

Analysis
of
Bangladesh Secondary Teacher Education Curriculum

A Search for Digital Literacy

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Ranjit Podder
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SACMID
JUNE 2020

Coordinated by



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Published by:

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Preface

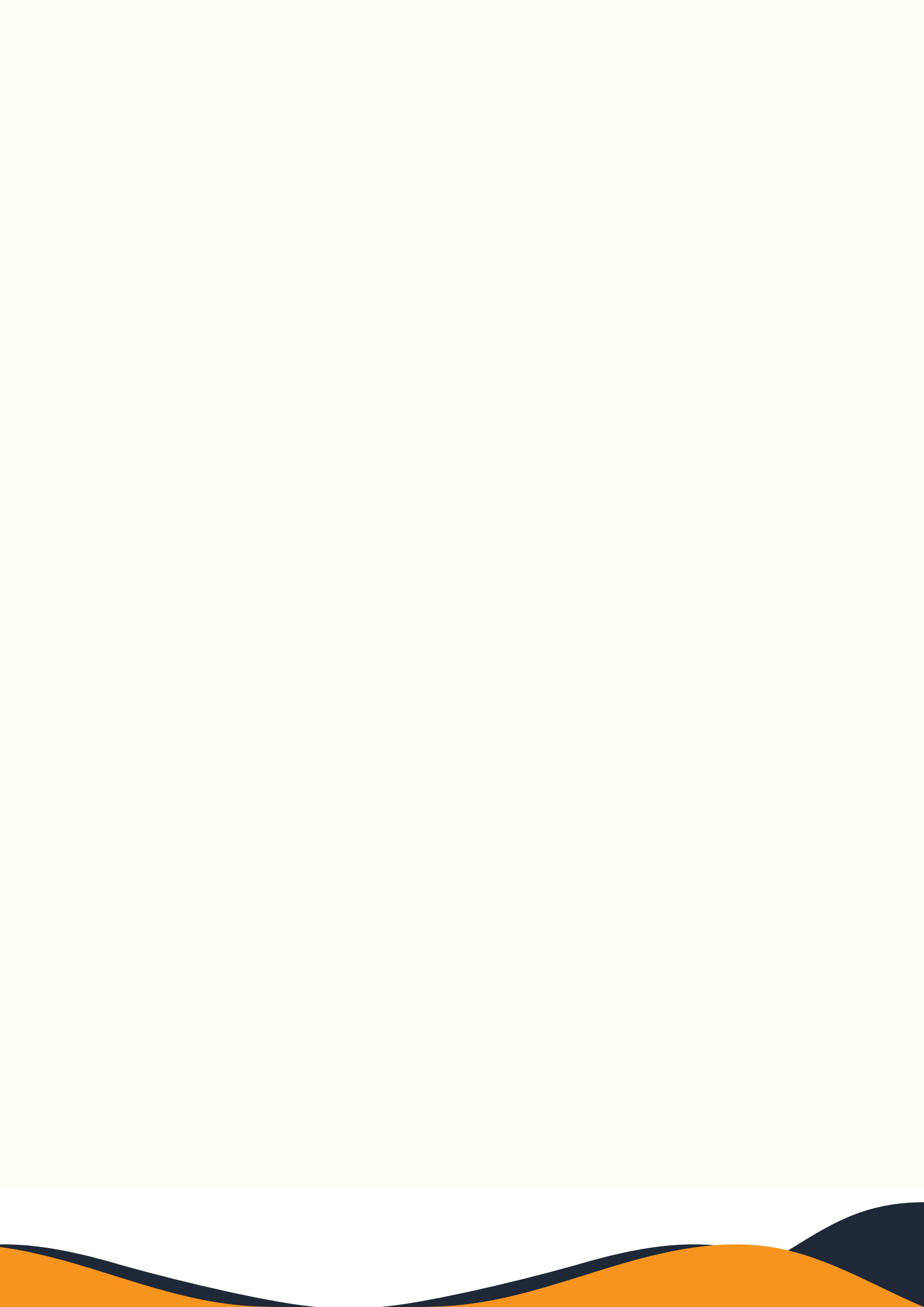
This study- **Analysis of Bangladesh Secondary Teacher Education Curriculum: A Search for Digital Literacy** has been conducted as part of our project activities under the project: **"Promoting Media Literacy on Bangladesh"** which we have been implementing since 2018 in the country under the support of Free Press Unlimited (FPU), a Netherlands based media development organization. One of our primary project target groups are secondary level students and the teachers who teach them in classroom. We have also engaged other stakeholders in our project like reputed educationists, media academics and the relevant government officials who are responsible to ensure proper education in line with the demands of 21st century skill and the vision for achieving Digital Bangladesh. As the world, and so the country is moving forward very fast with the advent of digital technologies and we are to accept and cope up with new devices and tools of smart technologies, we have to take a close look in our education system and the existing curriculum. The current study tried to explore the gaps in the existing B.Ed. ICT curriculum (now being used to provide basic foundation training for the Secondary level school teachers) in light of 21st century learning skills and 4IR and the challenges to implement the stated curriculum. In response to our request two very experienced researchers and Associate Professors of Dhaka Teachers Training College came forward and accomplished the study. Defying all the problems and limitations within a lockdown period due to corona pandemic the researchers have applied on-line interviews, organized FGDs and secondary literature analysis at their homebased set up, and succeeded to come up with some valuable findings and recommendations. The qualitative study has identified some specific gaps and areas and pointed ways how to solve those and by whom. SACMID will ensure sharing the findings and recommendations of the study to the relevant government agencies and policy-making bodies later on so that it can be helpful for them to revise the existing curriculum and the knowledge delivery system. We believe that better teacher will produce better students. We would like to thank the 02 researchers of the study and other teachers and trainers who gave their valuable time to make this study a valuable one. We express our gratitude to Free Press Unlimited for their continued support.

Stay safe. Best wishes-

Syed Kamrul Hasan

Deputy Director

South Asia Center for Media in Development(SACMID)



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Analysis of Bangladesh Secondary Teacher Education Curriculum: A Search for Digital Literacy

Abstract

The current study tried to explore the gaps in the B.Ed. ICT curriculum in light of 21st century learning skills and 4IR and the challenges to implement the stated curriculum. The qualitative study employed document analysis, semi-structured interview, and FGD methods to collect data. B.Ed. ICT curriculum was analyzed as part of document analysis; six teacher educators from four Teachers' Training Colleges engaged in implementing the B.Ed. ICT curriculum were interviewed with a semi-structured interview schedule; and five trainees of 2020 academic session were invited for an online FGD. Interviews and the FGD were audio-recorded with prior consent from the participants. The recorded data were transcribed and the similar themes were coded in different ink. Then all the different themes were put under the themes of the research questions as findings. The major findings of the study includes Teacher educators with Computer Science and Engineering or related subjects are required for better implementation of the ICT curriculum; there is lack of ICT teaching-learning resources (computers, high speed Internet, sound boxes, projectors, etc.); the ICT curriculum needs to be reviewed with contents required to step into the era of 4IR; assessment of ICT courses should focus more on practical activities; and finally, the college authority should be proactive in solving the local problems institutionally. Moreover, insufficiency of contents about moral values, attitudes and safe use of ICT and control over uses and misuses of the Internet should be taken care of. If the findings are considered, B.Ed. ICT curriculum would be better implemented at the Teachers' Training Colleges impacting on the digital literacy in secondary level institutions.

1.0 Introduction

The general concept of literacy is being able to read and write a language. Paulo Freire (1970) claims that 'reading the word is reading the world' which means that understanding a text from different point of views is important to know what is happening around. With the advancement of technology, the concept of literacy changes. Currently, there are some other kinds of literacy such as political literacy, financial literacy, social literacy, and so on other than the media literacy. Media literacy is defined as the ability to access, analyze, evaluate, create, and manipulate media in a variety of forms (Berger, Logan, Miroshnichenko, & Ringel, 2019). Media literacy encompasses different kinds of media such as print, broadcast, and digital media, claims Association for Media Literacy (AML), Toronto. Print media includes newspapers, books, magazines, comics, brochure, photos, etc.; broadcast media covers radio, TV, mobile phones, films, movies, cartoons, and so on; and the digital media includes the Internet (Twitter, facebook, Instagram, and all other Google apps), computers or any other devices (PowerPoint slides, Xcel, Spreadsheet, etc.), digital photos and images. According to Martin (2005), digital literacy includes being able to carry out successful digital actions required in everyday life; acquiring and using knowledge, techniques, attitudes, personal qualities; and evaluating digital actions in the solutions of everyday life problems. A study in America by Ginosar and Tal (2017) with 64 teachers and 188 news items revealed that middle school science teachers' media literacy was inadequate because they could not choose the appropriate writers and the right news items from the websites to use in teaching which support the realization of curriculum expectations and the researchers have argued that media literacy is important for effective use of journalistic texts in science teaching. Proper media literacy is important for the teachers as well as the students all over the world. On the other hand, digital literacy is being able to use technology judiciously in everyday life (Murry, 2019). However, all the literacies are interrelated and digital literacy consists of all other literacies because, through the use of technology or digital devices, the user uses all other literacy such as media literacy and broadcast literacy. The current study uses the term digital literacy to mean the use of ICT which also includes the print and the broadcast media.

2.0 Purpose of the study

SACMID (South Asia Centre for Media in Development) has been working for enhancing the digital literacy in the country as digital literacy influences the lives and the way of living of the people. From a baseline survey with 483 secondary level students from 16 schools in Dhaka city and Tongi in Gazipur (14 schools from Dhaka & 2 schools from Tongi) on digital literacy, SACMID reports that being in the seas of unlimited sources of information, the younger people are being negatively affected (Quarmal, Hasan, & Sultana, 2018). Quarmal et al. (2018) further allege that the free flow of any materials is causing damage to the younger people as most of

them do not know the ethical and legal use of the resources. It seems apparently that students are not aware of UNESCO (2013) provided guidelines of media use or in other words most students are not digitally literate as they do not have the ability to fully 'understand, evaluate, and use' the contents and in many cases, they share the pieces of information without ethical and legal considerations. Quarmal et al. (2018) further state regarding the use of social media and mobile phones that about 50% of the respondents claim that they themselves or their teenaged friends were victims of offensive comments or picture-sharing without permission or receiving offensive images and videos in the inbox or account hacking or different kinds of blackmailing. The stated issues arose a serious concern and SACMID wanted to find a way out to minimize the negative impact of misusing digital contents by the younger generation.

Therefore, SACMID wants to find the glitches, if there is any, in the B.Ed. ICT curriculum because these B.Ed. trained teachers teach in those schools in most cases. There may be a question if the secondary teachers; the teacher educators teaching in the Teachers' Training Colleges have strong digital literacy; and if the B.Ed. curriculum have the contents which can very well make the B.Ed. trained teachers digitally literate. By studying all the stated, SACMID wants to find a good solution to save the huge number of the teen-aged learners from different kinds of harassment emerging from the use of digital technology. With that end in view, this study has tried to identify the gaps in the ICT curriculum; recommend the concerned authority to review the curriculum including all those contents related to 21st century learning skills and the 4th Industrial revolution; and to explore the better ways to implement the B.Ed. ICT curriculum.

3.0 Objectives of the Study

This study analyzed Bangladesh Secondary teacher education ICT curriculum aiming to achieve the following objectives:

- ✓ To explore teacher educators' and the trainee teachers' understanding of digital literacy
- ✓ To identify the gaps in the existing Secondary teacher education curriculum in the light of 21st century learning skills development framework and 4IR
- ✓ To generate recommendations about how the B.Ed. curriculum can serve the purpose of achieving the digital literacy in the context of 21st century skills development framework and 4IR.
- ✓ To explore ways to ensure the successful implementation of the digital literacy at the Teachers' Training Colleges.

4.0 Research Questions

- ✓ In light of the stated objectives, this study has tried to find answers to the following questions:
- ✓ What do the teacher educators and the trainee teachers understand by digital literacy?
- ✓ What is the status of digital literacy in the present teacher education curriculum?
- ✓ What resources and supports are there to implement the ICT curriculum?
- ✓ What are the gaps in the current curriculum in terms of 21st century learning skills and 4IR?
- ✓ What challenges do the teacher educators face in implementing the B.Ed. ICT curriculum?
- ✓ What are the effective ways to implement the ICT curriculum in Teachers' Training Colleges?

5.0 Clarifying the important terms and concepts

For the effortless understanding the readers, the researchers consider it better to clarify the terms and the concepts which may be new to them or to let them know what we meant here in this study with the terms and the concepts. The major terms used in this study included digital literacy; 21st century learning skills development framework; 4IR; and B.Ed. ICT curriculum. They have been clarified in the following sub-sections (5.1 – 5.4)

5.1 Teacher Education

An educational programme is defined as a collection of educational activities which are planned to achieve a pre-determined objective or the completion of a specified set of educational tasks. Teacher education refers to the policies and procedures designed to equip prospective teachers with the knowledge, attitudes, behaviors and skills they require to perform their tasks effectively in the classroom, school, and wider community. Teacher education is often divided into different stages; pre-service and in-service teacher training or education; and teacher development or continuing professional development. In Bangladesh, there is a one year long training program named Bachelor of Education (B.Ed.) designed for secondary teacher education. Teachers Training Colleges are mainly responsible for providing teacher education to the secondary level teachers of Bangladesh. In order to improve teaching-learning in secondary institutions, Teachers' Training Colleges (TTCs) provide pre-service and in-service training for teachers. In the current study, one-year Bachelor of Education (B.Ed.) is considered as teacher education. This B.Ed. programme is designed by the National University of Bangladesh and implemented by Government and Private Teachers' Training Colleges.

5.2 Digital literacy

Digital literacy consists of three main stages. The first stage is for a person to become aware of all the media they consume in their day-to-day lives and manage this. The second stage is to develop critical thinking - what message is this media trying to portray; what information may have been left out to produce the desired effect on the stakeholders, and the final stage of digital or media literacy is to consider who is creating the media for experiencing every day and Why? It is important to effectively access, organize, analyze, evaluate, and create messages in a variety of forms. In our study digital literacy encompasses the practices that allow people to access, critically evaluate, and create or manipulate media. The purpose of being digitally literate is to engage in a digital society; one needs to be able to understand, inquire, create, communicate and think critically.

5.3 21st century learning skills

According to Palmar (2015), recent technological advances have affected many areas of our lives, including the way we communicate, collaborate, learn, and, of course, teach. Those advances necessitate an expansion of our vocabulary, producing definitions such as digital natives, digital immigrants, and the topic of this post-21st-century teacher'. The term 21st century skills refers to a broad set of knowledge, skills, work habits, and character traits that are believed by educators, school reformers, college professors, employers, and others to be critically important to achieve successes in today's world, particularly in academic programs and contemporary careers. Generally speaking, 21st century skills can be applied in all academic subject areas, and in all educational, career, and civic settings throughout a student's life (<https://www.edglossary.org/21st-century-skills/>). This study focuses on four skills: creativity, critical thinking, communication, and collaboration, which are part of the 21st Century Skills. Teacher educators are expected to enable the trainees to use such ways of working and thinking in the 21st century, and teacher preparation programmes expect to offer multiple opportunities for teacher candidates to learn, develop and practice these skills.

5.4 4IR (4th Industrial Revolution)

The World Economic Forum (2016) claims that, the first industrial revolution started around 1820 with the steam power to mechanize production; and the second revolution started with the invention of electric power which also brought a huge change in the production system. The third industrial revolution started with the digital revolution (advancement of electronics and information and communication technology) which started in the middle of the last century to automate production. Based on the third revolution, the Fourth Industrial Revolution (4IR) has already started, some believe, and the breadth and depth of the changes foretell the huge transformation of the entire production, management, and governance system.

6.0 Research Methodology

This study has employed qualitative research methodology as through qualitative study, it is possible to delve deep into the research problem (Bogdan & Biklen, 2007; Creswell, 2012). The current study has employed document analysis, semi-structured interview, and Focus Group discussion (FGD) methods to collect data. Through document analysis, it has been possible to learn the curriculum expectations and what contents are being used to achieve the learning outcomes; and if there is gap between the curriculum expectations and the contents provided for achieving the expectations. Semi-structured interviews provided opportunity to go deep into the research problem (Bogdan & Biklen, 2007; Creswell, 2012). FGD helped to gather diverse opinions from a group of participants who are B.Ed. trainees.

6.1 Data Sources

Teacher Education curriculum (B.Ed. curriculum), ICT curriculum (Education Studies: compulsory), and Advanced ICT curriculum (Teaching Studies: Appendix: 3A, 3B, 3C); ICT Teacher training manuals including the training manuals prepared by a2i and the ICT project; and the teacher education ICT textbook contents were analyzed to collect data. Five teacher educators who are engaged in the implementation of the B.Ed. ICT curriculum as well as the in-service ICT training programs in different Govt. Teachers' Training Colleges were interviewed with a semi-structured interview schedule (Appendix: 1). The participants included senior and junior members of the faculty and a female lecturer. Although the initial plan was to collect data through face to face interviews, the data were collected through online interviews with the six teacher educators from Teachers' Training College, Dhaka; Teachers' Training College, Feni; Teachers' Training College, Pabna; and Teachers' Training College, Rajshahi due to the country-wide lock down for Covid-19 pandemic.

Moreover, a group of purposefully selected five trainee teachers who are currently enrolled for the Bachelor of Education program at Teachers' Training College, Dhaka were invited to an online FGD. Initially, it was decided to organize the FGD with 10 trainee teachers but because of the corona pandemic and country-wide lockdown, the number of the trainee teachers were brought down to five for FGD because 10 were not available and instead of face to face FGD, it was organized online via messenger. The FGD was conducted using an FGD schedule (Appendix: 2).

6.2 Data collection Process

The Bachelor of Education (B.Ed.) ICT curriculum and the in-service training manual were analyzed. It has been cited in section 4.1 that the interviews were conducted online through the use of messenger although the initial plan was to go to five Teachers' Training Colleges in person and to interview them in-depth. The interviews were audio-recorded with prior consent

of the teacher educators.

And then five B.Ed. trainees who are also teachers in government and non-government secondary schools were invited to a group call through messenger to take part in an FGD. The FGD was also audio-recorded with the participants' prior consent.

6.3 Data Collection Tools

Data were collected through the use of interview schedule (Appendix: 1) followed by probing questions as per situations dictated and the FGD schedule (Appendix: 2). Moreover, the researchers reflected on their experiences and observations as teacher educators, ICT trainers, and Bachelor of Education curriculum designers.

6.4 Data Process and Analysis

The data collected through interviews and FGDs were transcribed and the data giving similar meaning were be coded in different ink and then they were put under the themes of the research questions. Data collected from different sources were triangulated as triangulation of data increases the validity and acceptability of findings (Creswell, 2012).

6.5 Research Questions and Research Methods at a Glance

Research Questions	Methods	Comment(s)
✓ What do the teacher educators and the trainee teachers understand by digital literacy?	Semi-structured interview; FGD	
✓ What is the status of digital literacy in the present teacher education curriculum?	Semi-structured interview; FGD, Document Analysis	
✓ What resources and supports are there for the teacher educators and the secondary teachers to implement the ICT curriculum?	Semi-structured interview; FGD, Document Analysis	As insider researchers, the researchers also reflected on their own and colleagues' teaching and training experiences
✓ What are the gaps in the current curriculum in terms of 21 st century learning skills and 4 IR?	Document Analysis; semi-structured interview; FGD	
✓ What challenges do the teacher educators face in implementing the B.Ed. ICT curriculum?	Interview, FGD	
✓ What are the effective ways to implement ICT curriculum in Teachers' Training Colleges?	Interview, FGD	

6.6 The Teacher Educator (TE) Participants

Teacher Educator (TE) Code	Designation & Affiliation	Educational Qualifications	Training	Experience	Gender (M/F)	Comment
TE1	Assistant Professor, TTC, Dhaka	BA (Hon's) & M.Ed.	ToT in ICT (A2I), Diploma in ICT (Sweden)	12 years	M	ICT Master trainer
TE2	Assistant Professor, TTC, Feni	B.Sc. (Hon's), M.Sc. (Math)	B.Ed., ToT in ICT (A2I); Diploma in ICT (Sweden)	12 years	M	Training on Math education (Canada) ICT Master trainer
TE3	Assistant Professor, TTC, Dhaka	B.Sc. (Hon's), M.Sc. (Science)	B.Ed., ToT in ICT (A2I); Diploma in ICT (Sweden)	8 years	F	ICT Master trainer
TE4	Associate Professor, TTC, Pabna	B.Sc. (Hon's) & M.Sc. (Math); Ph.D.	B.Ed., ToT in ICT (A2I); Diploma in ICT (Sweden)	24 years	M	ICT Master trainer
TE5	Lecturer, TTC, Rangpur	B.Sc. (Hon's) & M.Sc. (Math);	B.Ed., ToT in ICT (A2I);	20 years	M	ICT Master trainer

6.7 Trainee participants

Trainee Code	Designation & Affiliation	Educational Qualifications	Training	Experience	Gender (M/F)	Comment
T1	Assistant Teacher, BCSIR High School, Dhaka.	Bachelor of Education (Hon's)	Teaching Practice Digital Content training	4 months	M	Trainee teacher
T2	Assistant Teacher, Sher-e-Bangla Govt Boys' School, Dhaka	Bachelor (Hon's) and Master in Management	B.Ed. and M.Ed.; Digital Content training	12 years	M	Trainee teacher
T3	Assistant Teacher, Bandor High school, Narayangonj	Bachelor (Hon's) and Master in Accounting	B.Ed. and Med, Digital Content training	12 years	F	Trainee teacher
T4	Assistant Teacher, Kalikaccha Pathsala High School, Brahmanbaria	Bachelor (Hon's) and Master in Bangla	B.Ed. and M.Ed.; Digital Content training	20 years	M	Trainee teacher
T5	Assistant Teacher, Tejgaon Govt Girls' School, Dhaka	Bachelor (Hon's) and Master in Management	M.Ed, Digital Content training	16 years	F	Trainee teacher

7.0 Findings and Discussion

During transcribing the interviews and the FGD data, and analyzing the Bachelor of Education ICT curriculum, the findings came to the surface. The findings have been placed under the themes of the research questions. The major findings include teacher educators' and the trainee teachers' understanding of digital literacy (7.1); digital literacy in the present teacher education curriculum (7.2); resources and supports available for the teacher educators (7.3); gaps in the Bachelor of Education curriculum (7.4); challenges teacher educators face in implementing the curriculum (7.5); and ways to overcome the challenges (7.6). The findings have been presented in the following sections (sections 7.1 – 7.6) and discussed relating to the current literature.

7.1 Teacher educators and the trainee teachers' understanding of digital literacy

The interview shows that the teacher educators have some understanding of the digital literacy although all of them are not much aware of the ethical and legal use of digital resources. In interview with the TE1 (Teacher Educator 1) and TE4, it was revealed that having some basic skills in ICT use is digital literacy. He (TE1) claims, "Digital literacy means some Basic ICT skills through which one can complete daily communications and can perform basic academic or official tasks". TE4 also provides similar opinion regarding digital literacy that being able to operate a computer and other electronic devices is digital literacy. According to TE1, "Digital literacy encompasses media literacy and broadcast literacy because in digital literacy, there is print, electronic, and broadcast media".

TE1 claims that he (TE1) is a digitally literate person as he uses ICT to teach his trainees and students. Additionally, he claims that he collects resources from various websites and also uses some software and applications. "Moreover, I maintain a website from where students can get handouts and contents for their courses. I also use various social media like Facebook, LinkedIn, Tweeter, etc." he claims.

TE2 (Teacher Educator 2) like TE1 claims that digital literacy is being able to use some ICT skills required to perform daily-life activities through the use of the Internet, social media, etc.

Moreover, TE2 claims that persons being able to use mobile phone, Internet, social media for communication are digitally literate persons.

TE3 claims, "Digital literacy is the ability to use information and communication technologies to find, evaluate, create, utilize, share and create content using information technologies and the Internet". Digital technology allows people to interact and communicate with family and friends as well as office colleagues on a regular basis due to the busy schedule of everyday life. According to TE3, understanding copyright rules and ethical use of ICT is important. However, she claims that many of the teachers and teacher educators are not aware of the copyright,

plagiarism, ethics in use of ICT, and the Digital Security Act 2018.

TE1, TE2, and TE4 claim that, if a teacher educator communicates with colleagues and students using technology, they can be called digital literate teacher educators. They further maintain that digitally literate teacher educators play a very important role in teaching the trainees and the students digital technologies making them digitally literate. If the trainee teachers are properly educated and trained, they can teach digital literacy properly when they go back to schools to teach the secondary students. TE5 claims that a well-educated and trained secondary teacher plays a vital role in providing digital literacy to the younger learners enabling them use the digital resources judiciously, and safely.

According to TE5, digital literacy is the ability to use computer or other digital devices to solve his/her daily life problems. Moreover, TE5 claims that a digitally literate person must be able to produce, evaluate, and share documents with others and collect necessary resources following the ethical and legal framework. TE5 further maintains that not only the ability to use the electronic devices, to be digitally literate, one must be able to access to different media, understand and justifying the reliability of the messages the media is circulating. According to TE5, a digitally literate person or student knows how to keep themselves away from cyber-crimes.

TE6 believes that anyone using the digital devices is a digitally literate person which means being able to operate digital devices such as computers, laptops, mobile phones is digital literacy.

However, the trainee teachers are found not to be aware of the idea of digital or media literacy. They were asking the researchers questions like – ‘is it all about knowing and using ICT? ‘is it teaching ICT to the students?’, and so on. Only one of the five members in FGD group finally asked, although he was not sure, ‘is it analyzing the digital resources?’ Actually, the trainees are not familiar with the term digital literacy.

It is clear from the data stated above that some of the teacher educators do not have clear ideas of digital literacy. Only the ability to use the digital devices is not digital literacy; it is much more than that. TE3 and TE5 have more clear conception of digital literacy. They believe that alongside accessing and producing digital materials, one must be able to evaluate them from the validity and reliability, ethical and legal point of views. The facebook posts of the participants also show that all of them are not digitally literate. TE6, one of the participating teacher educators, was seen to upload a post which goes against the government decision. TE6 wrote regarding the government directive not to gather in mosques to avoid covid-19 contamination, “Who will go to mosque tomorrow with me to say Jumma prayers (prayers on Friday noon) even though there is rain-like canon firing?” The Digital Security Act-2018, Article 25

says that a person committing this offense may be punished with up to three years in jail and/or a penalty of up to three lac taka. Legally and morally, he does not have the right to do that. The above statement bears a testimony of the teacher educator's not being digitally literate. This might have happened because of his political ideology but that kind of a post posed a threat for him. On the other hand, the trainee teachers' unawareness of digital literacy might be because, they were not told in the classrooms during the ICT classes at the Teachers' Training Colleges.

On the other hand, TE3 and TE5 are comparatively younger in the profession and they have attended many training sessions and conferences home and abroad which might have provided them with the knowledge of moral and the legal aspects of the uses of the digital resources.

7.2 Digital literacy in the present teacher education curriculum

The Bachelor of Education (B.Ed.) ICT curriculum analysis show what contents are there in the curriculum. Alongside MS Word, MS PowerPoint, Spread Sheet, Excel, the Internet, and the OER (Open Educational Resources), the B.Ed. ICT curriculum has cyber safety and security; guidelines for e-content uses; downloading and using free and paid apps and software; rules about copyright resources and plagiarism; how to create an email and how to use it for communication; how to browse the Internet; and so on. Therefore, TE3 believes that there is enough scope for the teacher educators to teach digital literacy in ICT curriculum because contents such as legal use of digital media, copyright rules, and judicious use of technology are there. The study of these contents makes the trainees aware of the justified use of technology. TE5 also believes that the contents which are there in curriculum are sufficient to teach digital literacy to the trainee teachers but the question is how the contents are taught. TE5 additionally claims that as teacher educator he knows the moral and the legal aspects of ICT use and he tells the trainee teachers all these moral and legal aspects when teach them.

TE3 claims that the current ICT curriculum takes into account the 21st century skills which include critical thinking, creativity, collaboration, communication, digital literacy (media literacy, broadcast literacy, any kinds of technologies, etc.). Moreover, the 21st century skills include flexibility, leadership, initiative, productivity, and social skills. She (TE3) believes that all the mentioned 21st century skills are there in the ICT curriculum but the question is how all the teachers teach them. TE1 and TE3 allege that there is nothing mention in the curriculum about the 4IR (4th Industrial Revolution) because the idea of 4IR comes into being after the B.Ed. curriculum got reviewed in 2016.

TE2 claims, "I use mini lecture, demonstration, discussion, blended learning approach, problem solving, project based learning, question-answer, etc., to make the teachers digitally literate". According to TE2, there are contents in the syllabus to make the trainee teachers aware of

the ethical use of ICT. TE2 alleges, "I always tell the trainees to use reference to use others' intellectual property. Direct cut-or-copy-paste without recognition of the original writer is unethical and it is considered as intellectual theft. I cannot encourage my trainees to be unethical!" However, TE1 and TE2 do not know more about the moral and legal use of ICT and they are not sure if the trainees follow the ethical and legal aspects of the use of ICT as they do not have any mechanism to check plagiarism in their submitted assignments.

TE3 and TE5 claim that alongside providing ICT knowledge and skills to the B.Ed. trainees to teach the ICT courses in schools, they are provided with the knowledge of moral and ethical use of ICT. For example, the two teacher educators claim that they talk about the ethical use of the intellectual property from the Internet; teach the trainees to analyze the materials to check their authenticity, validity, and culture sensitiveness. However, TE4 and TE6 fail to provide any information regarding moral and legal use of ICT. Although those two teacher educators teach the ICT courses, their literacy base seems to be weaker.

The participants of the FGD claimed that there are some contents in the curriculum the practices of which can make the trainees expert in ICT but these contents are not taught probably the teacher educators do not have enough knowledge and skills in those areas. In unit five of the Advanced ICT Course, contents under the chapter head Language of Programming: Concept of Program include Programming Language; Machine Language; Assembly Language; Mid-Level Language; High Level Language; C, C+, Visual Basic; Java, Oracle, Python; 4th Generation Language - 4GL; Translator Program; Compiler, Assembler, Interpreter; Organization of a Model; Steps of Developing a Program; Algorithm, Flow Chart; Program Design Model; Programming Language – C: Compiling of Programs; Structure of Programs; Types of Data, Constant, Variables, Expressions; Key word; Input Output Statements; Conditional Statement; Loop Statement; Array, and Function.

The above data show that all the teacher educators (TE1, TE2, TE3, TE4, TE5, and TE6) put more emphasis on the technical sides of ICT teaching at the colleges. For example, they claim that the B.Ed. trainees would learn how to prepare ICT based teaching and learning materials, and they would be able to use these materials for enhancing the quality of teaching in schools. TE1 alleges that the trainees are supported to learn how to use the Internet to find, download, and use the materials but no guidelines are provided regarding the ethical and the legal use of the resources.

Another observation by the TE1, TE3, and TE5 is that there is no hardware related contents in the curriculum. They claim that there should be some lessons on trouble-shooting. Document analysis also supports the claim of the teacher educators.

What is observable from the data above is that only TE3 and TE5 are aware of the moral and legal aspects of digital literacy. Those two teacher educators, TE3 and TE5, informed the

researchers that they put added importance to the moral, cultural and legal aspects of the use of ICT although Digital Security Act -2018 has not been included in the curriculum. Although none of the TEs has ICT-related background, they have Diploma in ICT from Life Academy, Sweden or at least training in ICT from a2i. TE3 and TE5 are with similar ICT education and training background but they teach ICT in Teachers' Training Colleges.

7.3 Resource and supports for teacher educators to implement the ICT curriculum

The experiences of the researchers say that the Teachers' Training Colleges have one or more computer Labs each having multimedia projectors; display screens; and other classroom resources. In some colleges, there are also SMART Boards. TE2 claims that he uses resources such as ICT textbooks from 6 to intermediate level prepared by the NCTB; B.Ed. ICT course book prepared by TQI-SEP-II; ICT related reference books; Computers or laptops; modem or router for Internet connection; white board and SMART board; and Multimedia Projector, etc. Similar statements are provided by TE1 and TE4. TE1 claims that he engages the trainees in pair and group learning and in the pair and the group work, the trainees learn from each other. TE1 adds that when the trainees work together, the stronger ones provide supports to the weaker trainees and thus in the participatory way their learning becomes lasting. TE2 further adds that, he demonstrates how to use the electronic devices and how to teach an ICT lesson and then the trainees have to simulate lessons or different parts of a lesson to make them digitally literate.

TE3, TE5, and TE6 claim that they use PowerPoint slides in every class; they prepare the slides based on the information provided in the course book; and sometimes, they provide the trainees practical work where they use the computers in the labs. These three teacher educators also claim that they use OER (Open Educational Resources) such as UNESCO resources and other online resources. They also use the TCG (Teacher's Curriculum Guide) to teach lesson planning to the trainees. After delivering a lecture on how to prepare a lesson plan, they ask the trainees to prepare a lesson plan on a topic from a school ICT books that they would use to teach the students of the class they prepared the lesson plan on. TE6 claims that he uses laptops, mobile phones, sound boxes, and SMART boards in teaching.

There is an arrangement of simulation for trainees where they practice teaching ICT contents; in this simulation, the trainees teach a lesson or a part of a lesson and receives feedback from the teacher educator in the areas of pedagogy (teaching methods, approaches, and techniques; lesson plans and their phases/steps; resources used; if they are appropriate for the lesson and if they are culturally sensitive, etc.) and uses of the resources including the electronic devices. It is worth mentioning that, in this teaching practice, the trainees use written lesson plans, laptops, projectors, sound boxes, the Internet, and so on. Thus the trainees become expert in using the teaching and the learning resources appropriately.

Regarding supports in implementing the ICT curriculum, all the six teacher educators claim that they have more one training on ICT home and abroad (See section 6.6). Additionally, most teacher teaching at the Teachers' Training Colleges have opportunities to join training programs organized by different ICT projects.

All the five participants in the FGD claim that they do not have enough resources to use when necessary. Sometimes, especially when in-service training runs in the college, we have to attend lectures as almost all the computer labs are occupied by the in-service trainees. On the other hand, when we can use the computer labs, we do not find a computer for individual use; this happens because the number of students in a section is around 100 but the number of computer in a single lab is 40 or 50. Moreover, some computers remain out of order because of lack of maintenance.

It is observed from the stated data that almost all the teacher educators use the available resources in teaching ICT. However, they did not talk about how much the trainees have access to the resources on-campus. The experiences of the researchers say that the college authority cannot provide a computer to each of the students during ICT classes and practices. Moreover, there is almost no opportunity for the trainees to practise computers or browse the Internet during the leisure time. When the trainees share a computer, they cannot achieve the full literacy as there is almost no scope to operate a computer individually. Therefore, it can be said that there is insufficiency of resources in the colleges which hampers the better implementation of the ICT curriculum.

7.4 Gaps in the Bachelor of Education ICT curriculum

The interviews with the teacher educators; FGD with the current trainees at Teachers' Training College, Dhaka; and the ICT curriculum analysis reveal that there are some gaps in the ICT curriculum. Some gaps are identified in the areas of contents; human and physical resources; and ICT friendly environment.

7.4.1 Lacking in the areas of contents

TE1, TE3, and TE5 assert that the curriculum was reviewed around five years ago when SDG, Digital Security Act 2018, and the idea of 4IR did not come into being. Therefore, the expectations of SDG, Digital Security Act 2018, and the 4IR are not reflected in the curriculum.

They (TE1, TE3, TE5) expect to see AI (Artificial Intelligence); VR (Virtual Reality) is simulated experiences that can be similar or completely different from the real world; LMS (Learning Management System) is an application software through which is used for administration, documentation, tracking, reporting, automation, and delivery of educational services; and Robotics should be included. They claimed that without being able to use the mentioned technologies and without being able to create some like those, we would be skidded off the track of

fourth industrial revolution.

TE2, TE4, and TE6 have claimed that the B.Ed. curriculum has many good contents but contents such as moral values, attitudes, and safe use of ICT; and control over the uses and misuses of the Internet are absent from the curriculum.

The trainee teachers claimed in the FGD that most contents of the ICT curriculum have been taken from the SSC and the HSC ICT textbooks; only one unit, unit 5, in the Advanced ICT curriculum contains advanced contents (see section 7.2). It has been mentioned earlier that teacher educators are not capable of teaching those contents or for some reasons, they do not deal with those contents. Therefore, this is a big gap in the curriculum implementation.

Moreover, the curriculum analysis shows that there are no contents on AI and robotics which will be used to 4IR happen around a couple of years later. Additionally, the Digital Security Act 2018 has not been included in the curriculum. It indicates that the legal aspects of ICT have been ignored in the curriculum. If those contents are not practised in teacher education colleges, they may not reach to the schools in a proper way. As a result, the Bangladeshi people may not be aware of the moral and legal use of ICT and the country may lag much behind many other countries in stepping into the era of 4IR. This will also disrupt implementing the vision of the government to achieve the goals of “Digital Bangladesh”.

From the data placed above, it is clear that there is lack of appropriate contents as well as implementation of the planned curriculum. Teacher educators or teacher who are considered as the light givers to the society (Podder, 2017), are not well-prepared to deal with the ICT syllabus. The curriculum which is being implemented only prepares the students to be the users of technology, not the producers.

7.4.2 Insufficiency of human and physical resources

It is revealed from the interviews and the FGD that there are insufficient physical resources. TE1, TE3, and TE5 allege that the colleges do not have good number of computer labs for the trainees to use during the ICT classes. Moreover, the college authority cannot provide a computer to each of the trainees for individual use during the classes and in other times. During the interviews, the TEs talked about the perceived gaps in the curriculum. Although the question was regarding the gaps in the ICT curriculum in relation to the 21st century learning skills, the teacher educators also identify some other issues related to curriculum implementation. Regarding the human resources, TE1 claims:

I find two kinds of gaps in the curriculum. The first gap is related to the contents; that is, the contents included in the curriculum and the syllabus do not fully reflect the Digital Security Act 2018 and the 4IR. Contents like AI, AV, and MLM should have been included in the curriculum.

The other gap TE1 mentions is implementation. Although some programming languages are there, they are not properly practiced. Therefore, there is a huge gap at the implementation level.

TE3 and TE5 claim that, assessment of the ICT courses also does not focus on the practical aspects of ICT; the assessment attaches more importance to the theoretical aspects of ICT. Moreover, the ethical and legal aspects of digital literacy are neglected. They also allege:

We think one of the important gaps is lack of ICT subject teachers; actually no teachers are recruited with Computer Science and Engineering or related subjects background and there is no arrangement for the current teacher educators who teach the ICT subject for undergoing higher studies on ICT related subjects.

According to the teacher educator participants, they have got some training or a small number of them have achieved Diploma in ICT Education home and abroad on their own initiatives. They further continue that there are specialized teachers for Bangla, English, Maths, Political Science, and so on but there is not a single teacher with ICT learning background.

T1, T2, T3, T4, and T5 all assert that the contents in the syllabus are fine but all the contents are not taught and we are not provided much time in practice. During the FGD, the trainee participants allege that the teacher educators are not capable enough to teach some areas. Although they could not mention some contents, they mention that almost all the contents of the B.Ed. ICT syllabus are similar to those which are set for the students of classes nine-ten and eleven-twelve. They requested the researchers to include higher level contents for the B.Ed. course.

From the data provided by the teacher educators and the trainee teachers in the FGD indicates that all the contents should be taught properly; some contents that focus the moral, legal, and 4IR should be included in the curriculum. Moreover, there needs a good number of ICT teacher educators in the Teachers' Training Colleges for better implementation of the curriculum. Moreover, sufficient number of digital equipment should be procured and maintained for better implementation of the curriculum. So far as is known, the current B.Ed. curriculum was developed about five years ago and then the SDG and IR 4.0 in education came into being. Therefore, the curriculum needs to be updated through the inclusion of the recent development.

7.4.3 ICT friendly environment

The experiences of the researchers show that the total environment at the colleges is not ICT-friendly. For examples, the ICT labs are not kept open all time for the trainees' use and there is no technicians who can help the teacher educators and the trainees if there is any trouble. The teacher educators TE1, TE3, and TE5 claimed that during Teaching Practice and

in-service training for the secondary teachers, the trainers are not deliberately included in the trainers' list to provide support to the subject teachers. For example, suppose, secondary teachers with Bangla, English, and Mathematics background join a training program. If there are trainers having Bangla, English, and Maths subjects and pedagogy knowledge would perform better and because the teacher educators (trainers) would be able to answer the questions related to the teaching of that subject using ICT. But in reality, this important issue is not considered.

The trainees also claim in the FGD that they do not find the computer labs open for use during the college office hours and other times. As a result, they have to get their assignments composed in the outside computer shops destroying the opportunities to develop their computer skills. Moreover, the Internet speed is so low that necessary activities are almost impossible; teacher educators sometimes cannot enter into a website during the ICT classes. Therefore, it becomes a theoretical class in absence of the Internet or because of the low speed. Another issue that the trainees identified is the lack of cleanliness; there is dust everywhere: in the floors, tables, computers, chairs, etc. Therefore, the trainees say that they do not love to go to the labs.

In order to improve the teaching-learning of ICT at the TTCs, the computer labs should be accessible to the trainees and there should be high speed of Internet connection. The computer labs should be neat and clean that would welcome the trainees.

7.5 Challenges in implementing the B.Ed. ICT curriculum

There are some challenges identified by the participating teacher educators. The challenges include age-gap of the trainees (7.5.1); infrastructural facilities (7.5.2); ICT-teaching staff (7.5.3); high-speed Internet (7.5.4); class routine (7.5.5); access to ICT facilities (7.5.6); curriculum review (7.5.7); absenteeism (7.5.8); and online platform (7.5.9). The challenges have been placed in the following sections:

7.5.1 Age-gap of trainees

TE2 claims that many teachers who come here are aged female teachers with little or no knowledge of ICT. Some of them are starting the use of computers for the first time and most of them use analog mobile phones. However, in few days they become habituated to the use of the computers. On the other hand, comparatively younger teachers, male and female, are advanced enough to understand and do practically. TE1, TE3, and TE5, also provided similar opinion as TE2. They also claim that most teachers do not know how to use computers with some exceptions.

7.5.2 Infrastructural facilities

All the six teacher educators (TE1, TE2, TE3, TE4, TE5, & TE6) claim that infrastructure is a huge challenge such as providing a computer to each of the trainees during practical classes; two or three trainees have to use a computer on shared basis.

7.5.3 ICT-teaching staff

The trainees in the FGD allege that the teacher educators are not capable enough to teach the contents properly. According to the trainees, the teacher educators should acquire more skills so that they can teach the B.Ed. trainees better. The teacher educators also claim that teacher educators with computer engineering background should be recruited for the Teachers' Training Colleges for better implementation of the B.Ed. curriculum. The current ICT-teaching teacher educators totally avoid unit five of the Advanced ICT course as they themselves are not that much conversant with the contents in the unit.

7.5.4 High-speed Internet

The absence of high speed Internet is another challenge on the way to implementing the ICT curriculum. The teacher educators have to conduct some sessions such as creating an email, sending email, Google classrooms, etc. where the use of Internet is compulsory, that is, these kinds of classes are Internet-based. "Because of low speed, these classes are hampered", asserted TE1, TE3, and TE5.

7.5.5 Class routine

The trainees in the FGD claim that four one-hour classes per week are not enough for some of the trainees although for some younger trainees, the current four classes per week is fine. Those trainees who demanded more time on the routine claim that each class should be longer creating opportunities for more practices.

7.5.6 Access to ICT facilities

It has been mentioned in section 7.5.2 that the infrastructural facilities are insufficient; every student does not have a computer for individual use. Moreover, the computer labs are kept under lock and key other than the class times. Therefore, the trainees who are interested to practise and compose their assignments in the college labs, it is not possible for them.

7.5.7 Curriculum review

The TEs add that the existing ICT curriculum should be reviewed through the inclusion of some contents and changing the assessment system. The teacher educators maintained that below-standard contents are there in the syllabus. The teacher educators during the interviews and the trainees in the FGD disclose that the contents included in the Bachelor of Educa-

tion syllabus are similar to those in the HSC ICT syllabus. For some trainees, these contents are too easy and these contents do not create any interests in them. They ask for some higher level contents such as AI, Robotics, etc. The trainees complained that there is a unit which includes the language of programming but that is not taught in the classroom probably because the teacher educators are not capable enough to handle these.

The assessment of the ICT courses is totally theoretical; it does not have any practical test. The internal or the in-course and the final examinations organized by the National University are all theoretical. The trainees do some practical as part of their classroom activities but that is not assessed. In order to attach importance to the ICT course, there must be practical examinations; that practical examinations are expected to compel the trainees to concentrate to the course more.

7.5.8 Absenteeism

TE1, TE3, and TE5 mentioned another challenge, absenteeism or absence of trainees, for quality learning in general and ICT education in particular. A good number of the trainees remain absent from the classes everyday hampering their understanding of the ICT sessions. T1, T4, and T5 alleged that the college authority cannot make it sure that the trainees would be present in all the sessions or the college authorities are lenient to the irregular students.

7.5.9 Creating an online platform

The teacher educators in the interviews and the trainees in the FGD claim that unless practice time is increased, ICT skill level of the trainees would not improve. TE1 puts special emphasis on practices by the trainees and for that to happen, practice time of the trainees must be increased. T3 claims, "We learn some ICT knowledge from the ICT courses, but because of lack of practices or lack of practice opportunities, we cannot achieve ICT skills to the desired level." And he (T3) further claims that there should have been an online teaching-learning or e-learning platform which could have been used to upload the teacher educators' lectures; Power-Point slides of the regular classes; upload students' assignments; and so on. This kind of a platform could engage the trainees more in the practice of ICT skills.

The analysis of data stated above says that the challenges are very practical. Although some challenges need policy decisions to get solved, some can be settled locally if the college administration becomes committed. Recruiting teacher educators with engineering background and setting up computer labs may require higher authority decisions and funding. And including higher level contents such as AI, Robotics, LMS needs the National University decisions. However, high speed Internet; opening the labs for the trainees' individual use; handling the absenteeism; increasing the length of a period or increasing the number of classes per week can be settled by the college authority. The college authority can write to the Ministry of

Education for the qualified ICT teachers, required computers, and other equipment.

7.6 Ways to Overcome the Challenges

It is observed that, the challenges lie at different levels; some of the challenges need Ministry of Education initiatives; some require the National University; and some can be solved locally by the principals of the colleges.

The Ministry of Education needs to take initiatives to recruit staff with Computer Science and Engineering background (see section 7.5.2). All the six teacher educators (TE1, TE2, TE3, TE4, TE5, and TE6) ask for recruiting teacher educators with engineering background. The Ministry of Education requires to take decisions regarding recruiting the qualified teacher educators for teaching ICT at the Teachers' Training Colleges. TE4 puts emphasis on recruiting teacher educators with at least a diploma in ICT and pedagogical degree or diploma (For example: Diploma in ICT and Bachelor of Education/ Diploma in Education/ Master of Education); and lab technicians who can provide immediate supports to the teacher educators and the trainees should be recruited. Moreover, those ICT teacher educators should be provided with pedagogical training for better implementation of ICT curriculum, claims TE4. Moreover, infrastructure development also depends on the allocation of Ministry of Education.

The National University is responsible for the review of curriculum through the inclusion of AI, Robotics, LMS, etc.; allotting more classes for ICT subjects; putting added importance to practical rather than theoretical classes; including the Digital Security Act 2018 and concepts of 4IR. National University is also responsible for including practical activities in assessment instead of cent percent theoretical assessment. The arrangement of e-learning platform goes to the Ministry of Education or to the National University.

The college authorities can handle some of the challenges such as handling the aged trainees; keeping the computer labs open for the trainees' individual uses; and handling the absenteeism. The college authority can arrange some extra classes for those who do not have preliminary digital literacy. Moreover, increasing the length of each period or number of classes; high speed Internet can be solved by the college authorities locally.

The challenges seem not to be so complicated to solve. Some decisions by the colleges, Ministry of Education, and by the National University can solve the problems. However, the college principals together can write to the Ministry of Education and to National University to draw their attention. The colleges can also organize a seminar where concerned personnel from the Directorate of Secondary and Higher Education; Ministry of Education; and National University can be invited. If the concerned officials are convinced, they can take initiatives to take care of the challenges. Moreover, some organizations such as a2i, SACMID, and other organizations working on ICT can organize a workshop and disseminate the findings in a seminar to draw the

attention of the Ministry of Education and the National University. However, the Teachers' Training Colleges should work together with the organizations.

8.0 Implications, Recommendations, and Conclusion

The following sub-sections deal with the summary of the findings (8.1); implications (8.2); recommendations (8.3); and finally concludes (8.4) the report of the study.

8.1 Summary of the findings

The major findings of the study includes that the Teachers' Training Colleges do not have teacher educators with Computer Science and Engineering background as SDG -2015 asks for ensuring quality education (Goal-4). Teacher educators with no or little ICT education background teach the ICT courses. Infrastructure needs to be developed in the colleges. Computer labs with necessary equipment (computers, projectors, sound boxes, routers, SMART board, etc.) need to be established and it must be kept open for the use of the trainees.

Most of the trainees who come here for one year Bachelor of Education degree are fresh graduates and Master degree holders. Their main target is staying in the hostel and taking preparation for the BCS and other jobs. Therefore, most of the trainees are not attentive to the classes. That is why, many trainees remain absent from the classes or many of them are irregular. Therefore, it is difficult to help them to achieve quality ICT education.

The ICT curriculum should be reviewed with some focus on AI, AV, LMS that are related to the 4 IR. Additionally, contents related to the ethical and the legal aspects of ICT use should be more focused in the curriculum. And, the assessment system should be changed with focus on practical activities. Currently, the trainees are assessed on the theoretical aspects of ICT; there are no practical tests or examinations on the ICT courses. In order to build Digital Bangladesh, theory and practices must go together.

8.2 Implications

The quality of education chiefly depends on the quality of teachers (Podder, 2017). Therefore, if the concerned authority takes necessary action through the recruitment of qualified ICT teachers, establishing computer labs with modern facilities, the secondary education sector may have better performing ICT teachers and these teachers would continue to prepare the younger students at the school level.

Moreover, if the National University reviews the B.Ed. ICT curriculum through the inclusion of contents related to the 4IR, the nation is hoped to be able to step into the era of 4IR smoothly. The university needs to change the assessment system, too, with added focus on the practical activities which may enhance the digital literacy of the trainees as well as accelerate the building of Digital Bangladesh.

If the findings of the study are positively considered and implemented, it is expected that the teaching and learning of ICT at the Teachers' Training Colleges as well as in schools would find a momentum. This momentum may contribute to the smooth entry to the era of 4IR.

8.3 Recommendations

Based on the findings, the following recommendations are made:

8.3.1 Recruiting teachers

ICT teachers with Computer Science and Engineering background should be recruited.

8.3.2 Teacher training

Arrangement can be made for the training of practicing teacher educators on advanced ICT until teacher educators with ICT educational background can be recruited. Alternatively, guest teachers from Bangladesh University of Engineering and Technology (BUET), Dhaka University, or other organizations can be invited. In that case, permission from the Ministry of Education will be required; and fund for the remuneration of the guest teachers needs to be allotted from the Ministry of Education.

8.3.3 Labs should be made functional

Number of computer labs and facilities in the existing labs should be increased. Alongside increasing computer labs, the labs should be kept open where the trainees would get high speed Internet.

8.3.4 Arrangement of placement test

Based on the findings of the placement test, some additional classes can be included in the routine or the length of the existing periods can be extended for the weaker trainees.

8.3.5 Focus must be on practical activities

Most teaching-learning and assessment activities in ICT should be compulsorily practical. Currently, no practical tests or assessment is there.

8.3.6 Curriculum review required

National University should review the B.Ed. ICT curriculum with added focus on the AI, AV, LMS, etc. that are believed to be related to the 4th Industrial Revolution; unit 5 of the Advanced ICT must be taught with added care as this unit contains language of programming. Being skilled in programming, the trainees can get involved in outsourcing or can increase employability. The ethical and legal aspects of ICT consumption and creation, too, should be focused so that the younger generation is not associated with cybercrimes. In order to achieve the goal of

developed Bangladesh by 2050 (ICT Division, Government of Bangladesh), ICT curriculum must be revised and implemented as one of the four pillars of Digital Bangladesh is human resource development (other pillars are Digital Government, IT Industry Promotion, & Connecting Citizens).

8.4 How the limitations were handled

Data were collected through semi-structured interviews with six teacher educators from four Government Teachers' Training Colleges. None of the private Teachers' Training Colleges was included in the study. Moreover, FGD was organized with only five trainee teachers from Teachers' Training College Dhaka although the initial plan was to organize FGDs in three more Teachers' Training Colleges. It was not possible due to pandemic Covid-19 and country-wide lockdown. However, the rigorous nature of the study, maintaining honesty, and remaining unbiased throughout the study provided reliability of the findings to a great extent.

8.5 Conclusion

This study analyses the Bangladesh Teacher Education curriculum with a view to exploring digital literacy, its strengths and weaknesses. This qualitative study has employed document analysis, semi-structure interview, and FGD methods. Six teacher educators from four government Teachers' Training Colleges in Bangladesh have been interviewed and an FGD has been organized with five trainee teachers currently studying B.Ed. The major findings include ICT teacher educators needs to be recruited; curriculum requires to be reviewed; physical facilities such as computers, Internet, multimedia projectors, SMART board, etc. need to be available in the colleges; and the college authorities should be ICT-friendly.

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Appendices

Appendix: 1

Semi-structured interview schedule for Teacher Educators

N.B.- The following questions were asked followed by probing questions if situation demanded.

1. What do you understand by digital literacy?
2. Who do we call digitally literate persons?
3. What is the relationship between digital literacy, media literacy, and broadcast literacy?
4. Why do you think that you are a digitally literate teacher educator?
5. What kinds of education and training do you have to deal with the teacher education ICT curriculum?
6. What resources do you use to implement the ICT curriculum?
 - 6.1 What approaches/methods do you employ to implement the ICT curriculum?
 - 6.2 What are the ethical considerations in teaching, learning, and using digital media?
7. What organizational supports do you receive in implementing the ICT curriculum?
8. What are the 21st century learning skills mentioned in the SDG?
 - 8.1 How does the teacher education ICT curriculum help to achieve the 21st century skills?
 - 8.2 What gaps do you find in the curriculum in relation to the 21st century skills?
9. How do you assess your trainee teachers' knowledge, skills and attitudes?
10. How effective is this ICT course to teach the school ICT textbooks?
11. What challenges do you face, as a teacher educator, to implement the ICT curriculum?
12. What, according to you, are the effective ways to implement the ICT/digital literacy in Teachers' Training Colleges?

Appendix: 2

FGD Schedule for the Bachelor of Education Trainee Teachers

N.B. - The following questions will be asked followed by probing questions if situation demands

1. What do you understand by digital literacy?
2. Who is a digitally literate person, according to you?
3. What is the relationship between digital literacy, media literacy, and broadcast literacy?
4. Why do you think that you are digitally literate secondary teachers?
5. How skilled and knowledgeable your teachers at TTC are to deal with the teacher education ICT curriculum?
6. How many one-hour classes do the teacher educators require to complete the ICT syllabus?
 - 6.1 What approaches/methods do the teacher educators employ to implement the ICT curriculum?
 - 6.2 What resources do they use in implementing the ICT curriculum?
 - 6.3 How do the teacher educators assess your learning (knowledge, skill, attitudes)?
 - 6.4 What ethical factors do the teacher educators tell you to consciously consider in teaching, learning, analyzing, and using digital media?
7. What, according to you, are the important contents in the ICT curriculum? Why are they important?
8. What ICT knowledge and skills do you have to use to solve the real life problems?
9. What are the 21st century learning skills mentioned in the SDG ?
 - 9.1 How can the ICT curriculum provide you with the 21st century skills?
 - 9.2 What gaps do you find in the ICT curriculum in relation to the 21st century skills?
10. How do/does this/these course(s) help you to teach the ICT course(s) in your schools?
11. How do your teachers (teacher educators) assess your knowledge, skills, and attitudes?
12. What additional contents do you want to see in the curriculum to enrich digital literacy?
13. What challenges do you face, as trainees, to deal with the ICT curriculum?
14. What are your suggestions to minimize the challenges?

Appendix: 3A

Curriculum Structure at a glance

Education Studies		
Subject Code	Subject Title	Credit
ES 101	Secondary Education	4
ES 102	Teaching-learning Skills and Techniques	4
ES 103	Learning and Assessment	4
ES 104	Information and Communication Technology in Education	4
ES 105	Inclusive Education	4
ES 106	Research in Education	4
	Total	24
	Teaching Practice	
Teaching Practice- 1	College-based Demonstration Teaching and School-based Teaching Practices 4 weeks	6
Teaching Practice- 2	School-based Teaching Practices 8 weeks	16
	Total	22

Teaching Studies(TS)- any 2 subjects from each branch			
Branch	Subject Code	Subject Title	Credit
Humanities	TS 101	Teaching Bangla	4
	TS 102	Teaching English	4
	TS 103	Teaching History of Bangladesh and world civilization	4
	TS 104	Teaching Economics	4
	TS 105	Teaching Civics and Citizenship	4
	TS 106	Teaching Bangladesh and Global Studies	4
	TS 107	Teaching Geography and Environmental Education	4
	TS 108	Teaching Advanced ICT	4
		Total	8

Science	TS 109	Teaching Mathematics	4
	TS 110	Teaching Physics	4
	TS 111	Teaching Chemistry	4
	TS 112	Teaching Biology	4
	TS 108	Teaching Advanced ICT	4
		Total	8
Business Studies	TS 113	Teaching Business Entrepreneurship	4
	TS 114	Teaching Accounting	4
	TS 115	Teaching Finance and Banking	4
	TS 108	Teaching Advanced ICT	4
		Total	8
		Optional Subjects (OS)	
Optional Subjects (One must be selected from this group)	OS 101	Primary Education	3
	OS 102	Library and Information Science	3
	OS 103	Arts and Crafts Education	3
	OS 104	Physical Education, Health Sciences and Sports Teaching	3
	OS 105	Teaching Agricultural Education	3
	OS 106	Teaching Home Economics	3
	OS 107	Teaching Islam Religion and Moral Education	3
	OS 108	Teaching Hinduism and Moral Education	3
	OS 109	Teaching Buddhism and Moral Education	3
	OS 110	Teaching Christian Religion and Moral Education	3
			Total

		Comprehensive and Viva voce)	
	Comprehensive Examination	Two hours comprehensive exams on six compulsory subjects	2
	Viva voce	Viva Voce in presence of internal and external examiners	1
		Total	3
Credit	Grand Total	24+22+8+3+3	60

Teaching-Learning Methods and Techniques

<ul style="list-style-type: none"> • Lectures • Team work • Inspection and monitoring of schools • Group discussions • Brain storming • Mind mapping • Team projects / inquiries • Peer Teaching • Micro-teaching • Post-box 	<ul style="list-style-type: none"> • Seminar • Display • Role Playing • Simulation • Guest Lectures • Reflection diary • Action research • Practical work • The Walking Wall
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Instructions regarding teaching materials

The tools, equipment, or materials used to arouse the imagination of the students and make the contents easy, attractive, understandable and lasting to them is called teaching or learning aids.

- ✓ Hearing aids: Radio, tape recorder
- ✓ Audio-Visual Equipment: Television, VCP, Computer;
- ✓ Performing Materials: Persons, Scenes,
- ✓ New contributions to education technology: audio / video, program-learning, email, internet, multimedia projectors

ICT Integration in Teaching Profession

- ✓ Identify the practical areas of information and communication technology in the field of education
- ✓ Having basic knowledge and skills in the use of information and communication technology materials
- ✓ To have professional communication, collaboration, and co-creation skills through the use of communication technology (Internet).
- ✓ To integrate information and communication technologies with the content of the lesson
- ✓ To integrate learning and communication information and communication technologies.
- ✓ Understanding the coordination of information and communication technologies in the evaluation.
- ✓ Integrating information and communication technologies into integrated education.
- ✓ Practicing self-reflection for teacher professional development through information and communication technology

Appendix: 3B

ES-104 Information and Communication Technology Credit -4

This course will provide trainees with the basic skills needed to become a 21st Century teacher. One of the aims of Bangladesh's national education policy is to use information and communication technology (ICT) as a necessary tool in teaching and learning. Trained teachers will be able to integrate information and communication technology into the classroom activities. Trainees will be able to qualify themselves as ICT subject teachers by mastering the technique of ICT teaching as a compulsory subject till high school. In addition, you will be encouraged to improve the quality of teaching and learning by creating ICT-based education. These materials can be used in participatory teaching and learning activities, keep information about students'

progress and can be easily analyzed for reporting and evaluation work. They can also use the Internet to synchronize subject knowledge; you will be able to search, collect and store international curriculum and educational materials at World Wide Wave (www). Furthermore, through email, social media and professional networks, you will be able to exchange teaching materials and exchange evaluated samples of student work with colleagues and other authorities.

Aims

1. The trainees will be able to improve their ICT skills and be able to attend classes in an interesting and effective way.
2. They will acquire the necessary skills to produce high quality educational materials, especially as supplement to the textbook.
3. They will also acquire the necessary skills to teach the information and communication technology as a compulsory subject at the secondary level.

Learning Outcome

After studying this course, the trainees-

1. Will effectively utilize ICT materials, software, and digital resources;
2. Will create ICT-based educational materials;
3. Will assist in managing the class of secondary level ICT subjects;
4. Will be able to actively participate in the professional network of teachers;
5. Will be able use ICT in a safe, ethical and legal way.

Unit and Contents

Unit 1: Information and Communication in Education Practices: National and International Context

- The concept of information and communication technology
- Twenty-first-century teacher competence and the importance of ICT
- Importance of ICT in Bangladesh Education: National Education Policy, ICT Planning, and ICT Policy

Unit 2: Connection to Common Computer Devices

- Keyboard, icon, file, folder contacts
- On and off, create files and folders, name and rename, copy-paste, delete and retrieve documents from the Recycle Bin
- Usage of flash disk / removable disk, memory card, modem, etc.
- Transfer files and folders to different drives

Unit 3: Word Processing Practices and Applied in Education

- Introduction to word processing software (MS Word) and skills in writing English and Bengali
- Change font, color, size and style and, etc
- Adding and Editing Tables
- Add and format images and shapes
- Practicing writing, editing and printing skills in educational reports

Unit 4: Internet Interaction and Use in Education

- Concepts and Connections of Internet
- Accessing and browsing certain URL
- Educational information, pictures, video clips, software search and download

Unit 5: Digital Learning Materials: Concept and Preparation

- Concepts and requirements of digital education materials
- Introduction to presentation software (PowerPoint) and the ability to prepare digital educational materials
- Adding slides, adding information / text, editing
- Add and format images, shapes
- Using animation
- Add audio, video
- Preparing and presenting thematic digital educational materials

Unit 6: Introduction to Spreadsheets and its Educational Use

- Spreadsheet (Microsoft Excel): Introduction, Practicing Fundamental Skills
- Adding data to a spreadsheet
- Generate general spreadsheets with columns, rows and titles
- Use functions to calculate values: average, maximum, minimum number, GPA and preparation of results with grades
- Preparation of graphs, charts and tables
- Data analysis and making decision for improving teaching-learning activities.
- Spreadsheet printing

Unit 7: Social Media and Professional Networks

- E-mail contacts, account opening and its educational use
- Its requirements in social media and education
- Professional networks such as teachers' portal use (ShikshakBachchan) it for communication and professional development
- Subscribe, write blogs, comment, download, and upload information
- Introduction to virtual drive and its use in education

Unit 8: ICT-based Innovative Education: E-Learning

- E-book
- Online courses
- Educational blog, wiki
- Mobile Learning
- The Virtual Learning Environment
- Computer-based learning
- ICT-based innovation for implementation of inclusive education

Unit 9: Safe and Moral Use of ICT

- Safe and protected use of ICT
- Computer hacking, virus and antivirus
- Plagiarism, intellectual copyright

Appendix: 3C

TS-108 Advanced Information and communication technology Credit -4 Course Description

Advanced Information-Communication Technology (ICT) is crucial as a teacher qualification in the effective implementation of the secondary level ninth-tenth grade ICT curriculum in Bangladesh. It will provide trainees with a learning structure and learning environment so that they can master different learning techniques. Get trainees the opportunity to develop their knowledge and understanding of computer curriculum and related skills. Since this course is the main goal of learning to learn, create a confident and skilled teacher in information and communication technology. Advanced ICT courses allow the trainees to participate actively in the use of all teaching and learning methods; the practice of ICT will create a field of technology-friendly environment in secondary classes.

Purpose

Advanced ICT courses will allow trainees to demonstrate and apply knowledge, skills and perspectives on information and communication technology.

Learning Outcomes

After studying this course, the trainees-

1. Can be explained a clear idea about the secondary level ICT curriculum and the skills development in the teaching-learning program can be explained.
2. Can be allowed to analyze ICT textbooks, identify student problems, and analyze logical ways of presenting different learning areas.
3. Will be able to create a stimulating classroom environment for ICT learning and using a variety of and participatory learning-taught methods.
4. Will Identify and prepare appropriate learning materials.
5. Will be able to use strategies that ensure equal participation in all areas of teaching and learning by emphasizing the individual learning needs of each student.
6. Will be able prepare the lesson plan based on the secondary ICT curriculum and its associated learning activities will integrate students' personal experiences, knowledge and emotional consequences.
7. Will be able to select the material and questions of the structured and marginal assessment of the expected learning outcomes of the ICT curriculum of the secondary school.
8. Can meet the needs of school-based learning by designing and preserving information for students' progress and achievement.

9. Will be able to prepare questions for the exam and test, develop the number-granting index and publish questions, give examples of these for critical and critical consideration of past exam question papers and prepare students for national exams.
10. Will be allowed in the context of advanced ICT curriculum at the secondary level, ICT theory and computer use to develop their own skills and understanding and create learners.

Unit and Contents

Unit 1: Information and Communication Technology (ICT) in Secondary Education

What is ICT

What is ICT Education

Purpose of ICT teaching in ninth-tenth grades

Benefits of ICT teaching

Unit 2: ICT Curriculum for Ninth-tenth Grades

Content of the ninth-tenth grade secondary ICT

Analyze of content of ninth-tenth grade computer education curriculum

- Curriculum
- The syllabus
- Textbook
- Exam Question Paper

Subject Structure

- goals
- purpose
- The learning curve
- Scope of ICT;
- Introduction to ICT
- ICT in daily life
- Multimedia and ICT
- Jalika Connection (Networking)

Unit 3: Planning for Effective ICT Teaching-learning Activities

Learning outcomes of ICT

Examination of the ICT textbook

Considerations of the Learning Plan in ICT – Similarities-dissimilarities between international and Bangladesh ICT curriculum

A framework plan for ICT

Unit 4: Use of the Database

- Introduction to the Database and Relational Database Management System (RDBMS)
- Table, field, record, form, query, report
- Table creation and data entry
- Inserting new records into existing tables, deleting records, new fields
- Add, query, generate reports

Unit 5: Language of Programming**Concept of Program**

- Programming Language
- Machine Language
- Assembly Language
- Mid-Level Language
- High Level Language
- C
- C+
- Visual Basic
- Java
- Oracle
- Python
- 4th Generation Language (4GL)
- Translator Program, Compiler, Assembler, Interpreter
- Organization of a Model
- Steps of Developing a Program
- Algorithm
- Flow Chart

Program Design Model

Programming Language – C

- Concept, Characteristics
- Compiling of Programs
- Structure of Programs
- Types of Data, Constant, Variables, Expressions,
- Key word
- Input Output Statements
- Conditional Statement, Loop Statement
- Array, Function

Unit 6: Internet and Its Use

- Introduction to Internet
- The use of the Internet in education
- The use of the Internet in education and everyday life

Unit 7: Collection and Development of Teaching-learning Materials

- Teaching materials for ICT education
- Managing and storing of inaccessible materials and rare equipment
- Other: textbooks, video, TV, Internet

Unit 8 Integrated Assessment for Teaching-learning Activities

- Role of assessment in ICT teaching-learning: formal and informal, formative and summative assessment
- Development of learning assessment activities
- Asking and writing questions involving personal and intellectual skills, attitudes and values
- Examining the learning process through peer review, micro teaching, analogous teaching and feedback
- Plan to review specific lesson or title of teaching area

Unit 9 Ways to meet the Needs of all Students in ICT Classes

- Enabling students to apply their own computer knowledge and skills in class activities
- The use of structured learning techniques to identify and clarify existing ideas for students
- Embracing diversity of learning abilities; teamwork, extended activities
- Monitoring progress and assessing achievement
- Plan to collaborate in the creation learners' interest.
- Examination of teaching methods and plans through micro teaching, harmonious learning and feedbacks.

Unit 10 Preparing Students for the ICT Examination

- preparation of the test items for performance test and the marking techniques
- preparation of school exam test, moderation of questions papers
- Preserve student results and monitor their achievements
- Assessment of SSC Examination Question paper, review previous test

Unit 11 Self-directed Independent learning of ICT

- ICT lesson skills
- Practices and learning habits
- A way to re-study ICT
- Progressive professional development
- developing ICT knowledge and skills independently
- Reflective practices in ICT Learning through Action Research
- Keeping updated