

Information and Communication Technology (ICT) Utilization of Science Teachers in Taysan National High School

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Abstract:- This study aimed to identify the ICT tools utilized by teachers and their attitude towards using various ICT applications in Science teaching at Taysan National High School. Based on the assessment of the 11 Teachers on their IPCRF, one of the development needs to be prioritized the use of a range of teaching strategies that enhance learner achievement in literacy and numeracy skills. Using the mixed method of research, researcher-made questionnaire and interview as data gathering instruments were used. The study results revealed that the ICT tools used by the respondents were LED TVs, flash drives, and printers while the ICT applications were PowerPoint presentations, Youtube, and Microsoft Word. The respondents agreed on using various ICT applications with a composite mean of 3.98, which indicates a pleasant and favorable attitude towards using ICT applications in teaching Science. Based on the interviews, the respondents voiced a positive attitude towards using ICT tools they do not employ, such as ZipGrade, Quipper, Powtoon, and Google applications. The output of this study is the proposed plan of action to motivate teachers in using ICT-assisted teaching strategies that enhance learners' achievement.

Keyword: *Information and Communication Technology (ICT) Tools*

I. CONTEXT AND RATIONALE

In this digital era, literacy in Information and Communication Technology (ICT) is fundamental to life in our modern technological society. ICT in teaching science education in schools cannot be over-emphasized considering its effective teaching and learning promises. ICT is a resource that is widely used by many science teachers worldwide. Resources used by teachers as classroom instruction are one of the significant factors that influence students' achievements.

The foregoing challenge to the current teaching-learning situation in Science could have geared and directed the schools to upgrade teachers' competencies and the schools' technological resources to improve the students' performance, skills, and competencies in the subject.

From the foregoing situation, teachers can use a range of teaching tools such as discussion boards, forums, email, raps, web guests, video and digital photography, e-movies, and even mobile phones as tools for the delivery of classroom programs. This opens the reciprocal dialogue between members of the class community and may be extended to the school community at large through activities such as blogs and wikis.

To equip students to be literate lifelong learners and global citizens of the first 21st century, teachers must successfully integrate ICT using various ICT applications into the Science curriculum and Science pedagogical practices. Teachers' ICT is a professional resource, classroom delivery model, and a source of excellent and valuable text types.

This study aims to identify the ICT tools utilized by teachers in teaching Science and the attitude of teachers on using various applications in Science teaching with ICT integration. The researcher was prompted to conduct this study to propose a plan of action to motivate teachers in using various tools on ICT integration/utilization.

➤ *Innovation, Intervention, and Strategy:*

Through interviews, the researcher has identified the ICT tools utilized by Science Teachers and determine the attitude of teachers on using various applications in Science teaching with ICT integration. The researcher created an action plan to motivate teachers in using various tools on ICT integration/utilization.

➤ *Action Research Questions:*

Specifically, this study sought to answer the following questions.

- What are the ICT tools utilized by teachers in teaching Science?
- What is the attitude of teachers on using a various applications in Science teaching with ICT integration?
- Based on the findings, what plan of action may be proposed to motivate teachers to use various ICT tools?

II. ACTION RESEARCH METHODS

➤ *Participants and Other Sources of Data Information:*

The respondents of the study were 11 Science teachers. No sampling method was used in the study since all Science teachers are the subjects of the study.

➤ *Data Gathering Methods:*

The mixed method of research was employed in this study to identify the ICT tools utilized by Science Teachers and determine the attitude of teachers on using a various applications in Science teaching with ICT integration. The descriptive method was used through the researcher-made questionnaire.

A qualitative research design was employed in this study. Individual Interviews will be recorded in audio and video. Each interview lasted for approximately 30 minutes. The participants were informed of the schedule of the interview. After the interviews, the records were transcribed into writing without any alteration in the meaning of opinions and thoughts and evaluated.

In this study, ethical principles were considered during the data collection process. Ethical guidelines were followed to ensure that all the participants of the study were treated with respect and consideration. Before proceeding with data collection and analysis, permission to conduct the interviews will seek approval from the School Head.

They were oriented that the participation is voluntary and has the right to withdraw from the study at any time. The confidentiality and anonymity of the participants make certain effort, including the removal of names and descriptions that might reveal the identity of an individual and by using numeric labels when quoting the participants' statements. After completing the interviews, participants were allowed to review their responses and make any changes to their statements.

➤ *Data Analysis Plan:*

To answer the problem posed in the study, a weighted mean was used. After the retrieval of the questionnaires, the data were collated and tabulated. The following scales were utilized in the analysis and interpretation of the data.

Table 1 Data Analysis Plan

Option	Scale/Range	Verbal Interpretation
5	4.5 - 5.00	Strongly Agree
4	3.5 – 4.49	Agree
3	2.5 – 3.49	Moderately Agree
2	1.5 – 2.49	Disagree
1	1.0 – 1.49	Strongly Disagree

Interviews were recorded and transcribed into writing. Responses to these transcriptions were classified based on similar or different meanings, and exemplary quotations were directly reported without changing the meaning.

III. DISCUSSION OF RESULTS AND REFLECTION

Table 2 ICT Tools (Hardware) Utilized by Teachers in Teaching Science

HARDWARE	Frequency
LEDs TV	11
Flash Drive	9
Printer	8
Laptop	7
Calculator	5
Large prints	4
Multimedia Projector	4
Desktop	3
Microphones/Lapel	3
Speaker	3
DVDs and CDS	2

The above table manifests the ICT tools in terms of hardware utilized by teachers in teaching Science, which is as follows: LEDs TV, flash drive, printer, laptop, calculator, large prints, multimedia projector, desktop, microphones/lapel, speaker, DVDs, and CDS.

Based on the interview, the most common hardware used by the key informants in teaching Science are as follows: LED TVs, laptops, USB Flash drive, Printer, LED TVs, Large prints, Calculator, and Speaker.

The findings of the study of Ali (2015) gleaned that secondary teachers have a keen desire for the use of ICT and its integration within the classroom environment. The study concluded that stakeholders in education should facilitate

the secondary teachers in the use of ICT and must have to support the secondary school teachers through ICT training. The study may recommend that the ministry of education has the vision to provide funds for the department of

education to develop and promote ICT at the secondary level.

Table 3 ICT Tools (Software) Utilized by Teachers in Teaching Science

SOFTWARE	Frequency
Microsoft Powerpoint Presentation	11
YouTube	11
Microsoft Word	10
Media Player	8
Messenger	7
Facebook	6
Microsoft Publisher	6
Bluetooth	5
Email	5
Merriam-Webster Dictionary	5
Microsoft Excel	5
PDF	5
Slideshare	5
Web searching	4
Movie Maker	3
Shareit	3
Boardworks powerpoint	2
Google Drive	2
LRMDS Learning Portal	2
Powtoon	2
Digital video	1
Google Docs	1
Google Slides	1
PhET simulation	1

The above table details the ICT tools in terms of software utilized by teachers in teaching Science which is as follows: The Microsoft Powerpoint Presentation, YouTube, Microsoft Word, Media Player, Messenger, Facebook, Microsoft Publisher, Bluetooth, Email, Merriam-Webster Dictionary, Microsoft Excel, PDF, Slideshare, Web searching, Movie Maker, Shareit, Boardworks PowerPoint, Google Drive, LRMDS Learning Portal, Powtoon, Digital video, Google Docs, Google Slides, and PhET simulation.

The findings of Mulenga and Prieto (2018) indicated that Internet, word processing, Presentation software, and educational CDs are used by the teachers at least once in the teaching and learning of mathematics in a week, while other ICT components are rarely integrated with the teaching and learning in a week.

The results of the study Ventayen, Caren and Ventayen, Randy Joy (2017) showed that social media provides learning, but there are some disadvantages that users need to be aware of. It is highly recommended that teachers blend social media with other free learning management systems.

Based on the interview, the most commonly ICT Tools (software applications) used by the key informants in teaching Science are as follows: Microsoft Powerpoint

Presentation, Youtube, Microsoft Word, Microsoft Publisher, Slideshare, VLC Media Player, Windows Media Player, Microsoft Excel, Web Searching, Microsoft Excel, PDF, Powtoon, Google Classroom, Team Viewer, Powtoon, Prezi and Shareit.

Among the ICT tools that the key informants want to use in teaching Science are as follows: Microsoft Powerpoint Presentation, Youtube, Google Classroom, Audio Recorder, Media Player, PhET Simulation, Boardwork Powerpoint, Movie Maker and Quipper.

The study of Castro Sánchez and Alemán (2011) showed that students are now more frequently engaged in the meaningful use of computers. They build new knowledge through accessing, selecting, organizing, and interpreting information and data. Based on learning through ICT, students are more capable of using information and data from various sources and critically assessing the quality of the learning materials.

Table 4 The Attitude of Teachers on Using the Various Application in Science Teaching with ICT Integration

Indicator		WM	I
1.	I can use Microsoft Office programs such as Microsoft Word, Excel in developing the scheme of work and daily lesson log.	5.00	SA
2.	I can search for files on a computer system and organize them into folders.	5.00	SA
3.	I can access and share information on CD/DVD/USB flash drive.	4.82	SA
4.	I can create a basic presentation package using Microsoft Powerpoint Presentation and print to various networked printers.	4.55	SA
5.	I can use my DepEd Email account to download teaching materials using various ICT applications such as presentations in PDF, Powerpoint Presentation, Prezi, youtube, slideshare, boarworks PowerPoint, and PhET simulation.	4.45	SA
6.	I can set up and use Smart TVs, LEDs, LCD TVs, LCD Projector, or Multimedia Projector for classroom delivery.	4.36	A
7.	I can use my Facebook, Messenger, Edmodo, Instagram, and Twitter to ask for and send assignments and projects to my students if possible.	4.09	A
8.	I can use Windows Media Player (WMP) and VLC Media Player to play, store and organize digital audio, images, and video.	4.09	A
9.	I can use a Learning Resources Management and Development System (LRMDS) to browse and download published learning resources.	4.00	A
10.	I can collaborate with my co-teachers using Google applications such as Google Docs, Google Slides, Google Sheets, and Google Drive for coaching and mentoring purposes.	3.73	A
11.	I can use TeamViewer to remotely access and control the Smart TVs, LEDs, and LCD TVs.	3.73	A
12.	I can use Quipper to streamline teaching methods and class management and enables students to learn in a fun and effective way.	3.36	MA
13.	I can use and allow my students to use Powtoon and Movie Maker to build animated videos, presentations, and personalized movies quickly.	3.00	MA
14.	I can use a mobile phone to access ZipGrade to capture an image of the student's paper, grade multiple choice papers and analyze the results.	2.91	MA
15.	I can access Google Classroom to facilitate paperless communication between teachers and students and streamline educational workflow.	2.64	MA
Composite Mean		3.98	A

Legend: WM = Weighted Mean; I = Interpretation; SA = Strongly Agree; A = Agree; MA = Moderately Agree

In two of the listed indicators, the teachers posted the same weighted mean of 5.00 each and interpreted it as "strongly agree." These include using Microsoft Office programs such as Microsoft Word, Excel in developing the scheme of work and daily lesson log, searching for files on the computer system, and organizing them into folders.

The remaining indicators with "strongly agree" responses are as follow: can access and share information on CD/DVD/USB flash drive with a weighted mean of 4.82; creating a basic presentation package using Microsoft Powerpoint Presentation and print to various networked printers obtained a weighted mean of 4.55, and using DepEd Email account to download teaching materials through different ICT application such as presentations in PDF, Powerpoint Presentation, Prezi, youtube, slideshare, boarworks PowerPoint, and PhET simulation with a weighted mean of 4.45.

Can set up and use Smart TVs, LEDs, LCD TVs, LCD Projector, or Multimedia Projector for classroom delivery posted a weighted mean of 4.55, interpreted as "agree." Another set of two indicators obtained an equal-weighted mean of 4.09 each, correspondingly "agree." These include the following: using Facebook, Messenger, Edmodo, Instagram, and Twitter to ask for and send assignments and projects to their students if possible, and using Windows

Media Player (WMP) and VLC Media Player to play, store and organize digital audio, images, and video.

The remaining indicators with "agree" responses are as follow: using a Learning Resources Management and Development System (LRMDS) to browse and download published learning resources with a weighted mean of 4.00; collaboration with colleagues using Google applications such as Google Docs, Google Slides, Google Sheets and Google Drive for coaching and mentoring purposes and using TeamViewer to remotely access and control the Smart TVs, LEDs and LCD TVs with an equal-weighted mean of 3.73.

On the other hand, the respondents posted "moderately agree" responses on the following items: using Quipper is to streamline teaching methods and class management, and allows students to learn in a fun and effective way posted a weighted mean of 3.36; using and allowing students to use Powtoon and Movie Maker to quickly build an animated video, presentations and personalized movie with a weighted mean of 3.00; using a mobile phone to access ZipGrade to capture an image of the student's paper, grade multiple choice papers and analyze the results; and accessing Google Classroom to facilitate paperless communication between teachers and students and streamline educational workflow with a weighted mean of 2.64.

Overall, the composite mean of 3.98 falls within the "agree" scale, which indicates the pleasant and favorable attitude of the Science teachers toward using the various application in Science teaching with ICT integration.

The findings of Tezci (2010) affirmed that the most commonly used and well-known ICT types among teachers are the Internet, e-mail, and word processing, and teachers' attitudes towards computers and the Internet are generally positive. It was also found that their attitudes vary with their years of experience and levels of knowledge.

The study of Aydın and Semerci (2018) illustrated that teachers have a high level of positive attitude towards ICT use in their classes. Yet, there is no significant difference between teachers' ICT willingness by their gender, age, teaching experience, ICT experience, ICT skills and ICT training. However, they have a significantly different negative attitude (ICT anxiety) towards ICT use in education by their ICT experience, ICT skills, and ICT training.

➤ *Eleven Interviews Complemented the Quantitative Information:*

Based on the interviews, the attitude of teachers towards creating a basic presentation package using Microsoft Powerpoint Presentation and print to various networked printers was performed mainly by the key informants.

- According to Key informant 4, *"I always used Microsoft Word to do my daily lesson log and prepare rubrics for evaluation while Microsoft Excel was used for my E-Class Record."*
- Key informant 8 *"I used this ICT integration because on every slide. I can be able to show the meaning and the topic. And with that, I can express and elaborate the explanation about the topic."*
- Key informant 11 *"I commonly used in the delivery of the lesson."*
- Key informant 1 *"Using PowerPoint presentation makes my teaching life easier, and I observed that students whom I presented it caught the interest of them. It's makes teaching-learning more interactive."*
- Key informant 2 *"I am fond of making PowerPoint presentations because it is easy to integrate and deliver the lesson for me. It makes my teaching-learning more interactive."*
- Key informant 3 *"It gives me an access to familiarize tool, to present slides, meanings of a different topic."*
- Key informant 7 *"The use of Television and PowerPoint presentation in the discussion. I use the windows media player and VLC media player to play, store and organize digital audio, images, and video."*

The key informant also used Microsoft Office programs such as Microsoft Word and Excel to develop the work and daily lesson log.

- According to Key informant 5, *"I can use Microsoft Office Programs such Microsoft Word, Excel in developing my daily lesson log, making worksheet, creating and editing professional-looking documents."*
- Key informant 4 *"I always used Microsoft Word in doing my daily lesson log and preparing rubrics for evaluation while Microsoft Excel was used for my E-Class Record."*

The attitude towards using Smart TVs, LEDs, LCD TVs, or Multimedia Projector for classroom delivery is positive. According to Key informant 9, *"the use of laptop though connecting LED TV has a great impact in delivering the lesson."* She added that pictures and video clips are expected to be part of the presentation or delivery of the lesson on every topic. *It can be done using Microsoft Powerpoint Presentation."*

Based on the interviews, the attitude of teachers that the key informants they do not manifest are as follows: using mobile phone to access ZipGrade to capture an image of the student's paper, grade multiple choice papers and analyze the results; can access Google Classroom to facilitate paperless communication between teachers and students and streamline educational workflow; using Quipper to streamline teaching methods and class management, and enables students to learn in a fun and effective way; using and allowing students to use Powtoon and Movie Maker to quickly build an animated videos, presentations and personalized movie; collaboration with colleagues using Google applications such as Google Docs, Google Slides, Google Sheets and Google Drive for coaching and mentoring purposes; using DepEd email account to download teaching materials using various ICT application such as presentations in PDF, Powerpoint Presentation, Prezi, youtube, slideshare, boardworks PowerPoint, and PhET simulation; and using TeamViewer to remotely access and control the Smart TVs, LEDs and LCD TVs.

- According to key informant 1, *"The barriers to the use of Zip grade is lack of knowledge in using it"* while Key informant 8, *"Honestly, I don't know how to use ZipGrade."* Key informant 10, *"I cannot download the app because of the low memory/storage of my cellular phone."*
- According to key informants 1 and 6, *"The barriers on the use of Google Classroom and Quipper having no available internet connection in two computer laboratories"*; Key informant 7, *"When there is power interruption where I'm not able to use computer laboratory"*; Key informant 8, *"Honestly, I don't know how to use quipper."*
- Key informant 4, *"Due to poor internet connection, collaboration with colleagues using Google applications may lessen for coaching and mentoring purposes."*

Based on Asomba (2015) findings, internet availability is the primary factor affecting students' use of Google Apps for Education, followed by the teacher's learning

environment, followed by the students themselves. A minor factor was gender differences. Internet should be available in the institution for students' access, and that should be a priority. The learning environment should be organized to favor the use of technological devices, teachers must be trained and encouraged to adapt this teaching styles using Google Apps for Education, and students should get orientation on using the tool.

- Key informants 4, *"I was amazed at how to used Quipper, and I want to apply it to offers a fun way of online learning and makes students learn in different ways."*
- The study of Guillen (2018) revealed that Quipper School enhances the reading comprehension competencies of the students.
- Key informant 3, *"The barrier to using Powtoon and Movie Maker is lack of knowledge on using it and how to download the software applications."*
- Key informant 10, *"the barriers in Prezi are not familiar with me. It takes a more of time to prepare a PowerPoint presentation using it. That's why I'd rather download a PowerPoint presentation, slideshare, and video clip presentation concerning the topic."*
- Key Informants 11, *"I don't know how to download and used TeamViewer."*

IV. CONCLUSIONS

- The ICT tools utilized by teachers in teaching Science in terms of hardware are as follows: LED TV's, Laptop, USB Flash drive, Printer, LED TVs, Large prints, Calculator and Speaker while the software are as follows: The Microsoft Powerpoint Presentation, YouTube, Microsoft Word, Media Player, Messenger, Facebook, Microsoft Publisher, Bluetooth, Email, Merriam-Webster Dictionary, Microsoft Excel, PDF, Slideshare, Web searching, Movie Maker, Shareit, Boardworks PowerPoint, Google Drive, LRMDS Learning Portal, Powtoon, Digital video, Google Docs, Google Slides, and PhET simulation.
- The Science teachers agree on using the various application in Science teaching with ICT integration. They have a positive attitude to learn that ICT tools they do not manifest which are as follows: using a mobile phone to access ZipGrade, access Google, using Quipper, using and allowing students to use Powtoon and Movie Maker, collaboration with colleagues using Google applications, using DepEd email account to download teaching materials using various ICT application, and using TeamViewer.
- The final output of this study is a proposed plan of action to motivate teachers to use various tools on ICT in teaching Science.

RECOMMENDATIONS

- The teachers should maintain their positive attitude towards using various applications in Science teaching with ICT integration.
- Science Teachers need to be trained on the effective use of ICTs in Science.
- The technological infrastructure of schools should be improved.
- The school heads are expected to strengthen the relationship with stakeholders to quickly secure assistance in procuring internet facilities deemed essential in improving the teachers' delivery of instruction.
- Future researchers may use this manuscript for reference when they conduct their studies that may be similar or related to this current study.

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➤ *Action Plan:*

Table 5 Proposed Plan of Action to Motivate Teachers in using Various Tools on ICT

Concerns	Objectives	Strategies/ Activities	Person/s Involved	Success Indicator
Teacher's Attitude towards ICT application	To enhance teachers' positive attitude towards various ICT applications in Teaching Science.	<ul style="list-style-type: none"> Attending seminars related to the ICT-based approach <ul style="list-style-type: none"> Institutions Divisions Regional National International Echo training in school 	School Principal Teachers Sponsoring Institutions/ Agencies Expert/resource person	Teachers' positive attitude towards ICT Integration was enhanced.
Provision of 10 Mbps internet connection in two computer laboratories	To strengthen well-maintained internet facilities	<ul style="list-style-type: none"> Request the 10 Mbps internet connection in two computer laboratories Solicit donations from stakeholders to maintain internet facilities 	School Head Head Teachers Financial Staff	Well-maintained internet facilities were strengthened.
Conduct LAC Session towards ICT tools such as Teamviewer, Zipgrade, Google Classroom, Quipper, Powtoon, Movie Maker, and Google applications	To develop teachers' knowledge, skills, and values in using ICT tools	<ul style="list-style-type: none"> Coordinate the School ICT Coordinator to facilitate seminars and training in using Teamviewer, download Zipgrade, creating Google Classroom, can access various Google applications, using Quipper, creating video through Powtoon and Movie Maker Invites expert/resource person for teachers training 	School Principal Science Coordinator, Science Teachers	Teachers' knowledge, skills, and values in using various ICT tools were developed.
Coaching and Mentoring towards the use of ICT Tools such as google applications	To improve teachers' competencies in using various ICT Tools	<ul style="list-style-type: none"> Conduct one on one teaching and peer teaching towards the use of various ICT tools Encourage Science teachers to conduct collegial discussions by Grade Level about using various ICT tools in teaching Science. School head conduct conference with Science teachers on the use of various ICT tools 	School Principal Science Coordinator Science Teachers	Teachers' competencies in using various ICT Tools were improved.