

On the Perceived Awareness of Physical Education Teachers on Adoptable ICTs for PE

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Abstract—Nations are still finding it quite difficult to win mega sport competitions despite the major contribution of sport to society in terms of social and economic development, personal health, and in education. Even though the world of sports has been transformed into a huge global economy, it is important to note that the first step of sport is usually its introduction to children at school through physical education or PE. In other words, nations who do not win mega sport competitions also suffer from a weak and neglected PE system. This problem of the neglect of PE systems is the main motivation of this research aimed at examining the factors affecting the perceived awareness of physical education teachers on the ICTs that are adoptable for the teaching and learning of physical education. Two types of research objectives will materialize this aim: relevant theories will be identified in relation to the analysis of the perceived ICT awareness of PE teachers and subsequent models will be compiled and designed from existing literature; the empirical testing of such theories and models will also be achieved through the survey of PE teachers from the Camperdown magisterial district of the KwaZulu-Natal province of South Africa. The main hypothesis at the heart of this study is the relationship between the demographics of PE teachers, their behavior both as individuals and as social entities, and their perceived awareness of the ICTs that are adoptable for PE, as postulated by existing literature; except that this study categorizes human behavior under performance expectancy, computer attitude, and social influence. This hypothesis was partially confirmed by the survey conducted by this research in the sense that performance expectancy and teachers' age, gender, computer usage, and class size were found to be the only factors affecting their awareness of ICTs for physical education.

Keywords—Human Behavior, ICT Awareness, Physical Education, Teachers.

I. INTRODUCTION

SPORT is defined as “a game with a set of rules which puts the individual to a test, competitive in nature, in a contesting situation” [1:273]. Sport contributes to society in terms of social and economic development, personal health, and in education. According to [2:34], “by its very nature sport is about participation, inclusion and citizenship”. For example, a study commissioned by [3] found that for the European Union (EU) as a whole, the contribution of sport-related employment to total employment is 2.12%. In absolute terms, this is equal to 4.46 million of employees. According to [4], cited by [5], the South African 2010 soccer World Cup had an economic impact of US\$2.5 billion, which is an

equivalent of 159,000 annual jobs, in addition to US\$845.8 million in government taxes. Sport does not only train functional skills like dexterity and balance, but it also teaches soft skills like taking orders, leadership, teamwork, performing in a regulated system, and socialization. Sport can also help to form the character of young people because of its teachings of behavioral habits such as motivation, discipline, tenacity, competitive spirit, responsibility, perseverance, confidence, and self-esteem, which cannot always be easily acquired in a classroom [6].

A. Problem Statement

Although the contribution of sport to society is generally recognized, it is regrettable that most nations find it difficult to win major sport events. For example, at the 2004 Olympic Games, India won only one medal while Pakistan, Bangladesh, Vietnam and the Philippines failed to win a single medal [7]. It is also reported by [8] that few African teams have made it to the quarter finals stage of the soccer World Cup and no team have made it beyond the quarter final stage. In England and other European countries, both France and Italy only won the soccer World cup once in their history. The English football team has never won the European Championship [9]. It is important to note that even though the world of sports has now been transformed into a huge global economy, the first step of sport is usually its introduction to children at school through physical education. In other words, nations who do not win mega sport competitions also suffer from a weak and neglected PE system [21], [30], [31], and ICTs may help towards solving that problem of the neglect of PE in schools if certain research questions and objectives can be pursued.

B. Main Research Questions

What are the factors that affect the perceived awareness of teachers of the ICTs that are adoptable for PE? And which recommendations can be made from the identification of these factors?

Research question 1: What are the theories that can facilitate the identification of possible factors affecting the perceived awareness of teachers of the ICTs that are adoptable for PE?

Research question 2: How can one shape the contributing factors to the perceived awareness of teachers of the ICTs that are adoptable for PE into a hypothetical model?

Research question 3: How can one empirically validate a hypothetical model on the factors affecting the perceived awareness of teachers of the ICTs that are adoptable for PE?

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Research question 4: Which recommendations can be proposed from the knowledge of the factors affecting the perceived awareness of teachers of the ICTs that are adoptable for PE?

C. Aim and Objectives

The aim of this study is to identify the factors affecting the perceived awareness of physical education teachers of the ICTs that are adoptable for the teaching and learning of physical education, in an attempt to contribute towards solving the problem of the neglect of PE in schools. The objectives of this research are as follows:

- To select suitable theories that can facilitate the identification of possible factors affecting the perceived awareness of PE teachers of the ICTs that are adoptable for PE.
- To design a conceptual model of the factors contributing to the perceived awareness of PE teachers of ICTs usable in the teaching of physical education.
- To empirically test the above planned conceptual model of the perceived awareness of PE teachers of ICTs usable in physical education.
- To make recommendations on how to improve the use of ICTs in the teaching and learning of PE.

II. LITERATURE REVIEW

This section presents theories and models on the perceived ICT awareness of PE teachers as well as on related empirical studies.

A. Theories

It seems natural to consider that the examination of the perceived awareness of PE teachers of the adoptable ICTs for PE is a technology adoption matter. However, technology adoption can be seen as a change in the behavior of the technology adopter. Therefore, one can consider that theories of behavior change are suitable to explain the perceived awareness of PE teachers of the ICTs that are adoptable for the teaching and learning of PE. According to [10], there are two distinct psychology traditions to explain human behaviour: motivational psychology theories, and social psychology theories.

1. Motivational Psychology Theories

These theories “look for the motors of human behaviour in the individual rather than in the social being, focusing primarily on internal factors (e.g. drive, arousal, cognitive self-appraisal)” [10:118].

2. Social Psychology Theories

These theories “see action as the function of the social context and the interpersonal/intergroup relational patterns, as measured by means of the individual's social attitudes” [10:118].

B. Conceptual Models and Frameworks

Both social psychology theories and motivational psychology theories are used in this study to explain the

perceived awareness of PE teachers of the ICTs that are adoptable for the teaching and learning of PE. According to [10], the most influential social psychological approaches are the Theory of Reasoned Action (TRA) and its extension, the Theory of Planned Behaviour (TPB). On the other hand, the following three approaches are considered as the most influential motivational psychology approaches [10]: expectancy-value theories, goal theories, and self-determination theory (SDT).

1. The TRA Model

The TRA model put forward by [11] posits that individual behaviour is driven by behavioural intentions; and intentions are driven by the attitude towards the behaviour and by the subjective norms surrounding the behaviour. A person's subjective norm towards a given behaviour is his or her belief about what others think of him or her accomplishing that behaviour, and “attitudes are the overall evaluations of the behaviour by the individual” [32:1431]. According to the TRA model, attitude is influenced by individual beliefs and by evaluations, while subjective norms are influenced by normative beliefs and by the motivation to comply.

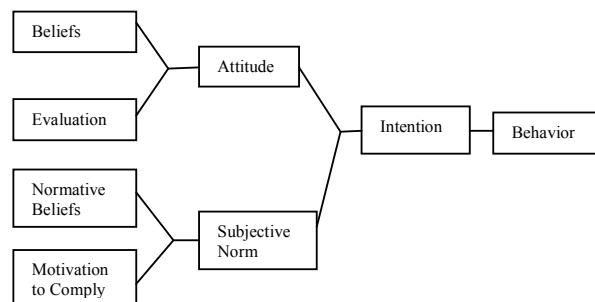


Fig. 1 Theory of Reasoned Action Model

2. The TPB Model

This model proposed by [12] argues that the behavior of a person is determined by his or her intentions to carry out that behavior. A person's intentions towards a given behavior depend on his or her attitude towards that behavior and on his or her ability to control such behavior even under the influence of social pressures or subjective norms.

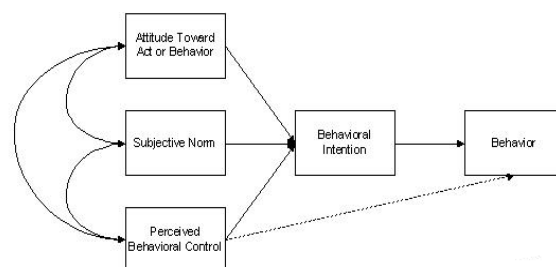


Fig. 2 Theory of Planned Behavior Model

3. The SDT model

This model by [13] distinguishes amotivation, the state of lacking the intention to act, from motivation. When

amotivated, people either do not act at all or act without intent; they just go through the motions. On the other hand, there are five types of regulations that nurture motivation: intrinsic regulation, external regulation, introjected regulation, identified regulation, and integrated regulation. According to [13:72], intrinsic regulation “is the doing of an activity for its inherent satisfactions. It is highly autonomous and represents the prototypic instance of self-determination”. On the other hand, “external regulations are behaviours performed to satisfy an external demand or reward contingency. Introjected regulation involve taking in a regulation but not fully accepting it as one’s own. Identified regulation reflects a conscious valuing of a behavioural goal or regulation, such that the action is accepted or owned as personally important. Integrated regulation occurs when identified regulations are fully assimilated to the self, which means they have been evaluated and brought into courage with one’s other values and needs” [13:72] (See Fig. 3).

C. A New Conceptual Model

This study proposes a new model of the factors affecting the perceived awareness of PE teachers of the ICTs that are adoptable for the teaching of PE. This new model is based on the TRA model, the TPB model, and the SDT model. It uses the constructs of computer attitude and social influence both from the TRA model and from the TPB model, as well the construct of performance expectancy from the SDT model. In other words, this model (Fig. 4) hypothesizes that the perceived awareness of PE teachers of the ICTs that are adoptable for the teaching of PE depends on the demographics of these teachers. This perceived awareness also depends on the performance expectancy, computer attitude, and social influence of these PE teachers.

The model on Fig. 4 can be translated into the following set of hypotheses to be empirically verified by the third objective of the current research.

Ha0: There is a direct relationship between the demographics of PE teachers, and their perceived awareness of the ICTs that are adoptable for the teaching of PE.

Hb0: There is a direct relationship between the demographics of PE teachers, and their performance expectations from available ICTs tools for physical education.

Hc0: There is a direct relationship between the demographics of PE teachers, and their computer attitude.

Hd0: There is a direct relationship between the demographics of PE teachers, and the influence applied to them by other people with regards to the use of ICTs.

He0: There is a direct relationship between the performance expectations of PE teachers, and their perceived awareness of the ICTs that are adoptable for the teaching of PE.

Hf0: There is a direct relationship between PE teachers’ computer attitude and their perceived awareness of the ICTs that are adoptable for the teaching of PE.

Hg0: There is a direct relationship between PE teachers’ perceived awareness of the ICTs that are adoptable for the

teaching of PE, and the influence applied to them by other people with regards to the use of ICTs.

The five constructs on the proposed model by Fig. 4 will be used as a guideline for the presentation for the rest of this paper, right from the next section on empirical studies on the intersection between ICTs and physical education in schools.

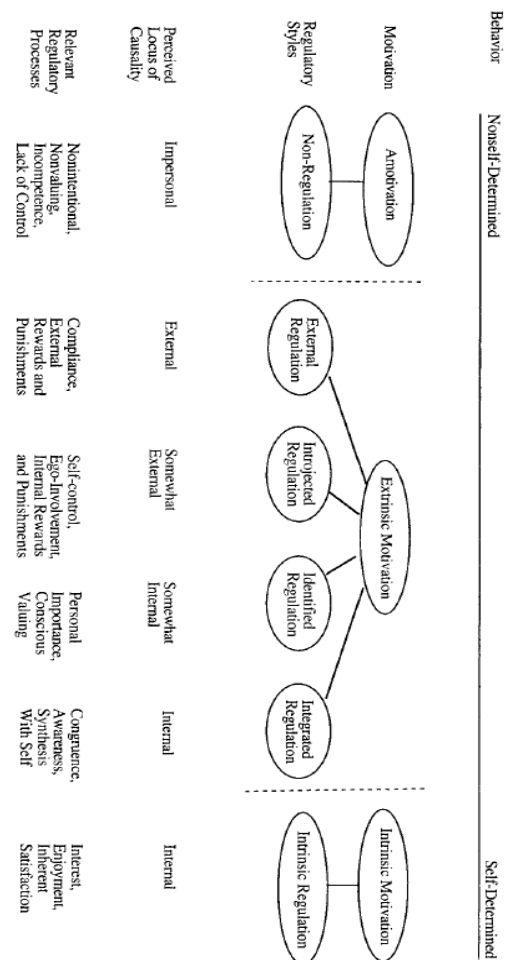


Fig. 3 Self-determination Model

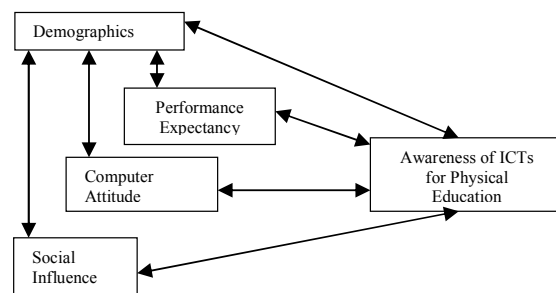


Fig. 4 Conceptual Model

D. Empirical Studies

This section presents existing literature on the intersection between ICTs and physical education in schools. The

following ten papers were retrieved using the Internet search keywords “ICTs” + “PE teachers”:

- A survey conducted by [14] on 337 pre-service PE teachers and students from Turkey
- A survey conducted by [15] on PE teachers from 252 schools in England
- A survey of 57 Human Kinetics students from Nigeria [16]
- An interview of 23 teachers from Sweden [17]
- A survey of 165 PE students from Greece [18]
- A survey conducted by [19] on 307 pre-service PE students from the United States of America and Israel
- A survey of 250 sport science students from Iran [20]
- A survey conducted by [21] on trainee teachers, school-based teachers, and university based PE tutors from UK
- A survey conducted by [22] on 453 PE teachers and students from Ireland
- A survey of pre-service health and physical education teachers from Australia [23]

1. Demographics

According to [14], [16], there is no significant relationship between the age, level of study of PE students, and their attitude towards ICTs; but there is a significant relationship between the gender of PE teachers, and their attitude towards ICTs. Results from [14] and [17]-[19] indicate that the gender of PE students have a significant relationship with their attitude towards ICTs, however this finding is not supported by [16]. According to [14], years of computer experience have an impact on the use of ICTs by PE students.

2. Computer Attitude

Findings from [14], [15], [21] indicate that PE teachers have a positive attitude towards ICTs.

3. Awareness of ICTs for PE

Findings from [21] and [22] indicate that PE trainees are aware of the potential of ICTs in PE, but they do not have specific knowledge, understanding or associated skills to use them for teaching PE. Moreover, PE teachers have an overwhelming perception that the Internet is useful for their teaching needs [23].

4. Social influence

According to [22], some PE teachers become interested in the use of digital videos for PE because they are persuaded by their colleagues.

E. Research Gaps

What is notable from the above review of existing literature on the intersection between ICTs and physical education is the almost complete absence of Africa in the list of countries involved in those studies, at the exception of Nigeria.

III. RESEARCH DESIGN

A quantitative approach was chosen for objective 3 and objective 1, 2, and 4 were achieved qualitatively.

A. Content Analysis of Existing Literature

For objectives 1, 2, and 4, content analysis of existing literature was performed as visible in Section II of this paper.

B. Survey of PE Teachers from the Camperdown Magisterial District of the KwaZulu-Natal Province of the Republic of South Africa

The conceptual model proposed by this study was empirically tested through a survey of PE teachers selected from the primary, secondary and combined public schools of the Camperdown magisterial district of the KwaZulu-Natal province of the Republic of South Africa.

1. Population and Sampling

The Camperdown magisterial district has a population of 788 educators from their primary, secondary and combined public schools [28]. The sample size for this research was calculated using (1) proposed by [29] for finite populations where $Z=1.96$, $P=0.05$, $d=0.0475$, and $N=788$. This gives a sample size of 73.

$$n^1 = \frac{NZ^2P(1-P)}{d^2(N-1) + Z^2P(1-P)} \quad (1)$$

2. Research Variables and Data Collection

Fig. 4 shows the research variables of this study. Data for each of these variables was collected using 10 items for each variable, all Likert scales, except for the demographic items which were categorical. Some of the demographic items include PE teachers' age group, their PE teaching experience (in years), and their frequency of computer usage. The scale for the performance expectancy variable was adapted from the South African Curriculum and Assessment Policy Statement for Life Orientation and Physical Education [24]. The scale for the computer attitude variable was adapted from the list of Computer Attitude Scale for Secondary Students (CASS) [25]. The scale for the social influence variable was adapted from the social influence scale proposed by [26]. The scale for the variable on the awareness of ICTs for PE was adapted from the ICT usage scale proposed by [27].

IV. RESULTS

Descriptive and inferential statistics for the survey conducted by this study are presented in this section just after the analysis of the validity and reliability of the survey's questionnaire.

TABLE I
RELIABILITY TABLE FOR THE RESEARCH VARIABLES

Research Variables	No. of Items	Cronbach's alpha (α)
Performance Expectancy	10	0.855
Social Influence	10	0.787
Computer Attitude	10	0.925
Awareness of ICTs for Physical Education	10	0.905

A. Validity and Reliability

Table I shows that the data collected by this questionnaire

based survey is reliable judging by the fact that the Cronbach's alpha (α) coefficients for all the Likert-scale research variables are greater than 0.7.

B. Descriptive Statistics

This section presents descriptive statistics on the demographics of the PE teachers who participated in this study. Descriptive statistics on their perceived performance expectancy, their perceived computer attitude, their perceived social influence, and their perceived awareness of ICT tools for the teaching of PE, are also presented.

1. Demographics

Descriptive statistics on the demographics of the PE teachers who participated in this study indicate that the majority of PE teachers are female educators teaching in primary schools located in urban areas, and they are Africans. It is an interesting fact that half of the teachers are using computers. Moreover, there is a spread in the teachers' ages and teaching experiences, and around three quarters of PE teachers are well qualified. Most PE teachers have a manageable PE class in terms of class size (See Table V).

2. Performance Expectancy

According to Table II, the majority of the PE teachers who participated in this study expect their learners to perform quite well if ICT tools are made available for the teaching and learning of PE.

3. Computer Attitude

According to Table III, the majority of the PE teachers who participated in this study admit that they have a positive attitude towards computers.

4. Social Influence

According to Table IV, the majority of the PE teachers who participated in this study do not believe that other people socially influence them to use ICTs for physical education. However, some teachers think that they can be influenced to use ICTs for PE by people who are important to them.

5. Awareness of ICTs for Physical Education

According to Table VI, the majority of PE teachers who participated in this study admit that they are aware of the benefits of using ICTs for the teaching of physical education, except for some PE teachers who admit they are not aware of the use of electronic boards for the teaching of PE.

C. Correlations

Results from Tables VII and VIII are summarized by Fig. 5 which can be translated into the hereby listed results when combined with the initial hypotheses of this study.

Ra: There is a direct relationship between the computer usage, gender, and age group of PE teachers, and their perceived awareness of the ICTs that are adoptable for the teaching of PE.

Rb: There is a direct relationship between the class size, the computer usage of PE teachers, and their performance expectations from available ICTs tools for physical education.

Rc: There is no direct relationship between the demographics of PE teachers, and their computer attitude.

Rd: There is no direct relationship between the demographics of PE teachers, and the influence applied to them by other people with regards to the use of ICTs.

Re: There is a direct relationship between the performance expectations of PE teachers, and their perceived awareness of the ICTs that are adoptable for the teaching of PE.

Rf: There is no direct relationship between PE teachers' computer attitude and their perceived awareness of the ICTs that are adoptable for the teaching of PE.

TABLE II
PERFORMANCE EXPECTANCY

B	S1	S2	S3	S4	S5	Mean	SD
B1	1	4	8	34	52	4.32	.896
B2	5	7	8	30	49	4.11	1.161
B3	4	1	15	37	42	4.12	.999
B4	1	4	8	30	56	4.36	.903
B5	3	4	18	36	40	4.05	.998
B6	3	7	8	41	41	4.11	1.008
B7	1	5	7	40	47	4.25	.910
B8	4	5	11	22	58	4.23	1.112
B9	1	5	10	26	58	4.33	.958
B10	4	5	8	36	47	4.15	1.063
	2.7	4.7	10.1	33.2	49		

TABLE III
COMPUTER ATTITUDE

C	S1	S2	S3	S4	S5	Mean	SD
C1	68	14	4	4	10	1.73	1.304
C2	71	11	3	10	5	1.67	1.237
C3	70	14	10	4	3	1.56	1.014
C4	60	11	16	5	7	1.88	1.269
C5	81	10	3	4	3	1.38	.937
C6	60	19	12	3	5	1.74	1.131
C7	42	22	16	5	14	2.26	1.414
C8	88	8	0	0	4	1.25	.830
C9	60	22	4	8	5	1.77	1.196
C10	90	3	3	0	4	1.25	.863
	69	13.4	7.1	4.3	6		

TABLE IV
SOCIAL INFLUENCE

D	S1	S2	S3	S4	S5	Mean	SD
D1	16	15	10	26	33	3.44	1.491
D2	15	14	12	22	37	3.52	1.482
D3	38	14	12	15	21	2.66	1.601
D4	53	11	5	14	16	2.29	1.603
D5	45	15	7	14	19	2.47	1.617
D6	41	10	8	23	18	2.67	1.616
D7	45	15	10	14	16	2.41	1.562
D8	49	11	5	21	14	2.38	1.578
D9	40	14	10	16	21	2.64	1.619
D10	36	10	12	11	32	2.93	1.710
	37.8	12.9	9.1	17.6	22.7		

Rg: There is no direct relationship between PE teachers' perceived awareness of the ICTs that are adoptable for the

teaching of PE, and the influence applied to them by other people with regards to the use of ICTs.

TABLE V
DEMOGRAPHICS

A		Percentage
A1	Male	37.0
	Female	63.0
A2	Urban	72.6
	Rural	27.4
A3	Primary School	76.7
	Senior Secondary School	16.4
	Combined School	6.8
A4	Less 30	20.5
	30-40	32.9
	41-50	35.6
	Above 50	11.0
	Grade R-3	23.3
A5	Grade 4-6	43.8
	Grade 7-9	8.2
	Grade 10-12	5.5
	Grade R – 6	6.8
	Grade 4 – 9	4.1
A6	Grade 3 – 4	5.5
	Grade R – 9	2.7
	Diploma	53.4
	Bachelors	31.5
	Honors	15.1
A7	Less 10	11.0
	10 – 19	15.1
	20 – 29	9.6
A8	Above 29	64.4
	None	43.8
	Daily	19.2
A9	Weekly	30.1
	Monthly	6.8
A10	African	100.0
	0-5 Years	34.2
	6-10 Years	34.2
	11-20 Years	20.5
	Above 20 Years	2.7

TABLE VI
AWARENESS OF ICTs FOR PHYSICAL EDUCATION

E	S1	S2	S3	S4	S5	Mean	SD
E1	10	10	3	22	56	4.05	1.363
E2	8	8	3	26	55	4.11	1.286
E3	8	7	14	21	51	3.99	1.296
E4	4	5	3	11	77	4.51	1.069
E5	5	7	4	18	66	4.32	1.177
E6	11	3	15	21	51	3.97	1.333
E7	4	7	10	10	70	4.34	1.157
E8	7	7	10	18	59	4.15	1.255
E9	8	12	10	15	55	3.96	1.379
E10	16	14	10	19	41	3.55	1.537
	8.1	8	8.2	18.1	58.1		

TABLE VII
CORRELATION NOT INVOLVING DEMOGRAPHICS

	B	C	D	E
B Pearson Correlation	1	.016	.369**	.293*
Sig. (2-tailed)		.896	.001	.012
N	73	73	73	73
C Pearson Correlation	.016	1	-.082	.013
Sig. (2-tailed)	.896		.491	.912
N	73	73	73	73
D Pearson Correlation	.369**	-.082	1	.136
Sig. (2-tailed)	.001	.491		.250
N	73	73	73	73
E Pearson Correlation	.293*	.013	.136	1
Sig. (2-tailed)	.012	.912	.250	
N	73	73	73	73

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

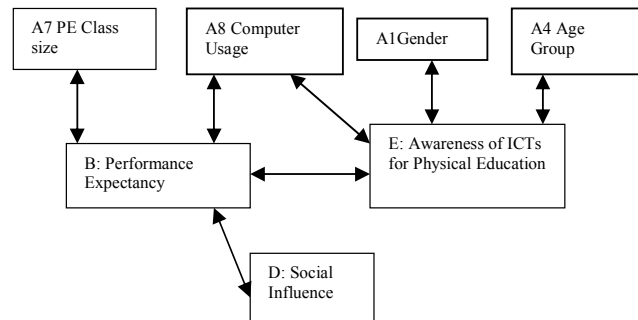


Fig. 5 The validated model

V. DISCUSSION AND CONCLUSION

This paper can be summarized as follows:

- Human behavior theories are able to explain the perceived awareness of physical education teachers of ICTs which are adoptable for the teaching and learning of physical education [10].
- A hypothetical model can link PE teachers' demographics and perceived awareness of physical education teachers of ICTs which are adoptable for the teaching and learning of PE, with the following constructs from human behavior theories: performance expectancy, computer attitude, and social influence [10].
- The results of the survey conducted by this study indicate that PE teachers' computer usage, their gender, their age group, class size, and performance expectancy have a direct relationship with their awareness of ICTs for PE.
- There seems to be an agreement between the findings of this study and existing literature on the fact that PE teachers have a positive attitude towards computers. Moreover, findings from this study agree with existing literature that PE teachers are aware of the benefits of using ICTs for PE but they are not using them. This calls for the need for schools to invest into the acquisition of ICTs that can be used for the teaching and learning of PE.

TABLE VIII
CORRELATION INVOLVING DEMOGRAPHICS

		B	C	D	E
A1	Pearson Correlation	-.139	-.112	-.214	-.259*
	Sig. (2-tailed)	.240	.345	.069	.027
	N	73	73	73	73
A2	Pearson Correlation	-.157	.058	-.159	-.163
	Sig. (2-tailed)	.185	.627	.178	.168
	N	73	73	73	73
A3	Pearson Correlation	-.186	-.009	-.147	-.211
	Sig. (2-tailed)	.115	.940	.215	.073
	N	73	73	73	73
A4	Pearson Correlation	-.251*	.069	-.059	-.121
	Sig. (2-tailed)	.032	.560	.617	.309
	N	73	73	73	73
A5	Pearson Correlation	.131	-.054	-.131	-.054
	Sig. (2-tailed)	.269	.652	.268	.653
	N	73	73	73	73
A6	Pearson Correlation	.093	-.004	.097	.098
	Sig. (2-tailed)	.433	.970	.412	.408
	N	73	73	73	73
A7	Pearson Correlation	.204	.030	.190	.238*
	Sig. (2-tailed)	.083	.803	.107	.042
	N	73	73	73	73
A8	Pearson Correlation	.286*	-.008	.189	.245*
	Sig. (2-tailed)	.014	.945	.110	.036
	N	73	73	73	73
A9	Pearson Correlation	. ^b	. ^b	. ^b	. ^b
	Sig. (2-tailed)				
	N	73	73	73	73
A10	Pearson Correlation	-.102	-.166	.228	.062
	Sig. (2-tailed)	.390	.160	.053	.604
	N	73	73	73	73

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

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