



## Evaluating the attitude of female public polytechnic teachers in Bangladesh towards incorporating ICT in teaching engineering subjects

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### Abstract

The importance of Information and Communication Technology (ICT) in the education system has been steadily increasing in recent years. Extensive research has been conducted to examine the use of ICT in Teaching-Learning (T-L) process, particularly in Technical Vocational Education and Training (TVET). This study specifically focuses on assessing the attitudes and challenges faced by female teachers in public polytechnic institutions in Bangladesh when it comes to integrating ICT in the T-L process. The study involved surveying 82 female public polytechnic teachers from four different institutions in Bangladesh: Dhaka Mohila Polytechnic Institute, Chittagong Mohila Polytechnic Institute, Khulna Mohila Polytechnic Institute and Rajshahi Mohila Polytechnic Institute. Data was collected using quantitative approach through a survey questionnaire. The analysis was conducted using SPSS software 27.0, employing various statistical methods such as frequency distribution, percentage, weighted average, Chi-square, mean, standard deviation, standard error. The study revealed a generally positive attitude towards the integration of ICT among teachers in public women polytechnic institutes. However, it also identified significant challenges, including teachers' discomfort in utilizing ICT tools to teach engineering subjects to large classroom sizes and a lack of administrative support in implementing ICT in the T-L process. The study recommends addressing these challenges through targeted interventions such as professional development programs and institutional policy reforms. By effectively integrating ICT in T-L processes, the quality of education can be enhanced, better preparing students for the digital age.

**Keywords:** Information and Communication Technology (ICT), female teachers, Teaching-Learning (T-L)

### Introduction

A nation's development relies heavily on the quantity of its education system, which is influenced by factors such as resource, material, environment, and most importantly, the expertise of its educators<sup>[1]</sup>. In the 21<sup>st</sup> century, Information and Communication Technology (ICT) has emerged as a transformative force in the education field<sup>[2]</sup>. Countries that excel in technical education often have superior educational standards, and the integration of ICT further enhances the quality of education. Education, particularly Technical Vocational Education and Training (TVET), plays a crucial role in driving a country's social, economic, and cultural development<sup>[3]</sup>. As Bangladesh transitions from a least developed country to a mid-level economic player, it has prioritized the enhancement of TVET by increasing the quantity and improving the quality of TVET teachers<sup>[4]</sup>. The utilization of ICT in education can be broadly categorized into two domains: ICTs for Education and ICTs in Education. The former focuses on the development of ICTs specifically tailored for Teaching and Learning (T-L) purposes, while the latter involves the integration of general ICT components into the T-L process<sup>[5]</sup>. Educators across various disciplines have increasingly embraced ICT to enrich their teaching methodologies and enhance performance<sup>[6]</sup>. The effective use of ICT significantly drives reforms in T-L practices across all educational sectors<sup>[7]</sup>. Consequently, there is a pressing need for teacher trainers and curriculum developers in countries like Bangladesh, Lao, Myanmar, Nepal, Viet Nam and Bhutan to enhance the management of technical education and delivery of TVET through ICT integration in technical institutions<sup>[8]</sup>. In line with this, Bangladesh's Human Resource Development (HRD) sector has formulated an ICT

policy aimed at equipping the country to compete globally in the ICT market<sup>[6]</sup>.

Furthermore, the application of ICT facilitates diverse learning pathways and broadens access to TVET, overcoming traditional barriers associated with distance and location. To harness the benefits of ICT, educational policies must ensure that high-speed internet is readily available in all educational institutions at both micro and macro levels in Bangladesh<sup>[9]</sup>. Various ICT tools such as teleconferencing, email, radio broadcasts, interactive radio counseling, interactive voice audio conferencing, television lessons response system, audiocassettes and CD ROMs, and pen drives have been instrumental in education for various purposes<sup>[10]</sup>. In this study, ICT primarily refers to the use of multimedia and the internet in classroom T-L processes, highlighting the importance of equipping polytechnic teachers with the necessary knowledge and skills to effectively leverage these ICT tools for improved T-L outcomes.

ICT tools have become increasingly important in the field of education. In recent years, many countries have recognized the potential of ICT and have incorporated it into their curriculum design, policy frameworks, and national development plans. International organizations such as Asian south pacific Bureau of Adult Education, UNESCO, and UNDP have also made significant progress in using ICT to improve the quality of life in the South Asian Pacific region, including Bangladesh<sup>[6]</sup>.

However, fully realizing the benefits of ICT remains a challenge, especially in the context of polytechnic education in Bangladesh. While institutions in major cities may have the necessary infrastructure for integrating ICT, there is a disparity in the adoption and use of ICT tools, particularly

among female teachers. Gender inequality further complicates this issue, highlighting the need for a change in attitudes towards technology adoption among educators. The reluctance of senior teachers to embrace ICT tools in the classroom worsens the situation, emphasizing the need for targeted interventions and policy initiatives to promote ICT use in polytechnic education. Empirical research emphasizes the transformative potential of technology in education and stresses the importance of continuous professional development for teacher to effectively utilize ICT for improved learning experiences <sup>[11]</sup>.

Despite the evident benefits of technology-rich classrooms, the effective integration of ICT in polytechnic institutions in Bangladesh remains difficult to achieve. Urgent measures are required to bridge this gap and empower polytechnic teachers with the necessary skills and resources to effectively integrate ICT into their teaching practices. This study aims to address these challenges by examining the attitudes and challenges faced by female teachers in utilizing ICT in the T-L process. The objectives of the study are to identify attitudes towards ICT usage and to identify barriers to its effective implementation in the classroom. By shedding light on these issues, the study seeks to inform

policy and practice in polytechnic education, ultimately contributing to the advancement of ICT integration in Bangladesh’s educational landscape.

**Methodology**

This section covers the research context, participants and sampling technique, instrument development, data collection procedure, reliability test, and data analysis.

**Research context**

This study employed a descriptive survey method with the aim of thoroughly understanding a phenomenon through quantitative research technique <sup>[12]</sup>. The study employed a survey questionnaire in collecting data to find out the answer to the research objective.

**Research participants and sampling technique**

The study was conducted on four female public polytechnic institutions in Bangladesh which include Dhaka Mohila Polytechnic Institute, Chittagong Mohila Polytechnic Institute, Khulna Mohila Polytechnic Institute and Rajshahi Mohila Polytechnic Institute. The word” Mohila” means female in the study.

**Table 1:** Study’s participants

Name of female polytechnic institutions	Participants from departments		
	Architectural Technology	Computer Technology	Electronics Technology
Dhaka Mohila Polytechnic Institute	10	9	8
Chittagong Mohila Polytechnic Institute	6	7	8
Khulna Mohila Polytechnic Institute	5	4	6
Rajshahi Mohila Polytechnic Institute	6	6	7
	Total: 27	Total: 26	Total: 29
Total number of participants: 82			

The study’s participants comprises of all teachers from computer technology, electronics technology and architectural technology department in the above mentioned institutions. The study used purposive sampling technique in the data collection from the study’s participants as depicted in Table 1.

**Instrument development**

Questionnaire was considered as one of the primary media for gathering data or information in education and social science research. In this study structured form of questionnaire was used as data collection tool. The researchers prepared appropriate questionnaire to collect data from the participants. The questionnaire consists of fill up the appropriate place, short answer type and statement wise opinion given the tick within the five-point likert scale. These items were supplemented by few open ended textual opinion was provided on the best aspects of participants’ educational experience and problems faced by them at their respective institutions. Statement wise data format were designed on 5 point rating scale from Excellent (5) to Poor (1).

**Data collection procedure**

The researchers carried data collection by distributing printed copies of the survey questionnaires to the participants during their office hours, following approval from the institutions administration. Among all the distributed questionnaires, 100% were returned successfully after regular reminders were sent to encourage active participation. The researchers spent seven-weeks of data collection.

**Reliability test**

The study employed the Cronbach’s alpha coefficient to test the reliability of the instrument items. The Cronbach’s alpha coefficient for these items was calculated to be 0.80, indicating a high level of internal consistency. According to Hair *et al.* (2013), a construct is considered reliable if its Alpha ( $\alpha$ ) value exceeds 0.70. The interpretation criteria categorize reliability as poor if  $\alpha < 0.70$ , good if  $0.7 \leq \alpha \leq 0.80$ , and high if  $0.8 \leq \alpha \leq 1.0$ . Therefore, Cronbach’s Alpha was used to assess the reliability of the constructs being studied.

**Data analysis**

After data collection, the information was tabulated in the Statistical Package for Social Science (SPSS) software version 27.0 for analyzing and interpreting the data obtained. The frequency distribution, percentage, weighted average, Chi-square, mean, standard deviation, standard error were calculated and the significant value was compared with the critical value = 0.05 significance level. The statement-wise percentage is just the ratio of number of participants from a particular responded to one of the 5-rating scale from Excellent (5) to Poor (1) of a statement and the total number of respondents for the same statement multiplied by 100.

**Analysis of the study**

In this section, statistical procedures are presented that were used to analyze both the continuous and categorical data collected from four public female polytechnic institutions in

Bangladesh. In order to investigate the two research objectives, frequency distributions were conducted on continuous data to adjust the percentages based on missing values. Whereas statement-wise percentage, weighted average and chi-square were conducted on the responses collected using 5-point rating scale: Excellent (E), Very

good (VG), Good (G), Moderate (MO), and Poor (P).

**Attitude of teaching engineering subjects using ICT**

Table 2 present the analyses of the first research objective to identify the attitude of female teachers from the public polytechnics of teaching engineering subjects using ICT.

**Table 2:** Attitude of teaching engineering subject using ICT

S/N	Description	5 (E)	4 (VG)	3 (G)	2 (M)	1 (P)	W.A	S.V	Remarks
01	Uses of ICT in classroom feels	(61.7%)	(21.7%)	(16.7%)	(0%)	(0%)	4.45	0.252	Very good
02	ICT improvement you feel in your teaching	(30.0%)	(45.0%)	(25.0%)	(0%)	(0%)	4.05	0.049	Very good
03	The result of using ICT for teaching a large number of students	(6.7%)	(45.0%)	(35.0%)	(13.3%)	(0%)	3.45	0.015	Good
04	Improvement of your confident level after using ICT in teaching	(38.3%)	(41.7%)	(20.0%)	(0%)	(0%)	4.18	0.389	Very good
05	Idea of working with students in digital environment	(40.0%)	(33.3%)	(20.0%)	(6.7%)	(0%)	4.07	0.115	Very good
06	Favour to using ICT in teaching of engineering subjects	(48.3%)	(25.0%)	(26.7%)	(0%)	(0%)	4.22	0.577	Very good
07	Using ICT makes the classroom management	(41.7%)	(30.0%)	(25.0%)	(3.3%)	(0%)	4.10	0.079	Very good
08	Improvement you evaluate on your student after you start to use ICT in teaching learning	(60.0%)	(28.3%)	(8.3%)	(3.3%)	(0%)	4.45	0.166	Very good

**Difficulties faced by female teachers in using ICT**

Table 3 present the analyses of the second research

objective to identify the difficulties faced by the female teachers in using ICTs in the T-L process in classroom.

**Table 3:** Difficulties faced by female teachers in using ICT

S/N	Description	5 (E)	4 (VG)	3 (G)	2 (M)	1 (P)	W.A	S.V	Remarks
01	Rate the encouragement of using ICT in teaching learning in your institute	(46.7%)	(43.3%)	(10%)	(0%)	(0%)	4.37	0.049	Very good
02	Quality of ICT resources in government women polytechnic	(15.0%)	(35.0%)	(40.0%)	(5.0%)	(5.0%)	3.50	0.027	Good
03	Using ICT in teaching	(40.0%)	(36.7%)	(23.3%)	(0%)	(0%)	4.17	0.523	Very good
04	Attitude of institute to modernize the ICT technology	(15.0%)	(35.0%)	(45.0%)	(5.0%)	(0%)	3.60	0.046	Very good
05	Access of ICT for each classes in institutes in engineering subjects	(50.0%)	(21.7%)	(23.3%)	(5.0%)	(0%)	4.17	0.148	Very good
06	Students attitude in using ICT for learning in classroom environment	(25.0%)	(55.0%)	(20.0%)	(0%)	(0%)	4.05	0.116	Very good
07	Access of internet for teaching learning inside and outside of classroom at institutes	(20.0%)	(35.0%)	(18.0%)	(15.0%)	(0%)	3.60	0.570	Very good
08	Administrative support for using of ICT	(15.0%)	(35.0%)	(25.0%)	(20.0%)	(5.0%)	3.35	0.288	Good
09	Student improvement in teaching learning process in engineering subjects to using ICT is	(63.3%)	(20.0%)	(13.3%)	(3.3%)	(0%)	4.43	0.012	Very good

**Discussion**

Through the sample selected which comprised of teachers and analyzed the data related to the objectives to assess the teacher’s attitudes towards using ICT and difficulties faced by teachers using ICT in public women polytechnic institutes in Bangladesh, the discussion of the findings is presented in the following:

**Objective 1**

The results from Table 2 shows the item with the highest weighted average (W.A) = 4.45, this indicates that the majority of the responses shows that the teachers uses of ICT in classroom feels very good and it shows that the performance of students tends to improve while the teachers start using ICT tools in the T-L process in the classroom. Similarly, the analyses also shows that the majority of responses indicate that using ICT tools favors the teachers in simplifying the method of teaching engineering subjects with a weighted average (W.A) value of 4.22. Furthermore, the response from the participants shows that teachers are not feeling much comfortable in using ICT tools to teach engineering subjects to a large number of students in a classroom with a weighted average (W.A) of 3.45.

**Objective 2**

The results from Table 3 shows the item with the highest weighted average (W.A) = 4.43, this indicates that the majority of the responses shows that the teachers find it easy

in delivering instruction using ICT and the students improvement in teaching learning process in engineering subjects to using ICT is very good. Similarly, the analyses also shows that the majority of responses indicate that the rate of encouragement of using ICT in T-L process in the institute is very good with a weighted average (W.A) value of 4.37. Furthermore, the response from the participants shows that the administrative support in using ICT in the T-L process is moderate which requires improvement to achieve the learning objectives with a weighted average (W.A) of 3.35.

**Implication**

Based on the findings presented in the discussion, several implications can be drawn for policymakers, teachers, and students regarding the integration of ICT in public women polytechnic institutes in Bangladesh.

**For Policymakers**

The study’s findings may help in addressing the reported discomfort of teachers in using ICT tools with large student groups necessitates investment in infrastructure, such as providing adequate technological resources and facilities in classrooms. Policymakers should allocate funds for the development and maintenance of ICT infrastructure in educational institutions to ensure equitable access and effective implementation.

### For Teachers

The study's findings may help the teachers to benefit from collaborative efforts and resource sharing to overcome challenges associated with ICT integration. Establishing professional learning communities where teachers can exchange ideas, share best practices, and provide mutual support can foster a culture of innovation and continuous improvement in ICT-enabled teaching practices.

### For Students

The finding of the study will help students to capitalize on the opportunities afforded by ICT integration to actively engage in their learning process. By embracing ICT tools and resources, students can enhance their understanding of engineering subjects, develop digital literacy skills, and access diverse learning materials to support their academic growth.

### Conclusion

The study's findings indicate a generally positive attitude towards ICT integration among teachers in public women polytechnic institutes in Bangladesh, there are notable challenges, particularly regarding teacher comfort and administrative support. Addressing these challenges through targeted interventions, such as professional development programs and institutional policy reforms, can facilitate the effective integration of ICT in teaching and learning processes, ultimately enhancing the quality of education and preparing students for the demands of the digital age.

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