International Journal of Innovative Social & Science Education Research 3(1&2):12-19, Apr-Jun. 2014

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THE RIPPLE EFFECT OF IMPROVISING EDUCATIONAL TECHNOLOGY IN SCIENCE EDUCATION

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ABSTRACT
The study showcases how social interactions can affect the state of affairs of other social components, and was impelled by the rapid evolution of the digital age and the dare need to satisfy educational quests via improvising instructional experiences to maximize the learning experience. Three research questions and three hypotheses were used, and a population of one hundred and sixty eight respondents (Lecturers/Teachers and Students) was selected at random for convenience from five Secondary Schools (Umiaghwa, Ojeta, Uhroka, & Erho Secondary Schools and Abraka Gramma School), Two Colleges of Education (Agbo and Warri) and One University (Delta State University) all in Delta State. A coefficient of 0.87 was obtained for the item's internal consistency using Cronbach alpha. The research question and hypothesis were tested with mean and T-test statistics. It was revealed that the effects of improvising educational technology in science education as an academic discipline includes; Helping the learners to remember more of what has been taught. Furthermore there is a strong significant correlation between improvising educational technology and science education as an academic discipline. The Study recommends that the National Policy on Education should inculcate educational technology in their curriculums

Keywords: ripple effect, improvising, educational technology, Science education,

INTRODUCTION

The theory of the ripple effect first gained acceptance in the field of sociology and grew to relatively all other academic disciplines. Inspired by wave forms generated from the distortion of a still water body and watching it grow into bigger wave forms, it connotes how social interactions can affect the state of affairs of other social components which are not directly related or connected to the initial cause of the action. As a social component, the educational sector has had its own fair share of such tidal displacements with regards to the advent of information technology. This has changed the way and manner in which teaching methodologies, constructive learning and educational technology is being perceived and administered. The fusion therefore, of Education and Technology referred to as "Educational Technology", and described by the Association for Educational Communications and Technology, (the professional society for Educational Technology), as "the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources", is constantly being pushed to the limit with evolutionary changes in teaching techniques, scientific analysis, instructional methods, educational psychology, and diverse inputs from scientific and other disciplinary theories of learning, including science education. This paper therefore seeks to explore the ripple effect of improvising educational technology in science education.

Literature Review

Since the dawn of creation, man has always sought out ways to improve his life style and make ease his burden. There appears to be a constant shift from what is, to what will be – from an already acquired objective, reformed or improved upon, using available resources to arrive at a better and enhanced outcome. This process is described as the process of improvisation. Adu & Adu (2014) posited that it is the process of "problem solving, or reacting in the moment and in response to the stimulus of one's immediate environment". With regards to educational technology Ajewole,(1998), explains that it devises and constructs "alternative instructional media as substitute to the manufactured ones "resulting" in the

discovery of new thought patterns, practices, new structures or symbols, and new ways to act. Scholars believe that there are four major instructional reasons for using improvisation in the classroom:

(1) It is consistent with the characteristics of the current genres of the learners known as "Net Generation" (Carlson, 2005, Junco & Mastrodicasa, 2007, Oblinger & Oblinger, 2006a, Palfrey & Gasser, 2008, Tapscott, 1999, 2009, Howe & Strauss, 2000). This generation has grown up with the technology, especially their desire to learn by inductive discovery, experiential experiences and collaborative teaching.

(2) It taps into learners multiple and emotional intelligence.

(3) It foster collaborative learning by helping to build trust, respect, and team spirit as well as listening, verbal and nonverbal communication, ad-libbing, role-playing, risk-taking and storytelling skills (Berk, & Trieber, 2009).

(4) It promotes deep learning through the active engagement with new ideas, concepts or problems, linking the activities or tasks to prior learning, applying the content to real-life applications, and evaluating the logic and evidence presented (Adu & Adu, 2014).

The uniqueness therefore, of science education as an academic discipline compels it to share "scientific content and processes with other academic disciplines not traditionally related to the sciences. Science on one hand refers to the process of knowledge acquisition through observation, studying and practice, while education on the other refers to the resultant effect of the application of knowledge" (Awviri, 2015), thus improvising educational technology "is an important issue in science Education which has attracted a lot of contributions from science teachers (Fatubarin, 2001)", probably due to the fact that it is a combination of "three subjects namely Biology, Chemistry and Physics which are combined with education (Kola, 2013)".

Statement of the problem

Students in developing countries often perceive science subjects – Biology, Chemistry and Physics as difficult, as Aina (2013) explains that students often find "science education" very difficult and this is why students always have low achievement in the subject. One major reason for this poor performance might not be separated from the abstract nature of the course as observed by Adeyemo (2010). In Nigeria, the jinx remain unbroken as it depends solely on an inherited educational system that focuses on traditional teaching methods instead of improvising orthodox methodologies using the application of information and communication technologies which according to (Adu & Adu, 2014) "soothes the learners learning experiences". Much attention and discussion has been evident in terms of the manner and process of providing education (Dimitrios et al. 2013), Kwapong (1988), emphasizing that the attainment of greater internal efficiency of the educational system, as a first step towards improved quality of education (via improvisation) should be a priority in order to reduce the misuse of resources caused by students dropping out or repeating grades.

Objectives of the study

Amidst numerous objectives, the researcher specifically seeks to;

1. ascertain the effects of improvising educational technology in science education as an academic discipline
2. Find out if science education teachers improvise in their teaching methodologies
3. determine whether improvising educational technology improves student's performance in science education

Research Question

1. What are the effects of improvising educational technology in science education as an academic discipline?
2. Do science education teachers improvise in their teaching methodologies?
3. Does improvising using educational technology improve student's performance in science education?

Research Hypothesis

Ho_1 – There is no correlation between improvising educational technology and science education as an academic discipline.

Ho_2 – There is no significant difference between the teaching methods of science education teachers who improvise using educational technology and those who do not.

Ho_3 – There is no significant difference in student's performance between students taught via improvising educational technology and students who are not taught via improvising educational technology in science education.

METHODOLOGY

A descriptive survey consisting of teachers and students from Five Secondary Schools (Umiaghwa, Ojeta, Uhroka, & Erho Secondary Schools and Abraka Gramma School) Two Colleges of Education (Agbo and Warri) and One University (Delta State University) all in Delta State were adopted based on convenient sampling. A twenty (20) item Questionnaires was used to collect data, and a four point scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) was employed to capture their responses. The instrument was validated by an expert in Measurements and Evaluation from Delta State University, Abraka, yielding an internal consistency of 0.87 using the Cronbach alph. An average of each item was used to test the research question, rejecting variables with values below 2.5 as negative (Disagree) while accepting variables with values above 2.5 as positive (Agree). The research hypothesis was tested at a 0.05 level of significance using a t test statistics.

RESULTS OF ANALYSIS

The results were obtained from the research question and hypotheses tested and shown below;

RQ1: *The effects of improvising educational technology in science education as an academic discipline?*

Table 1: Respondent's Mean score

S/N	Item	N	SA	A	D	SD	Mean	SD
1.	Helps learners to remembers more of what has been taught	168	49	56	35	28	2.750	1.054
2.	It enhances Classroom Instruction	168	53	48	37	30	2.738	1.090
3.	It augments traditional teaching materials	168	47	51	41	29	2.690	1.061
4.	It captures the attention of the observer or student via technological equipment used	168	62	43	36	27	2.833	1.098
5.	It give a professional feel to the discipline	168	47	59	40	22	2.780	1.000
	Group Mean						2.758	0.053

As displayed above, all the variables highlighted in Table 1 shows a mean value higher than the bench mark mean of 2.50, implying that all the variables highlighted were accepted by the respondents as areas in which they believe improvising educational technology effects science education as an academic discipline. This was further confirmed by the group mean of 2.758 ± 0.053, which is also higher than the average mean of 2.50.

RQ2: *Do science education teachers improvise in their teaching methodologies?*

Table 2: Respondent's Mean score

S/N	Item	Yes	Percentage	No	Percentage	Total
6.	In relating the course material to everyday life	102	60.71%	66	39.29%	168
7.	in mastering knowledge of the subject and applying that knowledge to circular events that need its application	63	37.50%	105	62.50%	168
8.	In the Structure of knowledge of the subject area	47	27.98%	121	72.02%	168
9.	In the concepts of the subject area	36	21.43%	132	78.57%	168
10.	In the theories and principles of the subject area	53	31.55%	115	68.45%	168
	Total					

The Table 2 above shows that the 'Yes' (60.71%) responses being higher than the 'No' (39.29%) responses of respondents, indicating that science education teachers improvise in their teaching methodologies in relating the course material to everyday life. Furthermore, on items 7 – 10, the tables revealed that the 'No' responses of the respondents (62.50%, 72.02%, 78.57%, 68.45%) higher than the yes responses (37.50%, 27.98%, 21.43%, 31.55%) implying that science education teachers do not improvise in their teaching methodologies in mastering knowledge of the subject and applying that knowledge to circular events that need its application, In the Structure of knowledge of the subject area, In the concepts of the subject area, and In the theories and principles of the subject area.

RQ3: Does improvising using educational technology improve student's performance in science education?

Table 3: Respondent's Mean score

S/N	Item	N	SA	A	D	SD	Mean	SD
11.	Enhancing students grades	168	62	45	36	25	2.857	1.079
12.	Helping to capture students attention in class via interest developed technological media used	168	71	43	38	16	3.006	1.018
13.	Assisting students to remember what has been taught under examination conditions	168	66	52	41	9	3.042	0.924
14.	Aids students to retain information to be applied in real life situation	168	59	57	34	18	2.935	0.992
15.	Inspires students to do more in terms of class assignments and home work	168	48	55	39	26	2.744	1.038
	Group Mean						2.917	0.120

In the table 3 above, the mean score of all variable listed was higher in value than the mean bench mark of 2.50, implying that improvising educational technology improves student's performance in Enhancing students grades, Helping to capture students attention in class, Assisting students to remember what has been taught under examination conditions, Aids students to retain information to be applied in real life situation, and Inspires students to do more in terms of class assignments and home work. This was further confirmed by the combined group mean of 2.917± 0.120, which is also greater in value that the above stated mean bench mark.

RESEARCH HYPOTHESIS

Hypotheses One:

Ho_1 – *There is no correlation between improvising educational technology and science education as an academic discipline*.

Ha_1 – *There is a correlation between improvising educational technology and science education as an academic discipline*

Table 4: Pearson Correlation to determine the relationship between improvising educational technology and science education as an academic discipline

		Improvising educational Technology	Science Education as an Academic Discipline
improvising educational technology	Pearson Correlation	1	.948
	Sig. (2-tailed)		.000
	N	168	168
science education as an academic discipline	Pearson Correlation	.948	1
	Sig. (2-tailed)	.000	
	N	168	168

P= ≤ 0.05 level of significance

The result of the Person Correlation for the relationship between improvising educational technology and science education as an academic discipline as shown in Table 4, reveals a correlation value of 0.948 indicating there is a strong significant Correlation between improvising educational technology and science education as an academic discipline at 0.05 significant level, being that the value 0.948 is closer to the positive whole number 1 in approximation. Furthermore the p value of 0.000 obtained is below the significant level of 0.05, thus we reject out hull hypotheses and accept our alternate hypotheses indicating that there is a correlation between improvising educational technology and science education as an academic discipline.

Hypotheses Two:

Ho_2 – *There is no significant difference between the teaching methods of science education teachers who improvise using educational technology and those who do not.*

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Table 5: T-test for the significant difference between the teaching methods of science education teachers who improvise using educational technology and those who do not

	N	Mean	SD	DF	t-Calculated	t Critical Value (.05)	Remark
teaching methods of science education teachers who improvise using educational technology	168	2.917	0.120	166	3.134	1.960	Rejected
teaching methods of science education teachers who do not improvise using educational technology		2.831	0.221				

P= ≤ 0.05 level of significance

Table 5 above shows the result of the t-test for the difference existing between the teaching methods of science education teachers who improvise using educational technology and science education teachers who do not improvise using educational technology. The result revealed a calculated t-test value of 3.134,

greater than the t-critical value of 1.960 at a 0.05 level of significance, implying that the null hypothesis is being rejected and the alternate hypothesis accepted, stating that there is a significant difference between the teaching methods of science education teachers who improvise using educational technology and those who do not.

Hypotheses Three:

Ho_3 – *There is no significant difference in student's performance between students taught via improvising educational technology and students who are not taught via improvising educational technology in science education*.

Table 6: T-test for the significant difference in student's performance between students taught via improvising educational technology and students who are not taught via improvising educational technology in science education.

	N	Mean	SD	DF	t-Calculated	t Critical Value (.05)	Remark
students taught via improvising educational technology in science education	168	2.917	0.120	166	23.460	1.960	Rejected
students who are not taught via improvising educational technology in science education		2.403	0.161				

P= ≤ 0.05 level of significance

As shown above, the Table 6 indicates that there exists a significant difference in student's performance between students taught via improvising educational technology and students who are not taught via improvising educational technology in science education. The Null Hypothesis is rejected due to its t-value of 23.460 which is greater than the t-critical value of 1.960 at a 0.05 level of significance, indicating that a significant difference exists in student's performance between students taught via improvising educational technology and students who are not taught via improvising educational technology in science education.

DISCUSSION OF FINDINGS

The researcher observed that the effects of improvising educational technology in science education as an academic discipline includes; Helping the learners to remembers more of what has been taught, as affirmed by Adu & Adu (2014) stating that Learners generally remember twenty per cent (20%) of what they hear, thirty per cent (30%) of what they see, fifty per cent (50%) of what they see and hear, ninety per cent (90%) of what they see and do. In addition, improvising educational technology also enhances Classroom Instruction, augments traditional teaching materials, captures the attention of the observer or student, and gives a professional feel to the discipline.

Furthermore, the study reveals that science education teachers improvise in their teaching methodologies In relating the course material to everyday life but not improvise in mastering knowledge of the subject and applying that knowledge to circular events that need its application, In the Structure of knowledge of the subject area, In the concepts of the subject area, and In the theories and principles of the subject area.

The study also revealed that improvising educational technology improves student's performance in Enhancing students grades. Flanders (1970) Johnson et al (1974), concurs to this in their investigation which shows that students who were taught using improvised instructional media that were properly evaluated made significant gains in their studies. The study further showed that improvising educational technology Helps to capture students attention in class via interest developed technological media used, assisting students to remember what has been taught under examination conditions, Aids students to

retain information to be applied in real life situation, and Inspires students to do more in terms of class assignments and home work

In addition, the study also revealed that there is a strong significant correlation between improvising educational technology and science education as an academic discipline. This outcome is similar that obtained by Johnson et al (1974) in Udosen (2007), who studied three categories of science students, namely: (i) a group that learned science from textbooks, (ii) a group that used textbooks and laboratory materials, and (iii) an activity-centred group that dealt primarily with improvised instructional materials and laboratory equipment. They found out that all the groups with textbooks and laboratory materials were relatively behind the group, which was activity-centred, and this group developed the greatest positive attitudes toward learning. The study also revealed that there is a significant difference between the teaching methods of science education teachers who improvise using educational technology and those who do not, and that a significant difference exists in student's performance between students taught via improvising educational technology and students who are not taught via improvising educational technology in science education.

CONCLUSION

This study explores the relativity and connotation of improvising educational technology in science education. It becomes necessary because of the social interactions of the present digital age and the rapid evolution taking place before our very eyes in the educational sector and other parts of society.

RECOMMENDATION

Based on preceding discussions the researcher recommends the following;

1. Educational Policy makers should encourage teachers to improvise in their teaching methodologies
2. The National Policy on Education should inculcate educational technology in their curriculums
3. Adequate electricity should be provided to power educational technological devices
4. The Federal Government should promote the adoption of technological policies to enhance science and promote the economy in general.

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