

ICT Integration in Teaching and Learning at the Primary Level in Bangladesh: A Comparative Study of Private and Government Schools

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Abstract

The importance of Information and Communication Technology (ICT) in current education, especially in the field of language teaching and learning, has received growing attention. However, the digital resources available and their successful use in the classroom may vary across educational institutions. This paper analyzes teachers' and students' attitudes, the availability of ICTs, teachers' confidence in using ICTs, and barriers to effective ICT use in teaching and learning in private and government primary schools in Bangladesh. The research method was a mixed-methods design, combining questionnaire surveys, classroom observations, and interviews. 120 students were selected from four schools: two private and two government primary schools. The results show a significant gap in access to ICT facilities between the two sectors. All private schools observed had computers and projectors, whereas only 15% of government schools had these. Students' attitudes toward the use of ICT in both sectors were positive, and they mostly used ICT to motivate students to search for words in a digital dictionary and to present their concepts using visual materials. However, ICT use was much greater in private schools than in government schools. Other factors identified included a lack of equipment, a lack of teaching materials, a lack of confidence, and reluctance among teachers. The results show that, beyond the availability of hardware, meaningful integration of ICTs also depends on teacher training, the availability of digital materials, institutional support, and pedagogically meaningful use of ICTs. Finally, the study suggests ways forward to make primary education in Bangladesh equitable and effective in the use of ICT.

Keywords: ICT, primary education, government and private schools, Bangladesh, digital learning, teacher training, ELT

I. INTRODUCTION

With the advancement of Information and Communication Technology (ICT), the field of education in the 21st century has been greatly changed in terms of how information is presented, how instructors interact with learners, how information is provided, and how learners interact with information. In language education, digital technologies can provide access to multimedia materials, electronic dictionaries, educational websites, applications, audio-visual materials, and authentic language input and digital texts. They can assist learners' experiences with language and facilitate interactions that occur outside of the classroom environment of traditional classroom reading/literacy instruction (Warschauer & Healey, 1998; Yunus et al., 2013). The 2023 Global Education Monitoring (GEM) Report also offers suggestions for enhancing teaching with digital technology: more practice, more representations, more opportunity to interact, and more opportunity to collaborate. However, its influence in the educational environment is not always positive; in other words, not every use of technology is educational, nor is every use of technology that has an educational outcome. (UNESCO, 2023). Thus, the use of ICTs is much more than the mere provision of computers, multimedia projectors, or internet access in the school. It requires appropriate technological infrastructure as well as teachers' digital competence and pedagogical knowledge, materials appropriate for digital learning and institutional support, and meaningful implementation in class. Therefore, to effectively use ICTs to facilitate critical thinking, problem-solving, collaboration, and meaningful learning, teachers should possess ICT competencies in technology and pedagogy (UNESCO, 2018). Similarly, the GEM Report 2023 identifies teacher training, appropriate institutional conditions, and access to technology as prerequisites for the effective and equitable use of technology (UNESCO, 2023).

This is an important consideration in Bangladesh, where the technology and opportunities for the use of ICT in teaching and learning in schools differ. Digital technologies are used with greater frequency within the educational environment, but a variety of factors related to infrastructure, internet connectivity, digital materials, teacher preparation, and/or instructional practices can affect the effectiveness of digital technology use. Therefore, for the purposes of this module, it is crucial to distinguish between access to technology and meaningful pedagogical uses of it when considering ICT in primary education. The present study is set out to address this issue and contrast some of the government and private primary schools in Bangladesh. The first study included four schools (two government and two private primary schools) and questionnaires, classroom observation, and teacher and principal interviews. The relevance of ICT to language teaching is especially important because language and its cultural inputs can be presented in a number of modalities to students via ICT. A gradual process of change has taken place in the application of computers to the learning environment, from a didactical tool to a more communicative and interactive learning environment, as in the evolution of Computer-Assisted Language Learning (CALL) (Warschauer & Healey, 1998). For Chapelle (2001), the pedagogical value of computer applications is not just a consequence of technology availability, but it is a matter of the quality and appropriateness of the learning activities to which they are used. For language learning, ICT can be employed to assist in learning by providing audio, video, text, access to the Internet, vocabulary applications, and other tools that can help learners to become familiar with language in meaningful contexts in this aspect. Based on the empirical studies conducted, it was found that the benefits of using the method were to improve students' attention, students' vocabulary acquisition, learning style, meaningful learning, problems caused by destructiveness, and classroom management problems (Yunus et al. 2013).

This article is based on a study conducted in Bangladesh, which provides additional evidence on the opportunities and obstacles to integrating ICT at the primary level. Classroom

observations revealed that in private schools, about 40% of the lessons observed included some aspect of ICT, whereas in government primary schools, only 15% of the lessons observed included some aspect of ICT. The study also found a lack of teachers' and students' Internet skills and confidence. The findings suggest a possible relationship between increased access to technology, teacher preparation, and the use of ICTs in the classroom. However, because only a few schools participated in the research, the findings should be interpreted as reflecting the selected research schools and not as generalizable to all primary schools in Bangladesh. Against this backdrop, the present article examines the extent of ICT integration in selected private and government primary schools in Bangladesh to gain insights into students' perceptions, teachers' use and confidence in ICT, classroom practices, perceived educational value, and implementation challenges. The study is not only an attempt to contribute to the understanding of the conditions that are conducive to the meaningful use of ICT in the primary language learning and teaching field but also to examine technological access and the actual use of ICT in the classroom.

II. OBJECTIVE OF THE STUDY

This study aims to examine the use of ICT in the teaching and learning process in both government and government-aided primary schools in Bangladesh.

III. LITERATURE REVIEW

This is not only changing but also creating new possibilities for interactive, learner-centered, and resource-rich instruction in today's education, which has come to be known as Information and Communication Technology (ICT). In the field of language teaching, computers, multimedia, electronic information sources, the internet and other electronic materials provide opportunities for learners to experience real language and varying modes of language input. Previous studies in the field of computer-assisted language learning (CALL) have established that the use of computer technology would provide additional opportunities for language practice outside the classroom (Warschauer & Healey, 1998). Chapelle (2001) further argued that the pedagogical uses of technology are also influenced by how well the technology is used to support language learning goals and pedagogical principles. Recent studies have reinforced the position that technology in the right hands and with the right pedagogical support can be a positive factor in learning. The results of a recent meta-analysis by Zuo et al. (2025) generally showed positive effects of ICT-supported interventions in early childhood and primary education, with the size of effects depending on the type, length, and design of the interventions. Likewise, Campbell et al. (2024) found that the effective use of mobile devices in primary classrooms could aid literacy development and other learning goals if technology is integrated into classroom activities in a purposeful way. The results indicated that the educational value of ICT is not only as a supporting tool that is suitable for classroom use but also when used properly and effectively by the teacher as a mediator in the learning process.

The Internet offers many opportunities for students to access word lists, pronunciation, visual materials, authentic texts, and interactive materials, and for English language learning, ICT has a special relevance. Increased learner engagement, the access to various learning materials, and the ability to practice language in an interactive manner are the advantages of the use of ICT in language teaching that were mentioned by Yunus et al. (2013), while the disadvantages are due to technical and inappropriate use of the ICT. In another systematic review of mobile-assisted language learning (MALL), Metruk (2024) demonstrated that targeted application of mobile technology and digital learning can help develop language skills, particularly. The trend of technology-assisted language learning can also be seen in the context

of the Bangladesh education system. For instance, Yeasmin et al. (2025) have reported that digital resources can positively impact the learning process of the English language by providing extra opportunities for higher secondary students in Bangladesh to learn English, practice and be exposed to the English language. Moreover, the previous study in Bangladesh has pointed out that interactive projectors, reflective learning activities, learner-centered teaching, and technology-based teaching improve engagement and participation of the learners. These studies, however, have been rather limited in scope at the secondary and higher secondary level of education and have mainly concentrated on the primary level of education, which was minimal, empirical studies.

Another important issue is teachers' role as part of a successful integration of ICTs. Technology is not a panacea for improved outcomes in the classroom if teachers are not knowledgeable, confident, and pedagogically prepared to use the technology. UNESCO (2018) acknowledges that the skills needed of teachers are not just technical; they are also pedagogical, which is the use of technology in the classroom. Research in recent years has identified teacher digital competence as a multi-faceted phenomenon and defined it as having four dimensions: technological knowledge, pedagogically making decisions, instructional design, and selecting and evaluating digital resources (Claro et al., 2024; Kim & Hong, 2024). Thus, the different levels of confidence and competence of teachers might account for the differences in the use of ICTs by teachers in schools in terms of frequency and quality. Professional learning, therefore, plays a key role in ensuring the sustainable integration of technology. Explain the technical skills and pedagogical approaches that teachers must develop to make routine use of digital materials in their everyday teaching. This is significant when teachers are equipped with technology but lack proper training, support, and confidence. Limited resources, lack of institutional support, infrastructural constraints, and teacher training were also cited as important factors that hinder technology-supported teacher training (previously cited studies).

The motivational value of ICT is not the only educational value, however. The use of still and moving images, animation, audio, web-based resources, and interactive applications are ways to simplify concepts and ideas that are abstract or unfamiliar. Resources like these can be especially helpful to young learners, as visual and interactive representation can help explain the verbal explanation and offer several ways for learners to receive a learning input. In the meantime, the dependence on narrowly defined digital resources may hinder learners' independent thinking and the occurrence of new problems of misinformation, plagiarism, privacy, and academic integrity as AI tools proliferate in the field of learning (Lo et al., 2024). These problems only further highlight the need for proper and educationally sound technology usage. Access to ICT resources is also highly related to educational equity. While technology can help mitigate educational inequalities, UNESCO (2023) warns that it could also perpetuate pre-existing inequalities if device access, connectivity, digital content, and teacher access to technology are not equitable. This is especially significant if there are substantial differences between the infrastructure, resources, training of teachers, capacity of government schools, and the private school. It is a typical situation in the country of Bangladesh. The result is that comparisons of access and the use of ICT in these two sectors can give useful evidence of the level of equitable distribution of technological opportunities.

Though ICT-supported education has attracted many international studies and research, there is a great lack of contextual understanding of Bangladesh. Several research studies have been carried out in secondary and higher secondary schools, while only a few have studied and understood primary schools. Moreover, comparative empirical studies on the availability of ICTs in the government schools and primary schools with private ownership in terms of teachers'

confidence, application of ICT in the classroom, students' perception, and the problems that were faced in the implementation of ICTs have not been conducted. This study is related to this question and tries to compare the application of "Information and Communication Technology" (ICT) in some government schools and private schools at the primary level in Bangladesh. The study will focus on the students' perception as well as the observed use and access to technological tools in the classroom in both sectors with the aim of obtaining a broader picture of such use and access. The findings of the study are context-specific and not nationally representative in nature but may offer some empirical evidence that can be considered for the purpose of equitable, purposeful, and sustainable integrating ICT in the primary education system in Bangladesh.

IV. RESEARCH METHOD

In this study, the researcher adopted the mixed-methods research approach of the "qual-quant" type as described in the original dissertation to analyze the availability, use, perception, and problems of Information and Communication Technology (ICT) in primary education. A mixed-methods design enabled the researcher to collect quantitative data on participants' access to ICTs and the use of ICTs in the classroom, as well as qualitative data on participants' experiences and perceptions of teaching and learning with ICTs. Four schools, two private schools (East-West International School & College and Medhashiri School) and two government primary schools (Kazipara Sarkari Prathomik Biddaloi and Hazi Asraf Ali School), were used for the study. The total number of students who took part in the questionnaire survey was 120 students (30 in each school). The respondents consisted of 69 females and 51 males, and it was a sample of Bangla- and English-medium education. The research instruments used were three main instruments that are student questionnaires, classroom observation, and semi-structured personal interviews. There were 15 substantive items, including yes/no, multiple-choice, open-ended, and agreement-based items in the questionnaire. It touched on topics related to the availability of ICT, access to the internet, teachers' confidence in using ICT, students' perception of learning with ICT, use of multimedia resources, digital dictionaries, websites, and applications, and barriers to effective ICT integration. Observations were made in the classroom to assess the availability of ICT facilities and equipment, practice by teachers in using ICT, the percentage of lessons using ICT, and students' access to the internet and their own digital devices during lessons. Moreover, semi-structured interviews were conducted with the teachers and other educational actors that were relevant to the research to obtain deeper insights into the perceived advantages, hindrances, problems, and potential solutions to the integration of ICT in primary education. The quantitative data obtained from the questionnaires and classroom observation was presented both in the form of frequency, percentage, and graphical presentation, while the qualitative data obtained from the interview and observation was analyzed thematically for data analysis. The analysis revealed specific disparities between the availability of ICTs and the Internet in private and public schools, teachers' self-confidence and classroom use, teachers' students' perceptions, and the main factors that affect the effective integration of the ICTs. The methodology was a combination of numbers and experiences and classroom observations of the participants, providing a more holistic picture of how much ICTs were used and what factors played a role in this, as identified in the selected primary schools.

V. FINDINGS & DISCUSSION

Availability of ICT Facilities: The most apparent difference between the two school sectors relates to the availability of ICT equipment. The study found that all classrooms in the two private primary schools had computers and projectors, while only 15% of classrooms in the two

government primary schools had computers and projectors. This disparity is an important manifestation of structural inequity in the learning environment. Without the necessary infrastructure, students will not be able to benefit from the use of ICT in teaching. There were also differences in the internet connectivity among sectors. The study mentions internet-connected computers in private school classrooms, while the government primary classrooms that were observed didn't have Internet.

Teachers' confidence in the use of ICT: About 90% of teachers in the private schools said they were confident in using the ICT materials, while 65% of teachers in the government schools said they used the materials available to them. A different set of figures emerged when teachers were observed in the classroom: some 85% of private-school teachers and 70% of government-school teachers were observed as having good confidence in using ICT. These differences in the mean between the "perceived confidence" and "observed confidence" should be viewed with caution, as they are based on different data sources. The findings, however, suggest more generally that preparedness of teachers is indeed an aspect of ICT integration.

Student perception of ICT: Generally, students in both sectors had positive perceptions of ICT. For example, 82% of the private school students and 68% of the government school students agreed that ICT has the potential to create a natural learning environment. Besides, 94% of private school students and 85% of government school students thought that films could inspire students. Moreover, 92% of private-school students and 84% of government-school students thought that websites and apps would enable them to learn new things about a topic. Of the private-school students, 97% preferred or supported the use of electronic/web dictionaries, and 86% of government-school students did the same. Furthermore, the attitudes of the students towards the use of still and motion pictures in presentation and understanding of concepts are reflected in the following percentages: 93% of those students in private schools and 64% of those in government schools think that still and/or motion pictures can be used in presenting and understanding concepts more easily. The findings show that students' actual access to ICT was not the same, but despite this, they generally recognized the educational potential of ICT.

Instruction on using ICT to understand subject matter: The survey also shows that 86% of the private school students agreed that ICT can help them to understand the materials, 8% to a certain degree, and 6% disagreed. 59 percent of the government school students agreed, 5 percent partially agreed, and 36 percent disagreed. This is the difference to note between the two groups. The result of this study must be understood, however, as a difference in perceptions and not as evidence of enhanced academic understanding due to the use of ICTs because it is descriptive and uses a limited sample.

A variety of ICTs for use in the classroom: The study showed that ICT was used more in private-school classrooms. Classroom observation reveals that about 40% of lessons in private schools were supported by ICT, whereas in government schools (primary schools), about 15% of the lessons were supported by ICT. The research also found that teachers in both sectors discourage students' use of their own devices in class. Thus, the type of ICT use also varied. In private schools, a significant number of lessons used ICTs, including the use of Microsoft Word and PowerPoint, followed by the use of videos, web portals, search engines, and teacher-developed digital materials. There was significantly less use of ICT in the government school classrooms. This is a distinction to note because the mere presence of technology does not mean that there is pedagogically rich technology use.

Infrastructure and Equipment: Inadequate ICT equipment was found to be the strongest barrier in primary schools run by the government. According to the study, 88% of the respondents of government schools noted that lack of ICT equipment is a major problem, and 12% attributed limited use of ICT to the disinterest of teachers. This indicates infrastructure still plays a key role in technology-aided teaching.

Teaching Materials: Interestingly, the principal issue that was reported by the private-school students was not equipment but the lack of good teaching materials. People stated that inadequate teaching materials were a problem for them, with about 89% and disinterest of teachers with 11%. The results reveal that the quality of infrastructure does not necessarily address all ICT integration issues. After the availability of the equipment, the quality, relevance, and availability of digital pedagogical materials become important.

Teacher Preparedness: The research results also show that there is a need for systematic training of teachers in the ICT field. 100% of the respondents agreed on training teachers on the use of ICTs. The question is not just if teachers can use a computer or projector. For effective ICT integration, teachers need knowledge on how to relate ICT to learning objectives, classroom activities, assessment, and learner needs.

Plagiarism and Overdependence on Digital Materials: The interviews revealed two other concerns: plagiarism and learner reliance on pre-made digital resources. About 10% of the comments made during the interviews about ICT were connected to plagiarism, and 12% of the comments were about the possibility of students becoming less intellectually engaged if they use prepared materials too much. These concerns do not always mean that ICT leads to plagiarism and passivity. Instead, they illustrate the importance of teaching digital literacy, supervision of teaching, and responsible use of digital resources.

VI. DISCUSSION

Results show clearly that there is a difference between access to ICT and effective integration of ICT. The biggest gap between the two sectors of schools is related to infrastructure. Computers, projectors, and internet facilities were much more readily available in private schools in the study. The primary schools were not as well-equipped as they could have been; however, in government-operated schools. This lack of infrastructure naturally limits the teaching opportunities for teachers and students. The study reveals that pupils in both sectors were aware of the learning value of ICT at the same time. Attitudes towards visual materials, motion pictures, websites, applications, and electronic dictionaries were more positive. This indicates that it is not appropriate to assume that there is not much student interest in the use of ICT in some classrooms where it is not used. A second significant finding is related to teacher readiness. The results indicate that teacher confidence is correlated with the actual use of technology. However, training should not be about only technical skills. Additional pedagogical support is needed for teachers regarding choices and utilization of digital resources. The study also shows that there is a need for suitable content in integrating ICT. Inadequate teaching materials were cited as a major challenge by the private-school participants, while technological equipment was relatively good. Therefore, the absence of appropriate and timely digital resources in an ICT-enabled classroom is unlikely to bring about any pedagogical changes. The results on personal devices are also of interest. Most observed classrooms did not allow students to have their own devices or internet access during class. Uncontrolled or unmanaged use of digital devices may generate issues related to classroom management and distractions, but well-planned and monitored use could offer opportunities for seeking information, collaborative learning, and language development. However, all such uses need to be based on clearly stated learning goals. The results reinforce the broader concept of the integration of ICT as an educational process at a system level, which encompasses the infrastructure, the capacity of the teacher, the digital resources, classroom practice, and institutional policy.

VII. IMPLICATIONS OF THE STUDY

The results have implications for primary education in a number of ways.

Infrastructure Must Be Accompanied by Pedagogy: Having computers and projectors is a first step, but that's not enough for effective learning. It is also a responsibility of the school to assist teachers in designing pedagogically meaningful lessons with ICT.

Continuous Teacher Development: The most effective professional development in information and communication technology (ICT) is a continuous, cyclical process, not a one-off technical training session. A one-off training may introduce instructors to a tool, but in the absence of follow-up, practice, and reflection, most of what is learned rapidly evaporates and rarely impacts classroom practice. Thus, good programs involve initial training and regular refresher courses, peer collaboration, mentoring, and opportunities for experimenting so that teachers may progressively build confidence and keep up with quickly evolving technologies. Training in multimedia lesson design is a significant area. Teachers need to be trained in how to use text, graphics, audio, video, and animation in lessons that are interesting and suit diverse learning styles. So that teachers are helped to select media that increase comprehension and focus attention, rather than detract from what is being taught, training should include pedagogy as well as technical.

Another aspect is education websites and applications. Teachers need support in accessing, assessing, and choosing digital resources that are linked to curriculum goals and student capacities, and should have practical experience with interactive sites, language learning apps, and collaborative tools so that they can be used in meaningful ways and not just for novelty. These tools provide faster feedback to help teachers identify learning gaps earlier so they can provide more targeted education. At the same time, it is also important to educate about online safety and digital citizenship. Teachers need to know how to secure personal information, how to identify cyberbullying and inappropriate content, and how to set clear norms for polite, responsible, and ethical behavior on the internet. With this knowledge, teachers can model good digital behavior and pass this on to their kids. Teachers should additionally encourage pupils to be aware of the restrictions of copyright and plagiarism. This entails teachers training on the necessity of crediting sources, how to reference information correctly, what items can be used or shared legally, and how to access copyright-free or Creative Commons resources. This enables teachers to design tasks that stimulate original thinking and instruct students to paraphrase, cite, and employ plagiarism detection technologies constructively, thus establishing a culture of academic integrity. Professional development could also help teachers generate their own resources for lesson planning and other professional activities.

Teachers can be educated to produce and adapt digital worksheets, presentations, slide decks, audio recordings, and shared lesson banks rather than using pre-made resources. Collaboration systems allow teachers within the same school or between other schools to share materials and minimize burden, and improve quality through reciprocal feedback. This type of resource development also helps to build a sense of ownership and creativity among teachers. Finally, technology should be used in conjunction with communicative language instruction (CLT). The aim is not to use technology for its own sake, but to enable meaningful communication in the target language. Teachers can learn how to use resources such as video conferencing, discussion forums, collaborative documents, podcasts, and messaging applications to provide authentic opportunities for students to communicate, negotiate meaning, and complete real-world tasks. When technology is used in accordance with communicative principles, it will facilitate the development of speaking, listening, reading, and writing abilities, and it will actively involve learners. Combined these elements create persistent, practical, and directly connected teacher development for enhanced learning outcomes teacher development.

Creating a collection of context-specific digital materials: The results of the study indicate that there is a lack of proper teaching materials, which may indicate a need for digital materials for Bangladeshi primary learners. These materials should be representative of the learners' age, proficiency level, curriculum, cultural context, and classroom realities.

More Fair School Sector Equity: There is a huge disparity in access to ICTs in private schools and government schools, which raises the issue of educational equity. Therefore, any policies aimed at promoting digital education should include a discussion of the expansion of technology as well as equitable resource distribution.

Students' requirements to use their devices responsibly: Schools should consider the smartphone or tablet as a device that can be used for specific learning objectives, with the teacher's control and management. Schools are not limited to using personal devices as a tool for distraction but should rather think of smartphones or tablets as tools that can be controlled and used by the teacher to implement specific learning tasks. Rules for using these should be well defined, and digital-literacy lessons should be integrated.

VIII. RECOMMENDATIONS

The following recommendations are suggested based on findings:

- a) Increase IT infrastructure in government primary schools, especially computers, projectors, and a reliable internet connection.
- b) Introduce systematic ICT professional development for primary-school teachers.
- c) Create digital learning resources that are aligned to the curriculum and suitable for Bangladeshi primary students.
- d) Support teachers' development of digital materials based on the needs and level of achievement of learners.
- e) Create a system of technical support within the school for teachers to get immediate help when technology issues occur.
- f) Encourage pedagogical training and not just technical training in ICT, and focus on how ICT can be used to achieve certain learning outcomes.
- g) Give instructions for responsible use of digital resources, such as ways to avoid plagiarism and how to evaluate sources.
- h) Allow students to use their own devices in a well-monitored way that is directly related to learning goals.
- i) Formulate institutional policies on sustainable use of ICTs, such as maintenance of equipment, use of the internet, and replacement of obsolete technology.
- j) Carry out comprehensive comparative studies in more schools with different geographical areas in Bangladesh.

IX. CONCLUSION

The study reveals that ICT can play a significant role in enhancing primary education in Bangladesh by visual learning, motivating students, boosting their vocabulary, providing them access to ICT resources, and enhancing their knowledge of subject matter. A positive attitude towards the use of technology in learning was generally observed among students of both private and government schools. But there were significant differences between the two sectors in terms of access to ICT and use of ICT in classrooms. Provision of computers, projectors, and internet facilities was limited in government schools as compared to private schools. The findings suggest that successful integration of ICTs is not simply about getting the technology in place but needs robust infrastructure, suitable digital resources, competent and empowered teachers, institutional backing and good pedagogical planning. Therefore, a coordinated effort is required

for equitable, purposeful, and sustainable integration of ICTs in the primary education system in Bangladesh.

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