



## Research Article

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# Factors affecting ICT integration in the Teaching and Learning of Physical Education in South Africa: A Case of Johannesburg East Cluster Primary Schools in the Gauteng Province

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## Abstract

**Background:** The adoption and subsequent utilization of information and communication technology (ICT) has revolutionized the pedagogic environment in the modern world. Despite the extensive acceptance and utilization of ICTs in the education and training discourse it appears there is low adoption and underutilization of ICT in the field of Physical Education (PE) pedagogy which is regarded as the basic foundation of sport. **Aim:** The primary aim of this research was to empirically examine the critical factors that impede the utilization of ICT in the discipline of PE pedagogy as an important curriculum subject in primary schools in Johannesburg East Cluster in the Province of Gauteng (South Africa). **Materials and Methods:** The quantitative approach, utilizing the descriptive survey design was adopted in order to address the research questions. The study utilized a questionnaire as a data collection instrument. The questionnaire contained closed questions and was designed to investigate the factors causing the low utilization of ICT in the teaching of PE. A sample of 217 PE teachers was randomly selected from a population of 1 768 teachers that teach in the Johannesburg East cluster of schools. A sample of 217 PE teachers was randomly selected from a population of 1 768 teachers that teach in the Johannesburg East cluster of schools. **Statistical Analysis:** Data analysis consisted of simple statistical analysis which resulted in the identification of frequencies and percentages, which reflected the perception of PE teachers who were surveyed on the topic in question. **Results:** The study established that while primary school teachers have access to adequate ICT hardware, poor training, negative attitudes, lack of PE specific ICT training, lack of PE specific ICT software and teachers computer self-efficacy are the major factors negatively affecting the adoption and utilization of ICT in Physical Education pedagogy in Johannesburg East Cluster in Gauteng province of South Africa. **Recommendations:** The study recommends that in addition to the ICT hardware already provided the South African department of education should also provide PE specific ICT training and PE specific ICT software to its teachers as well as address the negative attitudes and self-efficacy issues of PE teachers.

**Keywords:** : ICT, Teaching, Physical Education, Sport, Primary schools, Gauteng province, South Africa.

## INTRODUCTION

Information and Communication Technologies (ICTs) are a very important component of the transformation happening in all areas of human activity in the modern world. Within a very short space of time, ICTs have become one of the basic and indispensable components of modern society [1]. The influence of ICTs has so far permeated every domain of human life [2]. The introduction of complex ICT technology and hardware has made human activities faster, easier and more interesting. ICTs have revolutionized the learning and teaching of curriculum content in most training and educational establishments. Most modern training institutions and some educational institutions have adapted to this development by changing their classrooms environments from using simple black boards to white boards that are suitable for use with a projector. The availability of interactive white boards has made it easier for teachers to present stimulating and captivating lessons and for learners to understand concepts in a better way.

Because of the advent of ICTs, communication has become faster, sharing of ideas has become easier and storage of information is now more secure. The positive role of ICT in the learning and teaching of most subjects is undeniable. Studies focusing on effects of technology on pedagogy has proven that under ideal conditions educational technology contributes significantly to the quality of teaching of all subjects and to all students [3]. The use of ICTs by teachers and learners offers enormous potential to enhance learning in

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all subjects, including Physical Education (PE).

In apparent recognition of the role that ICT play in the education system [4] proposes that “We want to ensure that every school has access to a wide choice of diverse high quality communication services which will benefit all learners and local communities.” The South African government recognises the inherent unrealized positive impact of ICTs in the field of pedagogy. A brief look at the prevailing status and availability patterns of ICT infrastructure in South African schools reveals that Gauteng province has the highest number of schools with computers at 88 percent [4]. The Gauteng province may account for its superior access to ICTs, to an organised, efficient and well-funded programme directed at providing all its schools with well-managed computer laboratories. It also has a consistent structure for monitoring and training teachers on the use of the computers in teaching and administrative work [4]. It is against this background that the researcher found it necessary to find out why the use of ICTs in the teaching of PE has remained low in the province.

The efficient and effective use of ICTs is a major issue for many educational institutions. Many primary school curriculum subjects face the pressure of adopting methodologies that accommodate ICTs in their lesson delivery. PE is no exception to this dilemma. Although other curriculum subjects have successfully adopted ICTs, it appears there is low utilisation in the delivery of PE curriculum content in Johannesburg East cluster primary schools thereby justifying the need to investigate the reasons for the low integration.

### Statement of the Problem

The researcher’s observation, which is not supported by scientific evidence (anecdotal evidence), reveals that there is low utilisation of ICTs in Johannesburg East cluster of schools in Gauteng province during PE curriculum delivery. PE lessons take place both inside and outside the classrooms but most teachers rarely use ICTs. While the use of ICTs seems to be prevalent in lesson planning and recording of marks, the use of ICTs in the actual practical and theoretical lesson delivery remains subdued. Many PE lessons follow the same redundant format with little use of ICTs. The primary objective of this study was to investigate the factors that affect the integration of ICTs in the teaching of PE in Johannesburg East cluster of schools Gauteng province of South Africa. The primary objective influenced the development of the following secondary research objectives:

- To identify the attitudes of Johannesburg East cluster primary school teachers towards the integration of ICTs in PE.
- To establish the extent to which Johannesburg East cluster primary school teachers receive Physical Education specific ICTs training.
- To find out the availability of PE specific hardware in the Johannesburg East cluster of schools.
- To identify the availability of PE specific software programmes Johannesburg East cluster primary schools

### Literature Review

#### *Factors Affecting the Integration of ICT in the Teaching of Physical Education and Sport*

A number of factors have been put forward as contributing to the failure by teachers to integrate ICTs in their teaching. Technical factors such as lack of appropriate and adequate technology, scarcity of software in schools, the inadequate general computer literacy, and the limited expertise of teachers regarding ICT have been noted as common reasons [5-7]. Other factors include teacher’s negative attitudes and lack of specific expertise and practical skill and know how on the actual use of ICTs in the learning process [5-7]. The researcher is cognisant of the fact that most schools in the

Johannesburg East cluster have well equipped computer laboratories and have been allocated with electronic tablets that can be used to facilitate PE. However, the utilisation of ICT during lesson delivery remains subdued.

#### *Teacher Attitudes in using ICT*

[8] argues that, “personal characteristics such as educational level, age, gender, educational experience and attitude towards computers can influence the adoption of ICT” [8]. He asserts that the mere presence of computers in a school does not guarantee the use of the tools. The attitude of the teacher towards the use of ICT is believed to be a strong indicator of whether the teachers will use ICTs or not. In a similar study [9] found out that there is a link between the teacher’s attitudes towards technology and their chances of integrating it into teaching. The teachers that have a higher chance of integrating ICTs successfully are those that have more experience, confidence and positive attitude in their ability to use them effectively [10].

#### *Teacher Training in ICT*

Teacher training plays a pivotal role in determining whether teachers use ICT or not. Research findings revealed that teachers’ training programmes lacked pedagogical training which prevented teachers from using ICTs in the classroom [11]. [11] in their studies further identified that although individual ICT skill for personal use, may have been high, the challenge was the transfer of these skills to the classroom “. [12] added weight to the debate and reported that the teachers surveyed in their study did not get the necessary encouragement to use ICTs in the classroom as explained by [11] this was as a result of problems that were associated with teachers’ own use of ICTs. It is therefore reasonable to conclude that universities and colleges might be contributing to this ICT phobia by not training and preparing teachers adequately for the use of information communication technology particularly in PE lesson delivery.

#### *PE Teachers’ Access to ICT*

A key factor in determining the integration of ICTs in schools are the rules set by the school on how and when to use the computers. [13] observed that the rules set by the project organisers on who can use the technology and what it can be used for affected the level of usage and the benefits derived from the technology. Also of crucial importance is the fact that ICTs in most schools is only available for specific subjects. This indicates a main reason why PE teachers might not be using the ICT. [14] concurs with this assertion when he points out that the red tape around the use of the laboratories prevents the educators from having the opportunities to get into the laboratories.

Research findings also indicate that another discouraging feature is that the number of computers does not usually tally with the number of students [15]. Overcrowded laboratories and students sharing computers are a common practice in most schools and this tends to create problems for teachers in managing the learners during the lessons [15].

The proximity of the computers and other forms of technology to the PE teacher is of paramount importance. Most computer laboratories have immovable computers [15]. This limits the PE teacher’s ability to fully employ the computers. If they were located in the school gym or hall then they would be easily accessible to the teacher [15]. On the same note computers in the laboratories limit the type of tasks to mere academic research, typing of documents, video analysis and other sedentary activities [15].

#### *Computer Self-efficacy in PE Teachers*

Computer self efficacy theory has been associated with studies which centred on examining participants’ self judgements and self

perceptions of ability to apply one's skills when using computers for varied activities<sup>[16]</sup>. The import of self efficacy in this sense is premised on self evaluation and self judgement of one's ability to use one's computer skill for broader tasks and does not focus on component skills such as using specific software features or starting up a computer<sup>[16]</sup>. Studies have shown a positive correlation between high self-efficacy and the adoption and usage of computers in general<sup>[16]</sup>. Research has identified that in the case of teachers, a strong sense of computer self-efficacy affects both the frequency and the manner in which ICTs are used in everyday instructional practice<sup>[16]</sup>.

## **MATERIALS AND METHODS**

### **Research Design**

The study adopted the quantitative approach utilising the descriptive survey design. The quantitative research approach "is a formal, objective, systematic process to describe and test relationships, examine cause, and effect interactions among variables"<sup>[17]</sup>. The descriptive survey design was used in this study because, it is a suitable design "for collecting original data for describing a population too large to observe directly"<sup>[17]</sup>. In addition the descriptive survey was used in this study because it provides a correct picture of the characteristics under study<sup>[17]</sup>.

Collected data was organised and analysed using simple descriptive statistics. Frequency tables were constructed from the analysed data and percentages were calculated from these.

### **Population and Sample**

A sample of 217 PE teachers was randomly selected from a population of 1 768 teachers that teach in the Johannesburg East cluster of schools. A population is defined as "all elements (individuals, objects and events) that meet the sample criteria for inclusion in a study"<sup>[18]</sup>. A sample of 217 was considered adequate because it was derived from Krejcie and Morgan's table for determining sample sizes for finite populations.<sup>[19]</sup> developed a table for determining sizes of a randomly selected sample from a given finite population of *N* cases such that the sample proportion *p* will be within plus or minus 0,05 of the population proportion *p* with a 95% level of confidence.<sup>[19]</sup> argues that, "there is no need of using sample size determination formula for 'known' population since the table has all the provisions one requires to arrive at the required sample size".

### **Sampling Procedures**

Random sampling was used to select participants for the study. The sample consisted of 217 teachers from the Johannesburg East cluster of primary schools who were selected based on the criteria that they teach Physical Education.

### **Research Instruments**

A questionnaire which consisted of closed ended questions was used as a data collection instrument. The questionnaire was considered appropriate because of a multitude of reasons. The questionnaire ensured a high response rate as it was hand delivered to respondents to complete and were collected personally by the researcher. The questionnaire also required less time and energy to administer and complete. The questionnaire did not only offer the possibility of anonymity, because subjects' names were not required, but it also presented less opportunity for bias as it was presented in a consistent manner. The questionnaire contained closed items which made it easier to compare responses of each item.

## **Data Collection Procedure**

To ensure the credibility of the study, permission was sought from the department of education as well as the respective administration of each of the schools. Initial contact was made with the possible participants to appraise them of the nature of the study. The questionnaires were personally hand delivered to the respondents for completion by the researcher and research assistants. A date was then set for the collection of the completed questionnaires.

## **RESULTS AND DISCUSSION**

Out of 217 questionnaires which were distributed 200 were returned constituting a 92 % return rate. This section presents the findings of the study.

### **Attitudes towards the Use of ICT**

The study revealed that a substantial number of teachers have negative perceptions towards the use of ICT in the teaching of PE which could be a huge factor in determining whether teachers integrate ICT or not. This observation supports the findings, which were made by<sup>[9]</sup> who found out that there is a link between the teacher's attitudes towards technology and their chances of integrating it into teaching. A number of studies<sup>[20, 21]</sup> have shown that there are a variety factors which influence educators' underutilisation of ICT in their teaching which include the attitude of the teachers (Table 1).

### **Physical Education Specific ICT Teacher training**

Half of the teachers reported that they did not receive training on the use of ICT for the teaching of PE at University and College. The statistics indicate that there are universities that are offering PE specific ICT training and that there are others that are not offering the training at all. There seems to be an anomaly in that some institutions within the same country are providing ICT training while others are not. The above findings reveal a huge void in the training of PE teachers in the use of ICT. The lack of training is a probable explanation for the lack of integration of the 56 percent who revealed that they never use ICT at all in their teaching. The findings conform to the findings of various other researchers such as<sup>[11]</sup> who found out that a lack of ICT pedagogical training at teacher training colleges was one of the challenges affecting the utilisation of ICT in the classroom. Their studies found that although individual ICT skill may have been high for personal use, the transfer of these skills to the classroom was problematic. This is also supported by<sup>[22]</sup> who argue that, together with other factors training is a strong predicting factor of technology use (Table 2).

The above statistics (Table 3) support the low level of ICT use in the preparation and teaching of PE. It seems that teachers who received training regard the ICT training which they received as poor which causes them not to use ICT as often as they should. Teachers regard the ICT training that they receive from university and colleges to be poor and not adequate. The response suggests that teachers have a low level of proficiency perhaps because they lack a high quality of PE specific ICT training. Teachers would likely hold a positive attitude about technology if their training was consistent and of a high quality since quality training encourages meaningful use<sup>[23]</sup>.

There is overwhelming evidence that PE teachers do not receive adequate in-service PE specific ICT training. The statistics indicate that 78 percent of the sampled teachers have never received this specialised training. This must have a gross and negative impact on the need to integrate ICT in the teaching of PE. If teachers get a poor quality of ICT training at university, then an effort must be made to in-service the teachers by providing such training after teachers leave college (Table 4).

### Availability of Hardware

The figures suggest (Table 5) that although teachers do not have adequate quality ICT training, they are not short of ICT hardware. The research reveals that the sampled schools have adequate access to ICT hardware. Hence ICT hardware does not contribute towards the low adoption of ICT by PE teachers in the concerned cluster. This finding supports <sup>[4]</sup> who claims that the prevailing status availability patterns of ICTs in schools reveals that Gauteng province has the highest number of schools with computers. This availability of ICT hardware constitutes a sound basis for the integration of ICT by the schools in the Johannesburg east cluster. This is because access to ICT infrastructure and resources in schools should be a necessary condition promoting the use of ICT in the education sector <sup>[24]</sup>.

### Availability of software

The majority of teachers indicated that they have inadequate access to ICT software that can be used for the teaching of PE (Table 6). The research findings concur with the findings of other researchers who list lack of computer software amongst some of the major challenges that impede the utilisation of ICT <sup>[5-7]</sup>.

### Computer Self - efficacy in PES Teachers

Half of the teachers rated their computer self-efficacy as poor while the other half rated their computer self-efficacy as ranging from fair to excellent (Table 7). Studies have shown a positive correlation between high self-efficacy and the adoption and usage of computers in general <sup>[16]</sup>. Research has suggested that in the case of teachers, a strong sense of computer self-efficacy affects the frequency and the manner in which ICT is used in everyday instructional practice <sup>[16]</sup>.

**Table 1:** Teachers' Attitude towards the integration of ICT

Item	Positive		Indifferent		Negative		Total	
	N	%	N	%	N	%	N	%
1. Rate your personal feelings towards the integration of ICT in the teaching of Physical Education.	50	25	30	15	120	60	200	100

n=200

**Table 2:** Teachers that received training at University or College

Item	Yes		No		Total	
	N	%	N	%	N	%
2. Did you receive any training on the use of ICT for the teaching of PE at university or college?	100	50	100	50	200	100

n=200

**Table 3:** Quality of University or College ICT training

Item	Excellent		Good		Fair		Poor		Total	
	N	%	N	%	N	%	N	%	N	%
3. Rate the quality of ICT training that you received at college or University.	0	0	22	22	33	33	45	45	100	100

n=200

**Table 4:** PE Teachers' Specific in-service ICT Training

Item	Yes		No		Total	
	N	%	N	%	N	%
4. Have you ever received any in-service training on the use of ICT in the teaching of P.E?	44	22	14	156	200	100

n=200

**Table 5:** Teachers' Access to ICT hardware

Item	Yes		No		Total	
	N	%	N	%	N	%
5. Do you have any access to ICT hardware for the teaching of Physical Education?	160	80	40	20	200	100

n=200

**Table 6:** Number of teachers who have access to ICT software

Item	Yes		No		Total	
	N	%	N	%	N	%
6. Do you have any access to ICT software for the teaching of Physical Education?	10	5	190	95	200	100

n=200

**Table 7:** Computer Self - efficacy in PES Teachers

Item	Excellent		Good		Fair		Poor		Total	
	N	%	N	%	N	%	N	%	N	%
7. Rate your ability to apply your skills when using technology for broader tasks	5	5	20	20	35	35	50	50	100	100

n=200

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The aim of the study was to investigate the factors that affect the use of ICT in the teaching and learning of PE in Johannesburg East primary schools. The study adopted the quantitative approach, utilizing the descriptive survey design. A closed questionnaire was used as the data collection instrument. The study revealed that while Johannesburg East primary school teachers have adequate ICT hardware, poor training, negative attitudes, lack of PE specific ICT training and lack of PE specific ICT software are major factors affecting the integration of ICT in the teaching of PE. It was also noted that the barriers which were identified do not operate independently. For example, it would be naive to assume that negative attitudes are an independent factor since these could be caused by lack of training, poor training or inadequate software and so on.

In light of the above findings the study recommends that in addition to the ICT hardware already provided the South African department of education should provide PE specific ICT training, advocacy training to modify attitudes and also provide PE specific ICT software to its teachers.

### Conflicts of interest

The authors declare no conflicts of interest.

### Authors' Contribution

*Balume A. Dube:* Principal field researcher, responsible for conceptualizing and designing study, data collection, analysis and writing of initial research report. *Edmore Nhamo:* Supervision of field research by principal researcher, drafting the final research article for publication. *Simbarashe Magonde:* Critical proof reading of article for important intellectual content of final research article.

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