

Teachers' ICT skills and application of ICT in the middle and higher secondary schools in Bhutan

Yeshi Nidup*

Phuentsholing Higher Secondary School, Ministry of Education, Bhutan; nidupy1982@gmail.com,

**correspondance author*

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Abstract

This study explored teachers' ICT skills and application of ICT in education in eight middle and higher secondary schools in Bhutan. A quantitative method was applied and convenience sampling was used to collect data from 37 teachers from eight middle and higher secondary schools through survey questionnaires developed using a five-point Likert scale. The first set of questionnaires asked about teachers' ICT skills and knowledge, and the second set asked about the application of ICT in education. The data was analyzed using an excel data analysis tool package in simple descriptive form interpreted in percent, means, and standard deviation. The findings showed that teachers possess basic ICT skills and knowledge which are necessary for them. It was found that teachers are using ICT in their daily teaching and learning but only for basic purposes since many lack ICT skills at the advanced level. There were only a few teachers who used ICT for a variety of purposes at the advanced levels to enhance teaching and learning. They were some teachers who have never or rarely used ICT in teaching. This is something that led the researchers to deeply ponder and opened a room to plan for another research to find out why they have never or rarely used ICT in teaching.

Keywords: Information and Communication Technology, Learning, ICT skills, communication, applications

INTRODUCTION

Information and Communication Technology (ICT) is defined as information process and handling such as text, images, graphics, instructions, computers, Internet, projectors (Azoji, 2007 as cited in Ngangwu, Obi & Ogwu, 2014). ICT is also defined as a diverse set of technological tools and resources which is used to communicate, and to create, disseminate, store, and manage information (Gunton, 1993, & Victoria, 2020 as cited in Kennah, 2016). The use of ICT such as computers and the Internet has become important for the students and teachers as it helps to get the information, explore various topics and contents, students can collaborate with peers on projects and assignments using the internet

(Veselinovska & Kirova, 2016). Information and Communication Technology (ICT) has transformed the world ever since its inception. It has changed the business, office work, mode of communication, and our daily lives. ICT has enhanced access to information despite time and location. Communication has become fast and easy; information can be shared within a fraction of seconds to any part of the world. Technologies are rapidly evolving and it continues to influence the world at larger scale both positively and negatively. ICT has revolutionized the world and created wide opportunities for e-business, e-commerce, telemedicine, and e-learning (Jurmi, 2004).

Similarly, ICT has significant influence in education. It has increased the access to education, distance education has emerged as new trend in education, has given platform to those children who are forced to stay at home due to physical disability to continue education from home, increased opportunities for children in remote schools to continue education online at par with the urban schools. The use of ICT has changed the traditional classroom from chalk and chalkboard to the use of smart interactive boards, white boards with markers and projectors for presentation. There are software, apps and various simulators that can be used in daily teaching-learning system which can generate interest, help to understand the complex concepts, explore themselves by doing virtual experiments, test using simulators and do hands on exploration even if it is virtual. Use of ICT saves time and helps to do more work in less time. This ultimately improves the work efficiency. ICT enhance 21st century skills in children such as creativity, critical thinking, decision making, synthesis, and innovativeness. The developed countries like United States of America, South Korea, Japan, Singapore, United Kingdom, Finland, Sweden and European countries have implemented use of ICT in education and schools several decades ago (Nidup, 2018). Canuel, 2011 as cited in Mann, 2014 said, "If education is meant to prepare these children for their world, use of technology must become the norm in our classroom and schools". ICT can narrow the knowledge gap by improving quality of education, increasing accessibility to resources and people and reaching to remote populations beyond boundaries (ADB, 2009).

Although the use of ICT in education in Bhutan started in 1999 with the launch of Internet for the first time in the country, the application of ICT in the field of education has remained at the basic level with not much of significant transformation as compared to the other countries across the globe. Nevertheless, the government and the Ministry of Education (MoE) in Bhutan has given highest priority to have ICT in Education. Besides, the government and MoE took several initiatives to integrate ICT in education. ICT curriculum was developed for class 4 to 12 to teach the basic information, skills and knowledge about ICT. ICT was included as additional optional subjects for class 9 and 10 students in the secondary schools. Under flagship project titled, "Chigphen-Rigphel project", all the teachers across the country were given the basic training on ICT (Microsoft word) in collaboration with Singapore International Foundation, Ministry of Education and Royal university of Bhutan initiated the Bhutan W.I.R.E.D (Bhutan Infotech Resources in Education) for ICT development in education, Education development project funded by World Bank to enable infrastructure building and supply of computers in the school.

Realizing the huge potential of ICT, the government and MoE in Bhutan developed the first ICT Master Plan 2014-2019 which was implemented from 2014 and the second ICT Master Plan 2020-2024 which was implemented in 2020. The focus of these ICT Master Plan was to build ICT infrastructures in schools, integrate ICT in Education, enhance capacity building of teachers, strengthen the use of ICT in schools to improve the quality of teaching and learning, provide access to information and learning opportunities beyond classroom, and keep the teachers and students connected to the world and keep updated with the latest development (MoE, 2014 & 2019). But owing to national budget constraints, lack of human resources, a greater number of schools and teachers, high Internet cost, poor network connectivity and mountainous terrain, to integrate ICT effectively in education and schools has remain a challenge. The dream of creating an ICT enabled, knowledge-based society as foundation for gross national happiness as envisioned for ICT (DITT, 2014) still remains as a national vision with ever increasing demand and rapid development in technology in the world.

This study helped to identify and understand the kind and level of ICT skills and knowledge possessed by teachers. Moreover, the study was able to find out how ICT is being used by teachers in their daily teaching and learning. In a way, through this study, the gaps in ICT skills and the application of ICT by teachers in the school was found. This finding gave useful information to the leaders, planners and ICT coordinators in the Ministry while planning of ICT integration in the school.

METHODOLOGY

For this study, a quantitative research methodology was applied as it was deemed appropriate since the focus of the research was quantitative in nature. The data was collected through a survey questionnaire. The survey questionnaire was developed using five-point Likert scales: ICT skills and knowledge of teachers (Poor=1, Fair=2, Good=3, Very good=4, Excellent= 5) and applications of ICT skills and knowledge (Never=1, Rarely=2, Sometimes=3, Usually= 4, Always=5). The survey questionnaires used by researchers such as Alharbi (2014) and Bitok (2014) were used as reference while developing the survey items which was downloaded from the Internet. A convenience sampling technique was used to collect the data from the teachers in the school based on the readiness of teacher participants and convenience of researchers. The questionnaire was developed in google form for the timely response of the survey sent directly to the participants through their email. 37 regular teachers from eight different middle and higher secondary school in Bhutan were selected for the survey.

The response was compiled and computed in the excel according to the format developed for analysis. Before the analysis, data cleansing was done to ensure that all the incomplete data was discarded to minimize the error in the findings and data was also coded before the analysis was done. The data was then analysed using excel data analysis tool in simple descriptive form such as calculation of percent, mean and standard deviations which is represented in the tables. The findings from this analysis are interpreted using percent, mean and standard deviations calculated against each statement

RESULT AND DISCUSSION

ICT skills and knowledge

The findings from this study indicated that the teacher's ICT skills and knowledge fall within a range of good to excellent. Based on Table 1, 24.32% to 45.95% of the teachers were found within good, to excellent ICT skills and knowledge to create title and bullet slides, create slides in outline view, modify slide text and check spelling, insert a template, insert table, work with text, drawn objects and drawing tools, use clip art and wordart, edit a column chart, change text and bullets in the slide and remove objects. These are considered to be the basic ICT skills and knowledge which is quite important and useful for the teachers. Without these basic skills and knowledge, ICT can never be used effectively for teaching and learning.

On the contrary, the result showed that teachers lack or either possessed poor ICT skills and knowledge in some areas. It was known that 27.03% of the teachers had fair and 21.62% of the teachers had good ICT skills and knowledge to use slides show options, add transitions and animations. Likewise, 21.62% of the teachers had poor, 13.51% of the teachers had fair and 21.62% of the teachers had good ICT skills and knowledge to run a manual and animated slide show. Similarly, 10.81% of the teachers had poor, 35.14% of the teachers had fair and 16.22% of the teachers had good ICT skills and knowledge to create a template and work with design template. There were 29.73% of the teachers who had poor, 16.22% of the teachers had fair and 24.32% of the teachers had good ICT skills and knowledge to work with graphics, animation and multimedia, inserting movies and sound; 21.62% of the teachers had poor, 24.32% of the teachers had fair and 24% of the teachers had good ICT skills and knowledge to work with office suite to create slides from an outline and send slides to Microsoft word; 24.32% of the teachers had poor, 24.32% of the teachers had fair and 21.62% of the teachers had good ICT skills and knowledge to customize power point toolbars and automate the slide production; 32% of the teachers had poor, 18.92% of the teachers had fair and 24.32% of the teachers had good ICT skills and knowledge to use auto-correct and the style checker; 21.62% of the teachers had poor, 16.22% of the teachers had fair and 16.22% of the teachers had good ICT skills and knowledge to build interactive presentation; 32.43% of the teachers had poor, 24.32% of the teachers had fair and 13.51% of the teachers had good ICT skills and knowledge to explore online meeting and broadcast presentations.

The concern here is, quite a good percent between 21.62% to 32.43% of the teachers are said to have poor ICT skills and knowledge to run a manual and animated slide show, work with graphics, animation and multimedia, inserting movies and sound, customize power point toolbars and automate the slide production, use auto-correct and style checker, building interactive presentations and explore online meeting and broadcast presentations. These group of teachers need help to acquire and learn the skills to use and work with all the features. Otherwise, teacher's incompetence in these areas will seriously affect the teachers use of ICT in teaching. There will be some implications in the quality of teaching on the whole.

Table 1: ICT skills and Knowledge of teachers

Items	Poor (%)	Fair (%)	Good (%)	Very Good (%)	Excellent (%)	Mean	SD
Create title and bullet slides	5.41	5.41	24.32	18.92	45.95	3.95	1.20
Create slides in outline view	5.41	0.00	35.14	21.62	37.84	3.86	1.11
Modify slide text and check spelling	5.41	5.41	27.03	27.03	35.14	3.81	1.15
Insert a template	5.41	16.22	24.32	18.92	35.14	3.62	1.28
Insert a table	0.00	8.11	29.73	24.32	37.84	3.92	1.01
Work with text, drawn objects and drawing tools	2.70	16.22	29.73	24.32	27.03	3.57	1.14
Use Clip Art and WordArt	2.70	5.41	45.95	13.51	32.43	3.68	1.08
Edit a Column Chart	2.70	16.22	24.32	27.03	29.73	3.65	1.16
Change text and bullets in the slide and remove objects	0.00	16.22	32.43	16.22	35.14	3.70	1.13
Use slides show options, add transitions and animations	5.41	27.03	21.62	21.62	24.32	3.32	1.27
Run a manual and animated slide show	21.62	13.51	21.62	21.62	21.62	3.08	1.46
Create a template and work with design template	10.81	35.14	16.22	18.92	18.92	3.00	1.33
Work with graphics, animation and multimedia, inserting movies and sound	29.73	16.22	24.32	10.81	18.92	2.73	1.48
Work with office suite to create slides from an outline and send slides to Microsoft word	21.62	24.32	24.32	13.51	16.22	2.78	1.38
Customize power point toolbars and automate the slide production	24.32	24.32	21.62	16.22	13.51	2.70	1.37
Use AutoCorrect and the Style Checker	32.43	18.92	24.32	8.11	16.22	2.57	1.44
Build interactive presentation	21.62	16.22	16.22	32.43	13.51	3.00	1.39
Explore online meeting and broadcast presentations	32.43	24.32	13.51	16.22	13.51	2.54	1.45

Applications of ICT

This study showed that teachers are using ICT for various purpose. Based on Table 2, approximately, 18% to 35% of the teachers have usually used ICT and 21% to 45% of the teachers have always used ICT for planning of lesson in teaching, as a means for effective teaching and learning, to improve learning atmosphere, download information, videos, and pictures for science lesson, prepare power

point for delivery of lesson, demonstrate and simulate concepts, principles and theories, to make teaching and learning fun, seek information and ideas, to facilitate collaborative work between teachers and students, assign task, project work and other extended activities, video conferencing with other teachers or school, prepare teaching and learning materials, prepare class quiz, games and other activities, discuss online with students and teachers, and simulate or demonstrate some experiments using virtual lab.

On the contrary, there are teachers who have never or rarely used ICT in some areas. It was found that 2.7% of the teachers never used ICT and 10.8% of the teachers rarely used ICT to demonstrate and simulate concepts, principles and theories. 13.5% of the teachers have rarely used ICT for assigning task, project work and other extended activities, 18.9% of the teachers never used ICT and 24.32% of the teachers have rarely used ICT for video conferencing with other teachers or school. Also, 16.2% of the teachers have rarely used ICT to prepare teaching and learning materials, 18.9% of the teachers have rarely used ICT for preparing quiz, games and other activities. The concern is with 27% of the teachers who have never used ICT and another 27% of the teachers who have rarely used ICT to discuss online with students and teachers. 5.4% of the teachers have never used ICT and 21.6% of the teachers have rarely used ICT to conduct simulation and demonstration of some experiments using virtual lab.

The findings clearly showed that teachers are not able to use ICT at its full potential. If the teachers can harness the true benefits of ICT, there is an opportunity to improve the teaching pedagogy. This will help in improving the quality of education and also to garner interest for the students to pursue learning of science in the future. Moreover, the use of ICT in teaching will supplement the teachers work and make their work easy and effective. Otherwise, teachers will miss an opportunity to fully apply ICT in education. This will have further impact on the learning of students in the school.

Table 2: Application of ICT skills and knowledge

Items	Never (%)	Rarely (%)	Sometimes (%)	Usually (%)	Always (%)	Mean	SD
Planning of Lesson in teaching science	0.00	2.70	21.62	29.73	45.95	4.19	0.88
Means for effective teaching and learning	0.00	2.70	43.24	24.32	29.73	3.81	0.91
To improve classroom atmosphere	0.00	0.00	36.11	30.56	33.33	4.00	0.85
Download information, videos and pictures of science lesson	0.00	8.11	24.32	29.73	37.84	3.97	0.99
Prepare power point for delivery of lesson	0.00	5.41	27.03	32.43	35.14	3.97	0.93
Demonstrate and simulate concepts, principles & theories	2.70	10.81	27.03	32.43	27.03	3.70	1.08
To make teaching and learning fun.	0.00	8.11	21.62	27.03	43.24	4.05	1.00

Seek information and ideas	5.41	8.11	13.51	29.73	43.24	3.97	1.19
Record the lesson, reflect and review for improvement	5.41	13.51	24.32	35.14	21.62	3.54	1.14
To facilitate collaborative work between teachers and students	0.00	8.11	35.14	27.03	29.73	3.78	0.98
Assign task, project work and other extended activities	0.00	13.51	35.14	27.03	24.32	3.62	1.01
Video conferencing with other teachers or school	18.92	24.32	27.03	8.11	21.62	2.89	1.41
Prepare teaching and learning materials	0.00	16.22	32.43	27.03	24.32	3.59	1.04
Prepare class quiz, games and other activities	0.00	18.92	37.84	21.62	21.62	3.46	1.04
Discus online with students & teachers	27.03	27.03	13.51	10.81	21.62	2.73	1.52
Simulate or demonstrate some experiments using virtual lab	5.41	21.62	24.32	18.92	29.73	3.46	1.28

CONCLUSION

The need of ICT in Education and its influence is unquestionable. The importance of ICT is clearly understood by the government, Ministry of Education, policy makers, school administrators and teachers alike. Although there is much effort and initiatives taken to integrate ICT in education by various stakeholders, there are still many things that needs to be done to strengthen integration of ICT. The infrastructure, gadgets, ICT skills for the teachers, Internet connectivity and professional support mechanism are the main pillar for the successful integration of ICT besides several other factors that might have similar influence.

The teachers are said to be having basic ICT skills such creating title and bullet slides, create slides in outline view, modify slide text and check spelling, insert template, and insert a table. Yet, these skills are very useful for the teachers as many of them are comfortable in using it for the teaching and learning. However, the teachers are found to have poor skills in to work with graphics, animations and multimedia, inserting movies and sound, create slides from an outline and send slides to Microsoft word, customize power point toolbars and automate the slide production, build and interactive presentations. The teachers need to have both basic and advanced skills so as to use ICT and make greater impact on quality of education.

ICTs are used by teachers for different purpose: they are used for planning of lesson, preparation of power point presentation, downloading videos and information, assign task, demonstrate and carry out simulations, video records and sharing with teacher colleagues, prepare quiz and conduct assignment, and also to conduct video conference. But owing to lack of advanced skills in ICT is a big hindrance

for the use of ICT in education. In retrospect, teachers are ready to learn and use ICT at all times to ensure good delivery of lesson and for better teaching and learning processes. It is going to be a challenge for the government, Ministry of Education, policy makers, and all the stakeholders to ensure that teachers are given all the necessary support in terms of infrastructure and professional development. If these two are taken care of, the teachers are going to make a huge difference in providing quality education to our future citizen with the use of technology.

RECOMMENDATION

Based on the literature review and the findings from this study, the following recommendations are made for the:

1. The government and Ministry of Education must make sure that infrastructure and technical support is put in place in all the schools.
2. Teachers must be trained to provide adequate skills so that they can use ICT efficiently.
3. There has to be a system of motivating teachers for the use of ICT in education, either by giving incentives or awarding certificates both at school and national level.
4. Create a platform for the teachers to exchange good practices and innovations in teaching using ICT, so that it can be used by other teachers.
5. The school leaders must be proactive and take initiatives to integrate ICT in schools through the partnership with stakeholders, agencies and individuals in the community.
6. Encourage and support teachers to learn and apply ICT skills and knowledge in teaching and learning process.

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