INTERNATIONAL REVIEW OF HUMANITIES AND SCIENTIFIC RESEARCH
By International Scientific Indexing
ISSN (Online) : 2519-5336

www.irhsr.org

THE USE OF TECHNOLOGY IN SCIENCE INSTRUCTION TO ENHANCE NATIONAL ACHIEVEMENT TEST (NAT) PERFORMANCE IN THE DEPARTMENT OF EDUCATION

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ABSTRACT

The study probed the integration of technology in Science instruction in relation to the students' performance in National Achievement Test (NAT) results in school. It utilized a researcher-made questionnaire to obtain the data. The respondents of the study were the upper and lower 30% performing schools in the National Achievement Test (NAT) for the aforementioned school years (2016-2016). The findings of the study revealed that the available technological resources for use in Science instruction for the upper 30% were printer, desktop computer, and Internet connection while for the lower 30% were desktop computer, printer, and speaker; that the level of technological skills of both the 30% school-respondents were rated expert in creating a presentation, using social networks, and their knowledge to operate computer. For the level of implementation in Technology-Assisted Science instruction the respondents were rated occasionally. Moreover, the performance of the school-respondents in the National Achievement Test (NAT) revealed that the upper 30% performing schools in NAT had their highest rating of 89.50% during the school year 2013-2014 while the lower 30% schools had their highest average rating of 81.10% during the school year 2011-2012. On the other hand, data revealed that the relationship between the level of technological skills of the teachers, school's implementation in Technology-Assisted Science instruction, and the performance in Science NAT between the upper and lower 30% school-respondents was significant. Additionally, school-respondents considered lack of computer sets as the major challenge they faced upon the implementation of Technology-Assisted Science instruction.

Key words: *Technology integration, science instruction, Technology–Assisted Instruction (TAI), National Achievement Test (NAT), intervention program*

INTRODUCTION

The last decades have witnessed a worldwide proliferation of Information and Communication Technologies (ICT) in the field of education. The global adoption of ICT in education has often been premised on the potential of the new technological tools to revolutionize an antiquated educational system, better prepare students for the information age, and accelerate national development efforts (Bordbar, 2010). With this, the Philippine government has made an effort to provide the infrastructure that will make it possible to employ these technologies in school to include the launching of Computerization Program in DepEd schools (DepEd Press released, 2013). The ultimate goal is to enhance learning (Bull and Bell, 2010). In the Philippines, the Filipino students' poor achievement level in Science has been noted for several years now (Bernardo, et al. 2008). It is evident in the National Achievement Test (NAT) which is administered annually to measure the academic performance of the main subjects of elementary and secondary students in both DepEd and private schools (DepEd, 2014). In 1996, the national mean rating in Science test of the National Elementary Achievement Test was 41.5%. A recent National Achievement Test showed that in 2005, the average score in Science test was 54.1% for Grade Six students, and only 14.8% of Grade Six Science students attained mastery levels of Science curriculum goals (Bernardo, 2008). These low achievement levels were documented in international assessments of Science education like the Trends in International Mathematics and Science Study (TIMSS) (Martin, Mullis, Gonzalez, and Chrostowki, 2004). The results showed that Filipino Grade Six students ranked third from last out of 25 countries in Science, with an average mean of 332. The general international mean was 489, and the highest rating by some country was 565. The average global rating was 474, and the maximum score for any country was 578. Similarly, in the Division of Butuan City, the results of the National Achievement Test (NAT) for the past four years, from the school year 2010-2014 among Grade Six students showed below average performance regarding their Science MPS NAT result (DepEd database, 2012). DepEd (2012) points out that Science continues to be the most difficult subject of study in primary education in the Philippines. According to Samuel (2011), it could be attributed to lack of interest by the students, difficulty in Science as perceived by the students. In the other word, teacher factors have counted such as strategies used to teach Science, teacher attitude towards Science teaching, teacher experience, and qualifications, a perception of the academic standard of the school, and students' study habits. Various researchers to address the flagging and critical performance in the National Achievement Test (NAT), however, most of which only focused on the factors resulting within.

METHODOLOGY

This study utilized descriptive-correlational research design. It was descriptive because it described the use of technology to assist Science instruction among DepEd schools to enhance Science learning. Moreover, it was also correlational as it aimed to describe the level of relationship between the school's level of technological skills and performance in Science National Achievement Test (NAT); and the school's level of implementation and performance in the Science National Achievement Test.

The researcher utilized the non-probability using purposive sampling technique in the selection of the school-respondents since there were criteria that were followed in choosing the samples. On the other hand, the schools involved in this study were the upper and lower 30% performing schools in the National Achievement Test (NAT) based on their Mean

Percentage Score (MPS), the school year 2013-2014 among DepEd elementary central and non-central schools were not included for consistency of exposure and academic standards.

RESEARCH INSTRUMENT

The researcher developed a questionnaire for the teacher-respondents. The questionnaire consisted of four (4) questions representing the information needed for the study. It was reviewed by research professors coming from different for content validation and were revised based on their comments and suggestions.

The survey questionnaire was validated by the appropriateness of each item. In the same manner, the data collected on the pre-testing of the instrument underwent reliability testing using Coefficient Alpha yielding a reliability result of 0.84 which is highly reliable.

DATA GATHERING PROCEDURE

Before the conduct of the data gathering, the researcher sent a letter to the Schools Division Superintendent to ask permission to conduct the study on the use of Technology-Assisted Instruction in Science among DepEd schools. Following the approval of the Schools Division Superintendent, the researcher sent a letter to the school administrators of the said division asking permission to conduct the study in their respective schools.

The researcher then conducted the data gathering by asking the DepEd school-respondents to answer the questionnaires. In total, the researcher spent around one month working days in data gathering involving 56 teacher-respondents and 28 principal-respondents in the upper and lower 30% performing DepEd elementary schools in the Division.

DATA ANALYSIS PROCEDURE

The descriptive evaluation of findings to determine the technological skills of the school-respondents, level of implementation of schools in Technology-Assisted Science Instruction in terms of training program, and the practices of teachers in integrating the use of technology in Science Instruction among DepEd schools in the Division was based on the statistical parameters.

ANALYSES AND RESULTS

On the Availability of Technological Resources for Use in Science Instruction

Table 4 shows the percentage distribution of the technological resources available for use for Science Instruction as rated by the teachers and the principals when respondents were grouped as upper and lower 30% performing schools in the National Achievement Test (NAT).

Table 1
Percentage Distribution of the Technological Resources in Science Instruction

Technological Tools/ Resources	Teachers Upper 30%		Principals Upper 30%		TOTAL		Teachers Lower 30%		Principals Lower 30&		TOTAL	
	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
A) Desktop Computer	3.8	96.2	8.3	91.7	6.1	94.0	10.7	89.3	7.1	92.9	8.9	91.1
B) Laptop or notebook computer	37.0	63.0	42.9	57.1	40.0	60.05	25.0	75.0	41.7	58.3	33.35	66.7
C) Tablet Device	82.1	17.9	84.6	15.4	83.4	16.7	88.0	12.0	100.0	0.0	94.0	6.0
D) Overhead Projector	21.4	78.6	7.1	92.9	14.3	85.8	65.4	34.6	21.4	78.6	43.4	56.6
E) LCD/ multimedia projector	11.1	88.9	14.3	85.7	12.7	87.3	24.0	76.0	8.3	91.7	16.2	83.9
F) Television Set	46.4	53.6	28.6	71.4	37.5	62.5	32.1	67.9	28.6	71.4	30.4	69.7
G) Compact disc Player	17.9	82.1	42.9	57.1	30.4	69.6	34.6	65.4	46.2	53.8	40.4	59.6
H) DVD player	25.0	75.0	23.1	76.9	24.1	76.0	28.6	71.4	44.4	55.6	36.5	63.5
I) Speakers	14.3	85.7	14.3	85.7	14.3	85.7	7.1	92.9	16.7	83.3	11.9	88.1
J) Digital Camera	38.5	61.5	30.8	69.2	34.7	65.4	32.1	67.9	28.6	71.4	30.4	69.7
K) Video Recorder	82.1	17.9	78.6	21.4	80.4	19.7	78.6	21.4	66.7	33.3	72.7	27.4
L) Karaoke/ Videoke	82.1	17.9	61.5	38.5	71.8	28.2	30.8	69.2	60.0	40.0	45.4	54.6
M) Internet Connection	10.7	89.3	7.1	92.9	8.9	91.1	17.9	82.1	23.1	76.9	20.5	79.5
N) Printer	7.1	92.9	0.0	100.0	3.6	96.5	7.1	92.9	14.3	85.7	10.7	89.3
O) USB (memory) Stick	18.5	81.5	14.3	85.7	16.4	83.6	10.7	89.3	27.3	72.7	19.0	81.0
P) Computer Laboratory	18.5	81.5	7.7	92.3	13.1	86.9	18.5	81.5	28.6	71.4	23.6	76.5

As indicated in Table 4, there were three (3) technological resources that were being used by more than 90% of the teachers and principals for the upper 30% performing schools in the National Achievement Test. These were printers (96.5%), desktop computers (94.0%), and Internet connection (91.1%).

Based on the responses of the majority of the respondents to the survey questionnaire, they used printers for Science instructional materials, summative and periodic tests, lesson plans, activities, reports, processing output, visual aids, and worksheets. Meanwhile, desktop computers and Internet connection were used by teacher-respondents for making reports, PowerPoint presentations, hands-on application, data searching on the Internet, supplemental lessons, research about Science teaching, downloading educational videos, encoding, typing the lessons to collect data from the Internet and surfing Science materials for the lessons.

The table also indicated that 85% of these schools had Liquid Crystal Display (LCD)/multimedia projectors, computer laboratories, overhead projectors, and speakers. These imply that majority of the upper 30% performing schools in the National Achievement Test (NAT) had the basic technological resources that could be used by their teachers in their Technology-Assisted medium of instruction.

It could be noted however that less than 20% of these schools had video recorder (19.7%), tablet device (16.7%), lowest) and karaoke/video (28.2%) available for their teachers' use. But this did not imply that the teachers did not have access to these things because tablet devices could be a personal property of the teacher and yet could still be used as their instructional media. According to the respondents, tablet device was usually used for Science documentation and personal use only. Similarly, video and camera recorder were almost present and available even to students because of the technological advancement of smartphones used in school documentations like Science activities or programs, Science feature writing, photojournalism and "Palit-Awit" or parody contest.

Henderson and Yeow (2012) emphasize the usability of the tablet and mobile devices to increase learning. Being roughly the same size as a book, the tablet device is thought to encourage students to engage with it the same way they would with a physical storybook. The authors further put forward that the mobile devices encourage collaboration as their size stimulated face-to-face interaction.

On one hand, video recording techniques have been used in an educational setting for some years. They have included viewing videotaped lessons in Science, using whole videos or clips of tapes as a quick for discussion, viewing video recordings to observe role models for practice, and being video recorded to receive feedback on performance from peers and tutors. Although this last application has been used since the 1960s, it has only been evaluated as a teaching method with health care professionals in the past ten years and mostly in the areas of medical and counselor education (Minardi, 2008). Moreover, karaoke/video in school is an interactive media which opens new avenues for learning integrated into the lessons (Fornas, 2014).

Blumenfield et al. (2016) state that the integration of technology to Science education is based on the identified six contributions that technology can make to the learning process such as enhancing interest and motivation; providing access to information; allowing active, manipulative presentations; structuring the process with tactical and strategic support; diagnosing and correcting errors; and managing complexity and aiding production.

In contrast, unlike the upper 30% performing schools in National Achievement Test (NAT), the lower 30% performing schools in the National Achievement Test had only one (1) technological resource present to more than 90% of the lower 30% performing schools in National Achievement Test (NAT) and these were desktop computers with 91.1%. A little less than 90% of them have printers (89.3%) and speakers (88.1%). Other technological items that were present in at least 80% of these schools were Liquid Crystal Display (LCD)/multimedia projector and Universal Serial Bus (USB) stick with 83.85% and 81.0%, respectively. A similar case was depicted for the tablet device, which was present in only 6% of the schools.

In sum, both upper and lower 30% performing schools in Natt had both desktop computer and printers as common technological resources available for use in Science teaching and learning.

On the Level of Technological Skills of the Respondents

The level of technological skills of the teachers in the upper 30% and lower 30% performing schools in the National Achievement Test (NAT) from 2010 to 2014 is presented in Table 2.

Table 2
Level of Technological Skills among Teachers and principals of the Upper and Lower 30% Performing Schools in NAT

Level of Technological Skills	Teachers Upper 30%		Principals Upper 30%		Total		Teachers Lower 30%		Principals Lower 30%		Total	
	Mean	VD	Mean	VD	Mean	VD	Mean	VD	Mean	VD	Mean	VD
A) Edit digital photographs	3.2	P	3.1	P	3.2	P	2.9	P	3.1	P	3.0	P
B) Create a database	2.9	P	2.6	P	2.8	P	2.7	P	2.3	N	2.5	N
C) Use a spreadsheet to plot a graph	3.4	P	2.8	P	3.1	P	3.0	P	2.9	P	3.0	P
D) Create a presentation	3.8	E	3.6	E	3.7	E	3.4	P	3.4	P	3.4	P
E) Create a multimedia presentation	3.5	P	3.2	P	3.4	P	3.2	P	3.3	P	3.3	P
F) Knowledge of how computers operate	3.8	E	3.5	E	3.7	E	3.6	E	3.5	P	3.6	E
G) Ability to design own programs	2.7	P	2.9	P	2.8	P	2.5	N	2.9	P	2.7	P
H) Ability to evaluate educational software	2.7	P	2.4	N	2.6	P	2.5	N	2.7	P	2.6	P
I) Knowledge of educational computer applications	3.3	P	2.8	P	3.1	P	3.0	P	3.0	P	3.0	P
J) Create a document using word processing program	3.7	E	3.5	P	3.6	E	3.4	P	3.2	P	3.3	P
K) Use spreadsheet / excel program	3.5	P	3.6	E	3.6	E	3.1	P	3.4	P	3.3	P
L) Use a presentation program	3.8	E	3.7	E	3.8	E	3.2	P	3.3	P	3.3	P
M) Use a database program	2.7	P	2.6	P	2.7	P	2.6	P	2.8	P	2.7	P
N) Use a publication program	3.2	P	3.0	P	3.1	P	2.8	P	2.7	P	2.8	P
O) Create /edit multimedia presentation	3.5	P	3.2	P	3.4	P	3.0	P	2.8	P	2.9	P
P) Use programming software	2.8	P	2.9	P	2.9	P	2.5	N	2.4	N	2.5	N
Q) Use authoring program	2.3	N	2.1	N	2.2	N	2.0	N	2.2	N	2.1	N
R) Use social media programs like FB and skype	3.8	E	3.6	E	3.7	E	3.7	E	3.6	E	3.7	E
S) Can troubleshoot hardware problems	2.5	N	2.4	N	2.5	N	2.0	N	2.3	N	2.2	N
T) Can troubleshoot software problems	2.6	P	3.4	P	3.0	P	2.4	N	2.1	N	2.3	N
U) Can create a Website	2.5	N	2.4	N	2.5	N	2.3	N	2.1	N	2.2	N
V) Can create web-based learning materials	2.5	N	2.4	N	2.5	N	2.3	N	2.1	N	2.2	N
W) Can access blogs and e-journals	2.9	P	2.8	P	2.9	P	2.9	P	2.7	P	2.8	P
Over-all Mean	3.1	P	3.0	P	3.1	P	2.8	P	2.8	P	2.8	P

The participants from the upper 30% performing schools in National Achievement Test (NAT) indicated that they were expert in using a presentation program which received the highest mean ratings from the teachers (3.8) and principals (3.7) and highest grouped mean of 3.8. This result showed that the teachers could very well use presentation program by themselves and without the help from someone. Other items which the teachers considered themselves expert were creating a presentation and use of social media programs like Facebook (FB) and Skype, both with 3.7, and knowledge on how to operate computers (3.7).

A presentation program is widely used by Science educators, trainers, and students. Presentation program/PowerPoint has become the world's most widely used presentation program to Science lectures and instructions (Segundo and Salazar, 2011). As Schrodt and Witt (2006) examined the effects of classroom technology use in Science, including PowerPoint, they found out that teachers who augmented their face-to-face presentations with technology were perceived as being more reliable than those who did not employ technology in the school.

Furthermore, Ozaslan and Maden (2013) revealed that students learned better if the course material was presented in some visual tools. They also reported that teachers believed that PowerPoint presentations made the content more appealing; therefore, they helped them to take students' attention. The results of Corbeil's study (2007) also showed that students who were exposed to PowerPoint presentations preferred them over the textbook presentations and that students were learning better when their attention was captured via highlighting, color, different fonts, and visual effects.

On the other hand, as perceived by teachers, creating/PowerPoint presentation works well in the classroom in a number of ways like teachers can create graphically enhanced information and instructions for the learning centers, create tutorials, reviews, or quizzes for individual students, display student work and curriculum materials or accompany teacher presentations, and provide a slide show of classroom activities in Science or other subjects (Samsonov, 2014).

However as seen in Table 2, teacher and principal-respondents considered themselves novice in the use of authoring program with the least mean rating of 2.2. Other technological skills that the participants felt they were still novice were on troubleshooting hardware problems, creating a website, and creating web-based learning materials, all rated 2.5 by the group.

On authoring program, this technological skill received the least percentage rating because it is rarely used in the school since the skill is not widely used for related classroom activity of the teacher and student. Such applications tend to target professional educational content creators only and do not cater to end-users with limited computer proficiency (Mueller, Willoughby, and Ross, 2005).

Troubleshooting software was also rare in school. However, many teachers may automatically contact their computer teacher in the school for simple troubleshooting procedures while they encountered computer-problem during classroom lectures and to quickly access into Computer Troubleshooting for Teachers and Students websites (Rosenfield, 2008). Anderson (20012) notes that most schools will never be able to afford enough technical support for all of the problems that arise in one school day.

As to the level of technological skills of the lower 30% performing schools in National Achievement Test (NAT) for the last four (4) school years, the teacher and principal-respondents rated themselves the expert on the use of social media programs like Facebook and Skype with 3.7 means. This was the only item given an expert rating by the principal while teachers also rated themselves as expert and knowledgeable on how to operate computers.

For the knowledge of how to operate a computer, it has a lot of applications in various fields involved to manipulate well the technology for the teachers and students to use in the classroom. Therefore, computer literacy is much needed for teachers as well as learners. The networks have created a revolution in the content of education and the nature of learning process. Teachers should be in terms with the physical reality of the networks, and learn how to take actual advantage of the machines' educational potential.

With this, computer knowledge is essential for teachers. As research revealed, favorable attitude towards computer plays a significant role in making one interested in it. Unless the teachers possess an appropriate expertise towards computer which in turn will affect their knowledge of computer, and also they will find teaching with the help of computer difficult, which in turn will affect students learning in the classroom. Therefore, if the teachers have useful knowledge towards the computer, then there may be a chance for them to be motivated in acquiring knowledge of computer, as it is evident that the knowledge of equipment is very much needed for teachers in many aspects of the classroom (Smith, Tsai, and Rajasekar, 2007).

On the other hand, teacher-respondents also considered their skill in the use of authoring program and troubleshooting hardware problems as a novice with the least mean rating of 2.0.The principal-respondents also rated the lowest expertise on troubleshooting software issues, creating a website, and creating web-based learning materials with 2.1.

Taken as a group, the lower 30% performing schools were the expert on the use of social media programs like Facebook and Skype (3.7) and knowledge of how computers operate (3.6) but the novice regarding the use of authoring program (2.1) and troubleshooting hardware problems (2.2). The over-all mean rating of the teachers and principals of the lower 30% performing schools indicates that they were all proficient in their technological skills with 2.8.

On the Level of Implementation of the Upper and lower 30% Performing Schools in Technology-Assisted Science Instruction

Personal Practices in Integrating Technology in Science Instruction

Table 6 shows the level of implementation of both upper and lower 30% performing schools in their Technology-Assisted Science instruction regarding practices in integrating technology in Science teaching and training programs is presented in this section.

Table 3
Level of Implementation of the Teachers in Technology-Assisted Science Instruction among the upper and the Lower 30% Performing Schools in NAT regarding Personal Practices

Personal Practices in Integrating Technology in Science Instruction	Upper 30%		Lower 30%		Total	
	Mean	VD	Mean	VD	Mean	VD
A) I use computer for lesson planning	2.5	O	2.9	F	2.7	F
B) I use e-mail or network to communicate with other science teachers.	2.4	O	1.9	O	2.2	O
C) I use a computer database to keep an inventory of Science audio-visual materials	1.9	O	2.0	O	2.0	O
D) I use spreadsheet to maintain student achievement/attendance records	2.8	F	2.5	O	2.7	F
E) I demonstrate the use of computer to record data/calculations related to experiments	2.6	F	2.6	F	2.6	F
F) I use my personal computer programs to teach the lesson	3.0	F	2.4	O	2.7	F
G) I use web-based learning materials	2.6	F	2.6	F	2.6	F
H) I use audio/speaker/lapel devices to discuss the lessons in the classroom.	2.3	O	1.8	O	2.1	O
Over-all Mean	2.51	O	2.34	O	2.45	O

The personal practices in integrating technology in Science instruction regarding using technology to myself received the highest mean of 3.0 (frequently) from the teachers from the upper 30% performing schools. In contrast, teachers from the lower 30% rated the item 2.4 often. On the other hand, using the computer for lesson planning received the highest rating of the teachers of the lower 30% performing schools with 2.9, frequently, but rated only often by the other group (2.5). These items both received the mean rating of 2.70 when teachers were considered as a single group.

As to their least rated items, the upper 30% teachers said that they often used the computer database to keep an inventory of Science audio-visual materials with 1.9 while the teachers from the other group gave the same rating to the use of audio/speaker/lapel devices to discuss the lessons in the classroom. The use of computer database to keep an inventory of Science audio-visual materials received the least mean rating of 1.95 when teachers were grouped.

Both groups gave an over-all mean rating of occasionally on their personal practices in integrating technology in Science instruction with 2.47 (upper 30%),2.30 (lower 30%), and 2.38 (grouped mean). The result pointed out that the teachers either from the upper 30% performing schools or otherwise, only personally integrated technology in Science Instruction 40% of the time.

The principals from both groups were also asked to rate their level of implementation in the practice of integrating technology in Science instruction as presented in Table 7.

Table 4
Level of Implementation of the School Principals in Technology-Assisted Science Instruction among the Upper and the Lower 30% Performing Schools in NAT regarding Personal Practices

Personal Practices in Integrating Technology in Science Instruction	Upper 30%		Lower 30%		Total	
	Mean	VD	Mean	VD	Mean	VD
A) computer for lesson planning	2.6	F	2.8	F	2.70	F
B) e-mail or network to communicate with other Science teachers	2.3	O	1.8	O	2.05	O
C) a computer database to keep an inventory of Science audio-visual materials	2.3	O	1.9	O	2.10	O
D) spreadsheet (Excel) to maintain student/achievement attendance records	2.7	F	2.8	F	2.75	F
E) demonstrate use of computer to record data / calculations related to experiments	2.8	F	2.4	O	2.60	F
F) personal computer programs for my own	2.7	F	2.1	O	2.40	O
G) web-based learning materials	2.5	O	2.1	O	2.30	O
H) use audio/speaker/lapel Devices to discuss the lessons in the classroom	2.4	O	2.3	O	2.35	O
Over-all Mean	2.54	F	2.28	O	2.41	O

The principals of the upper 30% rated highest the item on demonstrating the use of computer to record data/carry out calculations related to experiments or problems while those from the lower 30% rated highest the items on the use of computer for lesson planning and use of spreadsheets (Excel) to maintain student achievement/attendance records with 2.8, which is frequently or about 70% of the time.

According to Fulguni (2014), computer in record keeping can be defined as one of the most useful modern means of collecting, updating, controlling, recording, and storing of information for future usage by any resourceful organization. Computers are widely used in the field of Science in education. When used as flexible tools in the hands of students for the collection, analysis, and graphical display of data, can accelerate the rate at which student can acquire data, abstract, and generalize from real experience with natural phenomena. A digital computer is a valuable tool for an inquiry-based option in Science because it has become a universal tool of inquiry in scientific research.

On one hand, the principals of the upper and lower 30% performing schools rated most depressed respectively the items on the use of email or network to communicate with other Science teachers, with 2.3 and 1.8, and the use of a computer database to keep an inventory of Science Equipment, supplies, references, audiovisual materials, with 2.3 and 1.9. The result presented that these things were occasionally practiced by the principals or at most 40% of the time.

Moreover, the principals from the upper 30% frequently integrated technology in Science instruction at least 70% of the time as indicated by their over-all mean rating of 2.55. In comparison, the principals from the lower 30% performing schools practiced integration of technology in Science instruction often or 40% of the time with the mean rating of 2.26. As a group, the principals rated their practices as often with a group mean of 2.41. Compared to their teacher counterparts, it could be seen that both teacher and principal participants from the upper 30% and lower 30% performing schools in the National Achievement Test (NAT) for the last four (4) years practiced personally the integration of technology in Science instruction less than half (40%) of the time.

Technology Integration Practices in Science Instruction

The technology integration practices in Science instruction of the teachers and principals from both the upper and lower 30% performing schools in National Achievement Test (NAT) was presented in Table 4.

Table 4
Level of Implementation of the Teachers and Principals in Technology-Assisted Science Instruction among the Upper and Lower 30% Performing Schools in NAT in terms of Technology Integration Practices

Technology Integration Practices in Science Instruction	Upper 30% Teachers		Lower 30% Teachers		Total		Upper 30% Principals		Lower 30% Princi Pals		Total	
	Mn	VD	Mn	VD	Mn	VD	Mn	VD	Mn	VD	Mn	VD
A) I use computer simulations to demonstrate experiments	1.9	O	1.9	O	1.9	O	2.4	O	1.9	O	2.2	O
B) I use computer-lab interface device(s)to control experiments	1.7	O	2.0	O	1.9	O	2.0	O	1.7	O	1.9	O
C) I use web-based teaching tools like Skype and Edmodo to teach Science	1.6	O	1.5	R	1.6	O	2.1	O	1.7	O	1.9	O
D) I use an interactive PowerPoint to explain concepts	2.4	O	2.5	O	2.5	O	2.6	F	1.9	O	2.3	O
E) I use online activity to improve students.' learning through scientifically-based research	2.1	O	2.3	O	2.2	O	2.2	O	2.0	O	2.1	O
F) I use online activity to my students	2.0	O	2.1	O	2.1	O	2.0	O	2.0	O	2.0	O
G) I use online research databases through school library / media center	1.7	O	1.6	O	1.7	O	2.1	O	1.7	O	1.9	O
Over-all Mean	1.9	O	2.0	O	2.0	O	2.2	O	1.8	O	2.0	O

Data in Table 4 shows almost similar rating on the technology integration practices of the teachers. All items were often practiced by the teachers from the upper and lower 30% performing schools except for one (1), the use of web-based teaching tools like Skype and

Edmodo to teach Science, which is rarely rated (1.5) by the teachers from the lower 30% performing schools. This item also received the least mean rating from the upper 30% with 1.6. The teachers rated highest the use of an interactive PowerPoint to explain concepts with 2.4 (upper 30%) and 2.5 (lower 30%).

As technology integrates into the classroom, the use of interactive PowerPoint to explain Science concepts of the lesson had always innovations being brought into the fold that can help teachers to get their points across better, and help students learn more efficiently. One such tool that has been utilized in the classroom now and continues to be used heavily is the Microsoft PowerPoint program. This technology enables teachers and students alike to prepare presentations to enhance learning in the classroom. When used effectively, PowerPoint can enhance teacher presentations and the overall comprehension of students to learn. It allows teachers to present their lessons in a more dynamic way than simply lecturing and writing on the board. It provides the ability to equip the presentations with different types of media-including images, sounds, animations, and much more. This enhances the students' abilities to retain what they are being taught, especially those who are visual learners. Teachers can focus on the class and interact with the students instead of writing on board because the text and the entire presentation are already there in the form of a PowerPoint file (Rowcliffe, 2016).

As presented in the table, the use of web-based teaching tools in the school like Skype and Edmodo to teach Science in the classroom had the least percentage due to unavailable Internet connect especially to far school areas. This problem was always experienced by the respondents. Aside from it, Internet connection is expensive for them to connect continuously into Skype or Edmodo in the school.

Moreover, the majority of the upper and lower 30% respondents were rated highest to the use of an interactive PowerPoint to explain concepts when it comes to technology integration practices in Science instruction while the use of web-based teaching tools like Skype and Edmodo to teach Science got the least percentage as rated by the respondents.

From the table, school principals of the lower 30% performing schools all ranked their practices of technology integration as often, almost the same as their counterparts from the upper 30% performing schools except the item on the use of interactive PowerPoint to explain concepts (2.6, frequently). Principals from the upper 30% gave their highest rating to an item on the use of interactive PowerPoint to explain concepts while those principals from the lower 30% rated highest the item on the use of audio/speaker/lapel devices to discuss the lessons in the classroom with 2.2.

On the other hand, there were three items rated 1.7 by the lower 30% principals which are the least. These are on the use of computer-laboratory interface device(s) to control experiments, use of web-based teaching tools like Skype and Edmodo to teach Science, and the use of online research databases through school library/media center. For the principals in the upper 30%, there were two items rated the least with 2.0 which includes the use of web-based teaching tools like Skype and Edmodo to teach Science and the use of online activity to students.

The over-all mean ratings of the school principals in the upper 30% (2.21) and the lower 30% (1.89) again indicates that the principals from either group only implement the technology integration practices in Science instruction at most 40% of the time.

On Training Programs

Tables 5 and ten present the level of implementation of the upper 30% and lower 30% performing schools in the National Achievement Test (NAT) regarding the training program as experienced by their teachers and principals.

Table 5
Level of Implementation of the Teachers in Technology-Assisted Science Instruction among the Upper and the Lower 30% Performing Schools in NAT is to Training Programs

Training Programs	Upper 30%		Lower 30%		Total	
	Mean	VD	Mean	VD	Mean	VD
A) School provides training for Teachers	1.9	O	2.4	O	2.15	O
B) School provides training only to teachers on technology use in Science Education	2.1	O	2.1	O	2.10	O
C) School provides video presentation about media technology	1.8	O	2.3	O	2.05	O
D) School provides training on the effective use of media technology	1.9	O	2.1	O	2.00	O
E) School mandates the integration of technology for Science instruction	2.1	O	2.9	F	2.50	O
F) The school prescribes the use of Internet sources in curriculum or lesson planning evaluation	2.0	O	2.6	F	2.30	O
regarding Mean	1.97	O	2.40	O	2.18	O

For the teachers, those coming from the upper 30% rated all indicators with an often implementation ratings with items on the school provides training only to teachers on technology use in Science education and school mandates the integration of technology for Science instruction with 2.1. Item on the school provides video presentation about media technology rated lowest with 1.8. The over-all mean rating of 1.97 from the teachers of the upper 30% performing schools in the National Achievement Test (NAT) indicated that the schools implemented training programs only 40% of the time.

On the other hand, their teacher counterparts from the lower 30% rated highest the mandate of the school in the integration of technology for science instruction (2.9) and the school prescribes the use of Internet sources in curriculum or lesson planning evaluation (2.6), both verbally described as frequently. They often rated on the school provided training only to teachers on technology use in Science Education and the school provided pieces of training on the effective use of technology devices, both with 2.1 and verbal description of often. The teachers from the lower 30% performing schools' over-all mean rating of 2.40 on the level of implementation of the training programs of the school in the integration of technology in Science instruction was only 40% of the times. This was also the opinion of the teachers from the other group.

INTERNATIONAL REVIEW OF HUMANITIES AND SCIENTIFIC RESEARCH
By International Scientific Indexing
ISSN (Online) : 2519-5336

Teachers from both the upper 30% and lower 30% performing schools gave an over-all mean rating of 2.18 to training programs. This means that teachers were given training by their schools related to technology integration to Science instruction only often or 40% of the times.

As to the principals of the upper 30% performing schools, their ratings on the level of implementation of the training programs on Technology-Assisted Science instruction were all described as frequently. The item on the mandate of the school to integrate technology into Science Instruction received the highest rating (3.2) while the school provides training on the effective use of technology had the least rating (2.6). The over-all mean score of 2.88 indicated that the principals of the upper 30% performing schools in National Achievement Test (NAT) had training programs 70% of the times which was quite the contrary of what their teachers were saying (1.97, often).

Table 6
Level of Implementation of the Schools Principals in Technology-Assisted Science Instruction among the Upper and the Lower 30% Performing Schools in NAT in terms of Training Programs

Training Programs	Upper 30%		Lower 30%		Total	
	Mean	VD	Mean	VD	Mean	VD
A) School provides training for Teachers	2.9	F	2.3	O	2.60	F
B) School provides training only to teachers on technology use in Science training	2.7	F	2.4	O	2.55	F
C) School provides video presentation about media technology	2.8	F	2.4	O	2.60	F
D) School provides trainings on the effective use of media technology	2.6	F	2.4	O	2.50	O
E) School mandates the integration of technology for Science instruction	3.2	F	2.6	F	2.90	F
F) The school prescribes the use of Internet sources in curriculum or lesson planning evaluation	3.1	F	2.7	F	2.90	F
Over-all Mean	2.88	F	2.47	O	2.68	F

For the principals in the lower 30% performing schools, they gave the highest mean rating of 2.7 on the item "school prescribes the use of internet sources in curriculum or lesson planning evaluation (frequently)" and the least rating of 2.3 on the item "the school provides training for teachers (often)". The over-all mean rating of 2.47 pointed out that the principals of the schools in the lower 30% felt that the implementation of the training programs on technology-assisted Science instruction was only often or 40% of the time. While this result was in agreement with the responses of the teachers in the lower 30% performing schools, this was quite different from the results on the level of implementation of training programs as perceived by the principals in the upper 30%.

Shelton and Jones (2006) suggest that teachers need considerable training and development time outside the school day so they can concentrate on instruction and training objectives without having to deal with the regular school day demands. The need to allot time for continual learning is echoed in studies outside of education suggesting that to provide workers with high technology on the job ultimately fails if employees do not receive adequate training and continuing support (Moursund, 2012).

Furthermore, this need for continuing support means teacher training must be ongoing and not limited to one-shot sessions. It must have an instructional focus that guides teachers to think first about their curriculum and then helps them address how to integrate technology into the curriculum (Guhlin, 2006; Persky, 2008).

Significant Relationship between the Level of Implementation of Schools in Technology-Assisted Science Instruction and Schools' Performance in Science National Achievement Test (NAT)

The result of the test of significant relationship between the level of implementation of schools in Technology-Assisted Science instruction in terms of personal practices in integrating technology in science instruction, technology integration practices, and training programs, and the schools' performance in Science National Achievement Test (NAT) among the upper 30% performing schools are presented in Table 7.

Table 7
Test of Significant Relationship between the Level of Implementation of Technology-Assisted Science Instruction and Schools' Performance in Science NAT among the upper 30% Performing Schools

LEVEL OF IMPLEMENTATION	NAT Performance		Decision on Ho	Conclusion
	R-value	P-value		
Personal Practices	0.33	0.04	Reject	Significant
Technology Integration Practices	0.45	0.03	Reject	Significant
Training Programs	0.32	0.05	Reject	Significant

As indicated by their P-values all less than 0.05, data on the Table 7 shows the significant relationship of the teachers' personal practices in integrating technology in Science instruction (0.042), technology integration practices (0.032) and school's training programs to the National Achievement Test (NAT) performance of the upper 30performing schools in Science. This result suggests that the National Achievement Test (NAT) performance in Science of the school is correlated to its level of implementation of the Technology-Assisted Science instruction.

The relationship of the National Achievement Test (NAT) performance to the level of implementation is all active as evidenced by their correlation coefficients (R-value). Thus, National Achievement Test (NAT) performance in Science among the upper 30% performing schools varied directly with the teachers' practices in integrating technology in Science instruction and the school's training programs given to their teachers. Greater implementation results to higher National Achievement Test (NAT) performance.

According to Baniola (2010) on Parents' Involvement in Children's Academic Performance, the participation in children's organization, a program of activities, evaluation of activities, and school curricula are positively related to children's academic performance. She further concluded that establishing a closer home-school partnership is necessary for the effective and successful performance of the students.

In another study made by Blancia (2010) on the Factors Affecting Academic Achievement of Student, she found out that the academic performance of students is significantly influenced by the following factors: teaching competence, the attitude of teacher work and students, attitude towards studies of their children, and attitudes towards their education.

Furthermore, research exists that on utilizing technology as a school reform model, and on teachers' perceptions of the development of change strategies resulting from the use of technology. Knowledge of elementary teachers of the effectiveness of technology serves as the catalyst for constructivist practices in the classroom. As school leaders and teachers make decisions about the use of technology in schools, and because educational technology continues to evolve so quickly, it is imperative that teachers' perceptions of technology be examined and monitored over time to determine the efficacy of those decisions. This study comprises 33 elementary teachers in schools in one county in Florida. These teachers completed a survey designed to assess individual attitudes, confidence, and expertise in a One-to-One classroom. From the survey, seven teachers participated in two focus groups separating beginners and experts. The focus group teachers were interviewed to gather information regarding their perceptions of technology as a catalyst for changing pedagogy and implementing constructivist practices (Huffman, 2012).

Significant Relationship between the Level of Implementation of Schools in Technology-Assisted Science Instruction and Schools' Performance in Science National Test (NAT) among the Lower 30% School-Respondents

The test of the significant relationship between the level of implementation of Technology-Assisted Science Instruction and schools' performance in Science National Achievement Test (NAT) among the lower 30% performing schools in Butuan City Division is shown in Table 8.

Table 8
Test of Significant Relationship between the Level of Implementation of Technology-Assisted Science Instruction and Schools' Performance in Science NAT among the Lower 30% Performing Schools

Level of Implementation	NAT Performance		Decision on Ho	Conclusion
	R-value	P-value		
Personal Practices	0.32	0.05	Reject	Significant
Technology Integration Practices	0.42	0.04	Reject	Significant
Training Programs	0.32	0.04	Reject	Significant

Data in Table 16 for the lower 30% performing schools in National Achievement Test (NAT) shows similar results with the upper 30% performing schools. The P-values are all less than 0.05 which warrants the rejection of the null hypothesis at the 0.05 level of significance. This implies that the National Achievement Test (NAT) performance in Science of the school-respondents is correlated to its level of implementation of the Technology-Assisted Science instruction.

This shows that the lower 30% schools' performance in the National Achievement Test (NAT) should ensure proper implementation and enhancement of their teachers' personal practices of integrating technology in Science instruction and their technology integration practices and provide the teachers with proper training programs for a better performance in the National Achievement Test (NAT) results.

Meanwhile, as revealed in the table, the level of implementation among the lower 30% respondents warrant to reject the null hypothesis even though the p-value is low for the reason that the statistical evidence to support rejecting the null hypothesis is alternatively true, and there is about 5% chance correctly rejects the null hypothesis. As to the p-values, it is calculated based on the assumptions that the null is false for the population since the difference in the sample is caused entirely by random chance. Consequently, p-values could tell the probability to reject the null hypothesis because it is 100% true from the perspective of the calculations.

As President Obama highlighted in his announcement in the White House's ConnectED initiative (2012), technology can make a substantial impact on student achievement. The initiative, therefore, aims to make the best technology accessible to students across the country, no matter their background.

On one hand, according to Pew Research (2011), only 50 percent of the teachers working in the lowest income areas consider their schools to be doing an excellent job providing resources and supporting teachers' need to utilize digital tools in the classroom. Moreover, in a new nationwide survey of K+12 teachers conducted by Digest (Tullman, 2011), 75 percent of teachers reported adequate assistance from the school when using technology in the classroom.

Moreover, the levels of technological support correlate to teacher confidence in the benefits of educational technology. Or so, a survey by CDW-Government, Inc. found. In fact, 76 percent of surveyed K+12 teachers responded that training is the key to increased technology use.

CONCLUSION

Based on the findings of the study, it was concluded that the use and integration of technology equipment in Science classroom instruction significantly impact students' performance on their National Achievement Test (NAT) result.

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