A SURVEY OF PRIMARY SCHOOL TEACHERS' PERSPECTIVES ABOUT ADVANCING BASIC SCIENCE THROUGH TECHNOLOGIES IN OYO TOWNSHIP

By

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Abstract

The primary education remains the bed-rock of any functional education and such should be handled to standard. Science education is a sine qua non to national development as it holds impacts on individual and societal development. Thus, teaching and learning of science in primary education should be according to the Next Generation Science Standard (NGSS) with reflective thinking and technology. This paper thus investigated the perception of primary school teachers' about advancing basic science through technologies in Oyo township. A survey design was adopted for the study, sampled 240 primary school teachers from the four local Government Areas of Oyo township and a validated instrument titled "Perceived Impact of Advancing Basic Science with Technology Questionnaire (PIABSTQ, r=.83) was used for data collection. Frequency counts, percentages, t-test and Analysis of Variance were used for data analysis. The results revealed that there are 154 female, 175 six years and above, 126 primary 4-6 and 145 first degree and above teachers in the distribution, significant influence of teachers' perspectives on advancing Basic Science teaching and learning through technology (t= 144.33; df= 239; ***p****<.05). The significant influence of teachers' perception of advancing Basic Science teaching and learning through technology was not beclouded by gender, teaching experience, class taught and qualification. It was therefore recommended that technological gadgets should be made available in primary schools with proper training and retraining of in-service teachers for effective advancing of Basic Science with technology.*

Keywords: Teachers' perspectives; Advancing Basic Science; Technologies

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Introduction

Primary education is an indispensable educational stratum in the field of education and that is the reason United Nations (UN) summits on education made compulsory Basic Education for All (BEFA) in the quest of realizing the Sustainable Development Goals (SDGs). To this end, effective teachers at this level plan

teaching activities to engage, enhance, enrich and enable pupils to be effective learners. Different strategies have been adopted by teachers at various levels of education be it child-centeredness strategy, Programmed learning, Individualized instruction, and the use of Information and Communication Technology (ICT) (Adesanya, 2017; Ige, Durowoju & Oke, 2017; Olagunju, Odutuyi, Bolaji & Adesina, 2015).

Research findings have indicated that Time to Learn (TTL) or Time needed for Learning (TNL) and Time actually Spent on Learning (TSL) are two important parameters of pupils' academic achievement and these are aided with teaching strategies to achieve positive end goals (Awofala & Awofala, 2010 in Adesanya, 2017). An effective and efficient instructional strategy facilitates and promotes multiple paths to knowledge and skills acquisition. Technology, using ICT devices to teach pupils have multifaceted and multisensory approaches to enhance learning. It develops psycho-cognitive skills of the pupils while using their heads, mind and brain for intellectual and skills development.

The state of science education in Nigeria is still pathetic; the deplorable performance of secondary students in sciences signals poorly laid scientific foundations at the primary education. Nations like Japan, Singapore, China, America, Spain, Germany and many other developed countries prioritises effective and pragmatic science teaching and learning using technology in Basic Education (foundational education). The United Nations Educational, Scientific and Cultural Organisation (UNESCO) as well as United Nations International Children Emergency Fund (UNICEF) have been engendering innovative and creative instructional strategies at the basic education level to ensure optimum scientific literacy in pupils.

Of recent, the National Science Teacher Association (NSTA) proposed the Next Generation Science Stanadard (NGSS) which stipulated that right from foundational education, science should be taught with technology and reflective thinking (Heitin, 2015; Olaniran, Raimi, Bolaji, Adesina & Adegoke, 2016, Olagunju & Adesina, 2017). Nonetheless, teaching Basic Science to pupils using technology has the following as merits: Promotes and facilitates multiple paths to knowledge and skills acquisition; enhances the teaching and learning process; increases efficiency and effectiveness of current practices; aims at pedagogical change; provides powerful tools to try out different designs; improves education and facilitate learning processes; increases performance of educational system; promotes active participation of students; enhances the realism of concrete situation and structure; makes students to be creative and gives technological compatibility; enhances system approach to the teaching and learning process, centering on optimum design, implementation and evaluation of teaching and learning (Ige, Durowoju & Oke, 2017; Adesanya, 2017; Abimbade, 2011).

Theoretically, technology use in teaching and learning are premised in behaviourists, cognitive-constructivists' theories and the amalgamation of the two theories into cognitive constructivism – behaviourism theory. Skinner (1968) described technology in education as having clearly defined content and objectives presented in small increments. As small units of the content are presented, the learner is presented with a question that must be answered (stimulus). The student answers (response) are evaluated whether correct or wrong (consequence). With this behaviourists approach of technology in education, it can be rightly concluded that technology offered an eclectic approach in principles and techniques of teaching-learning process.

To the cognitive-constructivists, students' knowledge is constructed, deconstructed or reconstructed from available problems or ideas within the environment (Piaget, 1973; Bruner, 1986; Glasserfeld, 1989; Karen, 2015; Olagunju & Adesina, 2017). Technology in education presents organized instruction to the students with questions (problems) for reflections that enhance knowledge construction or linkage between previous knowledge, and the new knowledge.

The two theories pivoting technology in education, behaviourism and cognitive-constructivism are subsumed in cognitive-constructivism–behaviourism theory (CBT). The cognitive-constructivism – behavioural theory is that changing maladaptive thinking leads to change in effect and behaviour (Hofmann,

2011). Technology in education techniques help individuals challenge their patterns and beliefs and replace "errors in thinking such as over-generalization, magnifying negatives, minimizing positives and catastrophising (Rachman, 1997 in Onwumere & Kalu, 2012) with more realistic and effective thoughts thus decreasing emotional distress and self-defeating behaviour" (Hayes, Villate, Levin & Hildbrandt, 2011). This makes the pre-service teachers preparation to be more efficient and effective in teaching-learning process to effect overall sound mind and revitalized educational products.

Evidence has equally indicated the efficacy of technology-driven instructional strategies in raising students cognitive, affective and the psychomotor domains of education. Effects of computer mediated power point presentations on students' achievement in Basic science (Raimi, Bolaji & Adesina, 2016; Anulobi, 2012; Erhan & Okan 2011; Erdemir, 2011); Meta-analysis and research synthesis of the effects of integrated mobile devices in teaching and learning (Sung, Chang & Liu, 2016; Abimbade, 2015; Shin & Kang 2015); Effects of Computer assisted instruction (CAI) on students' achievement in Agricultural Science (Olagunju & Adesina, 2017; Ugo, 2017; Idowu & Odewumi, 2017); Computer assisted instructional on students' achievement in chemical reaction and equilibrium in secondary schools (Achor & Ukwuru, 2014); Computer aided instructional package on students' academic achievement in Biology concepts (Nsofor, Ala & Gambaki, 2013; Afolabi, 2006); Webquest (web resources for teaching and learning) application on educational technology concepts for selected undergraduate students (Morakinyo, 2017; Samara, 2013; Badmus, 2012; Halat, 2008); Computer Assisted and Textual Programmed Instructions on pre-service teachers' learning outcomes in some environmental education concepts in Biology (Olagunju & Oduwaiye, 2011); Gamification approach (Aremu, Akinyemi & Babafemi, 2017; Lister, 2015; Hanus & Fox 2015; Watson, Hancock & Mandryk, 2013; Villagrasa & Duran, 2013).

The main cruise of the study is the dearth in the use of technology in teaching and learning Basic Science in primary schools and the lingering poor achievement in sciences in Nigeria generally. Is the teachers' perception a factor in the use of technology in primary schools? According to Walberg and Frazer (2001), perception is a function of individual's personality and the environment. Adesina (2006) identified that the perception an individual makes of the learning environment influences the acquisition of knowledge, experiences and the integration of innovative practices like the use of technology in the teaching-learning process. Thus, would the primary school teachers' perception influence the advance of Basic Science teaching and learning in primary schools in Oyo township?

Research Questions

i. What is the primary school teachers' perspective of advancing Basic Science teaching and learning through technology?
ii. Is there any difference in the perception of primary school teachers' of advancing Basic Science teaching and learning through technology by gender?
iii. Is there any difference in the perception of primary school teachers' of advancing Basic Science teaching and learning through technology by years of teaching experience?
iv. Is there any difference in the perception of primary school teachers' of advancing Basic Science teaching and learning through technology by class taught?
v. Is there any difference in the perception of primary school teachers' of advancing Basic Science teaching and learning through technology by qualification?

Hypotheses

Ho_1: There is no significant influence of teachers' perspective on advancing Basic Science teaching and learning through technology;

Ho_2: There is no significant difference in teachers' perspective on advancing Basic Science teaching and learning through technology based on gender;

Ho_3: There is no significant difference in teachers' perspective on advancing Basic Science teaching and learning through technology based on teaching experience;

Ho_4: There is no significant difference in teachers' perspective on advancing Basic Science teaching and learning through technology based on class taught '

Ho_5: There is no significant difference in teachers' perspective on advancing Basic Science teaching and learning through technology based on qualification.

Purpose of the study

The main purpose of the study is to investigate the perspective of the primary school teachers on advancing teaching and learning of Basic Science through technology. Other purposes of the investigation are to:

i. assess the perspective of primary school teachers on advancing Basic Science teaching and learning through technology based on gender;
ii. evaluate the perspective of primary school teachers on advancing Basic Science teaching and learning through technology based on teaching experience;
iii. verify the perspective of primary school teachers on advancing Basic Science teaching and learning through technology based on class taught;
iv. assess the perspective of primary school teachers on advancing Basic Science teaching and learning through technology based on class qualification.

Method

Research design

The descriptive type of survey design was adopted for the study. This design seems fitting as the study collected data from relatively large sampled population with the aid of questionnaire and subjected the data to empirical analysis for systematic description of the variables of the study.

Population of the study

All the primary school teachers in the four local government areas in Oyo township (Afijio, Atiba, Oyo-East and West) constituted the population of the study.

Sample and Sampling Technique

Multi-stage sampling strategy was adopted in sample selection. Stratify random sampling technique was used to select four schools from each of the four Local Government Areas of the study area to make sixteen primary schools. Fifteen (15) teachers were selected from each sampled school totaling 240 sample size.

Instrumentation

A 25-item, self-constructed instrument titled: Perceived Impact of Advancing Basic Science with Technology Questionnaire (PIABSTQ) was used for data collection. Copies of the instrument were given to experts of Test and Measurement and Psychometrics, their critiques were incorporated into the final draft of the twenty-five item instrument. The validated questionnaire were administered on twenty-five primary school teachers in Akinyele Local Government Area of Oyo state, their responses were subjected to Cronbach's Alpha reliability measure yielding a value of . 83.

Procedure for Data Collection

The researchers as well as their assistants went to the sixteen primary schools to administer the instruments on the randomly sampled teachers. There was hundred percent return of the instrument.

Method of Data Analysis

The socio-demographic variables of the respondents were presented in table of frequency counts and percentages. Mean and standard deviation were used to answer the research questions. The hypotheses were tested using t-test and Analysis of Variance (ANOVA) parametric statistics.

Results

Table 1: Socio-demographic Variables of the Respondents

Variables	*Frequency*	*Percentage (%)*
Gender		
Male	**56**	**23.3**
Female	**184**	**76.7**
Total	**240**	**100.0**
Teachers' Class taught		
Pry 1-3	**114**	**47.5**
Pry 4-6	**126**	**52.5**
Total	**240**	**100.0**
Teachers' Educational Qualification		
NCE		
B.Sc. (Ed)	**95**	**39.6**
M.Ed. & Above	**131**	**54.6**
Total	**14**	**5.8**
	240	**100.0**
Teachers' Years of Teaching Experience		
1-5 Yrs		
6 Yrs & Above	**65**	**27.1**
Total	**175**	**72.9**
	240	**100.0**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	51.00	2	.8	.8	.8
	52.00	1	.4	.4	1.3
	55.00	1	.4	.4	1.7
	57.00	2	.8	.8	2.5
	58.00	2	.8	.8	3.3
	61.00	2	.8	.8	4.2
	62.00	1	.4	.4	4.6
	63.00	4	1.7	1.7	6.3
	64.00	4	1.7	1.7	7.9
	65.00	2	.8	.8	8.8
	66.00	3	1.3	1.3	10.0
	67.00	2	.8	.8	10.8
	68.00	4	1.7	1.7	12.5
	69.00	6	2.5	2.5	15.0
	70.00	12	5.0	5.0	20.0
	71.00	7	2.9	2.9	22.9
	72.00	2	.8	.8	23.8
	73.00	7	2.9	2.9	26.7
	74.00	6	2.5	2.5	29.2
	75.00	11	4.6	4.6	33.8
	76.00	9	3.8	3.8	37.5
	77.00	15	6.3	6.3	43.8
	78.00	12	5.0	5.0	48.8
	79.00	11	4.6	4.6	53.3
	80.00	9	3.8	3.8	57.1
	81.00	11	4.6	4.6	61.7
	82.00	14	5.8	5.8	67.5
	83.00	13	5.4	5.4	72.9
	84.00	14	5.8	5.8	78.8
	85.00	2	.8	.8	79.6
	86.00	20	8.3	8.3	87.9
	87.00	9	3.8	3.8	91.7
	88.00	6	2.5	2.5	94.2
	89.00	4	1.7	1.7	95.8
	90.00	1	.4	.4	96.3
	91.00	5	2.1	2.1	98.3
	92.00	1	.4	.4	98.8
	93.00	1	.4	.4	99.2
	94.00	2	.8	.8	100.0
	Total	240	100.0	100.0	

From Table 1, 56 (23.3%) of the respondents were male while a larger proportion were female (184, 76.6 %); 114 (47.5%) taught in primary 1-3 while 126 (52.5%) were teaching in primary 4-6 classes. 95 (39.6%) have NCE qualification, 131 (54.6%) had B. Sc. (Ed.) while 14 (5.8%) had M.Ed. and above. 65 (27.1%) had 1-5

years of teaching experience while the remaining 175 (72.9%) had 6 years and above years of teaching experience.

Answers to Research Questions

Research Questions One: What is the primary school teachers' perspective of advancing Basic Science teaching and learning through technology?

Table 2: Level of Primary School Teachers' Perception of Advancing Basic Science with Technology.

Mean	Median	Mode	S.D.	Variance	Range	Minimum	Maximum
77.80	79.00	86.00	8.35	69.74	43.00	51.00	94.00

From Table 2, the mean perception of primary school teachers of advancing Basic Science through technology is 77.80, standard deviation of 8.35, the minimum score is 51.00 while the maximum perception score is 94.00.

Research Question Two: Is there any difference in the perception of primary school teachers' of advancing Basic Science teaching and learning through technology by gender?

Table 3: Difference in Teachers' Perceptions based on Gender

	teachers' gender	N	Mean	Std. Deviation	Std. Error Mean
Teacher perception	male	56	77.6607	8.19817	1.09553
	female	184	77.8478	8.41860	.62063

The female primary school teachers' mean perception of advancing Basic science through technology is 77.85 which is greater than that of the male, 77.66.

Research Question Three: Is there any difference in the perception of primary school teachers' of advancing Basic Science teaching and learning through technology by teaching experience?

Table 4: Difference in Teachers' Perceptions based on Years of Teaching Experience

	teachers' experience	*N*	*Mean*	*Std. Deviation*	*Std. Deviation*
Teacher perception	1-5 yrs	65	77.5538	10.61990	10.61990
	6 yrs & above	175	77.8971	7.36727	7.36727

The teachers with years of teaching experience of 1-5 years have mean perception score of 77.55 which is less than the mean perception score of those with 6 years and above years of teaching experience (77.90).

Research Question Four: Is there any difference in the perception of primary school teachers' of advancing Basic Science teaching and learning through technology by class taught?

Table 5: Difference in Teachers' Perceptions based on Years of Class Taught

	teachers' class taught	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Teacher perception	basic 1-3	114	76.3509	8.89465	.83306
	basic 4-6	126	79.1190	7.62586	.67937

The perception mean score of 76.35 of teachers with of Basic 1-3 was less than that of teachers teaching Basic 4-6 (79.12) in advancing Basic Science teaching and learning with technology.

Research Question Five: Is there any difference in the perception of primary school teachers' of advancing Basic Science teaching and learning through technology by qualification?

Table 6: Difference in Teachers' Perceptions based on Years of Class Taught

teachers' educational qualification	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
NCE	95	76.7158	8.29405	.85095
B.Sc (Ed.)	131	78.3893	8.10392	.70804
M.Ed. & above	14	79.7143	7.52994	2.0124

From Table 6, the perception mean score of 76.72 of NCE teachers was less than that of first degree holder teachers (78.39) in advancing Basic Science teaching and learning with technology while that of the M.Ed. and above qualification (79.71) was the highest.

Hypotheses Testing

Ho_1: 'There is no significant influence of teachers' perspective on advancing Basic Science teaching and learning through technology'

Table 7: T-test analysis of influence of teachers' perspectives on advancing Basic Science teaching and learning through technology

Variable	*N*	*Mean*	*SD*	*T*	*Df*	*Sig.*	*Remarks*
	240	77.80	8.35	144.33	239	.000	*S

Table 7 revealed that there is significant influence of teachers' perspectives on advancing Basic Science teaching and learning through technology (T= 144.33; df= 239; p<.05). Therefore, Ho1 is not accepted.

Ho_2: 'There is no significant difference in teachers' perspective on advancing Basic Science teaching and learning through technology based on gender'

Table 8: T-test analysis of difference in teachers' perspectives on advancing Basic Science teaching and learning through technology based on gender

Teachers' gender	*N*	*Mean*	*SD*	*T*	*Df*	*Sig.*	*Remarks*
Male	56	77.66	8.20	.147	238	.884	NS
Female	184	77.85	8.42				

From Table 8, there is no significant difference in teachers' perspectives on advancing Basic Science teaching and learning through technology based on gender (T= .147; df= 238; p>.05). Therefore, Ho2 is not rejected.

Ho_3: There is no significant difference in teachers' perspective on advancing Basic Science teaching and learning through technology based on teaching experience;

Table 9: T-test analysis of difference in teachers' perspectives on advancing Basic Science teaching and learning through technology based on teaching experience

Teachers' Experience	*N*	*Mean*	*SD*	*T*	*Df*	*Sig.*	*Remarks*
1-5 Yrs	65	77.66	77.55	.282	238	.778	NS
6 Yrs & Above	175	77.85	77.90				

From Table 9, there is no significant difference in teachers' perspectives on advancing Basic Science teaching and learning through technology based on teaching experience (T= .282; df= 238; p>.05). Therefore, Ho3 is not rejected.

Ho_4: 'There is no significant difference in teachers' perspective on advancing Basic Science teaching and learning through technology based on class taught'

Table 10: T-test analysis of difference in teachers' perspectives on advancing Basic Science teaching and learning through technology based on class taught

Teachers' Experience	*N*	*Mean*	*SD*	*T*	*Df*	*Sig.*	*Remarks*
Pry 1-3	114	76.35	8.90	.282	238	.778	NS
Pry 4-6	126	79.12	7.63				

From Table 10, there is no significant difference in teachers' perspectives on advancing Basic Science teaching and learning through technology based on class taught (T= .282; df= 238; p>.05). Therefore, Ho3 is not rejected.

Ho_5: 'There is no significant difference in teachers' perspective on advancing Basic Science teaching and learning through technology based on qualification'

Table 11: Analysis of Variance of difference in teachers' perspectives on advancing Basic Science teaching and learning through technology based on qualification

Teachers' Qualification	*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*	*Remarks*
Between groups	208.467	2	104.234	1.501	.10	NS
Within groups	16459.328	237	69.449			
Total	16667.796	239				

The Analysis of Variance in Table 11 indicated that the difference in teachers' perspectives on advancing Basic Science teaching and learning through technology based on qualification is not significant ($F_{(2, 237)}$ = 1.50; p >.05).

Discussion

From the answered research questions and tested hypotheses, it was revealed that the teachers' perspective on advancing Basic Science teaching and learning through technology is high and significant. This may be owing to the fact that technological gadgets like handsets, ipad, laptops and others are already ubiquitous in our society. All the teachers perceived that teaching and learning Basic Science through technology can advance the subject. This is in line with the recommendation of the National Science Teachers Association (NSTA) that science should be taught with technology and reflective thinking. This is also in consonance with the Nigeria Vision 20:2020 that ICT gadgets should be incorporated into all facets of human endeavours to enhance, enable, enrich and empower efficiency and efficacy in production.

The significant influence of teachers' perspectives on advancing Basic Science teaching and learning through technology is not beclouded by gender, years of teaching experience, class taught and teachers' qualification. These show that the degree of the perspectives of advancing Basic Science teaching and learning through technology is transgender, cutting across different grades of teachers of varying teaching experience, class taught and qualifications. This passes more credence on the fact that the trending path of advancing teaching science in the 21st century is by technology (Afolabi, 2006; NGSS, 2015; Raimi, Bolaji & Adesina, 2016; Olagunju & Adesina, 2017) and reflective thinking as it holds ability of organized instruction, learner controlled interaction, prompt feedback to learner, self-pacing, adaptability of instruction, variability of lesson purpose, multiple users facilities, random access facilities, facilities for revision and updating, attention sustaining, interest and attitude boosting as well as performance and achievement enhancement in Basic Science.

Conclusion

The perception teachers made in teaching-learning process influences the activities and efficiency of the product of the process. Thus, the conception of integrating or advancing Basic science teaching and learning through technology go a long way in instilling the right disposition towards technology implementation. It is therefore averred that with strong perception of advancing Basic science teaching and learning using

technology of the basic teachers, availing these technological tools in schools would be properly and adequately utilized by the classroom teachers irrespective of their gender, years of teaching experience, class taught and qualification.

Recommendations

Based on the findings of the study, the following recommendations were put forth:

i. Government and Non-Governmental agencies should provide technological tools in the primary schools for efficient utilization in Basic Science;
ii. Technological literacy and operation in the primary schools should be encouraged while relevant technological packages should be accorded attention and developed for use within the Nigeria school system. This can be done by bringing experts in subject contents and technology together to design effective package in line with school curriculum.
iii. Educational curriculum planners should incorporate practical technological training course in their curriculum design for pre-service teachers. This will help them to be more proficient in using technology to teach effectively when they become in-service teachers.
iv. Workshops, seminars, lectures, symposia and conferences should be organized for the Basic Science teachers to intimate them and keep them abreast of the trending technologies in science teaching and learning.

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