learning. The study report by the European Commission (2010) also found that the second most required aspect of teacher development was ICT. Also, similar results are portrayed by Balanskat et al. (2006) who confirms that teachers shy away from using ICT in class for fear of the students understanding more than the teacher.

This systematic survey found that the lack of skills and knowledge in the use of ICT was another limitation that hampered the successful use of ICT in elementary PE in the US. This is because the teachers including those who have a positive perception towards ICT do not feel competent about their technical skills. This can also be attributed to the lack of early introduction of necessary computer applications to the college curriculum thus making the graduates void of this fundamental skill.

Additionally, this study found that both graduate and experienced teachers lacked the technical competence due to lack of self-interest in ICT. The findings of this study were inconsistent with the studies carried out by Korte and Hüsing (2006) and Balanskat et al. (2006) who found that both pedagogical and technical competence among the teachers of various countries was different.

Another noted challenge to the use of ICT in PE was the level of professionalism and professional growth, which further determined the successful integration of technology in a learning atmosphere. This is because every area of specialization in the education world demands specific technology requirements like the tools and software, and if experts do not undertake the specified approach in the respective areas, then ICT integration is deemed to fail. The hindrances to the successful implementation of technology in schools and found that it is the degree of professionalism and professional development that substantially matters.

Another limitation to the use of ICT in elementary PE in the US is leadership. From the findings of this study, it was ascertained that both the local and the national governments in addition to non-governmental organizations in the United States are significant to the leadership in education. This is because the policies and legislation are determined by the kind of leadership that is in place. Also, it is the leadership that determines the allocation of funds (SanchezVaznaugh et al., 2017). The type of leadership at the school level may affect the use of ICT in PE because the decisions to support and purchase ICT resources are vested in the school leadership among other factors. The outcomes of this study are in agreement with those of Yuen, Law, and Wong (2003) who found that the strategy used any school that is geared towards implementing pedagogical practices is wholly dependent on the objective the leader and the understanding as well as history and vision of the school.

The lack of support from the parents or guardians to the school is another challenge that was noted in this study. Some of the computer appliances are very costly, and some parents or guardians are not ready to acquire these fundamental tools. The study also found that the lack of collaboration from the parents about the purchase of some tools becomes too costly and makes it difficult for the teacher in the classroom to use the ICT in PE effectively. Also, the pupils do not get sufficient exposure to the various ICT tools thus hampering the overall success of the integration of ICT in PE in the United States elementary schools. The research by Khan, Hasan, and Clement (2014) coincides with the results of this study and points out that parents or guardians do not regard ICT as fundamental as the regular curriculum and therefore are reluctant to spend any additional cost in acquiring the necessary ICT tools.

4.5 The Future of ICT in Elementary Physical Education in the U.S.

According to the evaluation that was carried in this paper, the use of information and communications technology (ICT) in the sector of education is somehow a new occurrence. Various parties of interest in education have undergone different challenges of using ICT and have succeeded to some extent. The daily advancement in the complexity of internet use and future expectations shows that there remain many opportunities that have not been explored fully. Based on the preceding findings, the success of the integration of ICT in schools is much dependent on the provision of relevant infrastructure and tools such as computers, internet, and experienced instructors. This is also closely associated with networking between schools to ensure sharing of information for development.

The ICT in Education Policy is focused on the integration of ICT to the curriculum in schools beginning from the elementary level, in addition to the provision of high-speed internet. Furthermore, the policy on education emphasizes on the continued establishment of online curriculum content, advanced methods of ICT tools and techniques and student assessment. The future of ICT in elementary physical education and its impact in the United States will be discussed based on the tools and techniques for ICT used in PE in elementary schools in the United States.

In the future, it is expected that ICT in education to shift from teaching to learning. Based on the outcomes of this study, the techniques, and tools used in the implementation of ICT in elementary schools such as the use of cameras, interactive whiteboards and pedometers require the transfer of information from the teacher to the pupil that is it is on a one-to-one basis. This makes the teacher rely on time, education system, location, and situation. However, the elementary education system in the future is likely to transit from more focus on the teaching to learning. In this scenario, technological experts will develop courseware, and the pupils that can't make it to school will learn from anywhere at any time under the guidance of the parent. Therefore, teachers will only act as guides. Additionally, the existing number of schools will be outnumbered and supplemented by eLearning and blended learning (White, 2008).

Based on the study findings, the pedometers that are currently used to track the steps of pupils while in motion demands that a teacher is present and to observe and retrieved the data and compare it across different age groups. However, Pelgrum and Law (2003) proposes that with the advancing trends and favorable policies it is likely that in the future the teacher need not be physically present but all the data can be transmitted to the cloud storage and retrieved at a later date by the teacher. Also, the analysis and comparisons of activity level are likely to be processed by a process, and the results relayed both to the teacher and parent instantly.

The study also found that video cameras, interactive whiteboards, and computers were optimally used by the guidance of the teacher and information gathered useful to both the parent and the teacher about the health status of the pupil. However, the use of all these techniques was limited to the physical presence of the teacher, classroom, and the learner. Aktaruzzaman, Shamim, and Clement (2011) and Moore and Kearsley (2011) suggests that in the future, the physical presence of worn of still cameras may not be needed because the advanced technology then will use satellites to show the images or videos captured while the child was in motion. These satellites will be linked to the parents and teachers' smartphones, and through the help of the internet, the child can be watched instantly. Similarly, whiteboards were found to be useful in the use of ICT in PE on condition that the learner, teacher, and the device are physically present. However, future advancement in technology may not demand these conditions. With the help of satellites, the parent can guide the child in the studies while at home at any time.

The study outcomes of this review noted that smartwatches, heart rate monitors, smartphone applications and computer games were not relevant to the elementary level. This is so because of the facilities that some of this equipment required are beyond the capability of the elementary level. However, the future development of ICT in education is likely to see a more simplified version of such techniques such as the heart rate monitors, based on the study by Osborne and Hennessy (2003). Technology will improvise heart rate monitors that can be attached to the buttons on the chest to monitor the rates of the heartbeat. The captured data will also be transmitted directly to the application on the parents or teacher's smartphone through satellites. Also, the future version of heart rate monitors will be sophisticated but simple to use and thus, will not require the presence of a specialized expert to run it. This will eliminate the costly requirements of setting up and using the systems.

Thus, the future of ICT in elementary PE education in the US is full of explorations that what waits is the only time. The current trend with which transitions and innovations are taking place in the education sector is proof of this fact. It is expected that the education sector will ultimately be transformed from the emphasis on teaching to learning and reduced amount of restriction. Additionally, the techniques used in the implementation of ICT in PE are expected to be improved for the better service delivery. With all these future developments in education, it is anticipated that the integration of ICT in PE in elementary schools will be inevitable and all teachers and parents or guardians will be forced to learn on the basic functionalities of the ICT tools. Also, the increased complexity but simple to use will also foster the full integration of ICT in elementary PE in the United States.

5 RECOMMENDATIONS AND CONCLUSION

In conclusion, the research covered several factors associated with the use of ICT in PE. The research examined the extent to which different technologies have been integrated into teaching, learning, and assessment of physical activity lessons in elementary education. The study hypothesized that although several ICT methods that could be used elementary PE exist, most schools have not implemented a framework that incorporates these technologies at the elementary level. At the middle and high school, the use of technology in ICT is more significant when compared to how technology is applied in elementary level. In most cases, the young kids are not given the required experience to explore how modern gadgets such as video cameras, pedometers, and smartwatches could be used to improve their experience in learning fitness and wellness skills. This research also noted that the potential exists when seeking to integrate the use of ICT in PE at the elementary level. Since most implementations have not been attained, it is essential for the stakeholders to consider setting the mechanisms that will ensure that changes are incorporated in elementary PE.

The study also found that there exist several challenges associated with the use of ICT in elementary PE in the country. The most common factor that featured in this research was the issue of financial constraints. Most schools lacked the resources to fund the PE plans and procure the desired equipment. The number of students in schools determines the funds to be allocated; therefore, based on the effectiveness of traditional approaches to attain the national fitness and participation targets most schools have neglected the use of technology in PE at the elementary level and only adopts these change at advanced levels. Lack of proper leadership and managerial support was also noted as part of the

challenges that affect the performance of schools in line with ICT integration in PE. Moreover, inadequate training of teachers and lack of proper preparation to embrace change and participate in decisions process was part of the contributing factors to the existing disparity in ICT implementations in elementary PE; however, various measures could be adopted to mitigate these challenges. For example, schools should seek a higher degree of success and achievement (Zhou et al., 2014). ICT should be centralized to increase learning in PE. The focus of ICT integration should be to spark an increasing tendency to participation. Moreover, ICT should not be used to increase the disparity in motivation. Furthermore, ICT use in PE should enable the instructors to build a connection between the learning objectives and the child-centered skill development for a lifelong impact.

The researcher also found that the country has invested in the training and preparation of teachers to embrace ICT use in PE. Nevertheless, what is being done is not enough when compared to other subjects where ICT has been integrated. Moreover, the perception of teachers and students also impact the nature of outcomes associated with the use of ICT in elementary PE in the United States. Moreover, there should be a provision that will allow PE teachers to undertake refresher courses and on-job training to improve their skills and learn how to implement the new trends in teaching PE (Pourkarimi & Zare, 2016). Technology is subjected to constant changes, which calls for the need to ensure that the teacher understands the innovations and emerging techniques that could be used to improve the quality of PE. Advanced assessment methods, use of modern equipment, and desire to increase the level of engagement and skill development among learners cumulatively justify the need for professional progress.

Furthermore, this paper concluded that the integration of ICT in elementary PE has significant policy and curriculum implications, which should be given the required attention to ensure that the schools, teachers, and student work together to achieve sustainable and long-term results (Thompson et al., 2015). Through effective technology integration, teachers could be in a position to motivate students to participate in indoor and outdoor activities. In fact, the study noted that the teachers could influence decisions in schools in favor of elementary PE to ensure that the curriculum recognizes the need for change. Time, participation targets, and funding could be included within the policy framework to enhance the success of schools.

Lastly, the current status of PE in the country requires a proper approach to the integration of ICT at the elementary level. The gaps, challenges, and existing potentials could be used to predict the future trends and considerations. Such move will ensure that the state education leaders prepare to face the future changes to accommodate the required progress. Based on the findings, it is clear that the level of technology integration requires teamwork and collaboration. The support from the school management and the school districts is not enough. The national government and the Department of Education has a central role to play. The non-governmental organizations also should be allowed to create an impact in elementary PE across the country to create a balanced integration and ICT development for teaching and learning physical activity and fitness (Carlos et al., 2014). On the other hand, student should develop enthusiasm at an early stage to ensure that they acquire health and fitness behavior at higher stages of learning and growth. ICT should also be focused on creating the perception among learners that PE is visual and practical. Such a move will encourage students to view PE as an essential part of learning (Odum et al., 2017).

5.1 Proposed Recommendations

Based on the findings of this study, the success of technology integration in elementary PE could be improved if several measures can be undertaken. Although the paper as considered various factors to determine the best mitigation measures to the existing challenges, the proposed recommendations are not exhaustive. Therefore, schools and states should consider evaluating their experiences and resources to determine the suitability of any of the proposed measures. The outlined mitigation measures have included the literature perspectives as well as the findings of this research. Other dimensions covered in the consulted publications have been included to support the recommendations.

5.1.1 Upgrading Curriculum

One of the factors that came out in this study in line with the use of ICT in PE was the role that policies and guidelines play. A framework such as a curriculum or guidelines provides the baseline that could be used to implement the proposed strategies. Since education is dynamic, having a provision that allows the curriculum to be upgraded to meet the changing external environment will ensure that PE is aligned with changes in technology. It was clear in this study that the national guidelines call for school districts to enact flexible curriculum; however, the evaluation that was carried in this research

indicated that most schools still adopted the use of the traditional method. The upgrading of the curriculum is not an end on its own; therefore, it should be accompanied by a proper monitoring and implementation strategy to ensure that the changes are being carried out according to the proposals. Schools should include the use of ICT as a compulsory component of PE curriculum. Such a move will ensure that the technology is integrated to the desired level as witnessed in science and mathematics.

5.1.2 Accountability

A framework that seeks to enhance the level of accountability in schools based on PE performance targets and outcomes should be put in place. Schools operate based on the provided guidelines such as the CDC School Health Index, which determines whether a school is implementing the PE requirements. Another portfolio such as the School Improvement Plan as well as the wellness policies should be aligned to a comprehensive assessment framework that will guarantee accountability. For example, it is only through technology that a school will be in a position to have historical data in place such as the number of students participating in PE, the number of days in every year that a student undertakes PE lessons, and the number of minutes in a class for every week. For the data to be tracked for a class from the entry level to the middle-class stage, then efficient technology-based methods should be in place. Moreover, assessment of students requires a more diverse approach. Therefore, adopting the continuous method to determine the progress of each student requires tracking of attendance and credits.

5.1.3 Professionalism and Training

The training of teachers is a vital aspect of PE. The use of technology in learning can only be successful whenever the training of instructors recognizes the need to integrate the appropriate knowledge and experience. Training of PE teachers in the United States should consider a modern approach where teachers are prepared to be innovative and competent to transform learning spaces. The world is changing as so should the manner in which children are taught; therefore, the student should be prepared to face the future where physical fitness will be advanced and technology will be used to assess each health dimension and fitness dimension (Zhang & Chen, 2017). Instructors should be advised to specialize in specific fields to guarantee knowledge concentration. Moreover, there should be a provision that will allow PE teachers to undertake refresher courses and on-job training to improve their skills and learn how to implement the new trends in teaching PE. Technology is subjected to constant changes, which calls for the need to ensure that the teacher understands the innovations and emerging techniques that could be used to improve the quality of PE. Advanced assessment methods, use of modern equipment, and desire to increase the level of engagement and skill development among learners cumulatively justify the need for professional progress.

5.1.4 Leadership and Engagement

Leadership is an important element, especially when seeking to implement change. As noted in this study, most schools lacked leadership and managerial support from the administration. The success of PE witnessed in higher education levels emanate from the leadership that exists in the department. Similarly, at an elementary level effective managerial experience and practice will encourage teachers to commit to implement and monitor the learning progress of students. The schools should provide a separate department with a designated budget to ensure that the proposed changes are funded from the departmental kitty. The challenges that most schools have faced in the country is that the leadership in place was not sufficient to consider other options that could be used to advance the PE. The proper training of leaders and having support from the management will ensure that teachers are on the forefront to supporting the integration of technology in PE. Proper leadership will also ensure that schools adhere to the set standards and policies, which could reduce the number of cases where schools sought for exemptions. In fact, based on the findings of this research, it will be important if institutions will include a training program on PE leadership qualification as a method of professional development.

5.1.5 Time Factor

Technology is important in planning whenever the time element is featured. In PE, the number of hours per week that each student is allowed to participate in physical activity is essential. The credits that are included in performance assessment depends on the hours spent and the skills acquired. Based on the findings of this research, schools have

struggled to attain the minimum recommended time for activity. However, through technology, it will be easy to carry out the outdoor activities followed by the assessment of motion and engagement at a later period. ICT use will ensure that the PE supplements are designed to incorporate opportunities that will ensure that each student at elementary level achieves the 60 minutes of physical activity. The use of ICT techniques and tools could also assist students with physical and learning disabilities to achieve the credits required to graduate from one level to another. Tracking the motion of each learner through integrated devices will save on time spend to oversee the participation of students during outdoor activities.

5.1.6 Resources

The scarce resource was the most common drawback identified in this research. There is need to find the best approach to mitigation of the problem. The first consideration is appropriate budget allocation. School districts and schools should ensure that there is a laid procedure that recognizes the need to fund the PE departments and plans. Most schools in the country have depended on external funding and grants to acquire equipment. In fact, some schools have relied on university programs to assist in attaining the PE objectives. Having a proper budget allocation will ensure balanced development in subject management. The current data indicates a skewed preference at the expense of physical education (Mirzajani et al., 2016). Administrators should set a budget limit that will ensure that a specific percentage of annual financial appropriation is segregated for PE projects, purchases, and training. Moreover, schools should seek grants to subsidize the financial deficits in PE departments to ensure that the proposed plans are implemented. Nevertheless, there is a need for a long-term projection of activities and strategies carried out. The school should have an investment program that seeks to achieve one milestone after another. After some period, the cumulative success will depict the desired vision that the school had in line with the ICT integration objectives.

5.1.7 Benchmarking and Research

Evidence-based research is an essential source of information. Results from studies have resourceful insights that could be used in making decisions. In most cases, studies incorporate recommendations based on the findings. Schools should consider the advantages of adopting the national report recommendations. For example, the Shape of the Nation reports has been outlining the recommendations that could be used to achieve the best PE outcomes. The reports have also outlined the measures that could be used to ensure that the strategies being enacted in PE are tailored for sustainable results (SHAPE America, 2016). Schools should be keen to implement such recommendations. Moreover, scholarly evaluations have also recommended what could be done to improve the success rate associated with the integration of technology in PE. Such knowledge-based resources are essential when seeking to gather information for decision-making. Moreover, schools should carry out benchmarking activities where they assess the success stories of other schools on how they achieved their ICT targets in PE. The benchmarks could even extend to other countries to understand the challenges experienced and how those countries overcame. The literature indicated that other countries had faced some challenges that this research found that they also characterize the current situation in the United States. An understanding of how these challenges affected the integration of technology into their PE curriculum could be used to determine the appropriate direction for elementary schools.

5.1.8 Evaluating Alternative Equipment and Methods

Based on the findings of this study, there is need for a proper approach to use of equipment and CT methods. Evaluating the viability of the existing alternatives could provide vital solutions to implementation challenges. For example, the use of technology in PE guarantees access to learning resources. Schools should consider how the use of ICT in PE could lead to new potentials such as extending educational opportunities for elementary students (Turner-Cmucha & Aitken, 2016). The administration should capitalize on methods that could link the rural and urban learners to experience the essence of moving away from the traditional techniques. The time that students spend at home can also be used to achieve the minimum time required to participate in physical activity. Using technology to collaborate with parents and guardians could ensure that students are also engaged at home especially during the weekends at the results transferred to the school's portal for assessment. Educational programming and broadcast are other techniques that could be adopted in PE to enhance the level of participation and engagement of learners both in school and at home.

5.1.9 Other Recommendations

Apart from the recommendations mentioned above, schools should seek a higher degree of success and achievement. ICT should be centralized to increase learning in PE. The focus of ICT integration should be to spark an increasing tendency to participation. Student should develop enthusiasm at an early stage to ensure that they acquire health and fitness behavior at higher stages of learning and growth. ICT should also be focused at creating the perception among learners that PE is visual and practical. Such a move will encourage students to view PE as an essential part of learning (Odum et al., 2017). Moreover, ICT should not be used to increase disparity in motivation. There should be a plan to consider the experiences of minorities as well as those with low motivation on outdoor activities. Therefore, instructors should ensure that children are engaged through technology regarding the actual subject content as they class is shifting to the practical application. Furthermore, ICT use in PE should enable the instructors to build a connection between the learning objectives and the child-centered skill development for a lifelong impact. The analysis should involve the specific needs of the children and consider the ways of improving their performance through a tailored PE experience.

5.2 Future Studies

The process of evaluating the use of ICT in elementary PE revealed several factors regarding the need for sustainable integration. The research showed that there is little information that stakeholders can use to set measures that could improve the process of attaining the fitness targets among elementary students. While the study was based on a qualitative approach, this paper recommends primary research centered on the experience of each school in line with the regulations and policies of the state. Based on the Shape of the Nation – 2016 report it was clear that the evaluation of the PE achievements cannot be generalized at the national level (SHAPE America, 2016). Several factors determined the nature of implementations experienced at each school. Since each state in the country is responsible for policy formation and regulation of the education affairs, it will be essential to consider the experience of each state or district school in line with the established framework of learning. For example, since one of the challenges associated with the integration of technology in PE was weak financial muscle. However, such a challenge requires a comprehensive analysis to determine the extent to which the funding programs and percentage affect each school or state in comparison to the other areas of education. Such an aspect was missing in this study.

Moreover, this research recommends the need to carry out a study based on the appropriateness of the invested technologies. While this study found that the technologies being used are mainly applicable at a higher level of learning, the age factor among elementary school children should be assessed to determine how it impacts the PE innovations. It is not easy to create devices that incorporate the fitness needs of young children as well as that of the older learners at the same time. Such a challenge has an impact on successful technology integration. However, it was not entirely covered in this study. Therefore, scholars should consider this dimension in future study and conduct an evidence-based or cross-sectional assessment regarding this element. On the other hand, as noted in chapter three, one of the limitations that were experienced in the study was the issue of access to information. The future studies should consider using the data collected from the study locations, for example, the use of responses from participants to overcome limitations of the inadequate evidence.

5.3 Reflection on the Research

Based on the findings of this study it was clear that the professionals play a critical role in ensuring that schools integrate the use of technology in PE. It is evident that the success and commitment of teachers start from the time they begin their undergraduate programs. The curriculum determines the expertise that PE teachers will acquire throughout the training period. One of the commitments expected from all teachers is the need to link knowledge to experience. Such an achievement allows the instructors to understand the changes that could alter the education in future. In this research, I have noted that teachers determine the extent to which technologies could be used in PE. When teachers are adequately prepared to embrace change, then they will extend this practice to the classrooms. PE teachers can also influence the decision being made in schools by emphasizing the need to transform the manner in which PE lessons and activities are conducted. When the school's management is convinced on the essence of integrating the listed technologies in PE, then they will fund the proposals. However, teachers who do not strive to influence decisions in their schools contribute towards the existence of skewed technology-based education and learning. Therefore, teachers should participate not only in teaching but also in decision processes to ensure that the learning environment and methods are adapted to the changes in technology.

Moreover, another factor that I consider essential as depicted in this study is the lack of concern for elementary PE. I believe that the current curriculum transformation does not emphasize the need to incorporate technology to improve participation among children during PE lessons. Publications included in this study showed that middle and high school levels had been given priority while little attention is given to elementary schools. The number of implementations and tools adopted when teaching and learning PE increases as the students advance from one class to another. Such a scenario raises questions regarding the degree to which the country esteems the experience of elementary school students as far as physical fitness is concerned. In fact, the findings of this research showed that more effort is needed to improve the commitment of educators and other stakeholders towards adopting a technology-based PE approach. Nevertheless, the scenario can be changed to a better experience if all the recommendations highlighted in this paper are implemented based on the nature of the school in line with resource allocation and ownership.

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