

Transforming teaching practices: Enhancing ICT-pedagogy integration through curriculum innovations in teacher education of Bangladesh

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Abstract: The use of ICT in teaching and learning processes at all levels was highlighted in Bangladesh's educational policy. According to studies, there are not enough secondary-level instructors in Bangladesh who are proficient in using digital technologies for instruction. The purpose of this research was to explore options for updating the teacher education curriculum by filling up any gaps found in the development of ICT-Pedagogy integration abilities. In this study, the TPACK framework was utilized to pinpoint curriculum gaps, and a mixed-method approach was used to achieve the study's goals. The curriculum was first examined to find any deficiencies, and then key informant interviews looked at potential updates to the curriculum that might fill those gaps. The study discovered a lack of proper teaching-learning methods and assessment, as well as clear objectives and topics on ICT and pedagogy integration. The study promoted a few approaches for teacher skill upgrades to improve their ability to teach with ICT.

Keywords: ICT and pedagogy integration, teacher education, teacher professional development

Transformasi praktik pengajaran: Meningkatkan integrasi TIK-pedagogi melalui inovasi kurikulum dalam pendidikan guru di Bangladesh

Abstrak: Penggunaan TIK dalam proses belajar mengajar di semua tingkatan disoroti dalam kebijakan pendidikan Bangladesh. Berdasarkan penelitian, jumlah instruktur tingkat menengah di Bangladesh yang mahir menggunakan teknologi digital dalam pengajaran tidaklah cukup. Tujuan penelitian ini adalah untuk mengeksplorasi opsi pemutakhiran kurikulum pendidikan guru dengan mengisi kesenjangan yang ditemukan dalam pengembangan kemampuan integrasi TIK-Pedagogi. Dalam penelitian ini, kerangka TPACK digunakan untuk menunjukkan kesenjangan kurikulum, dan pendekatan metode campuran digunakan untuk mencapai tujuan penelitian. Kurikulum tersebut pertama-tama diperiksa untuk menemukan kekurangannya, dan kemudian wawancara dengan informan kunci dilakukan untuk melihat potensi pembaruan pada kurikulum yang mungkin dapat mengisi kesenjangan tersebut. Studi ini menemukan kurangnya metode dan penilaian belajar-mengajar yang tepat, serta tujuan dan topik yang jelas tentang Integrasi TIK & Pedagogi. Studi ini mempromosikan beberapa pendekatan untuk peningkatan keterampilan guru guna meningkatkan kemampuan mereka mengajar dengan TIK.

Kata Kunci: Integrasi TIK dan pedagogi, pendidikan guru, Pengembangan profesional guru

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INTRODUCTION

To achieve the goal of using ICT in education, many countries have enacted explicit policies. For instance, Bangladesh has made a great effort to incorporate ICT into virtually every sector of the country. As a result, the National Education Policy 2010 included integrating ICT skills into teaching-learning processes. Additionally, Bangladesh has developed its preferred future education framework, aiming for 2041 (Aspire to Innovate, 2019) while taking into consideration the Fourth Industrial Revolution. Teachers' ability to integrate ICT & Pedagogy will be vital in ensuring students' readiness for the 21st century (Rahmayanti et al., 2020). The availability of qualified teachers would help facilitate the accomplishment of Sustainable Development Goal (SDG)-4 (United Nations Educational, Scientific and Cultural Organization, 2021). The value of the teacher education program and the teachers' skills to "integrate ICT & Pedagogy" are proven by these policy initiatives (Leach & Moon, 2000).

Bangladesh has taken a number of steps to digitally transform schools and offered in-service training so that teachers may teach in these multimedia classrooms (Bangladesh Sangbad Sangstha, 2017) Out of 358,907 Secondary level teachers, it was found that almost 200,000 (Bangladesh Bureau of Educational Information and Statistics, 2018) have undergone in-service training on 'ICT & Pedagogy integration' skills and the creation of digital content (Ropum et al., 2023). Nevertheless, due to a number of obstacles, including a lack of technology & pedagogy integration skills, many teachers were found to be less motivated to use technology in the classroom (Campaign for Popular Education, 2019). Two-thirds of secondary-level teachers were found to have degrees in teacher education but they were nonetheless shown to be much less capable of teaching in a classroom setting, especially at the time of using digital tools (Campaign for Popular Education, 2019). The less effective teacher education curriculum which was highlighted in National Education Policy 2010 was one of the primary causes for it. To generate qualified teachers with "ICT & Pedagogy integration" skills, it is necessary to take into account the deficiencies in the teacher education curriculum (Williams et al., 2000). There is currently no evidence-based research examining the gaps in the curriculum for teacher education along with looking at the key methods required to develop the curriculum effectively in order to provide teachers with the ability to teach with digital technology. In Bangladesh, The National University and Open University provide teacher education to the majority of present and aspiring secondary school teachers, and this study will take a look at the same Teacher Education curriculum that both institutions have been following since 2017 (National University, 2017; Bangladesh Open University, 2017).

For the primary objectives of this study, the following two research questions were established:

1. Where are the shortcomings in the teacher education curriculum that prevent teachers' integration of ICT skills into teaching-learning activities?
2. How can this curriculum be improved by offering teachers more room to improve their ICT and pedagogy integration skills?

METHOD

This study was exploratory research because it investigated some specific issues in the teacher education curriculum of Bangladesh that had not been studied and thoroughly

examined before. A mixed-method approach (Creswell et al., 2003) was deployed to get the answers to the two research questions. At first, the teacher education curriculum was analyzed based on the Tyler (1969) curriculum development model (Kliebard, 1995) and the TPACK framework (Koehler & Mishra, 2006) to find the gaps in the four sections of the curriculum. The primary strategy of that analysis was to assess the objective, content, teaching-learning method, and evaluation sections by the features of the components of the TPACK framework. TPACK is the foundation of effective teaching using technology, which provides knowledge on technological and pedagogical techniques in constructive ways (Koehler & Mishra, 2006). According to the TPACK framework (see Figure 1), content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK) are the three main components. The interactions between and within these components generate other four components, such as PCK (pedagogical content knowledge), TCK (technological content knowledge), TPK (technological pedagogical knowledge), and TPACK (technological pedagogical content knowledge), which are equally essential to the model. This means this framework consists of seven components.

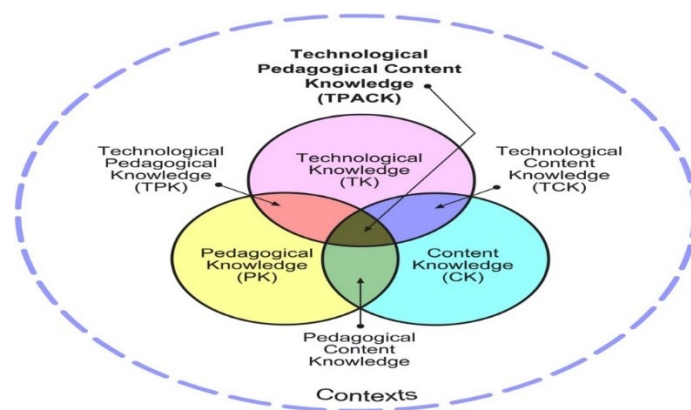


Fig. 1. The TPACK framework and its knowledge components (Source: Mishra, 2009)

Then a Likert scale questionnaire survey (Siegle, 2015) was conducted with the teachers' educators to accumulate the perceptions on some of the gaps identified from the curriculum analysis. The weakness of the curriculum for developing skilled teachers for teaching with technology was pointed out through these two processes. Finally, the key informants' interviews were materialized with experts to obtain strategies for developing the curriculum by filling up those weaknesses.

Fourteen government teachers' training colleges provide teacher education programs for both National University and Open University students. Teacher educators of those fourteen institutes most definitely have a better understanding of that teacher education's curriculum. The researcher conducted a five-point Likert scale questionnaire survey of the current teacher educators recruited for government teachers' training colleges. So, the population for that survey was all the teacher educators from those fourteen institutes, which was around 350. The "Convenience Sampling" technique was applied to select 95 sample forms out of that total population. The Google Forms software was used to reach out to the samples via an internet platform. The Likert-type questionnaires were presented to collect data, having the continuum of five (5) items' possible responses by giving each item a numerical score. The Likert scale's midpoint was considered a neutral item, with the

positive items on the left and the negative items on the other. 'Agreement' types of items, such as Strongly Agree, Agree, neither agree nor disagree, Disagree, and Strongly disagree, were used for developing the scale. The 'Ordinal level' data was collected by individual Likert-type statements to manipulate the descriptive statistic to summarize the collected data in simple numerical or visual form.

Purposive sampling was deployed for selecting key informants. The six interviewees were chosen considering their diversified expertise in educational research, curriculum development, teachers' professional development, and technology integration in pedagogy. Out of six informants, two have been working as faculty members of two public universities and have expertise in teachers' professional development & ICT integration in pedagogy. Two of them have experience working as Teacher Educators and members of the teacher education curriculum formulation committee. The other two informants had been working in the developing sector, focusing on teacher professional development, curriculum development, and ICT integration in teaching-learning. At the first stage, the interview data were decontextualization by reading the transcribed data to obtain the actual data to develop the meaning of that data. Then each identified meaning unit was labeled with a code, aligning with the context. After that, all the aspects were checked according to the content concerning the research question. After condensing extended meanings of the data, the categories were created. Once the categories were established, the analysis and writing-up process began. Then various overarching themes were extracted through those identified categories. The findings were written based on the themes which the majority of the respondents agreed upon. However, the unique ideas and contradicting statements between and among the respondents on particular issues were also discussed, along with the others' supportive views.

RESULTS

Curriculum Analysis

Related to ICT integration into the teaching-learning process, four out of seven compulsory courses should impact making trainees skilled in ICT and Pedagogy integration. Besides this, all the teaching courses from 'Teaching Studies courses' and seven out of ten 'Elective Courses' can offer scopes to the trainees to master the skills needed for ICT integration in specific subject areas' teaching-learning process.

Objectives Analysis

The objectives of the teacher education called 'Bachelor of Education (B.Ed.)' program, are to prepare future teachers, develop skilled teachers, and prepare highly skilled education officials to improve the quality of education. So, this curriculum is treated as 'Preservice' for future teachers and 'In-service training' for those who are already teaching and education officials. Significantly, one of the Specific Objectives of this curriculum is to prepare skilled teachers to integrate ICT with teaching-learning practices to improve the quality of teaching. The study explored the objectives of those selected twenty-five courses; those could have played a significant role in making teachers skilled in ICT and pedagogy integration.

Two of the significant compulsory courses for teaching-learning practices are 'Teaching-Learning Skills and Strategies' and 'Learning and Assessment'; but no specific

objective is set up for teaching with ICT. On the other hand, the only mandatory course called 'ICT in Education' contains a specific objective for developing trainee teachers with ICT skills and effective ICT integrating skills in teaching-learning practices. Out of fifteen (15) teaching courses, only five (5) have an objective for developing trainees on integrating ICT tools in respected subjects' teaching-learning process, those are Teaching Economics; Teaching Mathematics; Teaching Physics; Teaching Biology and Teaching Business Entrepreneurship. On the other hand, none have objectives related to ICT integration skills out of eight (8) elective teaching courses. So only six out of twenty-five courses contain objectives related to 'ICT & Pedagogy integration,' which need to be considered to incorporate in all those courses when redesigning or updating the curriculum.

Contents Analysis

The study identified the contents from selected twenty-five courses based on the features of the TPACK framework's seven components (Koehler et al., 2013).

Content Knowledge (CK) Related Contents

According to this curriculum analysis, all the teaching studies courses of this curriculum had a significant number of contents aligning with the features of the 'Content Knowledge (CK)' component from the TPACK framework.

Pedagogical Knowledge (PK) Related Contents

'Teaching-Learning Skills and Strategies' and 'Learning and Assessment' were the two courses holding the objectives aligning with the features of the 'Pedagogical Knowledge (PK)' component from the TPACK framework. The study explored the contents of these two courses and found a reasonable amount of content related to attributes of the 'pedagogical knowledge (PK)' component.

Pedagogical Content Knowledge (PCK) Related Contents

The study inspected all those teaching studies courses to find out if the contents matched the PCK components. According to this analysis, all the twenty-three teaching studies courses accommodated a reasonable number of contents related to the features of the 'Pedagogical Content Knowledge (PCK)' component.

Technological Knowledge (TK) Related Contents

Through the curriculum analysis, the study identified some contents related to the features of the 'Technological Knowledge (TK)' features in the 'ICT in Education' course. However, as technology was a rapidly changeable domain, the researcher found those contents a bit obscure to call sufficient to impart technical knowledge and skills to the trainees. That is why the researcher felt further clarification on those contents, whether those were adequate for making trainees skilled in basic technological knowledge.

Technological Content Knowledge (TCK) Related Contents

The study found only three courses carrying some of the contents related to the features of TCK, and these were 'ICT in Education', 'Teaching English', and 'Teaching Agricultural Education'. Some teaching studies courses, such as 'Teaching Economics';

'Teaching Mathematics'; 'Teaching Physics'; 'Teaching Biology' and 'Teaching Business Entrepreneurship', contained one objective: developing skills for integrating ICT with respected subjects' teaching-learning process. However, no content on technological content knowledge (TCK) features was found in those courses. On the opposite side, despite not having any objective of developing skills in 'ICT and Pedagogy integration', the 'Teaching English' and 'Teaching Agricultural Education' courses carried some content related to the TCK features. As 'ICT in Education' was a compulsory course, the students were expected to attend the classes in large groups, so it demanded further inquiry from the teachers' educators whether the trainees used sufficient time and scope to gain intensive knowledge of concepts and skills for developing digital contents according to subject matters.

Technological Pedagogical Knowledge (TPK) Related Contents

The study identified two courses named 'ICT in Education' and 'Teaching Agricultural Education' courses that held some contents related to the features of the TPK component. The 'Teaching Agricultural Education' contained content without having any objective of developing ICT and Pedagogy integration skills. But despite carrying objectives related to ICT and Pedagogy integration skills, five teaching studies courses were found without having TPK features related contents. Those courses were 'Teaching Economics'; 'Teaching Mathematics'; 'Teaching Physics'; 'Teaching Biology' and 'Teaching Business Entrepreneurship'. The content related to this feature, titled 'Presenting digital Teaching Aids' in the 'ICT in Education' course, was found ambiguous to the researcher on providing scope to the trainees for obtaining knowledge and skills on technological pedagogical knowledge (TPK) as the large group of trainees was expected to join in a class within a minimal time.

TPACK Component Related Contents

The study analyzed that the Teaching Practice internship section could be aligned with the philosophy and the features of the 'Technological pedagogical content knowledge (TPACK) component from the TPACK framework. However, it was found very obscure, as there were no clear directions for using digital tools while practicing teaching in the actual school classroom environments. Therefore, the study asked for further clarification from the teacher educators regarding this issue.

Teaching-Learning Strategies Analysis

In the 'Bachelor of Education (B.Ed.)' curriculum, 'the teaching-learning method and strategies section was incorporated in general for every course. Very diversified teaching-learning techniques and strategies were mentioned in the curriculum such as lecturing; assigning in group works; investigation & observation; engaging in group discussion; brainstorming; mind mapping; setting for group project; simulation; micro-teaching; using postbox; arranging workshop; applying expert Jigsaw; using fishbowl approach; arranging seminar; demonstration; engaging in role-playing; inviting guest speaker; peer teaching; assigning assignment; operating feedback diary; conducting action research; practical work and using the working wall. It was recommended to ensure the use of technology in teaching-learning practices. This curriculum encouraged the teacher educators to use teaching-learning strategies based on their content demands. In addition to it, even any

different techniques that were not recommended in the curriculum would be well appreciated if demanded.

For the 'Teaching Aids,' various types were recommended to use at the teaching time as per the curriculum. These can present the teaching contents to students in an easy, understandable, attractive, and sustainable manner. Various teaching aids were recommended for teachers' educators, such as Visual aids, Audible aids; Audio-visual aids, and Technological aids. Multimedia projectors; Internet; Email; Software-based learning; Audio, and video; were the prescribed technological tools used for the teaching-learning process.

According to the analysis, no specific teaching-learning methods and techniques were identified for separate courses of the B.Ed. curriculum. However, according to the Tyler curriculum development model, the teaching-learning techniques and strategies should be accepted based on the objectives of any course. This issue should be considered at the time of revising or redesigning the curriculum.

Evaluation Strategies Analysis

From the analysis, it was found that except for 'Practice Teaching,' the evaluation process of each subject was very similar, such as forty (40) marks for the Internal examination and sixty (60) marks for the External examination. External examinations were designed to be taken by respected colleges, and the respected universities fulfilled external examinations' responsibilities. Therefore, the structure of internal tests consisted of two In-course examinations with fifteen (15) marks each, an assignment for five (5) marks, and class presence with five (5) marks. The external examination was divided into twenty (20) marks for objective questions and forty (40) marks for descriptive questionnaires. For the 'Practice Teaching,' hundred (100) marks were allotted for the 'Internal Assessment,' and fifty (50) marks for 'External Assessment,' which scored a total of one hundred and fifty (150) marks.

According to this finding, no directions for practical exams in the 'ICT in Education' course were found in the curriculum. In addition to this, no evaluation procedures were found for the skills of teaching with technology. The teachers' educators were applying or not those evaluation procedures; these issues were identified as essential to know for getting the implemented scenario for this curriculum. Besides this, as the evaluation section was incorporated into the curriculum as a general section, no evaluation procedure for evaluating technological content knowledge (TCK) and technological content knowledge (TPK) was found in the curriculum. So, course-specific evaluation procedures should be included in the future curriculum through revision or redesigning.

The Likert Scale Questionnaire Survey

The premier purpose of this survey was to get the perception about some raised issues from the curriculum analysis based on the TPACK framework. The objective of that survey was to get the real implemented pictures of this curriculum from the Teacher Educators' perspectives on providing the scope for trainees to be skilled in using ICT devices and software for teaching purposes. The survey was comprised of eight questionnaires on the scope and activities for developing ICT basic skills, knowledge, and competencies for

integrating ICT with the teaching-learning process. The results of this Likert scale questionnaire survey are presented here.

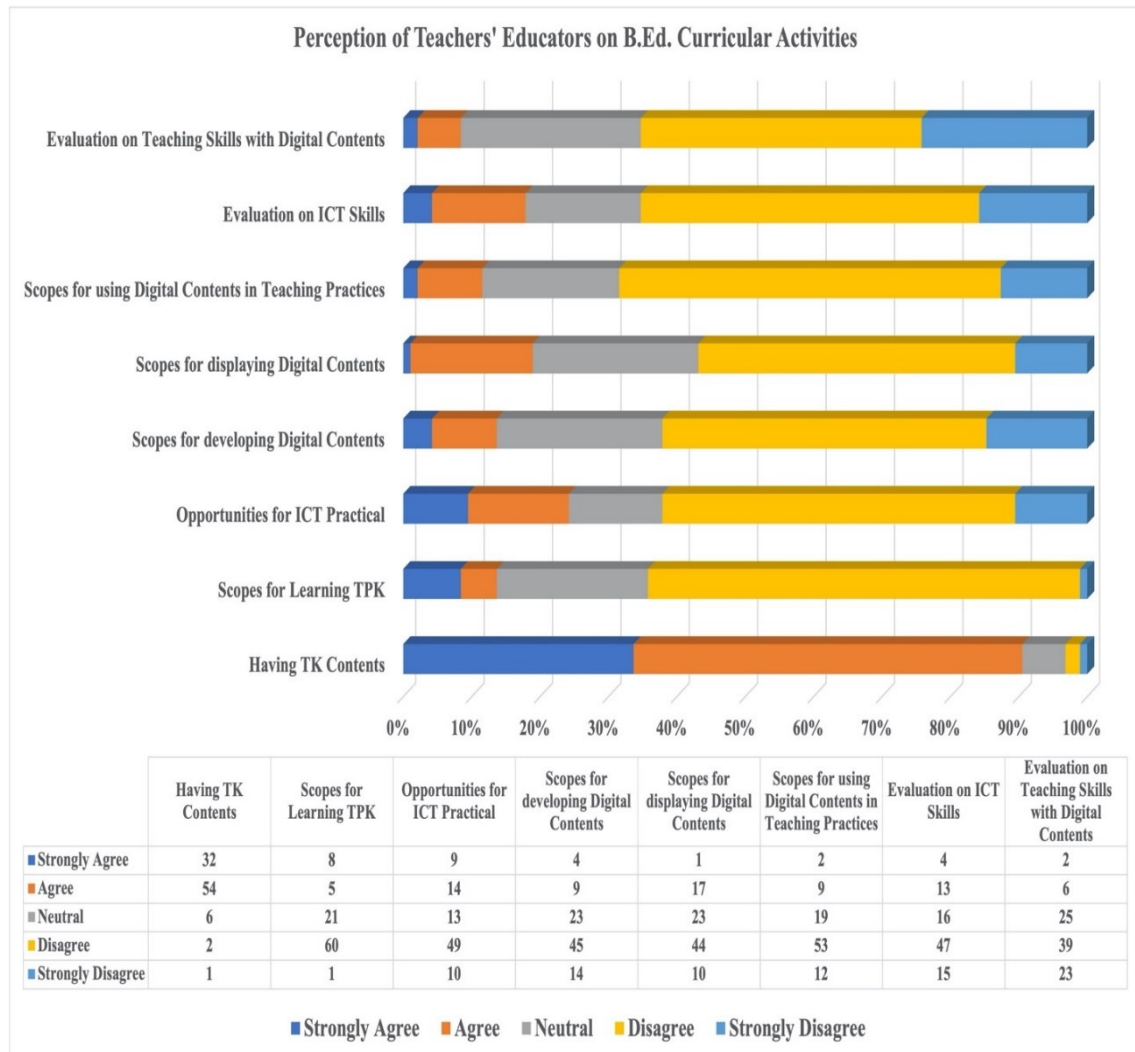


Fig. 2. Perception of Teachers' educators on B.Ed Curricular activities

According to the survey results, all eight questionnaires received unanimous responses. However, out of eight, only one opinion on having sufficient content on basic ICT skills was agreed by most of the respondent teachers' educators. The rest of the seven statements were not aligned with the respondents' perceptions, and those were on having scope for learning ICT & pedagogy integration; getting opportunities for practical works on ICT; getting coverages for making digital content; getting opportunities for presenting self-developed digital contents; having scopes to use digital content in practice teaching; having the evaluation on basic ICT skills and getting evaluated for instructing with technology. Nevertheless, overall, some clear perceptions were depicted from all eight questionnaires. The survey discovered that the curriculum accommodated acceptable content on basic ICT knowledge, but the trainees were not involved in ICT practical practices, and no examination was taken to assess the trainees' ICT skills. In addition, the trainees were not getting enough scope for developing teaching subject-related digital content and displaying self-developed digital content. The trainees were provided with minimal learning

opportunities on ICT-related pedagogy. The 'Teaching Practice' practicum was not accommodated with ICT seductions, and there was no provision for assessing trainees teaching skills with the use of ICT.

Curriculum Updating Strategies by Key Informant Interviews

The study conducted the qualitative interview to explore the strategies to fill the gaps found in the curriculum analysis and Likert scale survey questionnaire. The questions were asked about the appropriate design with the content, teaching-learning process, and evaluation procedure framework. The content analysis process was used for the analysis of the data. The findings from the curriculum analysis and survey analysis were also shared at the interview sessions.

Status of B.Ed. curriculum for 'ICT & Pedagogy integration' Skill

Almost all of the interviewees from all three levels agreed that the curriculum was mainly focused on pedagogical concepts and subject-specific pedagogical knowledge, along with some content knowledge and technical knowledge. Everyone mentioned that the curriculum was more focused on learning theories and the evaluation also focused on assessing that theoretical knowledge through paper-pencil examination. They also pointed out that the curriculum was mainly focused on objectives and Contents, where no specific guidelines were developed for Teaching-learning activities and Assessments. These observations matched the findings of the researcher's curriculum analysis. One of the interviewees said:

"The teacher education should be based on more practical work, and the assessment should be designed more on evaluating the skills they would obtain."

Regarding the 'ICT & Pedagogy integration' skill in this curriculum, one informant mentioned that the curriculum incorporated the ICT knowledge & skills, in an isolated manner, by leaving the integration with the subject studies courses. Another noted that despite having some specific objectives on ICT-pedagogy integration skills, the curriculum mainly focused on non-technological pedagogical aspects. Another interviewee stated that the curriculum emphasized knowledge and skills for hardware and software use regarding technological issues. The knowledge and skills for understanding the applicability of that hardware and software in a classroom and the practical pedagogical usages were insufficient. Another interviewee uttered that, like other courses, the ICT-related course was also packed with theoretical knowledge, and it should be more practical-oriented teaching-learning activities. Due to the complicated nature of 'ICT and pedagogy integration,' the curriculum should be organized by offering intensive practice. These opinions were also aligned with the findings of the curriculum analysis and the quantitative survey analysis.

For the future updating of the B.Ed. curriculum, the two informants mentioned that it demanded updating with delivering 21st-century teaching skills (Greenhill, 2010), technology & pedagogy integration skills, critical thinking skills, and imparting a positive attitude toward teaching. One of the informants mentioned that due to the rapidly changing nature of digital technology, the curriculum should be updated every two years.

Improvements in ICT Skills related Contents & Evaluation

In the B.Ed. curriculum, ICT skills-related courses such as 'ICT in Education' demand to be practical and works-oriented. To achieve the 'ICT in Education course objectives,' there should have detailed guidelines on 'the teaching-learning and assessment process, which are missing in this curriculum. This curriculum was outcome-based, so it would demand unit-based objectives and teaching-learning approaches, assessment procedures, and supplementary materials. The curriculum should be more focused on 'skills & competencies' than theoretical knowledge in this aspect.

For 'Technological Knowledge', the contents should be dynamic, not static. As technology devices and software were supposed to be changed very rapidly, the teacher educators should be given the authority to choose most of the contents according to the demands and context. Still, there should be some basic skills that the students should have to be taught. Learning management system (LMS), Module, Cloud-based video conferencing tools (Zoom, Microsoft Team, Google Meet, etc.), Lesson plan templates, and student participation software (Jamboard, Mentimeter, Pinterest, Google Classroom, Google Docs, Google Forms, etc.) usage should be included in the 'ICT in Education course.' A more intensive focus should be given to digital content development, ICT-Pedagogy integration, and ICT usage in the classroom. One of the interviewees uttered that:

"It is essential for the student teachers to learn how to navigate in the digital platform."

There should be a provision for evaluating 'practical skills' through formative and summative assessments. Regarding assessing the skills for developing digital content, it could be meager with the 'Teaching subjects', where one digital content assignment could work with the 'ICT in Education' course and the respected 'Teaching Subject' course. It could be assessed by both the educators and teacher educator. There should be an 'Evaluation Rubric' to determine the Technological skills' and ICT-Pedagogy integration skills. The external examination should be redesigned by the inclusion of the practical examination. Assignment or Project tasks could be an effective way to evaluate the 'ICT in Education course.' Two interviewees mention that basic ICT skills can be taught and practiced separately as a separate course. One of them said that:

"Due to time and resource-constrained, it is difficult to assess every student's ICT skills and teaching skills with ICT integration within one course. Rather, this 'ICT in Education' course should be designed with having practical examination on ICT skills."

Improvements in Digital Content-related Concepts & Evaluation

All the interviewees agreed that in the 'Teaching Studies' courses, the students should be introduced to the subject-specific digital content, application software, website, or Web page, which are regarded as 'Technological content knowledge.' In addition to these, the Theory and concept of subject-specified digital ideas should be included in those courses. Students of the program should be taught to use their basic ICT skills and digital content development skills to search, identify, and develop subject-specific digital content. Besides, these students should have the opportunity to incorporate emerging teaching methods,

such as Design Thinking, Collaborative learning, and Critical thinking, with the digital tools for the teaching-learning approaches.

Due to the rapidly changing feature of digital technology, the teachers' educators for teaching studies courses must have to instruct about the most updated digital content and learning platform for specific teaching subjects and have to guide the students in identifying and collecting appropriate and updated digital content. However, these topics can be taught in different courses as a multi-disciplinary approach. The features of compelling digital content that should be taught are specific subject-teaching courses, one of the interviewees stated that:

"It is crucial to know that a very colorful digital content which developed using different technological skills, cannot be regarded as effective digital teaching aids unless it implies conveying any sustainable knowledge to students."

The 'ICT in Education' course should be used as the platform for learning the basic skills of searching and identifying digital tools from the internet and the skills for developing digital content in PowerPoint, but subject-focused digital tools, software, and website & webpage; searching and identification should be rigorously practiced in the 'Teaching Subject'. The assessment for subject-specific technological knowledge could align with the 'ICT in Education' course, where a single assignment or project could be used for evaluation in both classes. One of the informants said:

"Application software and webpage for learning 'Periodic Table' in chemistry class and Webpage and application software for learning 'History,' is different, that's why 'Technological Content Knowledge' should be discussed in the 'Teaching Subjects' in B.Ed. program."

Improvements in ICT Lead to Pedagogical Content & Evaluation

All the interviewees uttered that technological-pedological theory and skills should be taught and practiced in the 'teaching studies' courses in detail and meticulously. These courses were objected to dealing with the subject-specific pedagogy and assessment approach. But a basic orientation could be given in the mandatory 'ICT in Education' course, as it was in the existing B.Ed. curriculum. There should have included some concepts on the applicability of any digital teaching aids, appropriate timing to use those, and the effective duration for displaying, focusing on making any class interactive and imparting sustainable learning to the learners in those 'teaching studies' courses. Besides this, the skills for infusing digital teaching aids in lesson designing be practiced in those teaching studies courses and the lesson delivering with digital teaching aids. According to one interviewee, the B.Ed. the curriculum should have incorporated any well-reputed university's self-developed strategies for integrating ICT into Pedagogy; by customization and contextualization following Bangladesh's education environment and resources. Another respondent suggested that the concepts of the 'TPACK framework' or 'UNESCO ICT Competency Framework for Teachers' could be included in the cross-curricular approach for imparting the theoretical concept of ICT-Pedagogy integration. In addition to these, one suggested including the contents related to the pedagogy for 'Online Teaching' in those teaching studies courses, considering the future dimension of the class. One of the interviewees said:

"The current B. Ed curriculum is mainly focusing on the pedagogical skills with non-digital instructional technologies and teaching aids, so the pedagogy with digital instructional technologies and teaching aids should get priority in the future updates of this curriculum."

Regarding the evaluation procedures, interviewees agreed that the students should evaluate the ICT using pedagogical skills. It could be aligned with the assessment of digital content development and identification skills in specific teaching studies courses. The evaluation of this skill should be executed in a summative format based on students' performance in practical settings. The main focus of this assessment would be on the skills of making any class interactive and collaborative by using digital tools and digital teaching aids. This assessment could be counted as an in-course examination for the final grading of those courses. One of the interviewees mentioned that:

"How and how long digital content can be displayed while teaching should have discussed in the curriculum, and there should have an assessment for the practical skills on technological pedagogical knowledge in the teaching studies course of the B.Ed. program."

Improvements in Concepts & Evaluation for ICT Lead Teaching

All the interviewees agreed that the integration of ICT with the pedagogy for any specific subject content of secondary-level education could be best practiced at the time of the 'Teaching Practice' of the B.Ed. program. In the first semester of this B.Ed. the program, the students should learn the concepts and skills of technology usage, digital teaching aids, and pedagogical approaches to technology through 'ICT in Education' and 'Teaching Studies' courses, along with practicing opportunities in 'Micro Teaching' sections. In the second semester's 'Teaching Practice' part, the students should need to apply that knowledge and skills in the actual classroom settings of secondary-level schools. There should have a clear guideline regarding this issue in the updated B.Ed. curriculum. One of the respondents mentioned that:

"In the first semester, teacher students should be involved in learning these theories and skills in 'ICT in Education' and 'Subject Teaching' courses and should have scope for practice in 'Micro Teaching' and should get the opportunity for practice in the second semester's 'Teaching Practice' part"

One of the interviewees suggested an evaluation rubric for accessing teaching skills involving technology, and it should be made clear and transparent to the teacher-educators and students. This rubric would be designed in such a way that could assess the content knowledge, pedagogical skills, and ICT-Pedagogy integration skills on conveying and accessing learning objectives. The B.Ed. the curriculum should get updated by providing clear guidelines for practicing teaching-learning using digital tools and digital teaching aids. These teaching-learning practices should get assessed for the final evaluation where a specific portion of these classes could consider for the final grading along with the traditional classes by using non-digital teaching aids. One of the informants suggested the ratio of non-digital and digital teaching aids used in classes could be 2:1 or 3:1. Another interviewee mentioned that at least half of the total assessed class should have been

conducted through the integration of digital tools in the teaching-learning process. Another informant urged that at least these ICT-used teaching-learning processes should be practiced and accessed through microteaching if the secondary schools would not be able to provide technological resources at the time of teaching practices. One of the interviewees said:

"Although due to lack of recourses in the schools, it is difficult to give the practice scope to trainees, its need to get ensured for developing the 'ICT-Pedagogy integration' skills. Through microteaching, these skills should be practiced intensively, which will make the trainees understand the essence of 'ICT-Pedagogy integration' and it will motivate them to use this skill in their professional life".

DISCUSSION

In Bangladesh, the teacher education program was criticized by National Education Policy 2010 (Ministry of Education, 2010) as being theoretically dense, weak in practical knowledge, and loaded with a traditional assessment system. Despite a new teacher education curriculum being established in 2017 (National University, 2017), it was unsuccessful in producing teachers who were adept in "ICT & Pedagogy integration." The curriculum for teacher education that was created for Bangladesh's secondary level of education was the subject of this study. The primary objective of this study is to determine the degree to which the curriculum was prepared to train current and future teachers in the integration of ICT and pedagogy skills. The two goals of the research were to identify the gaps in the teacher education curriculum that focused on the integration of ICT and pedagogy and to investigate remedial options for re-designing or updating the curriculum. The TPACK framework, which has been hailed as the best framework for guiding instructors in developing their expertise in teaching using digital technology, was used to examine the curriculum. This concept states that for teachers to be proficient in using ICT technologies for instruction, they would need seven components. Based on the characteristics of the TPACK framework, the study identified the gaps and investigated the development techniques in the four main curricular areas.

The TPACK framework was created to improve methods for identifying and characterizing the professional abilities associated with technology that should be used in teaching practices (Koehler & Mishra, 2009). The teachers' educators should have improved their understanding of TPACK before preparing the new teachers for employing technology in the teaching-learning process (Voogt & McKenney, 2016) The creation of the curriculum will eventually aid teacher educators in developing a solid knowledge of TPACK. The results of this study would help trainees develop abilities in "ICT & Pedagogy integration." According to Tondeur et al. (2013), if ICT could be incorporated into the entire teacher education curriculum, trainees would have the chance to comprehend the pedagogical justifications for using it and gain firsthand knowledge of the ICT-supported teaching-learning process in a variety of subject domains. The methods shown in this study to fix the curricular gaps mirrored Tondeur et al.'s (2013) recommendations.

The results indicated that not all the courses related to ICT & Pedagogy integration carry specific objectives for developing teachers with the skills for teaching using technologies. Insufficient content and directions were found related to the features of technological content knowledge (TCK), technological pedagogical knowledge (TPK), and

technological pedagogical & Content knowledge (TPACK). No course-specific teaching-learning strategies and evaluation procedures were spotted to lead the trainees to become competent in 'ICT & Pedagogy integration' skills. The study recommended incorporating specific objectives, teaching-learning strategies, and evaluation procedures for the updated future curriculum. It also advocated for including the latest ICT-related courses and subject-specific digital teaching aids concepts in every teaching studies course. Based on different pedagogical approaches with various digital tools, the contents and practices were advised to fit different teaching courses. The study also emphasized for inclusion of ICT-lead teaching in the practicum. It is prescribed to provide the scopes to the trainees for doing practical and getting assessed on basic ICT skills, subject-wise digital content identification and development skills, and subject-wise technology-pedagogy integration skills and teaching skills with the digital contents in actual classroom settings.

CONCLUSION

Like many other developing nations, Bangladesh is seeing a relatively recent emergence of ICT Integration in the teaching-learning process. The study's primary focus was on how teacher education programs have provided insights into ICT and Pedagogy skills and their applications. The results of the study would therefore provide a basis for examining the state of the implemented teacher education programs in Bangladesh concerning preparing teachers to use digital technologies in the classroom.

This study revealed that there were certain inadequacies in the adopted teacher education curriculum regarding the preparation of instructors to teach using digital material and digital technologies. According to a study by Cruzado et al. (2021), digital literacy is not a reality that has favored the teaching-learning process and that a training program is urgently required for teachers to reach optimal levels of digital skills, so as to undergo a true paradigm shift, ultimately combining methodology and educational strategies. As a result, it looked at different curriculum approaches for developing instructors who are adept at "ICT & Pedagogy integration (Ilube, 2013)". Initiating the use of technology in school was unquestionably a good thing for the secondary education system in the nation. Even yet, the built infrastructure of teachers' training institutions and the modified curricula based on the study's findings might provide greater access to technology for both teachers' educators and aspiring teachers. The majority of secondary-level instructors in Bangladesh are still employing traditional lecture-based teaching methods, therefore changing their perspective toward utilizing ICT in teaching-learning practice would take some time (Campaign for Popular Education, 2019). But since the majority of Bangladesh's undergraduate education curricula included ICT courses, it was assumed of the young, likely future teachers that they would do well when teaching using digital technologies. They should have some basic ICT understanding from their bachelor-level educational experiences. The teacher education program will recruit more young people to become trained in the ICT-leading modern idea of teaching thanks to the modified curriculum. Although it was clear that transitioning from analog to digital instruction would take time, teachers' education should serve as the foundation for future educator transformation.

In earlier research on the incorporation of ICT into education, certain difficulties were discovered. Even if there are no quick fixes for any of these issues, the pedagogical

revolution cannot begin without the teacher education curriculum being updated. The pre-service teacher education program should encourage ICT-driven instruction techniques to shape the early stages of the teaching profession as it was considered to be a continuous activity. It would give teachers insight into the skills that are required for integrating ICT in secondary classrooms if the government of Bangladesh took the appropriate actions to revamp the teacher education curriculum by examining the study's findings. The study would also provide a foundation for future ICT & Pedagogy integration research projects that would target Bangladesh's elementary and higher education systems.

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