

ICT integration in Secondary Education in Bangladesh: A study of Policy and Practice

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Master of Philosophy in
Comparative and International Education

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Abstract

Bangladesh, as a developing country has brought a substantial change in socio-economic sectors during last decade. The desire of being a middle-income country has driven Bangladesh to come up with a modern education policy which will help them to produce the skilled workforce. ICT integration in education was the most significant step of this latest education policy, and Government of Bangladesh has stepped up to make a successful implementation of ICT in education. This study investigated the strategy of technology- inclusion in secondary education according to new education policy of Bangladesh. It examines the extent of ICT usage in the classroom, the perceived impact of technologies in teaching and learning and the possible factors that seem to hamper enhanced ICT use in secondary education. Data were collected from teachers and students by using interviews and focus group discussions respectively. Class observations were also conducted to bring more credibility in data.

Secondary schools started using technologies in their teaching and learning, but still, the use is not optimal mainly because of minimum infrastructure and perception of stakeholders. ICT helped to make the classes student-centered and interactive which was one of the aims of new education policy, but the practice of using technology in teaching and learning is still limited in most of the schools.

Although all the stakeholders of education sector understand the benefits of ICT inclusion, they are facing various problems in the implementation process. More time is needed to overcome these obstacles and to bring about behavioral changes among the teachers and students to a successful integration of ICT in secondary education of Bangladesh.

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Acronyms

A2i – Access to Information

ADB – Asian Development Bank

BANBEIS- Bangladesh Bureau of Educational Information and Statistics

DSHE - Directorate of Secondary and Higher Secondary Education

EU – European Union

GOB – Government of Bangladesh

GS – Government School

GT- Government Teacher

ICT – Information and Communication Technology

IWB – Interactive White Board

MOE – Ministry of Education

NGS – Non Government School

NGT- Non Government Teacher

SDG – Sustainable Development Goal

TQI – Teachers Quality Improvement

TTC – Teachers Training College

UEO – Upazilla Education Officer

UNDP – United Nations Development Program

UNESCO - United Nations Educational, Science and Cultural Organization

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1 Introduction

1.1 Background of the study

Information and Communication Technology has brought a robust change in society. It has connected the whole world and has influenced economic and social sectors. ICT has produced a glittering change in both teaching and learning. UNESCO (2017) describes ICT as a tool of education which can complement, enrich and transform education for the better. ICT can provide access to all kinds of global resources and can facilitate secure collaboration in with modern world education. Different teaching and learning materials can be shared with the teachers and students. Facilitators can discuss their ideas about innovative classroom practices and their research works related to this (Parvin, 2013). According to policymakers worldwide, ICT in schools should lead to significant educational and pedagogical outcomes, beneficial for both students and teachers (Jimoyiannis & Komis, 2007).

Nowadays, the actual impact of integration of ICT into everyday classroom practices constitutes an essential question. A significant amount of research has shown that the use of ICT in education can increase students' motivation and deepen understanding, promote active, collaborative and lifelong learning, offer shared working resources and better access to information, and help them to think and communicate creatively (Jonassen, 2000; Webb, 2005). In other words, ICT appears to be changing the very nature of teaching and learning. With emerging technologies, the teaching profession could evolve from an emphasizing on teacher-centered instruction to creating more student-centered interactive learning environments.

ICT helps to build a more knowledgeable workforce by engaging students more in their studies and create the ability to use modern equipment which is more productive than previous versions. Innovation in the classroom through ICT brings creativity, distribution, and handling of knowledge properly which make an impact students' future. ICT helps students to solve the complex and real-world problem which add more value to the society and also on the economy (Goswami, 2014).

ICT is considered as an essential means to promote new methods of instruction in teaching and learning. In last few decades, many studies have been undertaken on ICT implementation in education and reformation of instruction technology (Drent & Meelissen, 2008). Most of them found some positive impact on students' learning because of use of ICT (Hattie, 2009; Mumtaz,

2000). Technology has been identified as an innovative and exciting tool of instruction which shifts the paradigm to student-centric learning that supports learners to understand topics better (Watson & Watson, 2011). Conversely, it is not possible to such positive impacts by only using technologies in the classroom without making an environment and without effective use of ICT for learning. It is not possible to create exciting new learning situations which can change the classroom environment by only putting computers in the classroom (IIEP, 1995; cited in (Sanyal, 2001).

Darling-Hammond (1997) & Shulman (1986) stated that "Educational researchers have identified two kinds of teacher knowledge that can significantly improve their practice: their understanding of their subject matter and the pedagogical knowledge about how students learn the subject and how it is best taught." Teachers must have in-depth knowledge of their respective subjects, and then they can incorporate their pedagogical expertise with it to present the digital content by using ICT. Teachers' professional development in these areas is connected to the effectiveness of their classroom instruction.

Every country needs a definite policy to accomplish the vision of ICT usage in education. Bangladesh has also emphasized on implementing ICT in almost every sector of the country as the Government of Bangladesh (GOB) has intended to make the nation significantly digital within 2021. As a consequence, the latest education policy of the year 2010 came up with a blueprint of integrating ICT in education. Meanwhile, only the formulation of policy does not ensure the exercise of it in reality. Regular and effective practices can ensure successful implementation of ICT policy in every level of education. The researcher has the intent to find out how are secondary schools in Bangladesh integrating ICT in their teaching and learning. This study will give an idea of how consciously schools are following the goals of ICT integration according to education policy. In this study, the researcher will figure out the extent of use of ICT in both teaching and learning, the impact of using ICT in classroom practices and also will unearth the challenges in successfully implementing the use of ICT in education. Few other studies have identified various difficulties in integrating ICT in Bangladesh's education sector; researcher aimed to look at whether these remain or have been overcome by GOB. He also attempted to dig out the present challenges to extend the incorporation of ICT in education.

1.2 Significance of the study

Education makes the workforce more skillful and productive. Enhanced productivity increases the earning potential of every individual. Education also impacts a person's mental development and thus plays a role in developing a sound human who will likely not be involved in crimes or corruption. New kinds of skills related to capabilities and attitudes can support fundamental economic and social transformation; that is why these need to be incorporated with the latest curriculum and policy of education (Smith & Baker, 2001). ICT in education can bring these skills to students, and they can become a part of their country's economic development through their education and training. R. B. Kozma (2003) found an explicit connection between innovation and national policies that promote ICT use in the classroom. However, policy alone cannot sufficiently ensure the use of technology in the teaching-learning process (Tyack & Cuban, 1995).

ICT can bring ample impact on the prolongation of learning opportunities for more diverse population if it can be used with right conditions (Haddad & Draxler, 2002). Integration of ICT in education into the very idea of teaching-learning always places pedagogy over technology. It is not only about using technology and being an expert on ICT but also making the learning process more attractive, joyful and engaging for the students. This integration will help students to promote initiation, creativity, and critical thinking. Teachers are expected to supervise the class with new flexible, interactive and multimedia-based classroom activities with ICT which will bring a new dimension to the learning environment (Zhu, 2003). Moreover, Majumdar (2015) added that "While designing any innovative teaching and learning environment using ICT, the teacher should always keep the learning at the center of all activities, pedagogy should be at the heart and integration of pedagogy-technology should be the central focus."

School is always the central formal institution for education and education is one of the fundamental human rights. Though there are still tensions of continuity and quality of education throughout the developing countries of the world, learning should be more enjoyable and accessible for the students. Technology brings quality with creativity in education which can attract most of the students to keep continuing in school even in the diverse situations. According to Elmore (2004), schools can restructure to engage ongoing innovation which will build the capacity of the effective and creative learning environment. In this kind of organizations, teachers get the autonomy to modify the curriculum and can adjust to modern technologies. They

can also share their goals with other colleagues and authorities which can help the school to set their vision (R. B. Kozma, 2005).

Teachers were used to be rigid, formal and stereotypes when education was treated as a transformation of knowledge and ideas only. Students were trying to memorize everything from teachers' lecture and textbooks. There was insufficient understanding of the topic using this approach. In this method, there is less opportunity for students to show their creativity or analytical thinking ability. Modern teachers work more as a guide or facilitator; this creates more chances for students to contribute in the classroom and to express their thinking. ICT motivates both teachers and students to make effective discussion, increase quest for knowledge and skills through the help of technologies (Goswami, 2014).

Researchers and educationists from all over the world consider ICT as a potential tool in educational change or innovation (Papanastasiou & Angeli, 2008) which made them interested in investing in ICT. Countries in Europe and Central Asia allocated 22% of their budget into ICT. Meanwhile, the allocation in developing countries is comparatively meager (Economic, 2010). Although a considerable change has been observed in recent years, especially in the use of personal computers, it does not ensure adequate use of ICT in education in schools. Moreover, many countries have made significant financial investments in developing ICT integration by modifying ICT standards, developing programs and putting ICT courses in teaching education program for future teachers (Erdoğan Tezci, 2009; Tondeur, Van Braak, & Valcke, 2007). If current teachers are not interested in integrating ICT in classroom practice, reformation of education will not be possible for that society or country (Erdogan Tezci, 2011).

Making a national policy is a tough job for policymakers. They have to manage complex interlinks among governmental, non-governmental and private entities. Policymakers have to emphasize more to the welfare of their people as well as to the development of a country's economy. Investment in ICT in education has to be justified by policymakers according to economic rationale/prospect of the state. National plans might have lack of explicit causal connection between this investment in ICT and the desired financial outcome (R. B. Kozma, 2003; Ozga & Jones, 2006).

Like many other developing countries, in Bangladesh, the conventional methodologies of teaching were being practiced to equip children with necessary skills and prepare them for the challenges of 21st century. The government of Bangladesh took the initiatives to integrate ICT in

education and started to implement from 2009 on a small scale. In 2010 GOB came out with a new education policy where they emphasized on the integration of ICT as a medium of instruction and set a goal to achieve ICT skills for every student. As a consequence, the master plan of ICT integration in Education came out in 2013 to ensure technology usage in every school of the country. After the generation of this education policy and masterplan for implementation, GOB has started to integrate ICT in all levels of education. Integration of ICT in education is still an ongoing process in Bangladesh, and it is not easy to shift traditional pedagogical practices by this emerging instructional method. In this study, the researcher wants to identify how this ICT implementation process is accepted and adopted by the secondary education of Bangladesh. The objective of this study is to address that how teachers are incorporating ICT as a tool in their teaching methods in the classroom as well as how the students are accepting this new phenomenon on their learning. He will also investigate if any loophole exists between the present practice of ICT in education and the expected goal of using ICT in education policy.

1.3 Problem statement

Usually, research questions are stimulated by relevant literature considering researcher's interest and the significance of the concern to be uncovered (Bryman, 2015). This empirical study focuses its investigation on issues in the realistic settings. Such research paradigms more often aim to draw a conceptual picture emphasizing the existing challenges, and consequently offer recommendations for a further course of actions based on the challenges identified through the study. Although at the very first stage, recognizing the challenges of ICT implementation process was not included in the problem statement, after initiating the data collection procedure, this concern was found to be addressed most significantly by the respondents. Consequently, the problem statement takes the interest to identifying the ICT implementation challenges into account.

The study is a phenomenological study on ICT integration in secondary education of Bangladesh. To provide rich information teachers and students have been interviewed and classes have been observed. National policy has been analyzed by taking the word 'ICT' as the central element of the analysis process. The purpose of the study is to find out the ICT

implementation situation according to education policy. The overall objective has been examined through following research questions:

1. To what extent do the ICT components of the Education Policy 2010 reflect in teaching-learning practices?
2. How is the use of ICT making an impact in classroom teaching?
3. What are the key challenges to ensuring the implementation of ICT in the classroom?

Answer from Research question 1 will give an idea about the range of ICT usage in teaching-learning, which will make sure how the implementation of the policy is going on according to the proposal of education policy. It will help to figure out how the use of different technological devices have or have not developed in secondary schools' instructional process. This answer will give a bright idea of the level of integration of ICT in education. Research Question 2 will help to describe the influence of ICT in teaching-learning. It will include how teachers are motivating students through using ICT in their teaching, what type of outcomes or output they are getting after using ICT in their class activities and how students are responding after ICT inclusion in instructional technology. Research question 3 will shed light on the hindrances of not implementing the use of ICT implementing successfully in classroom teaching. It will try to unearth the barriers that lead to loopholes in policy and implementation.

1.4 Definition of terms

ICT- The word ICT stands for Information and Communication Technology (ICT) which refers to technologies that provide access to information. According to Toomey and Ekin-Smyth (2001) "ICT relates to those techniques that are used for accessing, gathering, manipulating and presenting or communicating information. The technologies could include hardware (e.g., computers and other devices); software applications; and connectivity (e.g., access to the Internet, local networking infrastructure, video conferencing).

The most significant occurrence of ICT is the increasing convergence of computer-based, multimedia and communications technologies and the rapid rate of change that characterizes both the technologies and their use.

ICT in education – Usage of different technologies as a tool to improve the teaching and learning process and to enrich the quality of education is designated as ICT in education. ICT

brings more use of sensors, innovation, and interactivity in educational practices. Educational ICT tools can be divided into three categories as input, output, and others (relative devices).

ICT based classroom - The classroom is equipped with modern technologies like a computer, projector and interactive boards. Teachers can use these technologies as an innovative tool of their instructional method.

Digital Content- Making an audio or visual or audio-visual presentation of the topic by using technologies primarily by a computer program, which will be used for teaching in the classroom. These contents contain an exclusive narration of particular lessons and make more interaction between teachers and students.

1.5 Structure of the Thesis

Following this introductory chapter is chapter 2, which presents the literature review from the previous researches related to ICT integration in education. In this section, the researcher tried to organize the related literature from a global context to country context and from general idea to a specific one. A conceptual framework with theoretical guideline has been presented in chapter 3, which gives a map of the research to the readers. In chapter 4, the researcher describes the methodology of the study, provides a detailed idea about data collection, sampling procedure, tools of data, research design and trustworthiness of the study. Contextual information has given in chapter 5 to present an overview about Bangladesh and its education. Findings have been discussed in chapter 6, where themes have created according to each research question and addressed separately through the application of literature review and conceptual framework. Then the results are presented in greater depth about the research purpose at discussion in chapter 7. Finally, section 8 concluded the discussion with some implications and suggestions for practical ICT integration in secondary education of Bangladesh and some recommendations for future research and ways ahead.

1.6 Limitation and Delimitation:

This study is done to find out the real situation of ICT implementation in secondary education of Bangladesh. The researcher has tried to present a scenario of the present case of ICT integration and how the stakeholders are responding to it. Due to time limitation and convenient accessibility in schools, the researcher selected Dhaka, the capital city, as his research site. However, schools in the capital city do not represent the situation of the whole country. Besides,

stakeholders like parents and ministerial correspondents were also not included in this study because of time limitation. The researcher mainly looked at on classroom practices of an innovative method.

Moreover, as ICT integration in teaching-learning is a comparatively new paradigm in the education of Bangladesh, judging the extent of acceptance of this incorporation by the stakeholders in education is difficult to ascertain. Although, it seems confident in almost all perspectives there is more scope of researching this issue either on evaluating the impact or measuring the efficiency. More work can be done to understand the policy's reflection on the curriculum of secondary education. Also, the impact of this implementation process can also be studied after the successful integration all over the country.

2 Literature Review

2.1 Introduction

A literature review is one of the crucial elements of research. It gives an idea about already known affairs connected to research area and also build a thought about the methodological and theoretical approaches has been used in this particular area. The literature review also helps to interpret the findings as well as help to learn from previous mistakes(Bryman, 2015). The researcher has tried to review other studies on ICT integration in education done throughout the world. In this chapter, he has attempted to bring out the exemplary implementation processes applied in western developed countries, as well as the method being used in developing countries with a same socio-economic background like Bangladesh. Moreover, literature about ICT integration in Bangladesh has also been reviewed to find out the gaps that both future researchers and this research can study.

The researcher has done a selective literature review according to the goal of the research. The literature containing the processes and the extent of ICT implementation has been reviewed formulate possible research questions. The researcher has selected the literature ranging from a global perspective to a perspective involving developing countries and finished the review with the relevant aspects of Bangladesh. The literature has been classified to find out if there are any successful implementation processes, either in developed or developing countries, which can be followed by GOB to make an effective ICT integration in Bangladesh's education sector. The literature has been narrowed down from global aspects to a more country-specific context while maintaining focus on ICT implementation in education.

2.2 Extent of ICT

One motive to review this literature was to look how they increased or tried to increase the use of ICT in the respective education systems. This review gave an idea about the process of ICT implementation of the countries that have different and similar socio-economic background to Bangladesh, thus and helped to compare and contrast these situations with the one in Bangladesh.

2.2.1 Initiatives to ICT extension

In Sweden, there is an information center for teachers including library and news agency called 'ICT for Pedagogues.' The Swedish education ministry created this center in 1994 to create a connection among all teachers and to provide them pedagogical services as they needed (Gutterman, Rahman, Supelano, Thies, & Yang, 2009). European teachers can share their resources in different languages, and they can give their feedback about shared resources from another teacher. According to Cachia, Ferrari, Ala-Mutka, and Punie (2010) "European eLearning portal (elearningeuropa.info) provides some of the desired functionalities, but does not provide specific support for linking practitioners in the classroom practitioners with those developing projects."

In Finland, the education policy is coordinated with the national vision of an information society (Kankaanranta & Linnakylä, 2004; R. B. Kozma, 2008) which generated the schools to buy computers, link them with internet and endorse ICT as a tool for teaching-learning. This policy also brings out the in-service training for teachers to provide the knowledge and skills they needed to reform their pedagogical practices especially regarding the collaboration of technology, teamwork, and teaching-learning (R. B. Kozma, 2005). Establishing students as members of the modern information society is the primary goal of the Finnish strategy of ICT integration in schools. The Information Society Program for Education aimed at developing all citizens' information society knowledge and skills (Castells & Cardoso, 2006).

Radio, television, computers and the internet in classrooms, computer laboratories, and other locations, as well as developing a structure to support mobile learning using smartphone and tablet devices are the resources used to integrate ICT in schools in Asia (Valk, Rashid, & Elder, 2010). Economically developed countries in Asia like South Korea, Singapore, and Japan have ICT facilities in almost all of their classrooms (ADB, 2012). Japan has started implementation of "e-Japan Strategy" in 2001. To enhance intellectual ability and creativity, Japan has encouraged people to bring a proactive approach to teaching-learning activities through ICT. They recognized ICT as a medium of high-level communication skills that helps students to express their ideas and impel them towards innovation (Law, Pelgrum, & Plomp, 2008). Successful integration of ICT in education has been done by Singapore in two phases. In 1997, they took their first master plan to incorporate technologies into the school system (Mui, Kan, & Chun, 2004). This idea was focusing on installing computers in schools with high-speed internet and

training the teachers to use the technologies correctly. Later, in 2002 they came up with a second master plan which was more systemic and had a holistic approach to integration. ICT, curriculum, assessment, instruction, professional development, and school culture: all these components were integrated into this system. The curriculum was reduced by 10 to 30 percent to allow the technology integration in subject areas (R. B. Kozma, 2005; Law et al., 2008).

The government of Malaysia has started a project named Smart School project which contains browser-based teaching-learning materials for language, science, and mathematics education. They have made a connection between smart school management and classroom teaching. The school management also connected with the Ministry's data center and Ministry's helpdesk using a Local Area Network. The Ministry's helpdesk also provides maintenance and support to the pilot schools for better involvement of ICT in classroom practices (El-Halawany & Huwail, 2008). Malaysia desired to move towards a knowledge-based industrial nation. To achieve this goal they have punctuated on ICT-based education in a different level of schools (Hassan, 2011). Thailand's ninth "National Economic and Social Development Plan" (2007-2011) focuses on the development of people's quality of life in a knowledge-based society through a "sufficiency economy" philosophy. This issue is vastly associated with implementing and using ICT in education. Besides thinking of skills and traditional learning process, Thailand is giving importance to the use of technology to improve students' achievements in different international competitions (Anderson & Plomp, 2008). Being an emerging economy of the world, Brazil still hasn't ensured ICT integration in all levels of education. Its massive geographical is a considerable obstacle to enrolling all students and provide quality education through ICT. However, in recent years Ministry of Education and municipal secretaries of education have taken many initiatives to accomplish ICTE (ICT in Education) such as training the teachers and lab-coordinators for long time success (Mori & Assumpção, 2007).

ICT vision-2010 has adopted by the Mongolian government to ensure and spread ICT-related or ICT-based activities among all people in the year 2000. Hi-tech centers for supporting educators and teachers had also been established in Ulaanbaatar. Moreover, structural facilities were made to ensure that students and teachers can access different ICT based activities like e-library, images for learning, leisure, and entertainment (Uyanga, Chimedlham, Tsogtbaatar, & Choijoovanchig, 2004)

According to ADB (2012) "Countries that do not have objectives or courses on necessary computer skills (or computing) at all levels, the emphasis is placed on secondary education. For instance, in India, they are focusing more on secondary education to implement ICT in schools. 45% of secondary schools have computer laboratories compared to 17% of primary schools (India, 2012). On the other hand, Cambodia, Myanmar, Nepal and Sri Lanka included primary computer skill development in upper secondary education. In Kyrgyzstan, a course in necessary computer skills or computing occurs precisely at the lower secondary level (Wallet, 2014). Similarly, in the Philippines, Computer Assisted Instruction (CAI) is present in 41% of secondary schools but only in 17% of primary schools. In Bhutan, despite having relatively high levels of electricity almost in all schools of the country, they don't have a formal policy on ICT in education. No computer laboratory has been established in primary schools whereas two-thirds of secondary schools have computer laboratories (ADB, 2012).

Countries like Hong Kong, Macao, Japan, Kazakhstan, Malaysia, the Philippines, Singapore, Sri Lanka and Thailand, who have more capacity to provide ICT, are trying to implement ICT integration in all subjects at all levels. Moreover, Kazakhstan has planned for a more ambitious project to apply ICT in every level by covering all schools in their language. They also ensured 100% connectivity to diminish the digital divide. In some countries, a good number of schools developed their digital communication system for contacting the parents of students, for assessing exam papers and even for taking attendance of students (Cachia et al., 2010).

Using the computers in schools tends to be concentrated only in laboratories in many developing countries in South and West Asia and Central Asia (ADB, 2012; Bank, 2016). Most of the countries find it as a viable solution due to lack of resources. Countries like Kyrgyzstan, Azerbaijan, and the Maldives entangled computer-assisted education and laboratories in all levels of education whereas Bhutan and the Philippines have done it only in most of their secondary schools (Wallet, 2014). In India, however, computer provision is increasingly going to be linked up with library facilities, teachers' common room, and official activities of school's head office (ADB, 2012)

In Egypt, the pedagogy, curriculum, and textbooks were designed to urge students to memorize the topic (L. Kozma, 2004). They planned to integrate technologies to reform their education system to both improve their education and economy through knowledge-based service and software production. This reformation included the improvement of the curriculum which

matches the capabilities of subject areas and turns students into human capital. Government organizations, NGOs, and transnational organizations have launched different ICT-based educational programs to support this reformation (Bransford, Brophy, & Williams, 2000; Chudowsky, Glaser, & Pellegrino, 2001; R. B. Kozma, 2005).

The Government of Bangladesh (GOB) has declared a vision named "Vision-2021" to incorporate significant digitization of public services in Bangladesh (this effort is successfully and smartly called 'create Digital Bangladesh') as well as to improve the quality of education through ICT. Though implementing ICT in education is not merely a vision, it instead needs planning, policies, execution, and monitoring. GOB also introduced their latest education policy in 2010 by focusing ICT as a medium of instruction. Still, there is a long way to go to implement the strategy throughout the country as most of the schools are not ready to integrate ICT into their classroom activities (Khan, Hossain, Hasan, & Clement, 2012).

2.2.2 Teacher Training and attitudes to increase the extent of ICT

It is widely acknowledged that teachers' educational beliefs are reliable indicators of their planning, instructional designs and classroom practices (Bandura, 1989; Pajares, 1992). In other words, training for teachers is one of the essential elements to implementing ICT in the teaching-learning process. It also solves the pedagogical issues for the teachers. Changing attitude to using ICT in classroom activities can be influenced by some other factors like ICT competence, computer self-efficacy, government policy on ICT literacy and infrastructure facilities. Besides these, teaching experience, educational level, professional development, accessibility, technical support, the leadership of the headteacher, the pressure to use ICT also can play a vital role in implementation. (Ali, Haolader, & Muhammad, 2013).

In developed countries teachers and experts are giving more importance on using ICT in classroom practices than the developing nations. Their adoption and usage policy are much broader than developing nations. Thus, students are getting better at technology-based learning opportunities in developed nations and performing well in the job sector (Hamidi, Meshkat, Rezaee, & Jafari, 2011). Besides, most of the teachers use the internet to get the access to information to upraise their knowledge which they can use in their lessons or prepare handouts and materials for class. More than 50% teachers in EU believe that mobiles, digital games, and social technologies are important for teaching and learning (Cachia et al., 2010).

Almost two-thirds of teachers agreed that they found appropriate support for combining ICT and innovative teaching. While teachers are not using the computer as standard tools of teaching, some teachers gave an example of using Google map to teach geography which shows that the scenario is changing rapidly towards ICT integration. Still, the sharing of ideas between teachers and students regarding using technology in the same flow is rare in some places in Europe. (Cachia et al., 2010; Csikszentmihalyi, 1996). In Ireland teachers often use ICT to develop students' writing and presentation skills; sometimes they even use ICT in problem-solving and evaluative skills related activities. But it is hardly used to build teamwork and collaborative skills of the students. Some schools have the facilities to handle ICT for every subject in the classroom, and some schools use the common room like computer lab to conduct a class with ICT facilities (Flanagan, 2008).

In search of teacher's proficiency and motivation towards using ICT in the classroom, it has been seen that most of the teachers can use word-processing and internet in post-primary schools in Ireland. On the other hand, relatively low level of use of e-mail, spreadsheets, database, and graphics does not reflect the teacher's high proficiency in using applications. So, the teacher's motivation to use ICT in the classroom highly depends on their competence on the particular application (Flanagan, 2008). Jimoyiannis and Komis (2006) found that although most of the teachers in Greece have lack of confidence in their skills and abilities to use ICT, they have positive attitudes towards the importance of their training on ICT, the role of ICT in education and also the application of ICT tools in instruction process.

Though many of the countries in Asia and Pacific region have developed policies on teacher training on ICT, they need to be looked more carefully to link them with the broader perspective of ICT for development and education goals (UNESCO, 2004). Malaysia ministry of education use cascade model to solve this kind of problem, they train teachers who are genuinely interested in using ICT in classroom practice. These teachers share their idea and learning with the other teachers of the school and motivate them continuously to integrate ICT in the teaching-learning process. Sometimes, one school trains another school's teachers, which is more convenient in the same area (Gutterman et al., 2009).

Teachers' confidence concerning their pedagogical use of ICT mostly depends on finding related and useful materials for class; it may be taken from the internet or any other sources. Teachers' competence on using ICT also affects the adoption of classroom practices (Law & Chow, 2008).

Male teachers tend to be more technologically nous, confident and willing to learn a new technology than the female teachers (Yuen & Ma, 2002); they also have lower flutter levels than female teachers (Bradley & Russell, 1997). It shows the intention of gender biases in ICT usage in some part of the world.

2.3 Impact of ICT

2.3.1 ICT in bringing the interactivity in classroom

Classroom interaction is one of the leading challenges for effective teaching-learning. Without sufficient participation and engagement from students in classroom activities, learning cannot be fulfilled anyway. Mutual opportunities to talk about the classroom, proper guidance, creating an environment for participation and increasing students' autonomy level can make an impactful interaction in classroom learning (Burns* & Myhill, 2004). On the other hand, interactivity is the most perceived advantage of using ICT in the classroom regarding supporting teaching (Beauchamp & Kennewell, 2010). Moreover, Kennewell, Tanner, Jones, and Beauchamp (2008) states that "The term 'interactivity', therefore, can be used to describe technical interactivity as technology serves as an interface between the user and the material, and pedagogical interactivity, which is itself a teaching strategy." Beauchamp and Kennewell (2010) classified interactivity into five categories: no interactivity with ICT, authoritative interactivity, dialectic interactivity, dialogic interactivity and synergistic interactivity.

Potential of innovative and interactive education was the focal point to provide access to technology especially in schools in Europe from the last decade (Blandow & Dyrenfurth, 1994). The majority of schools in developed countries are equipped with PCs, interactive whiteboards (IWBs) and internet connection. Moreover, some schools already provide extensive area networks (WAN) for a better interaction between pupils and teachers even outside the classroom (Cachia et al., 2010). Though replacing traditional tools with digital equipment cannot ensure creativity or innovation in education, most of the schools have access to technologies for their teachers. These techniques are based on notions of networking which allow teachers to develop collaborative forms of learning. Schools in Europe have their website where they share their information on regular basis, and teachers use platforms like Moodle, wikis, and blogs to teach in the classroom. Nonetheless, textbook remains the primary resource for teaching. It is essential to

make a suitable combination of pedagogy and technology which can bring more creativity to teaching and learning (Cachia et al., 2010).

Students need to understand or realize the primary and innovative use of technology if we want to ensure sustainable, innovative knowledge generation. Without the proper concept of using technology, there is a high probability of using familiar forms and ideas in using the tools. It can make an obstacle to exploring new connections and different ways of creating things (Loveless, 2008).

2.3.2 Effective and quality education

By improving quality of the education and instruction, enhancing the assessment system, and reducing dropout from class, ICT has introduced a new era globally. It has transformed the education system from a teacher-centered system to a student-centered one in a very smooth way. This transformation empowers student towards better problem-solving abilities, more creative thinking, better communication skills and other improved higher order thinking (Trucano, 2005). Many nations believed in this transformation, and they re-introduced their policy on reflecting on this issue (ADB, 2012), while it may also be reflected in national educational targets.

On the other hand, the conventional and rigid, face to face classroom system makes student bored, and they lose their interest to attend classes. This boredom causes dropouts from the different levels of the educational system. Students from wealthier families go for private tuition to increase the chances for a better result in school; this is not possible for the students from comparatively poor backgrounds. Using ICT in classroom activities can make these classes more exciting and can increase the attention of students easily (Haddad & Draxler, 2002).

ICT is treated as an essential driver of innovation and growth in a modern society. ICT for education enhances the support of development by creating a skilled workforce. It also has an immense effect on research and development activities (ADB, 2009). ICT use in education increase students' technical and cognitive proficiency to access, create and develop. It also enhances the potential of teaching-learning activities (ADB, 2009). Moreover, a technology-enabled environment ensures the effective flow of information, and using technology in school makes it more accessible and usable (Mohd & Zainab, 2002). Also, to move up the next rungs of the development ladder, it is essential to integrate ICT in teaching-learning situations which can

improve the quality of a country's human capital and student's capability of using information (ADB, 2009).

Grimus (2000) stated that "By teaching ICT skills in higher educational institutions the students are prepared to face future developments based on proper understanding." Additionally, to support this statement Yelland (2001) mentioned that "Traditional educational environments do not seem to be suitable for preparing learners to function or be productive in the workplaces of today's society. Organizations that do not incorporate the use of new technologies in institutions cannot seriously claim to prepare their students for life in the twenty-first century."

2.3.3 Teacher training making an impact

Although home access and infrastructure capability have increased noticeably over last few years, teachers do not appear to make practical use of ICT in their instruction because of their attitudes towards ICT as well as a lack of skill in this area (Cox et al., 2003).

According to Williams, Coles, Wilson, Richardson, and Tuson (2000), "Teachers' attitudes towards ICT in education have a significant influence on ICT adoption and implementation behaviors in the classroom. Teachers, in general, agree that computers constitute a valuable tool and they are positive about students' attainment of ICT knowledge and skills. In many cases, they perceive ICT as a new subject matter in education rather than a new way of teaching and interaction between learners and knowledge". Moreover, even though teachers are concerned about the importance of ICT in education, they tend to be less interested in its extensive use in classroom activities. Teachers are more doubtful about ICT's potential to improve the teaching system (Higgins, 2003).

When teachers get more engaged with computers, their attitude also starts to convert in the direction of more excellent use of ICT in their lessons (Sang, Valcke, Van Braak, & Tondeur, 2010). Besides, a teacher's pedagogical culture shapes their demonstrations of ICT use in the classroom (Ruthven, Hennessy, & Brindley, 2004) and most cases, they are likely to adopt practices which reflect their beliefs about teaching and learning (Drenoyianni & Selwood, 1998). Similarly, a teacher's trust and confidence in using ICT efficiently in classroom play a significant role in implementing technology in teaching-learning activities (Sime & Priestley, 2005).

There are claims that the presence of technology creates pressure on teachers to make the classroom activities more efficient. But, technology does not have an educational value itself.

Technology becomes essential when teachers use it efficiently in the pedagogical process. Technology brought the innovation and development in teaching-learning process in education, but it must be implemented by teachers (R. B. Kozma, 2003). So, teacher's attitude and readiness to use technology are vital in achieving ICT in education successfully (Garland & Noyes, 2004; W. J. Pelgrum, 2001).

2.4 Challenges

2.4.1 Government's vision and plan

According to an ADB report (2009), some countries have plans of ICT integration; but these ideas are isolated from their national policies. ICT for education plans are often disjointed, as they are developed without considering the infrastructure, finances, and development as defined by the domestic ICT policy. ICT for education is a part of the national education plan. It must be associated with education development objectives and merged with the sector plan of education. National ICT policy must also be incorporated with the parameters of the education system, and there should be a technology-enabled environment.

Basic computer literacy needs to be initiated to integrate into teaching-learning. Many countries also realized that they need to revise their policy to make a favorable pedagogical perspective through ICT and according to that they are giving more importance to teachers' training now (UNESCO, 2004). The government of Malaysia wanted to reduce the digital partition between the schools, to increase the usage of ICT tools in the teaching-learning process, integrate different subjects through ICT. School management will also be more effective and productive (Said et al., 2013). To achieve these goals they started with a smart school project in four phases from 1999 to 2020. They changed their medium of instruction from the native language to English to teach mathematics and science in 2003. It encouraged more students to use ICT outside of schools. Ministry of education has distributed almost 3778 titles of ICT based teaching materials to the schools from 1999-2008. It encouraged teachers to use ICT in classroom activities (ADB, 2009). The Government of Malaysia took necessary steps to conquer the challenges on the way of ICT integration in education. It can be an excellent example to follow for different Asian countries who are still struggling to implement ICT in their education sector. Political parties and their views have an immense impact on integrating ICT in all sectors of developing countries. If they have no interest in ICT, it is not possible to collaborate all

stakeholders together and inform them about the blessings of ICT usage can bring (S. Sharma, 2006). The present ruling party of Government of Bangladesh had declared their vision of a digital country in 2021 before they constituted this government. As a consequence, they emphasized the implementation of ICT in education not only for improvement of the quality of education but also for increasing pupils' skills according to the job market. By publishing a new education policy in 2010, the government has shown their motive to redact their vision throughout the country (Khan et al., 2012).

2.4.2 Teachers' beliefs and readiness

Despite so many benefits of using ICT in education, in many cases learning the potential of ICT is dispossessed as teachers are still not fully ICT literate and they do not use any technology in their teaching. A study in teachers' readiness in ICT shows that there is still a long way to go before schools will be able to take the full advantages of ICT use in education (So & Swatman, 2006). Teachers' attitude and belief are one of the main generators of the use of technologies in instructional settings (Almusalam, 2001). According to Mumtaz (2000) teachers' belief about integrating ICT in teaching-learning is the core part of ICT implementation in education. Conceptual change in nature of learning is vital to change the attitude of teachers and to generate belief in ICT as an instructional tool. They will be able to determine the extent of their engagement with ICT and also will find out how engaged the students can be in using technology. Besides, teachers also need to bring a positive attitude to handle ICT regularly. This belief will allow them to gain sufficient level of understanding to implement it successfully. When teachers become knowledgeable about ICT use in the classroom, this efficiency encourages them to integrate ICT in a more significant scope into all aspects of education (Afshari, Bakar, Luan, Samah, & Fooi, 2009).

Teachers become more cautious to use ICT in schools when they utilize ICT for their learning. Sometimes, they also think that ICT is not relevant in class-based instruction for promoting cooperation and reflection in learning as they recognize ICT can drive students easily to real life learning (Barak, 2006). Without understanding the usefulness of ICT, teachers do not become interested in using ICT instead of their traditional teaching strategy (Sang et al., 2010).

Most of the countries across the world struggle to find out efficient ways to prepare teachers to adopt ICT as an integral part of their everyday teaching strategies. Therefore, a thorough analysis

of a teacher's perception about integrating ICT can give an idea about the rudiments of their effective grounding (Hennessy et al., 2010). To explore the factors deterring teachers' readiness and confidence in using ICT in teaching, Tella, Tella, Toyobo, Adika, and Adewuyi (2007) found that "inadequate knowledge to evaluate the role of ICT in teaching and learning, lack of skills in the use of ICT equipment and software had resulted in a lack of confidence in utilizing ICT tools." Lack of technical support and expectation of making mistakes while using technology in the classroom during teaching have reduced teacher's confidence and caused teachers to avoid its use (Khan et al., 2012).

On the other hand, some teachers have high interest and motivation on using ICT in classroom activities, but their resource is limited. Most of them use technology for low-level supplement tasks. A significant number of teachers use the computer only for simple tasks like word processing, spreadsheet, and registration of grades (Higgins, 2003; Rosenthal, 2004). Moreover, the majority of the teachers prefer to get readymade resources which are specifically designed for their lessons. Most of them confess that they do not get enough time to prepare a digital content for every lesson (Cachia et al., 2010).

In Europe, most of the countries have available facilities of ICT, but still, they need more training for teachers to ensure the proper use of it. Teachers still lack the knowledge to implement ICT in adopting creative and innovative learning environment. Most of the schools use interactive whiteboard and projections in the classroom to give students more space and time to explore themselves in improving interaction between teachers and students. In that case, teachers need to be more competent in ICT use as they could work in partnership with their students (Cachia et al., 2010). Few teachers are skilled in integrating ICT into their teaching and can motivate students, enrich their learning outcomes and stimulate higher-level critical thinking in their minds.

Teachers' proficiency in ICT is still a big concern in some European countries where 85% teachers believed ICT had improved their teaching and 91% thought ICT enhanced creativity in their teaching (Cachia et al., 2010). Teacher's ability to use technology in teaching-learning is mostly limited to some necessary programs. Most of the teachers are accustomed to some primary use of computer like the browsing the internet, using e-mail and word processing. As teachers cannot confidently use ICT effectively in the classroom, ICT use in the school, as a whole, is deficient. Lower knowledge about computers or other technology is correlated with

lower exposure to using technology. Teachers with previous experience about ICT do use technology frequently in their teaching. They think ICT has made their instruction process more manageable and smoother (Garland & Noyes, 2004; İşman, Evirgen, & Çengel, 2008; Tondeur et al., 2007). Balanskat (2009) found that lack of expertise in using technology pushes teachers to compromise their authority in class; Almost 56% of teachers rate themselves as reasonably confident in using ICT, such as in using powerpoint to create presentations with texts and images.

2.4.3 Infrastructure and other resources

Generally, in a developing country, the government wants to invest more money in defense or agriculture compared to education. Bangladesh is not isolated from this strategy. It seems difficult for developing countries to ensure an excellent financial allocation for education or ICT implementation in education. Afshari et al. (2009) stated that efficient and effective use of technology depends on the availability of hardware and software and the equity of access to resources by teachers, students and administrative staff. These costs are in most cases inflated and cannot be provided by most developing countries, including Bangladesh.

In Myanmar, electricity in schools is infrequent, and as a reason, only 1% primary schools can use technology compared to 15% in the secondary level. Similarly, in Cambodia and Nepal, the computer-assisted instruction is available in 3% and less than 0.5% in primary and secondary schools, respectively (ADB, 2009). That is to say, balancing priorities of integrating ICT among institutional subsectors is vital for educational development. Investment in ICT for education also depends on these preferences. A plan should be made which includes the resources and the proper use of it. It will create a technology-enabled environment. As an example, if all the resources are brought in to the classroom, and they require electricity then continuous power supply should be the priority for that school area. Similarly, it is no help to teachers if the e-resources they rely on are available on the internet, but there is no connectivity (ADB, 2009).

As an example, lack of resources and insufficient suitable infrastructure are one of the most challenging problems to tackle regarding implementing ICT in education in a developing country like Bangladesh. The practical use of ICT depends on the availability of technological devices, supplies of computers and their proper maintenance including other accessories (Khan et al., 2012). There are some barriers like technical support, unbalanced maintenance of software and

hardware, and slow connection speed, which are interrupting proper use of ICT in teaching. Both teachers and education stakeholders approve that poor internet connection is a significant obstacle to getting access to online materials. The substantial cost of interactive whiteboards and the way of using it raised questions to the relevance of ICT for innovative teaching practice (Cachia et al., 2010). Gülbahar (2007) also added that "ICT requires modern hardware and software. Using up-to-date hardware and software resources are key factors in the diffusion of technology, but it is a rare experience in educational institutions. High-speed internet connection is another prerequisite for integrating ICT into the teaching-learning situation. But unfortunately, internet access is poor in most of the developing countries." In Bangladesh, though multimedia education materials are available from government and private sources, most of the schools are not well equipped with infrastructural facilities, as well as with trained teachers. Teachers' attitude towards using ICT in the classroom is also low, especially in rural areas (Khan et al., 2012).

2.4.4 Interest of School administration

The vision of school leaders is essential to make successful integration of ICT in school level education. School leaders underscored the importance of using ICT for pedagogical approaches which can create a barrier to lifelong learning for the students. In some cases, school leaders seemed relatively inactive to make an influence on teachers' motivation to use ICT in classroom activities. It has already been proved that the more actively school leaders lead, the more active ICT integration in the teaching-learning process is (W. Pelgrum, 2008). Alternatively, if teachers think that this policy is imposed from outside without consulting with them or if they do not have enough training or instructional practice, any policy will be challenging to implement at the field level. Instructional complications and lack of programs and resource alignment hinder the implementation of the process (Cohen & Fink, 2001).

As an overpopulated developing country, Bangladesh has a considerable number of youth who are going to schools now. Besides this, the state does not have enough qualified teachers to educate them, and teachers are already burdened with heavy workloads. Moreover, most of the teachers are doing administrative works alongside teaching in the classroom. In these circumstances, it is almost impractical for teachers to design and develop their classes by using technology (Afshari et al., 2009; Beggs, 2000). Some teachers are unable to practice teaching by

using ICT, and some are unwilling to try because of anxiety, time shortages and lack of motivation (Duhaney, 2001). In this situation, administration should take more responsibility for encouraging teachers in integrating ICT

2.4.5 Social Cultural challenges

R. Sharma (2003) states that one of the most significant social factors influencing the use of ICT in Bangladesh, Malaysia, and other developing countries is the low social status of women. Providing education or incorporating women's role in the use of ICT is not considered necessary. As teachers are not often compensated for the extra time they need to integrate ICT, they lose their interest in using technology in their class. Bangladesh had consistently ranked as one of the most corrupt countries for few years according to Transparency International (Bhuiyan, 2011). Corruption is widespread here and is one of the identifiable reasons behind slow or no integration of ICT in education (Zafarullah & Siddiquee, 2001). Mamun and Tapan (2009) stated that "The budget for the newer technology was misused and reduced due to corruption in the administration. Huge budgets are passed to buy modern teaching and learning materials for the improvement of the teaching and learning process, but in the end, only minor improvements are found in the overall technical and vocational education sector." The misuse of money and by thieving government allocation to personal accounts, few people makes an obstacle to proper development in different sectors, including education. This money could have used in implementing ICT in every level of education (Kessy, Kaemba, & Gachoka, 2006).

As most people and students use Bangla (mother tongue) as their medium of communication and study, English is not spoken widely throughout Bangladesh (Turbill, 2001). On the other hand, almost all of the software which is used to in ICT is in English, and this language barrier creates problems to use ICT for most of the school teachers. The scarcity of Bangla software is a mental obstacle for almost all people when English is used as the second language in Bangladesh (Sultan, 2010).

2.4.6 Lack of Knowledge and skills

According to W. J. Pelgrum (2001), the success of educational innovations depends mostly on the skills and knowledge of teachers. Teachers' lack of knowledge and skills is one of the main hindrances to the use of ICT in education both for the developed and underdeveloped countries (Ihmeideh, 2009; Mamun & Tapan, 2009; W. J. Pelgrum, 2001).

Berner (2003) found that the faculty's belief in their computer competence was the most significant predictor of their use of computers in the classroom. Therefore, lack of knowledge regarding the use of ICT and lack of skill on ICT tools and software have also limited the use of ICT tools in a teaching-learning situation in Bangladesh.

Summary of literature

In sum, from literature, it has been apparently found that western and developed countries have implemented ICT in education more significantly. They have introduced ICT in their education system long before the developing countries have done. Developed countries have built infrastructures, trained teachers, and ensured internet accessibility to schools and made collaboration among the teachers of the nation to achieve the goal of ICT integration in teaching-learning. As a result, they are already getting positive feedback on their successful implementation of ICT in education.

On the other hand, ICT integration is a comparatively new idea in developing countries like Bangladesh which has recently formed a new policy and plan for inclusion of technology in its education system. Though they are trying to follow the way introduced by western and developed countries, it is becoming challenging for them because of various socio-economic factors. From previous literature, it can be seen that the culture of using ICT in education is building up throughout the world and the approach is pretty positive towards technology inclusion in education.

There are some studies done on account of ICT implementation in the education system of Bangladesh. Most of the studies tried to find out the barriers to implementing ICT successfully. Some of them only mentioned the government's vision on including ICT in education, but none of them analyzed the education policy to figure out GOB's plans and objectives of ICT integration in education. These studies presented the data about present difficulties, but there was no guideline to solve these problems and fulfill the aspirations of ICT integration according to the national education policy. In previous studies, some researchers focused only on higher education of the country and some concentrate on the overall situation. There were no studies found in Bangladesh's perspective where researchers have conducted studies on the condition of ICT integration in secondary education. Moreover, no study has found on teachers' readiness on integrating ICT in the secondary school of Bangladesh.

In this study, the researcher has tried to make a correlation between national education policy and ongoing practices in secondary schools of Bangladesh. It will help to figure out how secondary schools are adopting ICT usage according to the theory in their teaching and learning process. The researcher will analyze the situation with the data which will tell the story about the extent of ICT usage in schools, teachers' attitudes towards ICT integration, the impact of ICT in teaching and learning, and the challenges facing integration of ICT in education. As there were no previous studies which made a comparison between education policy and ongoing practices in schools, the researcher has attempted to figure out how secondary schools are incorporating ICT into their medium of instruction.

3 Theoretical Approach

The researcher is using the diffusion of innovation theory to describe and triangulate the data of this research. Diffusion of innovation seeks to explain how changes are taken up in a population. Innovation is an idea, behavior, or object that is perceived as new by its audience (Rogers, 1983). The researcher will try to see how teachers are adopting and practicing ICT integration inside the classroom according to education policy using this theory.

3.1 Diffusion of Innovation Theory

Rogers and Shoemaker (1983) stated diffusion as "Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. It is a special type of communication, in that the messages are concerned with new ideas. Communication is a process in which participants create and share information with one another to reach a mutual understanding."

According to Robson, Haugh, and Obeng (2009), "Diffusion of Innovations takes a radically different approach to most other theories of change. Instead of focusing on persuading individuals to change, it sees change as being primarily about the evolution or 'reinvention' of products and behaviors, so they become better fits for the needs of individuals and groups. In Diffusion of Innovations it is not people who change, but the innovations themselves."

According to Rogers (1983) "Innovation is an idea, practice, or object that is perceived as new by an individual or another unit of adoption. The characteristics of innovation, as perceived by the members of a social system, determine its rate of adoption." Rogers (1983) also described the main elements in the diffusion of new ideas as follows:

- 1) An innovation
- 2) Communication
- 3) Time
- 4) Among the members of a social system.

Innovation

How does a particular innovation spread to integrate itself into society? The features which determine to cover the promptness of innovation are:

- (1) Relative advantage – how the innovation is relatively better than present ideas
- (2) Compatibility – with existing values and beliefs
- (3) Complexity – the ease of use can promote the innovation among users, so complexity can be an obstacle for assembling with current values of society
- (4) Trialability –The change can be examined on a limited basis
- (5) Observable results- from people within the social system

In the education of Bangladesh, ICT was introduced as a medium of instruction in 2009 and government made it compulsory to integrate into all schools through the education policy of-2010. So, it is comparatively a new medium of instruction to teachers who are still discovering how it is better than their previous practiced ideas of teachings. The government is trying to implement ICT through the teachers; keeping values are related to nationalism, religion and other ethical issues intact. The government is providing training to the teachers and supplying ICT equipment in schools to removing complexity. They started implementing ICT on a trial basis only in few schools; after a successful pilot, the government is now trying to apply it all over the country.

Communication

Communication is the process by which participants create and share information with one another to reach a mutual understanding. A communication channel is the means by which messages get from one individual to another. Mass media channels are more effective in creating knowledge regarding innovations, whereas interpersonal channels are more effective in forming and changing attitudes toward a new idea, and thus in influencing the decision to adopt or reject an original idea.

Communication between teachers and students, among teachers, and among students is one of the leading ideas of implementing ICT in education. There should be a standard platform for teachers to share their thoughts and also for other stakeholders related to education to communicate.

Time

An individual seeks information at various stages in the innovation-decision process to decrease uncertainty about an innovation's expected consequences. The innovation becomes matured and blended over time.

- (1) Knowledge – person becomes aware of an innovation and has some idea of how it functions
- (2) Persuasion – person forms a favorable or unfavorable attitude toward the innovation
- (3) Decision – person engages in activities that lead to a choice to adopt or reject the innovation
- (4) Implementation – person puts an innovation to use
- (5) Confirmation – person evaluates the results of an innovation-decision already made

Robson (2009) added that "The second way in which time is involved in diffusion is in the innovativeness of an individual or another unit of adoption. Innovativeness is the degree to which an individual or another unit of adoption is relatively earlier in adopting new ideas than other members of a social system."

ICT in education has to be accepted by the teachers and students for sustained and successive use. If teachers can get knowledge about the process and they understand the benefits, they will be able to decide to use it as their medium of instruction. They will make new ideas on how to use it and will make efficient of technology in their teaching.

Social system or members

The fourth essential element in the diffusion of new ideas is the social system. A social network is defined as a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal. The members or units of a social system may be individuals, informal groups, organizations, and subsystems. The social network constitutes a boundary within which an

innovation diffuses. How the system's social structure effects, diffusion has been studied. The second area of research involved how norms affect diffusion. Norms are the established behavior patterns for the members of a social system. The third area of research has to do with an opinion on leadership, the degree to which an individual can influence other individuals' attitudes informally or overt behavior in the desired way with relative frequency. A change agent is an individual who attempts to influence clients' innovation-decisions in a direction that is deemed desirable by a change agency.

As ICT inclusion is a recent phenomenon to teachers in Bangladesh, it may take some time to take the place of traditional methods in teaching-learning. If the social members, especially the stakeholders of the education sector, can remove the social barriers and focus on implementing ICT in a productive way it may bring out the expected result of the inclusion.

3.2 Contextual Framework

At the very beginning, the conceptual framework was divided into two segregated parts: theory and application. The theory section described the applicability of the diffusion of innovation theory to analyze the current situation of ICT integration inside the classroom. At that point, the researcher decided to analyze the data following the diffusion theory components. The interviews evolved with different dimensional concepts were challenging to interpret through the broader theoretical concepts. Therefore the researcher turned towards open coding to analyze the data sets and evaluate the current situation on the five (time) stages structure of diffusion theory.

Since the significance of situation analysis of ICT integration in the secondary schools has been discussed in the previous discussions, this section focuses on the process of evaluating it. The ICT implementation in education will be evaluated based on four indicators: Document analysis, Classroom Practice Evaluation, Extent of ICT and Limitations and Suggestions.

To examine the practices of ICT use in the classroom of government and non-government schools, the researcher used three data collection tools such as Teacher Interview, Students' Group Interview, and Class observation. Collected data had analyzed following the Perceived Attributive Theory.

To do that, "Diffusion of innovation" theory has been used in this study. This method accumulates the necessary components to investigate the form of ICT integration in an education

system. It is a Metatheory of technology that includes many other theories. The researcher has used two focuses of this approach. The first part of the method is known as Roger's innovation theory. Five stages of innovation will help the researcher to find out the implementation situation of ICT in classroom studies. With the help of this approach, the researcher will look through the education policy of Bangladesh, which will give an idea about governments' policy and strategy about this particular phenomenon. It will mainly focus on finding whether schools or teachers are interested in implementing the ICT in classroom teaching or not.

The second part of the theory will try to find out how successfully teachers can imply ICT as their teaching-learning tools in classroom teaching. It will help to define the success and challenges of successful ICT integration in secondary schools. Successful integration will be determined by communication and time, which are the essential elements of the diffusion of innovation theory, as well as by the teachers' capability of using ICT in the classroom.

Following the document analysis, the classroom practices will be investigated to identify the differences between policies and practices. This inquisition would assist this study to find the scopes for further development of current practice. At the same time, the feasibility of the policy statement in the practical setting is to be checked, as well as the extent to how much the schools are prepared to captivate the instructions of policy and curriculum to integrate the ICT components in teaching learning process, is examined. Based on the above findings this study will propose a further course of actions required to develop the current practices of ICT integration in secondary schools of Bangladesh.

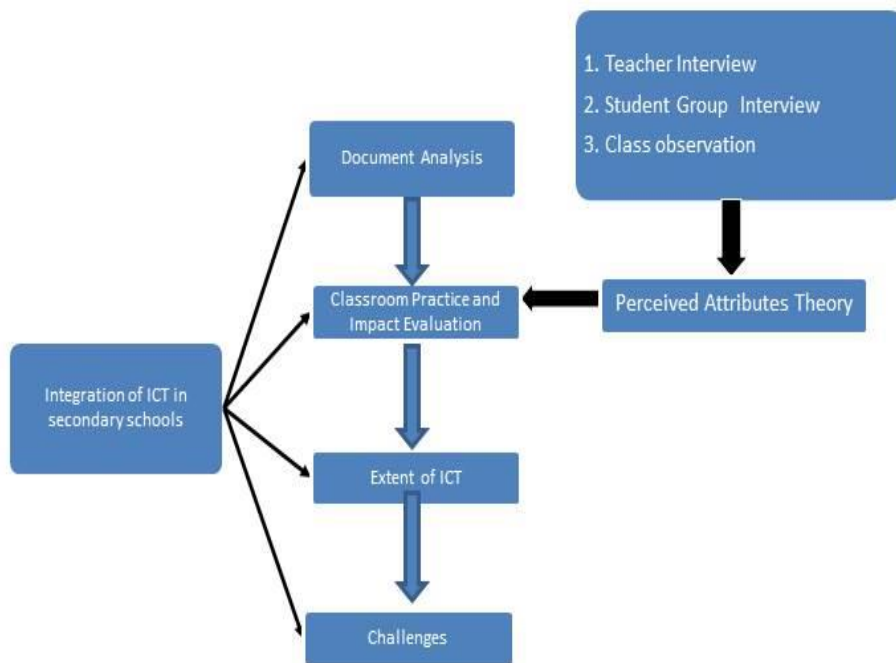


Fig: Contextual Framework

4 Research Methodology

This study analyzed the ICT integration and adaptation as an educational component in classroom teaching-learning process in secondary schools of Bangladesh. It analyzed the recent educational policy of Bangladesh which gave an immense interest to use ICT in the classroom to build up a modern knowledge-based society, as well as to make classes interesting to the students. This study does not intend to provide any generalized view of the education system. It rather aims to offer insight into how the schools are implementing and adopting ICT as a new means of teaching technique.

4.1 Qualitative paradigm

"A research design provides a framework for the collection and analysis of data." (Bryman, 2015). According to Patton (2005), qualitative data tell a story, and qualitative methods allow for an in-depth inquiry into selected issues where attention to detail, context, and nuance are necessary. Regardless of the unit of analysis, a qualitative case study seeks to describe that unit in depth and detail, holistically, and in context. The researcher has used open coding in this study according to the literature review and has made tools according to those codes.

Given the aim of the research, the researcher used a qualitative approach which has been accepted as a reliable method for data collection in social studies. Among various types of qualitative study, he did a phenomenological study to describe the ICT integration in secondary education of Bangladesh. In a phenomenological study, generally, a combination of methods, such as conducting interviews, reading documents, watching videos, and visiting places and events, to understand the meaning participants place on the issues being examined. We rely on the participants' perspectives to provide insight into their motivations (Bryman, 2015).

Phenomenological study helps to get in-depth information about the reality, which is expected from this research in case of identifying the real situation of school teaching. In addition to this realistic feel, qualitative research provides flexible ways of collecting, analyzing, and interpreting data and information. It has an extensive descriptive capability that follows from an array of primary and unstructured data collected through some alternative data collection methods, which also facilitate data triangulation.

Yin (1994) suggested that qualitative research should involve multiple sources of evidence (at least two), such as interviews, observations, and physical artifacts. Therefore, to allow for the expected analytical depth, this research employed semi-structured interviews, focus group discussions, and observation and document analysis. Document analysis, semi-structured interviews and classroom observations were considered as valid data collection tools to answer the inquiry of this study. Findings from the document analysis and the participants' perception of their real-life work experience will assist in getting insight on ICT adoption in secondary schools of Bangladesh. Classroom observation will give a clear view of ICT implementation in the classroom by trained teachers.

4.2 Sample site and Sampling

Dhaka, the capital city of Bangladesh, was selected as sample site for this research because some teachers from every school in the capital have got training on ICT integration in classroom activities according to the list of secondary and higher secondary education board. On the other hand, this site was also convenient for the researcher to collect data regarding contact with school authorities to conduct observation in their schools.

Initially, the researcher planned to follow a purposive sampling of the schools and teachers for data collection following class observation and students group interview. The researcher decided to choose schools from school list of Dhaka city provided by secondary and higher secondary education board. Ministry of Education provided that list of schools those are performing better according to board examination results. The researcher has divided schools into two clusters. Government and non-government schools where teachers got training through different government projects or from NGOs on implementing ICT in classroom teaching. From the groups, the researcher has chosen schools through purposive sampling. However, the researcher had to face following issues to continue with purposive sampling stepping into the field. First, in few schools the annual examination was in progress, so no class observation and student interview were feasible to conduct; second, some of the teachers were not willing to participate in the data collection process. Given that, the researcher decided to alter the sampling method with Snow-ball process. That way, the researcher could reach those schools where regular classes were running as well as the teachers who were interested in discussing the context and issues on the research topic.

Students have been selected by using a purposeful random sampling method. In purposive sampling, sites, like organizations, and people (or whatever the unit of analysis is) within sites are selected because of their relevance to the research questions (Bryman, 2015). This sampling process identifies the population of interest as well as it was guided by research question to get more credible data. The researcher has selected students in between grade 7 to grade 9 purposively as these students are the present students of the school who are experiencing the instruction through ICT by their teachers. Grade 6 students are just new in the school, and grade 10 is busy with their test examination of secondary school certificate examination (SSC). Grade 7 to grade 9 students have been the only available students who have participated in the technology used classes. During focus group discussion the researcher took a group of students where every group is consist of 6 students from the particular school. The researcher also had to maintain the gender equality in co-education schools while forming the groups. In that case, he made two clusters of boys and girls students and used random sampling in both clusters to choose the same number of boys and girls. In boy's school or in girl's school researcher used only simple random sampling to choose the students for focus group discussion. Thus, every group was consisted of students from grade 7 to grade 9, and they were randomly selected from their classroom.

4.3 Data collection methods and tools

Data collection for this research has been done through four different data collection methods. The researcher used semi-structured interview, focus group discussion and observation to collect data from schools and participants. The researcher also analyzed the document "National education policy -2010" of Bangladesh by coding ICT throughout the text. Different data collection methods have been used to aiming to explore the contexts from multiple dimensions.

➤ Document analysis

According to Coffey, Atkinson, and Omarzu (1997), documents are 'social facts' that is produced, shared, and practiced socially (P. 47). Document analysis is a social research method and is an important research tool in its right, and is an invaluable part of most schemes of triangulation, the combination of methodologies in the study of the same phenomenon (Bowen, 2009).

Recent national education policy of 2010 is the first attempt from GOB to integrate ICT in all levels of education. This study intended to find out the difference or similarity between the education policy and the implementation process of the policy in secondary schools' teaching-learning activities. The researcher analyzed the policy first. To make a comparison between policy and implementation, the researcher had to have a good understanding of the national policy where the government considered ICT as a modern instrument of the teaching-learning system. The policy document has been analyzed by searching the text "ICT" in the document to find every discussion about ICT in the policy. The policy is a government document, and it is available in English, so there were no language barriers to analyze it.

➤ **Semi structured interview**

Semi-structured interview is a widely used technique in development research. With a specific theme, the researcher wanted to ask some open-ended questions to the teachers in a conversational style. In a semi-structured interview the researcher should have a list of questions or relatively specific topics to be covered, often referred to as an interview guide, but the interviewee has a great deal of leeway in how to reply (Bryman, 2015). In a semi-structured interview, questions should be open-ended to help interviewees discuss more the phenomenon. The open, discursive nature of the discussions permitted an iterative process of refinement, whereby lines of thought identified by earlier interviewees could be taken up and presented to later interviewees (Beardsworth & Keil, 1992). Questions may not follow the exact outline of the schedule. More probe questions can come out through the discussion with interviewees.

The researcher aimed to know about teachers' motivation behind using ICT in classroom activities as well as their aims and beliefs about this comparatively new instructional technology. He wanted to figure out the direct influence of ICT in classroom behavior of both teachers and students. Conversationally it was possible to get more depth information about integrating ICT in schools and teachers' reaction to the training and other facilities. The interview schedule was both in-depth and time-saving. The researcher made a set of questions which drive teachers to explain the extent, impact, and challenges of implementing ICT in secondary education. He created a certain amount of topic areas so that questions about them can flow reasonably well. Though the questions were open-ended, he also added some prop questions to get an in-depth view of the situation. The interview questions had been made in Bangla, as all the participants

were native Bangla speakers. In the interview guide, the researcher avoided leading questions. As the interview progressed, interviewees themselves raised additional or complementary issues, and these formed an integral part of the study's findings. As participants faced some political and personal conflicts to answer some questions, the researcher made sure the interview guide was structured to shed light on only the facts and information that was necessary to gain and understand the issue at hand. The interview schedule was prepared in the light of the research questions.

➤ **Classroom Observation**

The researcher went for structured class observation to investigate the activities of teachers in using ICT in classroom teaching. Bryman (2015) stated that "Structured observation is a technique in which the researcher employs explicitly formulated rules for the observation and recording of behavior. The rules inform observer about what they should look for and how they should record behavior". This observation was a non-participant process where the researcher only observed the class but did not take part in any activities of the classes. The researcher has observed the class and made notes according to the observation guide by using pen and papers. The researcher also has seen the school preparedness of ICT, such as infrastructure facilities in the classroom, ICT lab, and student-teacher ratio.

The observation was also necessary to observe how teachers are using ICT in the teaching-learning process as well as how students are responding to these types of classes. Observation also gave the researcher a chance to cross check the data provided by teachers and students. If anything exceptional happened during the class time, the researcher took the remark for further comparison with data.

With the consent of the headmaster of the school, the researcher went to observe the classes. He observed the classes of those teachers whom he interviewed before. The researcher followed the observation guide which helped him to address ICT related usage on classroom practices. He observed the extent of using ICT in teaching and learning and how long teachers are using ICT in class. The researcher also tried to notice how the teachers were introducing technologies according to their lessons and how students were receiving it. Responses from the students were

also important elements to be observed. It was also essential to find how teachers were using their pedagogical knowledge to include ICT in their teaching.

Use of technology, in the discussion of different topics, was also observed by the researcher as it ensures the reliable use of technology in teaching and learning. The researcher tried to figure out the challenges faced by teachers during class time which was including classroom management and setting up the ICT tools. During group work, the researcher also looked around to figure out how students involved themselves with this new instruction method applied by their teachers. The researcher also took notes and wrote comments in his observation guide after observing every class.

➤ **Focus group discussion**

Before going for data collection, the plan was to take individual interviews of the students from different classes. Unfortunately, final examinations in the schools, as well as board examination for grade 8 students, were soon. So, their parents did not allow taking one on one interview, as it would have taken extra time after school hours and could hamper students' preparation for the examination. Henceforth, the researcher decided to go for focus group discussion which helped to gather more information applying the same amount of time. According to the main objective of the study, the researcher facilitated the discussion sessions by using some critical questions about the agenda.

Focus group discussions helped to get more information about the situation by generating more ideas and issues among the participants. According to Bryman (2015), "An individual may answer in a certain way during a focus group. But, as he or she listens to others' answers, he or she may want to qualify or modify a view; or may wish to voice agreement to something that he or she probably would not have thought of without the opportunity of hearing the opinions of others. These possibilities mean that focus groups may also be beneficial in the elicitation of a wide variety of different views about a particular issue."

A guide for FGD questions was made get more information in a short time from a group discussion of students. In formulating the FGD questions, the researcher has focused on how these problems support or disagree with the data collected from teacher's interviews. This FGD guide was made with some key questions for reaching the depth in discussions and getting

definite ideas about the situation. However, in the interview session, the researcher added more probe questions to encourage the interviewee to give detailed responses as well as stay focused on the topic. The researcher developed a version of the semi-structured interview and FGD questions. These questions helped to get a bright idea about the real situation in classroom practice.

The researcher conducted four FGDs in four schools and interviewed teachers from five schools. Teachers and parents from one government school did not allow the researcher to interview students as their final examination was nearby. There were six students in every group, and they were selected randomly from grade 7 to 9. Two schools had both male and female students, and rest had either all males or all females. It was also ensured to take the same amount of male and female students in a group to maintain the gender equality. The researcher introduced himself and his project at the beginning of the discussion and started the conversation with greetings. Then, he wanted to know about the learning experience in classes where teachers use ICT to teach them. Students expressed their comments, and they also added the difference between classes where ICT is used and where it is not used. The researcher was guiding them to stay in line with the research questions, and they were keen to explain the situation of their classroom and schools.

In an FGD, it is usually not difficult to write down precisely what people say, but who says it. In an individual interview, it might be possible to ask a respondent to wait while notes are taken. But to do this in the context of an interview involving several people is disruptive. The researcher was interested in who are expressing their views and how they were reacting to every question, but it was painful to look and listen in different directions in a particular moment. He instructed the participants to speak one by one by raising hands, but sometimes they could not maintain it and started talking together. The researcher recorded the whole conversation after taking their consent and students also tried to cooperate as much possible.

The parents of some students were concerned about the interview questions and procedure, so researcher took their consent also before starting the group discussion. Beside the FGD guide, more questions were raised during the debate through the answers given by students. Sometimes, students disagreed with each other's opinions; they tried to express their own opinions about the issues, but most of the time, in all group discussion, students agreed with each other's statements.

4.4 Data analysis

The researcher has made his data transcription in Bangla as the interviews were conducted in Bangla. Then he has translated into English. He went for open coding after completing all the transcriptions and translations.

First, the dataset was broken into manageable pieces which meant the researcher did not analyze the whole interview conversation; instead, he took the portions which are related to the research questions.

Second, he has taken these parts of the data and explored them for the ideas contained within. The ideas came from the interpretation of data which lead the researcher to create a thematic code for data interpretation.

Third, the researcher made the code by following the framework of grounded theory whereby data were broken down into parts and the parts were given names. The data were treated as potential indicators of concepts, and the signs were compared continuously.

The researcher set the theme according to findings, and not just to take a phrase from raw data and use it as a label. Instead, the researcher searched for the right word that best described what the researcher believes conceptually. Corbin and Strauss (2008) also support establishing themes which indicate the correct status of data.

4.5 Presentation and Interpretation

After analyzing data, it was explained under the themes used in the analysis. The data were presented in a shape that resembles the phenomenon being studied. Ideas had been generated through the topics and interpretation had been done according to research questions. After going through all the data, the theme has been conceptualized according to the importance which can best answer the research questions. No predetermined theme has been taken, and the researcher has chosen the themes under the light of literature review and findings.

Data was divided into three parts according to data collection methods; interview data was translated and separated under each research question, the same process was followed in case of FGD data. The researcher arranged the observation data by following the observation guide and presented it with the same theme as of the interviews.

4.6 Unit of comparison

The researcher tried to make a comparison between the latest National Education Policy 2010 and the present situation of its implementation process. The policy was analyzed by taking ICT as the main component. The researcher made interviews of teachers, students and observed the classes and triangulated the data to draw a detailed picture of the present implementation situation comparing the data collected from various sources.

Teachers gave their opinions in in-depth interviews about how they are trying to integrate ICT and what kind of impact they found after the integration. FGD data was collected to justify data from the teachers' interviews. Classroom observation was made to check out the behavior of teachers and students and triangulate the data with the data given by the same sample group in interviews.

4.7 Trustworthiness of findings

The most common criteria for evaluating research quality are reliability and validity. These are sometimes seen to be more suitable for quantitative, rather than qualitative, research (Lincoln & Guba, 1985). Their main objection is towards the positivistic idea of an objective reality the validity concept holds – it does not take into consideration that there can be more than one absolute truth about the social world. Thus, the verification concept trustworthiness will be used instead, which can be verified by providing arguments for the transferability, credibility, dependability, and conformability of the findings.

Credibility refers to how believable the findings are from the participant's perspective–. To increase the credibility and dependability of the study, data has been triangulated from multiple sources (Bryman, 2015). By talking not only to the teachers but also to the students, an additional perspective on ICT usage in teaching and learning at schools was provided. Besides, the observation was also done to cross check the information given by both parties of interviewees. When different respondents talked about the same issues, but from slightly different perspectives, the researcher became more specific in his understanding and was able to combine them. Many times, questions were repeated, reformulated and followed up to ensure the knowledge of the responses correctly. Notes were taken during all interviews and followed up by a short written summary of the session. Although the interviews were transcribed during and

straight after fieldwork, it was helpful to be able to go back and read the immediate thoughts and reflections on the material.

Transferability relates to the possibility to transfer the research to other settings. To enable this, a contextual framework of the research setting is provided in chapter 5. Transferability also refers to the generalizability of a study. The phenomenon studied in this study can be generalized in similar kinds of content or similar backgrounds. Developing countries who recently adopted ICT in their education has an excellent opportunity to use the settings of the study.

Dependability accounts for the quality of the analysis and the data collection. The interview guide was pilot tested with the assistance of two friends in class before leaving for the field. Through this, useful insights have been made, and the researcher got a clear view of how to behave as an interviewer. Questions that did not make sense were clarified, and some probe questions were added to gain the insight of the situation. The researcher has attempted to describe the research process in methodology chapter before and through that increase the dependability of the study.

Confirmability relates to the fact that although the researcher cannot be entirely objective, he or she can act in good faith. It was a great plus for the researcher to be a native of the same place as of the study site. As a native Bangladeshi, the researcher had some ideas about the context beforehand, though he tried his best to set aside these presumptions during the data collection process. The researcher did the extensive reading before going to field work, and during data analysis, he went back to his transcribed material continuously to avoid the misinterpretation of data.

4.8 Ethical Consideration

Clearance had been taken from the Norwegian Center for Research Data to interview teachers and students and to observe the classroom practices. The researcher's supervisor also agreed to send him to his own country for data collection by using the approved data collection tools.

Ethical clearance had been sought from headmasters of the schools that were sampled for the study. The objective of the research and purpose had been explained to them and also to the participants. Consent had been sought from the participants before starting the interview. Respondents were assured and guaranteed that the collected data will be managed with the

highest level of confidentiality and that each of them is free to withdraw own-self from the study at any time without any explanation to the researcher. The respondents were also informed about their right of having access to the final result of the study.

4.9 Limitations

In this study, the researcher and especially the respondents are not native English speakers. The interviews, therefore, were conducted in Bangla to allow the respondents to talk their mind with natural fluency and spontaneity. The interview and FGD transcriptions were translated into English later and were triangulated with the translations through another native. However, in qualitative research, interpreting the meaning of the responses through translation is critical to represent the respondent's perspective originally. In this study translating the interview questions from English to Bangla and the data sets from Bangla to English was challenging for the researcher. Though he tried his best to present the thoughts of the interviewees and translation and interpretation was done by data triangulation to ensure the validity of the languages, introducing minds of people remained challenging. As some of the teachers did not have clear ideas about the recent education policy, it was difficult to explain the correlation between policy and practice when the researcher wanted compliance from them.

Time limitation was another limitation of this study. As the yearly final examination was nearby, most of the students wanted to be done with the FGDs quickly. Teachers from government schools were also in a little rush as their schools were public examination venues and they were taking preparation for that.

Also, this study was performed only in Dhaka, the capital city of Bangladesh. This does not represent the overall situation of the whole country. The researcher tried to get a primary idea about the implementation of ICT. Admittedly, there is more space to conduct further research on this topic.

5 Contextual Information

Making and implementing an education policy depends on some others social circumstances of a country. Maintaining social, cultural, economic, political issues within the policy is very important for further implementation. It takes a long time to build up a sustainable system in every sector, especially in education. This chapter will present the information related to the education of Bangladesh. It will give an idea, how Bangladesh has designed and improved their education system over the years. It will help the readers to get an overview of Bangladesh and its education system at a glance.

5.1 Background of the Education of Bangladesh

Bangladesh is a developing country of South Asia who has got her independence in 1971 after a bloody war against Pakistan. As a brutal war effect, Bangladesh was suffering for food and shelter and depending on foreign aid for a long time after independence. It was a big challenge for Bangladesh to develop a policy, especially for education just after the liberation as the war made the disastrous situation all over the country. Instead of some barriers, first GOB formed a commission for education which named Kudrat-E-Khuda education commission-1972 according to the name of the chairman of this committee. Though this commission recommended making national curriculum by considering the rights of education declared in the constitution, it did not happen immediately because of some compelling reasons like natural disasters. In 1976 another committee formed to effectuation the recommendations of the first commission, and they started to implement with the educational expert. After this commission, GOB formed another three education commissions and one education committee till 2010. In 2010, GOB came out with a particular education policy for the first time in their history. They also made a master plan of ICT integration in 2013 followed by the policy.

Bangladesh has ensured the right to education for all the people of the country by constitutional law. According to the constitution of Bangladesh, every child of Bangladesh has a right to get at least primary or primary education. In section 17 it is said that:

Free and compulsory education: The State shall adopt effective measures for –

(a) establishing a uniform, mass-oriented and universal system of education and extending free and compulsory education to all children to such stage as may be determined by law ;

(b) Relating education to the needs of society and producing properly trained and motivated citizens to serve those needs; removing illiteracy within such time as may be determined by law.

The education system in Bangladesh consists of pre-primary, primary, secondary and higher education. These are the levels of formal education of the country. Secondary education is divided into three sub-stages as junior secondary, secondary and higher secondary respectively. Primary education (grade 1 to 5) is compulsory for all the children of Bangladesh according to compulsory primary education act of 1990, as Bangladesh pledged in EFA. Till now secondary education is not mandatory for all the children of Bangladesh, but the government is pushing all by giving free access and supplying books to the female students (UNESCO, 2007).

Two governmental ministries manage and control the education system of Bangladesh. They are the Ministry of Education and the Ministry of Primary and Mass Education. These two ministries run the whole education system with the help of attached departments and directorates, as well as some autonomous bodies. MOE is concerned with policy formulation, planning, monitoring, evaluation and execution of plans and programs related to post-primary, secondary and higher education. Directorate of Secondary and Higher Secondary Education (DSHE) which is attached with MOE is responsible for administration and management in secondary education level.

Teacher Training

Appropriate Teacher Training is one of the most critical factors, in the context of the teaching-learning process, to enhance the quality of education. The present conventional, theory oriented, and inadequate approach to training needs to be addressed in bringing about quality changes to cope with the demand of time. In Bangladesh, the success in achieving the quantitative targets has failed to bring essential learning attainment level for all learners in respect of obtaining the quality education. Many factors are backpedaling acquirement of the crucial level of teachers' qualification. Knowledge, skill, and attitude for clear understanding and practice of need-based training are some of them.

There is 14 Govt. Teachers' Training Colleges (TTC), 119 Private TTCs, 5 Higher Secondary Teachers' Training Institute (HSTTI), Physical Education College, Vocational Teacher Training College (VTTC) and Technical Teacher Training College. Bangladesh Open University also provides teacher training to secondary school teachers. Some private universities also have B.Ed and other types of teacher education programs. Institute of Education and Research (IER) also provides Honor's and Master's degree in education (Saleh Motin, 2008).

It is not mandatory to have a pedagogical degree before joining in the teaching profession in Bangladesh. Most of the teachers start their teaching practice only with their subjective knowledge though Bachelor of Education (B.Ed) degree is mandatory for their professional improvement. Since, B.Ed degree is a prerequisite for promotion, increment, and permanence of job; teachers are more willing to achieve a B.Ed degree from any institute that is providing. On the other hand, government TTCs has not enough capacity to accommodate all teachers of the country. SO, quality of teacher education remains an issue in secondary education of Bangladesh (Ahsan, Sharma, & Deppeler, 2011).

The present curriculum using in B.Ed last developed in 1996, and till then it has not yet revised although there have been many changes in the secondary education's curriculum. Bangladesh Open University (BOU) and some private TTCs' run their B.Ed courses for not more than 200 contact hours which is one-sixth of the government TTC's contact hours (ADB, 2015)

Apart from these pre-service teacher training, there are some short-term in-service training are providing from different government projects. Among them TQI- Teacher Quality Improvement (duration 14 days), CPD- Continuous Professional Development (duration six days), Subject-based training (for six days) and workshops on different issues are mentionable. Although short-term training is essential, there should be more follow up training to ensure the maximum outcome of these in-service training.

Teaching and Learning Methods

Most of the teachers use conventional teaching methods in their teaching and learning approaches in the classroom. B.Ed curriculum was last modified in 1996 which is backdated now; as a consequence teachers are not getting any modern ideas on practicing or improving their teaching methods. Among the conventional methods lecture method is used in most of the

classes all over the country. Besides, teachers also use discussion, brainstorming, group work, demonstration, role plays, etc. as an instruction technique in their classrooms. According to ADB (2015), most of the teachers of Bangladesh is using teacher-centric methods in their teaching where students have least chances to explore their thoughts and ideas about the topic.

After introducing ICT in education teaching and learning is becoming more student-centered and interactive. Students seem to enjoy lessons more than before, and school attendance also increased in last few years (ADB, 2009) More visualization of object and lively presentation is helping students to achieve sustainable learning whereas previous teacher-centric methods were not that fruitful (a2i, 2012)

5.2 ICT integration in education of Bangladesh

The Government of Bangladesh (GOB) has taken an initiative of formulating their first ICT policy in 2002 but did not succeed because of inactiveness of the stakeholders. In term of present government, a revised policy has passed in 2009 where they took almost all the components from previous one and include an action plan to implement it successfully. The aim of this well-developed policy is reducing poverty and unemployment by producing an ICT knowledge-based society throughout the country. It was most important to include ICT in education to achieve the objectives of digital Bangladesh. According to the policy statement, GOB emphasized on boosting the use of ICT tools in schools, improving the quality of education through ICT, more access to education and resources, ensuring ICT tools for special needed students, etc. The policy also gave importance on initiating diploma and trade courses for the teachers to build their capacity of using ICT tools in classroom practices (Wallet, 2014).

Although the Government of Bangladesh is trying to integrate ICT in education almost for a decade but still the result of the integration of ICT is not that extensive like other sectors. There are both external and internal obstacles GOB has been facing to implement ICT in classroom practice. Infrastructure, unavailability of equipment, lack of technical support, etc. are considered as external obstacles. On the other hand, internal barriers include school levels and teacher levels factors such as an organizational practice or teacher's motivation of using ICT in the classroom (Parvin, 2013). Most of the educational institutions had not managed to implement ICT in teaching –learning activities because of their lack of resources, training, and motivation. Some institutions in big cities have the facilities in the classroom, but still, they cannot

implement it successfully because of the lack of vision and planning. Therefore, government and some NGO's are trying to train the teachers and providing infrastructure facilities to achieve successful integration of ICT in all level of education as a part of government's vision of making a digital Bangladesh within 2021 (Khan et al., 2012).

Educational institutions of Bangladesh mostly use their computers for storage and printing purposes. For instance, Upazilla education offices (UEO) have their chance to use computers for administrative purpose whereas primary and secondary schools are hardly using ICT in their organizational activities. The Internet has been reaching the remote areas of the countries and mostly by the help of mobile operator companies (Rahman et al., 2012). Moreover, most of the schools of Bangladesh do not have a proper plan, support or essential training for implementing ICT in the classroom. They also don't have the vision to make school digitalized through the integration of ICT. The shortfall of a vision for the successful integration of ICT into teaching-learning process makes the situation worse (Tondeur, Van Keer, van Braak, & Valcke, 2008).

Previous studies described the situation of ICT usage in different levels, but those reviews were not exclusively connected with the education policy. Most of the studies were focused on the challenges, and some mentioned the limited extent of ICT usage as well. Researcher, in this study, assume that the situation has changed over last few years because of the implementation of the master plan of ICT which was a consequence of national education policy. Also, ICT implementation in education is an ongoing process, so it can be re-examined that are there the same loopholes remaining in the application or are there some new problems emerged in this issue.

5.3 Government vision and initiatives on ICT integration

The government of any country should have to be very clear about their national ICT policy that involves all sectors including education. ICT in education is one of the sector plans of national policy which is linked up with other sectoral programs, policies, and development. Sector Wide Approaches (SWAs) play a crucial role in integrating all sectors under a standard policy. If government faces difficulty in allocating money for large ICT investment, then PPPs (Public Private Partnerships) can be significant drivers to solve the financial problem in this sector. Private enterprise can usually move faster than governments to exploit the benefits of ICT (ADB, 2009)

As part of its development aspirations, the government of Bangladesh has established Vision-2021. GOB has come up with the National ICT Policy-2009, National Education Policy-2010 and Master plan for Information and communication technology in Education- 2013 to act as a catalyst in the country moves to become Digital Bangladesh by 2021 and thereby upgrade its position from developing to a middle-income country. In pursuit of Digital Bangladesh by 2021, it is vital that Bangladesh invests in Information Communication Technology (ICT) to improve its human capital to ensure that a trained and skilled and well-educated human resources are created as human capital which is the crucial tool to boost the country's development. Approximately 106 textbooks of primary and secondary levels are converted to e-books, an electronic version of textbooks and published by the National Curriculum and Textbook Board (NCTB). Government is also establishing digital classroom and ICT laboratories in schools. Education wing has been established under the a2i (Access to Information) project to support the digitalization of the schools and to organize more training and providing instant facilities. Beside this, private schools are also increasing their ICT facilities in the classroom and trying to ensure better teaching-learning environment. Different NGO's are also working with some private schools to enhance these services.

Information and communication for Development society (ICTD) think ICT can bring a positive and sustainable development in the education sector which can also bring the economic freedom to people (Gutterman et al., 2009). Likely, to ensure education for all, improve the standard of education, get more skilled workforce, eradicate the digital discrimination GOB also has taken a master plan in 2013 on implementing ICT in education, which supports their education policy taken in 2010. According to Ministry of Education (2013) "policymakers in Bangladesh widely accept that access to Information and Communication Technology (ICT) in education can help individuals to compete in a global economy by creating a skilled workforce and facilitating social mobility."

According to ICT master plan (2013), MOE destined some implementation strategies for ICT in education. There, they emphasized on collaboration between government and non-government organizations for sharing experience and resources. Moreover, in this plan they identify the need of sufficient funding, ensuring people's participation in all level, using modern and sustainable technologies, enhancing the skills, prioritize ongoing implementation projects and providing safe

and effective technology use. Followed by this master plan "Access to Information" (a2i, 2016) reveal that establishing full-fledged computer labs in every school was expensive, as a result, the started to equipped school with one laptop and projector as a pilot project to introduce multimedia classroom. After taking the very positive feedback, they began to establish MMC at all schools of the country.

At present, among 19,847 secondary schools of Bangladesh, 16,859 schools have the computer now in their schools, and 15,085 have multimedia to use ICT in their classroom practices (BANBEIS, 2016). MMC allowed teachers to present complex ideas through audiovisual contents and students started to get a better understanding of previously completed topics (a2i, 2012)

In the process of education, the human is the central element, but there is always a limit of the human part. Other interventions need to be brought out to overcome the limitations and for successful delivery and transformation of knowledge. ICT is taking this potential role of contributing to improvement in the effectiveness and efficiency of education in general (UNESCO, 2004).

5.4 How ICT blended in Education Policy of Bangladesh

Haddad and Demsky (1995) described policy as an explicit or implicit single decision or group of decisions which may set out directives for guiding future decisions, initiate or retard action, or oversee implementation of previous decisions.

Information and communication technology (ICT) policy, as noted by Hafkin (2002), can be categorized into vertical, infrastructural, and horizontal policies. Vertical ICT policy addresses sectoral needs, such as education, health, and tourism. The infrastructural aspect deals with the development of national infrastructure, and this is closely linked with telecommunication. The horizontal element deals with the impact on broader aspects of society such as freedom of information, tariff, and pricing, privacy and security.

Here researcher has found out the elements of the education policy of Bangladesh which supports the government vision of ICT implementation. Besides, the researcher wanted to figure out how GOB emphasized ICT in education policy and what the policy describes on ICT integration.

Table: Analyzed education policy by taking ICT as the main component of analysis

No	Statement	Chapter	Page no	Sl no	Remarks
1	to extend the use of information and communication technology (ICT) instrumental in the educational process at every level	Education: Aims and Objectives	9	21	Use of different technologies in extended level.
2	The instruction related to information technology will be delivered through books as long as the infrastructure is not adequately developed and an adequate number of computers and teachers cannot be provided.	Pre-Primary and Primary Education: Curricula and Syllabi	13	5	Government is intended to develop the ICT infrastructure
3	There will be three streams at the secondary level, general, madrasa and technical and each stream will have several branches. However, for all streams, uniformity will be maintained through some stipulated compulsory subjects, such as Bangla, English, Bangladesh Studies, General Mathematics and Information Technology.	Secondary Education: Curriculum, Syllabus, and Textbooks	21	2	Information Technology is a compulsory subject for every stream
4	Measures will be taken to expedite government support on a priority basis (such as salary and benefits of teachers, the instruments and materials for teaching sciences etc.) to the schools offering various subjects of science or subjects related to social sciences and business studies, such as economics, accounting and other subjects like information technology, computer	Secondary Education: Economic activities and development of technology	22	10	Importance of ICT in economy and development.

	sciences connected with technical education. All these subjects are closely related to economic activities and development of technology.				
5	Highest importance will be given to turn our students into competent manpower through vocational and technical education with an emphasis on science, technology and especially on information technology.	Vocational And Technical Education: Aims and Objectives	24		Highest importance of ICT to develop human capital.
6	The country needs to develop in these sectors including Information and Communication Technology (ICT). It needs competent manpower to meet up internal needs. Moreover, there is a high demand of skilled manpower abroad and this will gradually increase over the coming years. And the export of skilled manpower can increase our foreign currency earning. Development programs will be undertaken to build up competent manpower in view of national and international demands.	Vocational And Technical Education: Aims and Objectives	24		Making an ICT knowledge-based manpower to export skilled manpower.
7	To provide science education to the learners in a way so that the learners understand that there exists a close relationship between technology and humanities and each of them is complementary to the other; Science will be taught as a coordinated discipline.	Science Education: Aims and Objectives	38		Making a correlation between technology and humanities through ICT.
8	Change is again taking place in the 21st century because of ICT revolution. By	Information Technology	40		Eradicate poverty,

	<p>becoming a part of this revolution, Bangladesh, as a developing country, has found remarkable opportunities to alleviate poverty. Proper use of information technology can lead to the achievement of expected skills.</p> <p>Technology can play a vital role in the eradication of corruption by bringing in transparency in the state machinery.</p> <p>More attention will be given to prospective areas of export such as software, data processing or call center services industry including the supply of skilled manpower in information technology.</p>	Education: Aims and Objectives			corruption and create skilled and innovative labor forces through ICT integration.
9	to operationalize the libraries through ICT by phases and thus open up ways to access global knowledge;	Library: Aims and Objectives	56		Access to global knowledge through ICT
10	to train teachers of all levels in information technology and to ensure wider use of IT to build up a modern and developed Bangladesh;	Teachers' Training: Aims and Objectives	65		Teacher training on using ICT in school.
11	Internet connection will be provided to all educational and training institutions to help all academic staff/personnel update themselves with the latest information.	Teachers' Training: Strategies	65	11	Ensuring internet facilities in all educational institutions.

12	The proposed creative system of evaluation is oriented to that end. The proper implementation of this system will depend on the preparation of right kind of textbooks, set of rules to prepare question papers and an effective understanding of the process.	Examination and evaluation	58	3	Nothing specifically said about the use of technologies to evaluate students' performance.
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** In women education there are specific goals for gender, reproductive health, and vocational education. There is a vision to emphasize women empowerment but nothing about using ICT to empower women.

** There is still no plan to use technologies to evaluate students' examination paper in school. Though OMR (Optical Mark Reading) has been using in Bangladesh almost for last two decades. There is no scope for attending the online examination at any level of education.

** Very low use of ICT in admission procedure in schools. Manual written test has taken as the procedure of admission in most of the schools and colleges.

** E-text book is available.

6 Findings

In this chapter, the data has been presented which was collected through interview, FGD, and observation from different secondary schools of Bangladesh. Under every theme according to research question the data will be organized by maintaining the sequence of interview of teachers, FGD of students and researcher's observation.

After data transcription, the researcher did open coding by which he can find the answer to the research questions. Open coding requires a brainstorming approach to analysis because, in the beginning, analysts want to open up the data to all potentials and possibilities contained within them. Only after considering all possible meanings and examining the context carefully is the researcher ready to put interpretive conceptual labels on the data (Corbin & Strauss, 2008).

6.1 Extent of ICT

6.1.1 Infrastructure and technological devices

Teachers

Most of the teachers both are using different types of devices in their classroom. Among them, almost all the teachers had given their focus in using computer or multimedia in their classes. Apart from computer some of them use a calculator, mobile phone, audio recording player, microphone, sound-box, microscope in biology classes, etc. To amplify the images and videos, they also use the projector in the classroom.

According to G1T1 and NG3T1 science teachers have more opportunity to use different types of technology in their classes; on the other hand, language classes have less chance to use various technologies apart from audio player and computer.

NG1 School has a biometric process to ensure teachers presence at schools. Teachers put their fingerprint on this biometric machine when they start their official school time and again when they leave. This school is the only institution from the sample schools that use this digitalized biometric device to ensure teacher's presence in the school. Rests of the schools are still using the paper signing to assuring teacher's attendance.

Directorate of Secondary and Higher secondary education helped every government school to build at least one well-equipped computer laboratory on school premises. These schools also got more than one projector and laptop for using in other general classes. Though, teachers from government schools think that they have limited resources than non-government schools. They claimed that government has not enough budget for the schools which can make a rapid influence in implementing ICT integration in classroom teaching. Teachers usually cannot use computer laboratory for their classes as all the students have a compulsory computer course in secondary education and this lab remain busy always with students from different levels. Therefore, one or two projectors given by government and teachers' laptop are the primary resources to integrate ICT into the classroom. Hence, teachers need to cooperate among themselves to distribute the supplies as every one of them can use technologies at least minimum number of time.

Government school teachers also claimed that they could not buy the technologies as they wanted. If they're going to implement something new they need to give a requisition to school administration. It is a lengthy process and takes a long time even to repair any device. G1T2 noted that-

"Non-government schools get fund from different sources. They also charge extra money to the students to integrate ICT into the classroom. It is possible for them to decorate their whole school with the technological devices. Contrariwise, government schools have no other funds without the budget given every year which does not allow the institution to carry the cost of getting more resources in classes."

Few teachers also added that whatever the resources have already provided by the government some of them already get ruined because of the carelessness of the institution. They need a minimum number of staffs to take care of all technological devices.

G2T1 from government school also added that -

"After getting an excellent training about integrating ICT in my lessons when I came back to school to implement it, I faced several problems including lack of resource. Our school has only one classroom where we can use multimedia to present our digitalized content in front of the

students. So, I cannot use it more than once in a week as I need to give an opportunity for other teachers also."

Teachers from non-government schools have a different experience from the government schools. Some NGS have right enough resources to implement ICT in every class, but some of them do not have enough. NGS1 and NGS3 both have only one single room equipped with all technologies. So they are facing the same problem like government schools and need to share the room with other teachers. Though these schools have enough fund to include technologies at a larger scale in their respective school, their administration is not enough devoted to the integration of technologies. On the other hand, NGS2 is well equipped with technological devices in their school. Almost in all rooms, they have projector and whiteboard for display, teachers can borrow a laptop from teachers' lounge or can use their own. Though they have equipped classrooms for an extended period, still they are facing problem to take care of the devices which making unavailability of technological devices nowadays. Teachers from NGS2 claimed that-

"We have 12 rooms where we can project digital content, but lack of maintenance most of the devices are not working right now, in this situation we are using only two rooms for the classes where we want to integrate ICT in our teaching-learning. Though most of the teacher wants to use technologies in their classes and they are making their lesson plan according to that, they are not getting opportunities. Suddenly the implementation process went down from the previous year."

Students

Students usually use a calculator in their math and physics classes. Students who are not studying science have less opportunity to use technologies in the classroom or school. Typically, students do not get any chance to use a computer in their classroom activities. Teachers use the laptop and projector to show the presentation made by either picture or video or any other content. Students have almost no chances to operate technologies in classroom activities.

In large classrooms teachers use microphone and sound-box to reach their voice to all students, sometimes students also get the chance to use this mic during their presentation or to give any speech in the classroom. In most of the schools, students are not allowed to use a mobile phone

on school premises and in some schools, it is strictly prohibited to bring mobile phones or tab in school premises though many of the students use these technologies at their home.

Observation

Most of the schools are facing the lack of infrastructural resources very seriously. Though every school has a computer lab and at least one classroom with ICT equipment, it is not enough for their students. All the schools have more than 50 students in every classroom, whereas none of the school has more than 40 computers in their laboratory. As there are only one computer and projector in the classroom, there is no opportunity for students to use the technology. From researcher observation, it has been found that most of the teachers use computer and projector in their classes. It is not evident that they use this multimedia facility in their every class as they have not enough classrooms with such kind of services.

Teacher NG1T1 has used a calculator in his math class, G1T1 has used microphone and sound-box to deliver a speech in the classroom, NG2T1 has used the microscope in his biology class.

Some schools have no electricity back up to support technological devices when load shedding happens. Only one school (NGS) has this facility that they can use technology up to 1 hour even they get out of power supply from the leading electric supplier.

6.1.2 Extent of ICT in Instructional design and content development

According to Dasari (2001), "Instructional design is a systematic, repetitive process of activities aimed at creating a solution for an instructional problem. The steps involved in instructional design are; setting an instructional goal; goal analysis; learning domains; learning outcomes; prepare criterion-referenced test questions and a clear instructional strategy". The researcher tried to know in what extent teachers are using ICT in their instructional process in the classroom and how they prepare for the lessons or develop a plan to illustrate in the classroom.

Teachers

Teachers make their strategy of instruction according to their content of the discussion. The government of Bangladesh has a web portal for all the teachers of the country where all teachers can get access to their specific ID number. Teachers can upload their own created digital content

of any topic and also can download any item shared by their colleagues. This portal is a kind of open space where every teacher can show their skill in developing digital content which can help others to instruct in the classroom.

There is a group of teachers who are trained and paid by the government for developing content regularly. They make the content of their specialized subject. This teachers group is called as "content developer." There is also an approval committee who approved the materials before uploading to government portal and before being presented for all teachers of the country. As a result, teachers who are not expert in making digital content or who do not get much training to implement technology in the classroom can quickly get readymade content from the portal and can use it in classes.

Teachers who are developing contents with government projects get some more training on content development at home and abroad. They are also eligible to train the teachers of their school. The number of teachers who can develop content regularly beside their daily school activities is relatively low. So, it is not possible to find most of the material of every particular subject in government portal. In that case, trained teacher try to make their content and strategy of instruction by using ICT. On the other hand, as they have to take lots of classes in a week and they have no extra time for developing own strategy, most of the teachers want to follow or copy other's content. G2T1 said-

"As I have to take 26 classes in a week, I cannot make any content during my official school time. I need to spend time from my personal life if I want to make digital content for every class which is not possible and without digital content development it's not possible to use ICT effectively in the classroom."

Because of less available contents in government portal teachers of social sciences are not so interested to use technology in their teaching-learning process. They want more developed content related to the curriculum which they can use efficiently use in their lessons. Teachers do not want to spend extra time on developing digital content for every chapter.

Students

Students have nothing to do with developing content according to lessons, but they can realize or understand the experiences very well when an expanded material is used in the classroom. Almost all the students feel comfortable in classes when they can find a relationship between what teacher is showing on his/her digital content and the lessons from the book.

If students cannot relate to teacher's content and the lesson from the book it cannot be an efficient use of technology. Students from G2 faced this kind of problems in the beginning when multimedia used classes introduced in their school. According to them, it was challenging for first few days to interrelate between books and classroom activities. After a certain period, they found the correlation between the content showed in the class and lessons from books.

Observation

A digital text and images designed for display on web pages which are suitable for a particular audience are called as e-content or digital content. It means, any content product available in a digital form and it typically refers to music, information, and images that are available for distribution on electronic media (Saxena, 2011).

Most of the teachers both in government and non-government schools use the readymade content from the government web portal. They download the content and show it in the classes which make an audio-visual impact to the students. As there are not so many contents collection in that portal, teachers do not use technology when they do not find any developed digital content allied with their particular topic. Very few teachers are willing to create a new content according to their topic and lesson plan.

On the other hand, few teachers like G1T1, NG1T1, NG3T2 who are directly involved with model content development in different projects, are very much interested in making new contents for various lessons. They get some reward when their content gets approval from government portal to publish for all others. In that sense, they spend their time to developing content for the interest of the award or remuneration. But these practices of generating content on a regular basis made them skilled and expert in both curriculum and technology. As a result, now they quickly establish a correlation between subject topic and technology uses.

Moreover, there very few teachers like NG2T1 who developed digital contents for almost all topics and lessons of a particular subject. Though he got some training from government projects, he has learned more about ICT use in education because of his passion. He has made an archive or collection of the contents which he uses in his classes. He also made a private website to share his materials with the other teachers of the country. Though an expert team does not approve these contents, still it can show different teachers a way of integrating ICT with their topics. On this note NG2T1 said-

"Many of my colleagues were laughing at me when I started to make digital content for my classes, but now they encourage me for these and also want to learn from me how they can make a good correlative digital lesson plan for their subjects. Though all of my contents are not approved from government web portal, still I want to share these with all teachers of the country who did not get any training or have not enough facilities to make content."

In some of the classes, content looked interesting and informative which can easily attract student's concentration by its audio-visual effect. But in some other courses students were not enjoying the classes because of irrelevant information or it was presented as a typical whiteboard class. Teachers sometimes struggle to make a good connection between books' chapters and technology uses if they don't use a well-developed content about that particular topic.

Overall, a content development is mainly depending on some skilled and expert teachers who worked or working as a part of different projects. Even all trained teachers are not so eager to develop content when they can borrow it from others, or they can also manage without using ICT in teaching-learning. Now, schools or government need to take the responsibilities to train all the teachers to make digital content themselves and to practice it in schools on a regular basis.

6.1.3 Teacher Training

The researcher chooses the teachers who got training on using ICT effectively in their teaching-learning process. All the sample teachers did not get the training from the same project or the same institute. So, there might be some difference in training and implementation in schools from the teachers of different schools.

Teachers

The government of Bangladesh has already trained almost 15,000 secondary school teachers through different projects to teach the efficient use of ICT in teaching-learning (a2i, 2012). In these training, teachers can learn to make digital content for their respective subjects and also learn how to integrate this comparatively new program with their traditional pedagogical knowledge.

As Bangladesh is hugely populated country and there are almost 23000 secondary schools including madrasahs (they have the similar curriculum and examination like mainstream schools), it is complicated to train all the teachers together or even in quick phases. To solve this issue, the teachers who get a chance to enrolled in training provided by government or NGO projects are highly encouraged to spread their practice among their school colleagues through "in-house training" in their school.

Some teachers have got the opportunity to take training only from government projects, and some got opportunities from the different scheme of government and NGOs. On the other hand, a considerable amount of teacher did not get the chance to enroll them to learn the basics of using ICT in the classroom teaching. It was not possible for both government and NGO's to give an opportunity for every teacher in the country. Ministry of education wanted teachers name from every school through their administration. Schools sent the list of teachers whom they want to be trained and who are qualified to teach rest of teachers after getting prepared by the government.

Usually, most of the schools choose their science teachers for the training offered by government or from the NGOs. Selecting teachers for training was entirely a choice of school administration and head teacher of the school. Some schools choose teachers who can make most out of the training and can make an immediate impact on classroom teaching as well as other teachers view about using ICT in the classroom. As opposed to, some schools choose teachers according to the seniority and experience of teaching.

Teachers are getting one week to 3 weeks training from different government projects according to project design. They meet lots of teachers from a different part of the country and can share their ideas among themselves also. Most of the teacher think, in this time of training they can

learn many things about integrating ICT successfully from the trainer as well as from their colleagues also. They usually do not get this kind of chance of sharing their ideas of successful implementation of technologies with all the teachers from all over the country.

On the other hand, few teachers reveal that they were not interested in joining in training, but school forces them to participate in these training. G1T3 and G2T2 did not show their interest to participate in the training of ICT integration. They think they are practicing a particular pedagogical approach for a long time, this new training and format of teaching can make a bad influence on their teaching-learning process. These both teachers have been teaching from last twenty years, and they think they do not need to know the technological use in education. In spite of their incuriosity, schools decided to send a senior teacher to get the training first.

Teachers like NG1T1, NG2T2, and G2T1 are not satisfied with one or two training. They want a continuation of training at least once in a year that they can be familiar with modern technologies and latest innovation in the educational sector. According to NG2T2

"There is a chance to improve training facilities also. If project supply some booklet or guideline about the training before we join there, it can be more convenient for all teachers to participate and share their thinking about ICT inclusion in teaching. Lots of teachers do not know anything about using ICT in the classroom, and when they come directly to the training session, they feel very insecure and humiliate themselves."

Contrariwise, NG2T1 and NG3T2 think they did not learn enough new things from their recent training as they got proper training before at home and abroad. Even then they have a better number of developed content than government portal has. Both of them worked as an assistant trainer in recent training. One of the teachers(G1T3) said-

"When a teacher goes for training from a government project, he/she get some remuneration from there. Some of the teachers attend these training only for that money; they never imply their training in their classes when they get back in their schools."

G1T1 and NG3T2 have given "in-house training" for their respective colleagues in their school premises. G1T1 claimed, she trained almost 75 teachers about ICT integration in their classes in her previous school where she worked. Teachers who have got the opportunity to take training

from the government or Non-government organizations and who are directly or indirectly continuously involved in different activities with these organizations are more interested in using various kinds of technology in classroom instruction. Teachers who got training from own schools which they called "in-house training" are not very much interested in using ICT in classes. Few teachers from "in-house training" do not use technologies at all as a medium of their instruction as it does not bring any value to them. According to GIT3-

"I never used technologies to teach social science in my classes even then my students are performing very well in the test. So, I do not find any reason to use it unnecessarily."

6.2 Influence of ICT in classroom teaching learning

6.2.1 Sustainable Education

6.2.1.1 Learning through enjoyable activities

Teachers

Almost all the teachers who are conducting classes by using technologies in their teaching-learning certainly agree that students seem to enjoy the classes more than before when they started to integrate ICT into their classes. Previously most of the students did not enjoy the classes, and their absorbency level was comparatively lower than present days. Using ICT makes their lesson more enjoyable through some exciting classroom activities. Students like visualizing the topics and they do not feel bothersome during the class time. It appears that students enjoy participating in various activities through ICT in classroom activities. This participation increases more when teacher's use animation or video related to the topic of the class; they look so curious about the next session.

Students

Most of the students agreed that they are enjoying their classes more than before because of inclusion of ICT in the classroom. Previously, most of the teachers were using only lecture methods in their teaching. It was monotonous for the participants. Some students claimed that they even felt drowsy during the class time. When teachers started to use ICT, and they are getting more involved with the classroom activities, they are feeling more interest to join in the

class and to participate with teachers. Very few students have previous experience in using ICT or enjoying something related to their study. Different dimensions of technologies are making their education more enjoyable as well as they are now more attentive to their classes. One of the students' from a Non-government school said –

"I had been dropped out from my previous school because of my limited attendance in classes, it was so nagging for me to attend there and I couldn't concentrate at all. After being dropped out from there, I got my admission in this school, and now I enjoy the classes where teachers use technologies. Now it's becoming fun to learn for me."

Few students also complain that it might be more enjoyable if they can use technology by themselves in the classroom, whether only teachers are using technologies in the classroom.

Observation

Most of the students were lively, and they seemed to enjoy the classes. In a government school, though some classrooms were massive in size and full of about hundred students, the students from the back seats were trying to reach their voice to participate in classroom activities. Especially, when teachers were playing some videos or animation, students were looking so eager to watch it. Students were also discussing the consequence of topics after watching the animations among them which can make an outstanding impact on their learning

6.2.1.2 Engage more sensors (Listening, Visionary)

Teachers

Most of the teachers agreed that previously their class was too much teacher-oriented, so students were only listening to them. Sometimes it became difficult to understand a topic by using the only sensor hearing to the lectures. Teachers were using the calculator or scientific equipment such as the microscope, thermometer, etc. as technological devices before introducing multimedia in the classroom. With the new technologies like a computer, projector, modern sound system, etc. students now easily connect their topic with the visualization and hearing.

One teacher (NG3T3) from the non-government school said- *"When I use the real object in the classroom, students can engage themselves nicely with all of their sensors and concentration."*

They listen very carefully to the teacher and try to match it with the visual content which gives them a better understanding of the topic."

Students

Students think they involve more now in the classroom. Before introducing technologies especially the classes equipped with computer and projector most of the students were only listening to teacher's lecture, and they were not interested in discussing with the teacher. Most of the students agreed that now the lessons are becoming easy to understand as they can watch visualization besides listening audio or teacher's lecture. Few students also claimed that, as teachers use technologies mainly in science classes it becomes difficult for them to concentrate in the classes where the teachers use manual teaching method like previous days. Students made a differentiate of using their sensors and find out the lessons where they can both listen and watch that's become more interesting for them as well as they do not forget those experiences easily. On the other hand, where they only hear from teachers it becomes difficult for them to keep in mind.

Observation

Students were listening to teachers very carefully along with watching different slides of power point and also some video clips with animation. Sometimes the animation or video was going too fast where the teacher was troubling to describe it. So, few teachers were stopping it in the middle and were representing the pictures or any other objects. Students were also asking questions and taking part in the discussion which was an essential part of the classes. Students were using their various sensors to participating in classroom activities and making the topic clearer.

Few teachers were showing their presentation too fast, and they were not waiting for students' reaction to it. Especially one teacher from government school showed a video in his class which gone comparatively faster than students understanding level. After finishing the slideshow teacher started to describe it. When students started to ask a question, he was referring to the video shown before, but it was difficult for students to make a linkup between shown presentation and teacher's speech together.

6.2.1.3 More concentration from Students

Teacher

Most of the schools have classrooms with an excessive number of students. Most of the teachers claimed that it is tough for them to keep the attention of all students for a more extended period in manually performed classes where there is no use of ICT. Mostly in government schools, there are about 80 to 100 students in every classroom. Teachers cannot even reach their voice to the back side of the classes. Some teachers use a microphone during a class lecture to make attention to students. Almost all teachers agreed that students are giving more attention even in big size classrooms from when they started using technologies in teaching-learning. With a better concentration level, they are also responding to teacher's question. Sometimes, they also take part in discussion with teachers which give them a sustainable knowledge about the topic. One of the teachers (G2T2) from government school argued that- *"Sometimes students get too much involved with the presentation of teachers so that they do not focus on their books. If the presentation is not clear and the students also lose their attraction to books, it might have a negative impact on students' result."*

Students

All the students also agreed that now it's becoming easy for them to concentrate more on the classroom activities. The classes have become lively and exciting because of using different technologies. Technologies attract them more than their traditional lecture-based courses, and they eagerly wait for those classes where teachers use multimedia contents and projection.

One of the students said. *"When I attend in my biology class, and teacher shows us an animation of different biological topics, I enjoy this class like a movie. Though teacher took these classes only twice in a week, I eagerly wait for these two classes for a whole week."* Most of the students accede that, if all the classes use ICT according to the topic they will able to learn almost most of the text in the classroom.

Observation

Students were interested and looked forward to the classes where ICT was used for the instruction. They were looking so joyful and curious about the topic. Some teachers have excellent presentation skills of presenting question by using technologies. In these type of classes, students were concentrating hard, and it seemed they were focusing on classroom activities. Few teachers did not have that useful skill to make a correlation between books and multimedia presentation and students were looking a little bit puzzled during the discussion period.

Though in some classes there was mismanagement from teachers, students were inquisitive about the visual presentation. It shows their concentration and eagerness towards ICT integrated classes.

6.2.2 Provides more information in shorter time

Teachers

Almost all of the teachers believe that they can give more details through using technologies during class time. Technologies help them to present a comparatively tricky and complicated topic easily. Some teachers told that before available use of technology sometimes they were struggling to deliver full information about some issues and it was also difficult for the students to understand that. One of the teachers (NG1T3) from non-government school described it-

"In a class where I do not use technology, I need to write a lot of things in blackboard which consumes most of the time from the class duration. Students also need to follow every word to understand the topic which is difficult for them. But when I use computer and projector to show the pictures, written presentation, or videos it takes lesser time and students also can follow it easily. It gives me more time even to discuss with the students, and they can let me know what they understood from the topic."

Especially science teachers claimed that duration of the classes is low which makes it difficult to describe and discuss the science topic with students. Even though, sometimes they had to skip some issue because of insufficient time of classroom activities. Technology brings an advantage

to describe more things together and to demonstrate it quickly. With a 3D display of different science topic, they can now quickly adjust the time and content for a specified period. These projections bring up the abstract information in a real view and students also get sync with these very quickly. Most of the teachers think that as they have a lot of students in the classroom and class duration is not enough for most of the topics; there is no alternative to using technologies appropriately to make an impactful teaching-learning process.

As opposed to, few teachers claimed that sometimes technologies take more time to set up. Notably, in the schools where they do not have permanent technological set up in every classroom, it takes more time to setup and then starting class with the help ICT. One of the teachers (G1T2) from government schools said, -

"If I use ICT in my class then I need to bring my laptop and the projector from teachers' lounge. Sometimes, students help me to bring the projector in the classroom. Then I have to set up all technologies together for the projection in class. As we have to take almost 6 (Six) classes every day, very often we do not get a break in between the classes. So, all the setup time goes from the class duration, and it becomes difficult to show or to discuss the full content in a single class."

Students

Most of the students agreed that it is easier for them to learn more topics or content with the help of technologies. They can concentrate more and get more information about the topic when teachers use multimedia during class time. Students also assert that not only they get more information in a shorter time, but even they can remember this information for a more extended period as they can see and listen at the same time. They can also finish their lessons in due time before examination which was not happening before on a regular basis.

On the other hand, some government school students argued about the class time and more information. According to them, they need to bring the projector from teachers' lounge and need to set up during the class time which takes a lot of time from their classes. Moreover, if there is any interruption of electricity happen during the classes, some teachers do not continue their lessons and leave it for next classes. It makes an obstacle to their regular flow of that particular subject.

Few students also claimed that teachers feel comfortable to discuss only the information they bring in their presentation slides. If students, ask any question outside from the slide but related to the study, few teachers do not like to answer those question, and sometimes they avoid it. These attitudes dishearten students to ask more questions in the classroom. Over against, sometimes teachers gave too much information in the school which is very difficult to remember and as they do not get any soft copy of teachers' lecture they get in trouble when they want to study at home. Students demand the lecture copies or any suitable link from where they can explore their lessons by using ICT at home.

Observation

Teachers are trying to accumulate all the information about the topic in shorter time. Though they can give more details through technologies, sometimes they deliver so fast, and students struggle to catch the data or information. Due to lack of time some teachers also skip some slides in the classroom which might be necessary for the understanding of students.

Most of the schools do not have permanent setup in every classroom for using ICT or multimedia. In these schools, teachers took comparatively more prolonged time to integrate all the technologies together and get very little time to deliver his/her speech according to content. In well-equipped classroom teachers are getting enough time to give more information appropriately and students also perceive it nicely through a discussion with the teacher.

6.3 Challenges and barriers in implementing ICT

6.3.1 Lack of resources

6.3.1.1 Lack of physical resources- devices

Teachers

Lack of physical resources was one of the most featured issues among the obstacles to achieving ICT efficiently in schools. Most of the teachers agreed that they don't have sufficient physical resources and infrastructure facilities to conduct classroom activities by using ICT. Though the government has already taken the initiative to develop modern computer laboratories in every

school, most of the schools still do not have all necessary equipment to succeed governments' vision of integrating ICT in all level of education.

Teachers from NGSs claimed as they do not get the full amount of fund from the government they need to manage it from students' fees or any other sources. But it is not easy to decorate the whole school with modern ICT facilities with this limited budget. Moreover, they cannot give pressure to students to increase their fees as many of them will not be able to do that. Most of the NGSs are in a process to improve their resources according to their budget, but it will take a long time if they run this way.

As opposed to, teachers from one NGS (NG2) said that they have enough money to buy all the devices and set them up for ICT integrated classroom. Now, they want more advanced technology in school like a smart board where they can get the internet facilities directly, and they can save their class lecture also. Teachers from another NGS (NG3) claimed that they have thousands of students in their school, but only a few classrooms are equipped with modern technologies, they asked for more facilities and devices to their administration, but they did not take any steps which can help to teach more students by using ICT effectively.

Few teachers from GSs also complained about the load shedding problem in their schools, though there is a problem of continuous electricity supply, especially in summer season school, did not manage any power back up to continue the classes with the help of ICT. Most of the government schools have power back up for their administration sector but not for their classrooms.

Most of the teachers from both government and NGS School use the same materials to conduct their teaching in schools. Mostly they rely on government web portal from where they can collect readymade content according to subject and topics. Some teachers from both GS and NGS are working as a model content developer in different projects of government. They are also helping the teachers of their school to develop their content themselves. Contrariwise, those teachers who have no colleague as a model content developer they depend mainly on the internet.

Some teachers also demanded smart board which directly connected with internet. This technology also can preserve teacher's every lecture with video technology. They agreed that if

they can use this type of technologies students able to take part in every class even they miss classes because of sickness or any other reason.

Students

Almost all of the students from GS and NGS expressed their interest in classes where teachers use ICT regularly. Similarly, all of them facing the same problem of resource in their schools. They claimed, they have not enough sufficient classrooms equipped with modern technologies, so they need to wait for a long time to get a class where their teacher use ICT to teach them.

Some students also claimed that they could not use ICT themselves in schools as they do not have enough computers for all the students in the classroom. One of the students from government school said-

"We have no opportunity to use a computer in the classroom; teachers give us the chance to use ICT only in the computer lab. But it becomes difficult for us to use there also if some computers do not work correctly. It happens regularly, and we share the computer that time."

Observation

There are lacks of physical resources almost in every school. Unavailable equipment for every class, unequipped or unorganized laboratory, limited access to internet, electricity problem has seen in all types of school visited by the researcher.

Whether for suitable teaching materials which can be used in technology integrated classroom, teachers mainly depend on government web portal for getting their readymade digital content about their subject or topic. As the government portal is developing nowadays, it is not enriched with all the topics till now. Some teachers also struggle to search the topic through the portal as it is difficult for them to understand the use of it. Self-motivated teachers also depend on the internet especially on youtube to make their content acceding to their lesson plan.

6.3.1.2 Lack of human resources

Teachers

Almost all the teachers who are conducting their classes by using ICT claimed that they do not have enough technical expertise in their school. In school, there is no permanent technician for solving problems of different devices efficiently. So, if something goes wrong with devices or internet interruption happens no one in school can resolve these issues immediately. Teachers need to call people from other places and need to wait for a long time for technicians' arrival and solving the problems.

Teachers from NGSs (NG1 and NG3) faced the problem of broadband internet disconnection in school, they informed the internet provider through headmaster of the school immediately, but they solved the problem almost after a week. These kinds of issues interrupt the flow of teaching-learning and discourage teachers to integrate ICT into their lesson plan. Sometimes, they try to solve some problems without expertise, but it can affect if they ruin any device.

Students

Students from both GSs and NGSs faced the same problem in their classroom. In their view, sometimes teachers face the challenge to run the devices, and they call another teacher from another class who has better knowledge about that. If that teacher came to solve this problem both the classes get hampered in the same issue. They agreed that if there is any technician in school who can look after these issues, teachers can solve their problems nicely as well as students can get full attention in classrooms.

Observation

There is no professional technician in any of the school. The teacher does the service of all technological devices themselves. As teachers do not have sound knowledge about the hardware most of the time, they cannot solve the problems of the devices. The researcher observed that in an NGS there are 12 projectors in 12 classrooms, but 10 of them were not working that time because of lack of maintenance. GSs have one assistant who can fix the things in the laboratory,

but it is also hard for him to check every classroom as he has to assist also school administration to fix their administrative works through technology.

6.3.2 Lack of commitment

Teachers

A significant number of teachers claimed that most of the teachers have lack of obligations to integrate ICT into their classroom activities. Teachers who are well trained from different projects and who are linked up with various ICT related activities on education are mostly committed to using technologies in their classrooms. But most of the teachers of every school who took training in school compound through their colleagues or never got any training they show less commitment or no commitment to ICT implementation.

Some teachers also said that teachers' commitment is related to their commercial facilities also. As there is no extra remuneration or any award for the teachers who are trying to use ICT regularly in their classes other teachers are not getting motivated to use ICT. Some teachers both from GSs and NGSs think it takes lots of time to make digital content and they need to think a lot about the effective use of it, so it's better for them to take class manually which can save more time for them.

One of the teachers from GS (G2T1) said that –

"Sometimes the teachers who got a good number of training from different organizations or from different projects they also do not show their commitment as there is no one to praise their effort on implementing ICT. Maybe regular monitoring from school administration can make teachers more committed to using technologies in their teaching."

6.3.3 Time Constraint

Teachers

Secondary school teachers have to take lots of classes' every day which is one of the most critical barriers to maintain the quality of teaching. Teachers usually make their lesson plan at least before one week of the real class time, but it is difficult for teachers to create digital content

during this packed schedule of classes throughout the week. Beside this teacher also have to do some administrative works in schools, some teachers have to organize extra-curricular, some have to involve with examination committee. They even do regular meetings with the parents of their students.

According to an NGS (NG1T1) teacher

"We do not get enough time during school period to make our class content, so we need to give extra time for making content and for class preparation. We need more time for making useful digital content to use in class. We give this time from our personal life or our holidays. We also supply our own made digital content to government portal, but there is no recognition for that."

Another teacher from GS (G1T1) claimed that –

"I have to conduct five classes on average per day; sometimes it becomes six if any English language teacher remains absent. The school does not give any facilities or free time for making digital content. Though I already have some developed content syllabus also change every year. So, I should develop content continuously, but as I do not get any time during my school hours, I do it after reaching home. Sometimes it becomes midnight to develop my content for next day class."

Most of the teachers do their preparation of content developing after their school time as they do not get any chance to do it in schools. A usual number of classes per teacher is high, and they do not get any chance even to think about the next day lesson plans. Almost every teacher complained about their excessive number of classes, and they believe it is one of the leading obstacles to implement ICT use in classroom successfully.

Students

Students also support the problem of teachers. Almost all of them from different schools noticed that their teachers are taking practically 5 or 6 classes every day. Students from NGSs (NGS2) claimed that-

"We have at least three sections for every grade. Grades 9 and 10 have four sections each. One teacher takes classes in every section separately. Moreover, they take classes at the higher

secondary level also. That's why it seems they are always in a rush and try to finish our classes quickly."

Students from another school (NGS3) claimed that *"Because of time limitation sometimes teacher put our two sections together for her class. In that time total number of students of the class stand like 100 to 120. It's become difficult for us to listen to the teacher or to discuss with her."*

Government schools students are also facing the similar problem. They demanded more teachers in every particular subject that are teachers can give more time in their classes.

Observation

Most of the schools do not have enough number of teachers, especially for the science subjects. Teachers have to take 4-6 classes every day which is very incommodious for all of them. They were used to do their teaching manually and nowadays when the government introduced ICT as an instructional technology of education they are facing problem to adopt this new system. Lack of time in between the classes drive them more not to use technologies because they need time for preparation and to set up the devices in the classroom.

6.3.4 Lack of supervision and leadership

Teachers

All the teachers from government and non-government schools said that there is almost no supervision or monitoring in ICT implementation in schools. The teachers who got the opportunity to take part in training through different projects added that *"Whatever we have learned in training, we will forget it quickly if we do not practice it in our classroom activities. Most of the teachers are not interested in integrating ICT in their teaching as they think it is complex to do. But if there were regular supervision from the ministry of education teachers had to be encouraged to use technologies regularly in their teaching method."*

Moreover, government projects also provide training for school's headmaster and administration. Headmaster or principal is supposed to visit classes regularly and should ensure the uses of ICT in a different level of school. Most of the teachers agreed that their headmaster does not monitor

these issues periodically and some teachers said they were never supervised by their headmaster or by administration of the school.

Teachers of a government school (GS1) claimed that headmaster is mostly busy with administrative work though he has less concern about academic activities. He selected another senior teacher to supervise other teachers to implement ICT in their teaching, but it is not working as well as it should be. Teachers from that school claimed that only the assigned senior teacher is using ICT in her classroom teaching, but she cannot order or motivate others to do it as she does not hold an administrative position. One of the teachers from this school (GS1) added that- *"Though our headmaster had been awarded from the ministry of education for his leadership in school, he is not enough concern about the ICT implementation. He divided these duties among some senior and ICT knowledgeable teachers. But it becomes difficult to supervise or to judge your colleague who made this supervision system ineffective in school."*

Teachers from NGS3 said that-

"We were never supervised by anyone in our classes where we use technologies. According to government instructions, school administration has provided us ICT devices, but they are never interested to see how we are implementing this. This lack of monitoring leads some teachers to use their traditional teaching method till now. Teachers are losing their motivation to integrate ICT with their teaching-learning even after getting excellent training from either government projects or NGOs."

Most of the teachers (5 out of 6) from non-government schools agreed that their schools had started well to integrate ICT in their teaching-learning. They got some help from government also to establish their primary technological support on school. However, with the flow of the time, the practice of ICT inclusion is decreasing from their schools. One of the teachers (NG2T2) claimed that-

"Our head teacher or school administration is not conscious at all about ICT inclusion in teaching; the school fund has a huge amount of money in their account, so they set up all the technologies at a time. But because of ignorance and almost no maintenance these tools are becoming worthless one by one. Among the 12 projectors of the different classrooms, only two are working now!" Another teacher from NGS (NG3T3) said that *"Our headmaster is trying to*

get more projectors for classrooms, but school committee did not agree with him to spend more money on buying technological tools."

Moreover, one teacher (G1T1) informed that-

"As it is not possible for the government to train all the teachers at a time, most of the teachers are getting "in-house training" in their school. These maximum number of teachers are not getting motivated enough to integrate ICT into their teaching. Two types of training for the same school teachers are dividing them. One group wants a successful integration of ICT in school, but another group is not interested enough. If school administration does not force every teacher to make an integration of ICT in their teaching process, then it is difficult to change the negative attitude from most of the teachers."

Overall, most of the teachers agreed that there is almost no supervision from school authority or from Headmaster to find out who is using ICT in their classroom teaching and who are not using. The eagerness of headmaster to ensure the ICT use in pedagogy for every teacher can influence the start of using ICT in the classroom.

Students

We did not see anyone from outside to come to our school and to observe our classes where teachers use ICT devices. Teachers use this machine very rarely, and our headmaster never asked to use technologies when he visited our course, added a student from government school (GS1).

On the other hand, students from NGS1 said once we saw some people from the ministry of education came to our school and visited all our classrooms. They told us that "you are going to have digitalized classroom in every class and all the teachers will use it to teach you." After they left that day, till now only two teachers from our school use the devices regularly, no one else looks so interested to use these in our class.

Students from GS3 demanded that their headmaster often visit their classes, but he has no concern about the ICT implementation. Instead of that, during a class visit, he always tells teacher and students to maintain the discipline of the school. Apart from this school, all the other students claimed that they never saw headmaster or any other administrative person from school

to visit their classes on a regular basis. They added that headmaster or supervisor also never says any teacher to use ICT in their teaching at least during the class visit.

Students from NGS2 said –

"Previously they had a projector in every classroom after these become useless they complained to school headmaster about this, but headmaster never gave any positive feedback on that. Though students are paying money with their annual fees to use a computer and other technologies they are not getting enough chances to use those."

Observation

Most of the headmasters and principals were busy with their administrative work in their office room. The researcher found two headmasters in out of their schools as they were active in meeting with education board. During the school's visit researcher found no headmaster to observe the classes or to supervise teachers. Some Headmasters were also disagreed to talk with researcher when he went for consent for the study. They told him to contact with one of their senior teacher who is involved with government projects on ICT implementation in education.

6.3.5 Lack of motivation

Teachers

Teachers still are not enough motivated to use ICT or to introduce a new innovative teaching-learning procedure in their classrooms. Some teachers are implementing technologies by their motivation, and they understood the benefits of using ICT in their class. On the other hand, most of the teachers claimed that as their promotion or salary increment is dependent mostly on their experience of teaching very few teachers among them are interested in increasing the quality of teaching by using ICT. There is no impact on classroom performance of a teacher in their promotion or an increment of salary.

Some teachers also recommend that as most of the teachers are not self-motivated to level up their classroom performance by using ICT, there should be some motivation for them. It can be either introducing point system on classroom performance for promotion or can be economic benefits for using ICT in the classroom.

Teachers added schools also do not provide any facility during school time to get prepared for the classes where teachers can use ICT as an instructional tool. Also, most of the teachers want their financial security first, and they do not want to spend more time on making digital content rather than invest their time in private tuition. There is almost nothing for teachers to motivate them in integrating the use of technologies in their teaching-learning, added NGSs teachers.

One of the teachers from GS (G1T1) claimed that –

"As teachers' salary scale is not that high in Bangladesh, most of the teachers concentrate on private teaching in their coaching center. Moreover, if we want to use ICT on a regular basis in our class, then we need to bring the cost for internet, computer, electricity, etc. which is not convenient for most of the teachers. So, teachers prioritize to give more time to coaching centers than making digital content in the home."

Some experience teachers have different ideas from others. One teacher from GS (G2T2) who is going to retire next year did not get any point to take training on using ICT at the end of her teaching career. She claimed that-

"The school sends me in training, and I took training for 15 days. Though I am not interested in integrating ICT in my teaching as an instructional medium, I had to go for training on seniority basis from the school. I think young teachers are more interested in new technology and schools should choose them to attend in different training programs. I have learned so many things from training though I believe I can teach well without using ICT and if I go to use it in my classes, my students do not concentrate on my speech."

One of the teachers (G1T2) from said *"I never liked to use technologies in my classes, but because of headmasters' pressure I use it now once in a week. I think it takes more time for me and it's not adding anything special to my teaching."*

Another teacher (NG1T2) from non-government school claimed that *"Teachers who do not use ICT in their classes, some of them demotivate the teachers who use it. In our school about 75% teachers do not use technologies in their teaching process; most of them also do not use it because according to them it does not provide any better result in their pedagogical approaches."*

5 out of 6 teachers from NGS gave their focus in positive reinforcement on using ICT in classes. They said "There is no reward or punishment system for using ICT in classroom or not. If schools want to ensure the use of technology in every class, they need to give reinforcement to the teachers also. Most of the teachers think that using ICT in teaching takes more time for preparation and making content. So, they do not want to invest their time in making content as they do not have any financial or professional profit."

Students

Students from GSs and NGSs agreed that most of the teachers do not want to use ICT on a regular basis in their classes. Most of the GSs students said that they do not have enough facilities and their teachers are genuinely unaware of using technologies very often. They also claimed that if they want to do classes with more technological uses teachers gave them so many excuses like unavailability of equipped room, less computer in the lab than students, electricity problem, internet bandwidth problem, etc.

Students from another NGS explored that only two teachers in the school are very much interested in using ICT in the classroom, and just they use their technology-equipped classroom regularly. One of them takes almost all of his classes by using computer and projector which is very lively and attractive for the students. Students never found any other teacher to use the technology more than once in a week.

Students also agreed that teachers are not so willing to demonstrate something with the help of technology in the classroom as much they concern in private tuition. Most of the students claimed that many of their teachers know very well about using ICT in teaching learning. Some of them have started to implement ICT in teaching, but after few days they also stopped as they did not get any positive feedback from other teachers or the administration of the school.

Observation

Commercial and professional both factors are demotivating teachers to include ICT in their lesson plans. There is no assessment system on classroom performance of teachers in schools. So, teachers are not being concerned about using ICT in classroom activities which can make

their classes more impactful and enjoyable for students. There are also no commercial benefits for teachers who are developing digital content and uploading it in government web portal to make it available and usable for other teachers. As teachers' income is low in Bangladesh, they expected to earn more by improving their class quality through using ICT. When they found they are not getting praised by most of the people of school, they started to lose their motivation.

6.3.6 Teachers' experience and age

Teachers

Eight interviewee teachers out of twelve have been working as a teacher for more than 15 years. Five of them have more than 20 years of experience in teaching. Meanwhile, few younger teachers from different schools got this opportunity to be a part of ICT implementation, and they were looking so keen to make it successful. Three teachers from two different schools assert that they will be going to retire within one year and they got training for ICT implementation in this year. They think before ensuring efficient use of ICT in classroom teaching by their practice; they might be going to retirement.

One teacher from GS (G2T2) argued that *"I do not find any reason to send me in ICT integration training in this year as I am going to retire next year. Some young teachers in our school are familiar with ICT devices and also interested in integrating ICT in their teaching. School administration selected some teachers for the training, but we were not interested in changing our long practiced instructional methods by using ICT."*

Another teacher from GS (G2T1) said that *"Among the six teachers who took part in ICT integration training at different times, five of them working in this school at least for 15 years. Most of them went to training as they have more control over their subject knowledge. Moreover, they good amount of remuneration for trainees also motivated them to attend the training. After coming back from training, only the younger teacher using ICT in regular basis as he is interested in it and he is familiar to use ICT devices."*

Some experienced teachers raise their voice against integrating ICT in all subjects as they think they can teach better with their long earned experience in teaching and they do not want to change their style of teaching by including ICT.

Students

Students also agreed with their teachers that the senior and experienced teachers usually do not use the technologies. They mostly like to give lectures in the classroom and if need they write on the blackboard. Comparatively younger teachers try to use technologies on a regular basis and try to make classes livelier through their presentation.

Most of the students also agreed that they feel more comfortable to discuss any topic with younger teachers as they give them more space to express their view about the particular topic.

Observation

Most of the experienced and senior teachers were not interested that much as comparatively younger teachers. Some older teachers only use ICT if they find the readymade content of their topic in teachers' portal. They do not look eager to experience something new with their traditional teaching-learning process. As opposed to, young teachers who are familiar with ICT devices and use of it are very keen to use technologies as their medium of instruction. They want to make a digital content collection which they can use for the more extended period of their teaching career.

As young teachers have a long career ahead in the teaching profession and they are quite familiar with technological uses they seemed more enthusiastic to implement ICT in classroom practices. They also want to make collaboration between all the teachers as they can share their ideas about modern days' teaching-learning process and can improve their skills.

Summary of major findings

Teachers' interviews, FGDs with students and researcher's own observation helped to make a clear conception of the ICT implementation process in the education of Bangladesh. It also clarified the impact of ICT on teaching and learning as well as unlocked the remaining challenges of implementation. Teachers are using ICT to a certain extent in the classroom though they have still some obstacle and dilemma of using it as a teaching and learning tool. Both teachers and students are very much positive about using ICT in teaching and learning although students have almost no chance to use technologies in their classes. There are still lots of challenges remained in the way of practical implementation of ICT in secondary education, but

economy and infrastructure came out as the most prominent obstacle. Teachers complained about their training facilities, time constraint, resource limitation, minimum or award of their effort though they want more integration of ICT in their schools. It shows they are still in a dilemma of using ICT in full flow in their teaching. School administration and ministry of education are not so active in making promptness among the teachers.

7 Discussion

In this study, while the documents indicate the ongoing shifts at the policy level, the interviews and observation offer insights into the gap between policies and practices based on practical experience. Indeed, the interviewee's responses varied based on their ideological viewpoint and experiences. The findings show that some of the decisions of policy have seemed to be in the process towards materialization. Four themes emerged based on the conclusions of the document analysis, interviews, and observations offering insights into the ICT implementation in secondary education of Bangladesh.

7.1 ICT in classroom

Through the education policy 2010, GOB expressed their vision towards ICT integration in every level of education. ICT has not only introduced as a new compulsory subject in secondary level education for all grade students but also emphasized to be used as a teaching-learning method which can help the students to become a skilled workforce for the country. According to BANBEIS (2016) out of 19,859 secondary schools of the state 16,859 have the computers in the schools provided by the GOB. Among them, 15085 schools have multimedia facilities to present digital contents to the students. In that sense, it has been said covering 76.01 percent schools (BANBEIS, 2016) with multimedia facilities in last seven years is an excellent achievement for the government. In reality, the practice of using ICT in all schools activities still is limited. Despite the fact that most of the schools have an ICT lab equipped with computers and some of them have internet access also, in many cases the implementation process has not taken place yet.

On the other hand, students get an insufficient access to computers and internet that obstacles the opportunity to develop their skills. Similar to many other developing countries, students get chances once or twice in a week to use computers in their laboratory (World Bank, 2010; ADB, 2012) which is not enough to make them skilled on technology applies. Most of the time teacher operates the ICT devices in classroom and students only watch the topic what teacher share through the computer, internet, and projector. Teachers use computers and projector in their teaching-learning process. However, the amount of usage is minimal compared to the number of classes they conduct every day. Because of millions of students and a limited number of

teachers, it is almost impracticable for teachers designing and developing their classes through the use of technologies (Ashrafi et al., 2009). Teachers are still not so familiar, and it is not a regular practice in most of the schools. As teachers are new to using technologies, they need more time for getting prepared for the class especially on making digital content for a multimedia classroom. Teachers have extreme workload and too many classes in a day which do not give them enough time to think about their next lessons and to prepare for it. The inclusion of more trained and expert teachers on ICT can reduce the workload for present teachers, and they can have some time to do planning of successful integration of technologies according to their topic.

Lack of Monitoring and supervision is another reason behind the limited use of technologies in the teaching-learning process that is a vital step any implement process. ICT integration in teaching-learning is comparatively a new idea among the most of the teachers of secondary schools in Bangladesh. Lots of them already got training from government projects, and still many of them are gaining knowledge about this phenomenon, but there is almost no monitoring of implementation in school after teachers coming from training. This lack of supervision discourages teachers to practice the knowledge of ICT implementation in teaching in their respective schools. Headmaster or superintendent of school will have to take more responsibilities on supervising the application of ICT in classroom practice. Monitoring cell of MOE also needs to visit schools on a regular basis and give necessary advice to teachers and administration for a useful technological inclusion in teaching-learning.

Different electronic devices like fans, calculator, lights which are also counted as technological devices have seemingly been used more frequently within the educational setup, whereas, such devices are considered to have no or limited impact on the teaching-learning process. Focusing on the use of ICT in the administrative purpose, only one school out of five have found with the developed system for the biometric attendance of teachers and almost no one has for students.

In short, the education policy emphasizes on the ICT integration considering it will make a significant movement towards creating innovative and skilled human resources for both local and global sphere, but the use of ICT seems to be limited regarding students' access to the computers and internet, incorporating the devices in teaching-learning methods.

7.2 Quality of Education

Integration of ICT in education is significant to reform the traditional teaching-learning system into a modern one. Technology-enriched environment delivers a positive effect on students' performance in all subjects (Look, 2005). As discussed above, GOB has given immense importance on ICT integration in schools in their latest education policy to make students very efficient in technological development as well as increasing economic sufficiency (P: 22, Sl: 10). It is also described in policy that ICT will help to build a knowledge-based society from where Bangladesh will go forward with her skilled human capital. It will make a considerable impact on economy and development. (National Education Policy, 2010).

ICT offers a robust learning environment which is a transformation of the previous teaching-learning process so that students can deal with knowledge in an active, self-directed and constructive way (De Corte et al., 2003). Most of the teachers and students interviewed for this research also agreed that inclusion of ICT improve the performances of teachers and education became more student-centric. ICT increased the cognitive development of students, enhance creativity, and develop problem-solving skills (Nirgal & Klein, 2004, Drent, 2005, O'Hara, 2008). Previously, it was only a one-sided discussion from the teacher, but now students also participate in the debate and, they try to understand the theme instead of memorizing it. Barak (2004) found almost the same finding in his study, and he said that "The use of ICTs in education would promote deep learning and allows schools to respond better to various needs of students."

Moreover, both students and teachers are becoming more creative and proactive in the classroom. Most of the trained teachers seemed excited about these innovative teaching-learning experiences, and they want some more facilities from institutions and from the government which can help them facilitate all their classes with the support of ICT. Teachers agreed that more interaction between teachers and students encourage students to show up their creative thinking and teachers also get quick feedback from students. In particular, Becta (2003) pointed out that "ICT provide fast and accurate feedback to students, and speed up computations and graphing, thus freeing students to focus on strategies and interpretation. Further use of interactive multimedia software motivates students and leads to improved performance."

Throughout the interviews and observation, it has also found this interactive teaching-learning process attract students more in the classroom and dropout rate has decreased in last few years.

Students are more interested now in attending and performing in the classroom activities. It can be easily said, ICT integration encouraging them to study attentively and to get prepared for the next level of education. In a similar case, Barak (2004) revealed that many of the students finish high School and consider attending college when they are taught routinely by using technology.

Overall, the findings show the use of ICT in the teaching-learning process has a positive impact on both the achievement and completion rate in the secondary level. Teacher satisfaction is another mentionable.

7.3 Readiness of Teachers

The Education policy 2010 highlights the necessity to provide teacher training and affirms to take initiatives to train teachers of all levels in ICT to ensure more comprehensive and practical use of technologies.

Though GOB has taken the initiative to train teachers to the efficient use of ICT in classroom practice, the process is much sluggish to take place to include all the teachers across the country. Ministry of education is taking steps to train all the teachers from all over the country to use ICT in their lessons appropriately through different projects. In contrast, it is a tough job to qualify this large number which is approximately 243553 in a short period. Teachers are getting training through different government and non-government organizations and also through government projects aided and monitored by international agencies.

Most of the teachers marked the training as very good in quality, but they want the continuation of training according to curriculum and content development. Under the teacher-led digital content development initiative, teachers learned to develop and present digital contents for their classroom and use them in the multimedia classroom to explain difficult concepts with text, picture, and animations. (a2i, 2015). On the other hand, some senior teachers are not interested in integrating ICT with their previous pedagogical method, so they do not apply their training in school practice even after getting training. These training helped teachers to change their attitudes towards using ICT in classroom teaching, and they are ready now to integrate ICT as part of their instructional design.

Teachers found "digital content development" as a time-consuming work and for which they do not get any allowance or reward. Though they get excellent feedback and attention from students

when they use technologies as part of their teaching, they want some official recognition from school administration as well as from the ministry of education also. Some senior teachers still are not so much convinced with the use of ICT in their teaching as they think it may take too many times to get the setup in the classroom and students can be less interested in textbooks. The scarcity of knowledge in making digital content according to textbook lessons and traditional concepts in which they are comfortable keeping them away to use technologies in their lessons.

In spite of immense interest and devotion to teaching practice with modern technologies, some teachers do not get enough opportunity of using ICT in their pedagogical methods due to the limitation of devices. Time management is another problem for them as they have to take too many classes every day. Most of the teachers agree that appointing more teachers in the school can reduce the workload on them and if there is available access in using ICT, teachers are prepared for a successful implementation of their classroom practices throughout the country.

Mentionable, teachers attitude are differing from institution to institution. Most of the teachers are not eager to include technologies with their general pedagogical concept as it takes more time in preparation and as they do not have proper knowledge and training about it. Training facilities have an impact on their attitude; also, teachers who already attended in training sessions with experts through different government initiatives are more favorable in technology integration in their classroom activities. Conversely, teachers who have been trained within the school compound by their government-trained colleagues are not so positive about this modern pedagogy. Besides, there are no incentives for making digital content which take a lot of time from teachers' personal life, make them more apathetic of using ICT.

In a nutshell, government-provided ICT training is much focused on the content somewhat motivating teachers in owning and implementing the idea. Many teachers, in particular, those who are at the end of their career are not motivated to shift from the long-practiced traditional pedagogy to the ICT based one, also need to gain more knowledge of the ICT provisions of the education policy. Thus, teacher training initiative is struggling to reach the actual motive to ensure the effective use of ICT in the classroom.

7.4 Resources

The government of Bangladesh has started implementing ICT in all level of education with an insufficient number of resources in hand. They had to build new computer laboratories in all the schools and had to equip those laboratories with computer and accessories. Making computer lab and connecting to the internet is still going on many parts of the country. There was almost no digital teaching aid or readymade digital content according to the curriculum of secondary education which ha delayed in the progression of integration in classroom teaching-learning activities.

In policy, GOB has established their goal to extend the use of technologies in school. As part of that, they started to set up a computer laboratory in every school in the country. Still, this process is undergoing, and a good number of schools do not have ICT lab with all facilities. Till the last update of MOE 84.94 percent of secondary schools have at least a computer in their schools and 76.01 percent have the multimedia facilities (BANBEIS, 2016). Besides this, only by providing computers or establishing an ICT laboratory in every school is not adequate to integrate ICT into classroom practice in all subject areas. Most of the schools of the country have limited number of classrooms with ICT facilities, where the teacher can perform their teaching with the use of technologies. A substantial part of the country still does not have the broadband internet access, and most of the schools and teachers depend on the internet provided by mobile networks there which do not maintain proper bandwidth needed to use the internet in schools or classrooms. Moreover, schools sometimes face the problem of electricity, computer accessories, power backup, etc. According to statistics of BANBEIS (2016), 17,462 schools have electricity connection which is 87.98 percent of a total number of secondary schools. Load shedding is a very common problem in most of the areas in Bangladesh, without enough power supply during the class times it is not possible to implement technological usage in teaching-learning. Infrastructure problems like these make the most significant barriers even if all the stakeholders want a successful ICT integration in classroom practices. Khan et al. (2007) also stated that "Effective implementation of technology into education systems involves substantial funding, that is very hard to manage in developing countries like Bangladesh, where many people are living below the international poverty line."

It is always . for teachers to have available teaching material for the particular lesson to make the teaching more useful and enjoyable for students. Nowadays teachers from all over the country are getting some readymade digital content through the government teacher's portal. On the other hand, teachers who are contributing to government portal by making contents in their specific subject areas they are not getting enough recognition either economically or professionally from the government. This attitude towards teachers sometimes discourages them from contributing more to new ideas and contents of teaching in their respective subjective area.

Moreover, almost every school is suffering from technical problems in their computer lab. Lot of them do not have a trained or fixed technician who looks after all technological devices and can repair when need. In most of the schools, ICT-teachers have to do this job besides their teaching which makes an extra pressure of work for them. Meanwhile, some private schools have their technician who provides services in emergency issues, but some of them are not expert in computer software problems. This type of problem can make an obstacle to the regular use of ICT not only teaching but also in routine work of schools. The government can make a permanent job position in every school for a technician with computer-related skills.

Although it was expected that students would get available access to global knowledge through the internet, it is still not happening in schools. GOB stated their motive in "Library: aims and objective" chapter of national education policy-2010 to give students' more operationalized and convenient way to acquire more knowledge but students have almost no access to the digital libraries in schools. Students have nearly no participation in using ICT in the classroom, and they only use computer twice at most in a week, during their ICT classes.

Unavailable Bangla software is another problem of integrating ICT into classroom practice. Some teachers do not feel comfortable enough to use software commanded in English because of their lack of foreign language proficiency. In this regards, Mumtaz (2000) stated that software designers and teachers should work together and observe critically how a range of teachers teach in the classroom and how appropriate forms of software supporting different skills and ways of teaching and learning can be better developed for teachers to use in subject teaching. Bangla software also can make the ICT usage easy for the students and encourage them to productive use technologies. The government can support local software companies to make efficient Bangla software for school teaching followed by collaboration with teachers or trainers.

8 Conclusion

Integration of ICT in education is a comparatively new phenomenon in Bangladesh like many other developing countries. This study has engaged National Education Policy – 2010 which is latest education policy of Bangladesh, and the insights of teachers and students from different schools who are directly involved with the ICT integration process. Hence, the findings from the study offer to look into the present situation of integrating ICT in the secondary level of education in Bangladesh. The results from documents and observation followed by interviews show that, after almost seven years of introducing ICT in education, still it is not practicing in teaching and learning at a full flow in secondary schools of Bangladesh. It will take some more time to ensure successful, productive and continuous use of technologies in classroom practices because of various social, economic and ethical hindrances. Initiating the use of technologies in education is indisputably a positive sign for the secondary education of the country. Nevertheless, the curriculum should update according to it, and the infrastructures of schools have to be developed to ensure more access to technologies for both teachers and students.

Most of the teachers who are in the teaching profession for a long time were used to with their traditional teaching instructions. They need a little bit of more time than the young and new generation teachers who have known about ICT integration in teaching as it is included in their pre-service training. It may take some time for teachers to shift the paradigm of teaching from analog to digital instruction. Besides, some existing barriers are remaining which we found through previous studies. There is no magic solution to recover all the current challenges, and this pedagogical reformation cannot happen without solving these as soon as possible. This transformation of ICT in education is an ongoing process, and the real progress is still not showed up very clearly to the society. If the government believes and takes necessary steps to accomplish the project with a high achievement, it is possible to integrate ICT in every classroom in the country with the help of other stakeholders involved in the education sector. Further study can be done on this issue to analyze the impact of ICT integration on student's performance on the public examination. There are also more opportunities to study the situation of ICT implementation in education especially in rural areas and even in Madrasah education of Bangladesh.

8.1 Recommendation

According to OECD (1999) "The development of technical skill improves students' capacity to absorb technology when they move to the workforce." Along with pedagogical, curricular and assessment, use of technology bring knowledge creativity among students. Both teacher and students can share their ideas to create new knowledge and also can monitor their present level of understanding (Brown & Campione, 1994; Scardamalia & Bereiter, 1994). In Bangladesh, regular supervision and monitoring from both school administration and ministry of education can accentuate the technological usage in classroom practices as well as in school's administrative activities. GOB also can allow some particular budget or incentives for the teachers on the proper implementation of ICT in school level which can stimulate one of their primary focus to build a digitalized, skilled and knowledgeable society. Experts can be appointed to make digital contents according to the curriculum for all subjects which will be available for all teachers of the country. If teachers will get the possible content of their lessons through the internet and can download and use it, they will not be able to show further excuses of time constraint or unavailable materials.

Rapid infrastructure development is another necessary action should be taken. There are still 12.02 percent schools without electricity in the country (BANBEIS, 2016) which is one of the important barriers to implementing technological usage on school activities. As the computer is taking the places for most of the other technical devices, GOB has to make sure the availability of computers in every school to accomplish their policy on reality. Bangladesh can follow some other developing countries in the execution of the strategy. Developing countries can use ICT to reduce the sense of isolation as well as to make open access to knowledge on an extended level (Mamun & Tapan, 2009). Extensive use of ICT in schools can help the students to reduce the knowledge gap with developed countries and make them confident to compete with the knowledge society.

9 Reference

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10 Annex

Data Collection approval from NSD

Personvernombudet for forskning

Prosjektvurdering - Kommentar

Prosjektnr: 49416



INFORMATION AND CONSENT

The sample will receive written and oral information about the project, and give their consent to participate. The letter of information is well formulated.

INFORMATION SECURITY

The Data Protection Official presupposes that the researcher follows internal routines of Universitetet i Oslo regarding data security. If personal data is to be stored on a private computer, the information should be adequately encrypted.

PROJECT END DATE AND MAKING THE DATA ANONYMOUS

Estimated end date of the project is 30.04.2017 according to your email 30.08.2016. According to the notification form all collected data will be made anonymous by this date.

Making the data anonymous entails processing it in such a way that no individuals can be recognized. This is done by:

- deleting all direct personal data (such as names/lists of reference numbers)
- deleting/rewriting indirectly identifiable data (i.e. an identifying combination of background variables, such as residence/work place, age and gender)

Consent for Participants

Project Title: ICT integration in secondary education in Bangladesh- A study of policy and Practice

Name of the Researcher: M M Imran Iqbal Imon

I understand, by agreeing to take part in the study means that I am willing to be interviewed by the researcher and make myself available for a further interview should that be required.

I understand, my participation will be voluntary that I can *withdraw at any stage* of the project without being penalized or disadvantaged in any way.

I understand my name and the organization I work for, will be completely anonymized for this study and will not be identifiable to anyone based on this study.

I understand, any information provided by me is confidential, and that this information may be used in future reports, articles or presentation by the researcher.

I consent to allow the researcher to audio record the interview.

I agree to take part in the above research project of University of Oslo. I confirm that I have read and understood the information sheet and the terms and conditions of the research, which I may keep for records.

Name of the participant

Date

Signature

Thank you very much for your support and consideration!

M M Imran Iqbal Imon
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Interview Questions for Teacher in Bangla

সাক্ষাৎকারপত্রঃ শিক্ষক

Basic Information

Date:

Name of the Teacher:

Subject of Teaching:

Name of School:

Degree in Teaching: C-in-Ed/Dip-in-Ed/B.Ed/M.Ed/B.SEd/M.SEd/None

Training in Teaching:

মূল প্রশ্নঃ

১। ক্লাসে আপনি কি কি টেকনোলজি ব্যবহার করেন?

২। শ্রেণিপাঠে টেকনোলজি ব্যবহারের জন্য আপনি কখন এবং কিভাবে নিজেকে প্রস্তুত করেন?

৩। শ্রেণিপাঠে আপনি কি উদ্দেশ্যে আইসিটি ব্যবহার করেন?

৪। কোথা থেকে আপনি ক্লাসে আইসিটি ব্যবহার করতে শিখেছেন?

➤ এ ব্যাপারে আপনি কোন প্রশিক্ষণ পেয়েছেন কি?

➤ পেলে তা কি ধরনের? কারা দিয়েছেন?

➤ এ প্রশিক্ষণ সম্পর্কে আপনার মতামত কি?

৫। সাধারণত কোন ধরনের পাঠে আপনি টেকনোলজি ব্যবহার করেন?

➤ সপ্তাহে কতবার?

৬। শিক্ষার্থীরা কি ক্লাসে টেকনোলজি ব্যবহারের সুযোগ পায়?

- পেলে তা কি ধরনের?
- কি কি কাজে তারা টেকনোলজি ব্যবহার করে?

৭। আইসিটি ব্যবহারের আগে ও পরে শিখন-শিক্ষন প্রক্রিয়ায় আপনি কি ধরনের পার্থক্য লক্ষ্য করেছেন?

- শিক্ষার্থীদের পড়ানোর ক্ষেত্রে টেকনোলজির ব্যবহার কি সহায়তা করে?

৮। শ্রেণীপাঠে আইসিটির ব্যবহার কি শিক্ষার্থীদের পাঠের প্রতি আগ্রহী করে?

- আইসিটি ব্যবহার কি শিক্ষার্থীদের পড়া সহজে বুঝতে সাহায্য করে?

৯। শ্রেণীপাঠে টেকনোলজি ব্যবহারের ক্ষেত্রে আপনি কি কি ধরনের চ্যালেঞ্জের সম্মুখীন হয়েছেন?

- শ্রেণীপাঠে টেকনোলজির ব্যবহারকে নিশ্চিত করতে কি করা উচিত বলে আপনি মনে করেন?

FGD guide for Students in Bangla

Basic Information

Date:

Number of students in Group:

Name of School:

Male:

Female:

১. তোমাদের শিক্ষকরা কি ক্লাসে পড়াতে কোন প্রযুক্তি ব্যবহার করে

-যদি করে, কতক্ষণ ধরে তারা প্রযুক্তি ব্যবহার করে?

২. কোন ধরনের বিষয়ে শিক্ষকরা প্রযুক্তি বেশি ব্যবহার করে?

৩. প্রযুক্তি কি তোমাদের বিষয়বস্তু বুঝতে সাহায্য করে?

-যদি হয়, তাহলে কিভাবে সাহায্য করে?

৪. তোমরা বিদ্যালয়ে কতটা সময় প্রযুক্তি ব্যবহারের সুযোগ পাও?

৫. তোমরা কি মাল্টিমিডিয়া ক্লাস এবং অন্যান্য ম্যানুয়াল ক্লাসের মধ্যে পার্থক্য করতে পারো?

-প্রধান পার্থক্য গুলো কি?

-কোন পদ্ধতি তোমার বেশি পছন্দ এবং কেনো?

৬. তোমরা কি বিদ্যালয়ের বাইরেও প্রযুক্তি ব্যবহার করো?

-করলে কি ধরনের প্রযুক্তি এবং কি উদ্দেশ্যে?

৭. তোমরা কি মনে করো প্রযুক্তি তোমার শিখনে সাহায্য করছে?

- হ্যাঁ হলে, কিভাবে করছে?

-না হলে, কেনো নয়?

৮. তোমাদের প্রধানশিক্ষক বা প্রশাসনের অন্য কেউ কি নিয়মিত ক্লাস দেখতে আসে? যদি কেউ আসে তারা কি কখনো ক্লাসে প্রযুক্তি ব্যবহার করার জন্য শিক্ষকদের বলেছে বা উৎসাহিত করেছে?

Interview guide in English

Basic Information

Date:

Name of the Teacher:

Subject of Teaching:

Name of School:

Degree in Teaching: C-in-Ed/Dip-in-Ed/B.Ed/M.Ed/B.SEd/M.SEd/None

Training in Teaching:

Questions:

1. What technologies do you use in classroom?
2. How and when do you prepare yourself for using the technologies in classroom?
3. What is your objective on using ICT in classroom?
4. How did you learn to use ICT in teaching?
 - Did you get any training?
 - If you get training, who conducted it? What was the aim of it?
 - Do you have any comments about it?
5. In which type of lessons you use ICT usually?
 - How many times in day/weeks?
6. Are there any chances for students to use technologies in classroom?
 - For what they use the technologies?
 - How you guide them on using ICT in classroom?
7. Have you found any differences before and after starting ICT in classroom?
 - Is there any effect of using ICT in classroom? If yes what are they?
8. Does the ICT help students to understand the topic easily? How did it happen?
9. Have you faced any challenge on integrating ICT in your teaching? If yes, what are those?
10. Do you have any recommendation on ensuring ICT in schools to government?
11. How can ICT play more effective role in secondary education of Bangladesh? what is your opinion?

FGD guide in English

Basic Information

Date:

Number of students in Group:

Name of School:

Male:

Female:

1. Do your teachers use technologies in classroom teaching?
 - If yes, how often they use technologies?
2. In which subjects teachers use technologies more?
3. Does the ICT help you to understand the lessons or topics?
 - If yes, how does it help you?
4. How often do you get the opportunity to use the ICT in school?
5. Can you figure out the differences between ICT based classes and the classes with manual methods?
 - What are the main differences?
 - Which methods do you like most and why?
6. Do you use technologies outside of schools? If yes, in what purpose?
7. Do you think ICT is helping you on education?
 - If yes, how is it helping?
 - If not, why not?
8. Does your headmaster or school authority visit your classes regularly? If yes, do they ever say anything about using ICT in classroom?

Observation Guide

Primary information of Class
Name of School: Name of Teacher: Subject: Topic : Date : Duration of Class: Name of Observer:

What will be observed?

1. What technologies teacher use in class-
2. How does teacher make students involved with technology-
3. How do students response in class-
4. How long teacher use ICT in classroom-
5. Ability of teacher to combine ICT and lessons-
6. Are the students attentive in classroom or they misusing the technology-

7. What method or methods teacher is using in the classroom-
8. Reliability of using ICT according to lessons-
9. Is there any challenge/s faced by teacher to implement ICT in classroom teaching learning-
10. Recommendations –

Signature of Observer (with date)