



Impact of Using ICT Based Active Learning System in Bangladesh

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ABSTRACT

The advancement of ICT has brought significant changes in society, especially in the process of teaching and learning. This is often a challenge for teachers and administrators to integrate new technology into daily activities. In this paper an observation on the impacts of Information Communication Technology (ICT) driven active learning systems for the advancements of education systems in Bangladesh is reviewed. Underprivileged Children's Educational Programs (UCEP) is a non-governmental organization (NGO) dedicated to supporting children and youth from disadvantaged backgrounds through education, vocational training, and skills development initiatives. These schools have implemented computeraided learning systems to promote active learning. The concept of the knowledge economy, where knowledge is considered the main driver of economic growth, is employed in this analysis. According to the study's findings, educators and administrators in Bangladesh are eager to use ICT into educational systems, but they have faced numerous obstacles in this regard. The paper highlights some suggestions for the betterment as well.

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1. INTRODUCTION

With the help of ICT, the traditional passive educational system is currently increasing demand to convert into active learning system. Active Learning is a form of learning that students learn in a classroom directly in addition to passively listening to an instructor's presentation. The integration of ICT in the education sector affords the educational systems with previously unprecedented chances thanks to its ability to incorporate, improve, and interrelate with each other over a large topographical distance in a meaningful way to achieve the learning goals. Educators and learners now have permission to the outside world classroom, because of the advancement of communication and computer technology in many ways.

This is where Bangladesh aspires. The Bangladeshi government set a strategic aim in 2010 to become the earth's greatest competitive and self-motivated knowledge-based economy in ten or fifteen years. The ICT revolution is anticipated by many nations for knowledge economies. Information technology, or those systems that gather, improve, and commercialize knowledge to support high value services and activities, is the foundation of the knowledge economy. A larger "knowledge society" is anticipated to emerge concurrently, with knowledge, i.e., the implemented computer aided training being used to improve mass training such as training and education, thus ensure the enhancement of one of the factors for establishing 'Digital Bangladesh'.

A. Research Scope

Active participation within the learning process could be a good approach (Bruner, 1961) especially for science education (Piaget, 1970). Some development psychologies proposed by Vygotsky, 1978 during the learning process. Oral information, intellectual skills, cognitive strategies, motor skills, and attitudes are the five classes of learning outcomes in terms of internal and external conditions (Gagne & Alison, 1977). A model was proposed, providing useful assistance to designers and teachers, and issued more controlled studies of its critical attributes and areas of effectiveness (Keller, 1983). The teaching-learning of ICT-

enhanced skills set a behavioral and relational abilities influencing interaction with others (Forcheri *et al.*, 2007). The active learning methods have been identified because of the foremost appropriate instructional approaches associated with the effective teaching of the chosen ICT-enhanced skills (Sendova *et al.*, 2007).

B. Research Purposes

The main purposes of this study -

- To find out the issues/ factors influencing use of ICT to make teaching-learning more effective through 'Active Learning' in education system of Bangladesh and a comparative survey on the international situation.
- To recognize the novelties that ICT has brought in active learning techniques in education system especially in Bangladesh.

C. Background

Implemented Computer aided Active Teaching/Training has become an important issue to the 'Digital Bangladesh' that nothing, but it can promote the interactive learning process and raise impacts in transparent economy. The economy affects the basic stands of the mass people. The computer based active education and training would, therefore, ensure the economical stands of Bangladesh proportionately acted from behind.

In this connection, gathering knowledge and attitudes from schools under UCEP Bangladesh project and a few strategic partners to find out the result with various factors. The factors and bodies engaged in furnishing the paper were:

- Trainers/Teachers of 5 educational/ training institutes
- Supervisors and management of the schools
- Trainees
- Curricula
- Logistics and logistic supporters
- ICT establishment
- Multimedia
- Required PCs
- Internet, WAN, LAN, WiFi facilities
- Required digital learning/teaching materials
- Animation developing software

The Adobe Flash CS6 animation software and Action Script 3.0 programming language are the media to convert the Curricula, Teaching-Learning Aids, Training Tools, Handbooks, Job Sheets, and Pedagogy Approaches into Audio-Visual schooling. Facilities like the internet, WAN, LAN, and WiFi guarantee that staff, instructors, and students may use the internet and communicate with each other across departments. WAN enables various branch offices to access server-side applications and administrative tasks, such as the institute's student records management tool.

2. MATERIALS AND METHODS

The study's target sample consisted of ten students, five teachers, and two administrators from each of the five UCEP institutions in Bangladesh that were selected. Thus, five institutions, fifty students, and twenty-five administrators, made up the study's target sample. The stratified random approach was used to choose the sample. The questionnaire was prepared and divided into two pieces. The first segment contained direct questions with a multiple-choice, yes/no format. Respondents' opinions on the factors that support the use of ICT to make "Active learning" successful in Bangladeshi organizations were solicited in the second section's questions. An institutional learning management system was used to perform this study. Survey reports and a comparative study were used to analyse the data. The report considers the local evidence materials in the delivery of active teaching-learning in Bangladesh.

3. EXPERIMENT AND FINDINGS

A. Classroom of Active Learning (AL)

In an active learning classroom, a desk and a chair with casters or a portable appliance were used, so that various group projects, presentations, and lectures could be held. For group tasks, the projector and whiteboard were also introduced to relay information. The white wall can be utilized for information exchange because in certain classrooms the whiteboard covers the wall.



Figure 1: Classroom of Active Learning

A smaller budget allowed for the addition of two active learning classrooms to the UCEP Gazipur Technical School (GTS) campus in 2016; further active learning courses were added at the expense of the project on other campuses. Figure 1 shows the active learning classroom. In this classroom, ten portable whiteboards were available for group projects, and each student had a table and chair with casters.

B. Setup of an ICT based Active Learning Classroom

To facilitate ICT instruction in conventional classrooms, the system should be expanded to include a projector, a document camera, an additional desk, and a slide-type whiteboard. Figure 2 depicts the system of the ICT-based Active Learning Classroom. More detailed explanation cloud adds to the image that the projector projected onto the whiteboard. A laptop and a document camera are set up on a separate desk. Additionally, the auxiliary desk has a connection from the projector that is concealed. The projector and whiteboard were applied in the classroom that wasn't yet ready to have this technical system installed thanks to a student project and technical officials.



Figure 2: The Classroom with ICT Environment

C. International Innovative Teaching Approach- An Online Case Study to Compare the Situations with Bangladesh

The innovative teacher approach was created to identify and address the daily requirements for skills and capabilityoriented knowledge-based economy in life-long learning. It aims to create a set of practical methodologies, approaches, and tools used by teacher trainers and teachers. Educators from Italy, Poland, Romania, Lithuania, Germany, Netherlands and Bulgaria, as well as a sizable number of teacher trainers and before and in-service educators, have access to a questionnaire that was especially created for this study. After analyzing this dataset, the outcomes finally led to the conclusion includes the followings abilities-

- Information Abilities
- Abilities for Working on a Project
- Teamwork Abilities
- Communication Abilities

These four skills/abilities were considered as the most important soft skills that were naturally and necessarily connected with now-a-days ICT skills. Which were selected for the Innovative Teaching approach on ICT-enhanced expertise. Table 1 is described by Forcheri (Forcheri *et al.*, 2007), which gives a taxonomy of these ICT-enhanced skills.

i. Informational Abilities

- To identify the information/facts issues
- To determine the applicability of many data sources
- To carry out research utilizing appropriate methods
- To locate and obtain the facts discovered
- To assess the facts discovered and modify the search
- To process the facts/info discovered in order to achieve the desired result
- To employ the knowledge obtained in a moral and lawful manner

ii. Ability for Working on a Project

- To determine the works
- To prepare a plan
- To share the works
- To speak among oneself
- To connect outsider
- To monitor the development
- To incorporate findings

• To effectively make use of the appropriate tools

iii. Teamwork Abilities

- To speak among oneself
- To communicate externally
- To express criticism to get feedback
- To receive feedback
- To settle disputes
- To be a loyal team member
- To help the group/team to take responsibility

iv. Communication Abilities Overall Presentation

- Arrange and choose information
- Become a language expert
- Properly cite and correct references

Written Presentation

- To compile a report
- To organize a report
- To properly cite and reference sources
- To effectively use a word processor/equivalent software

Verbal Presentation

- To prepare a verbal presentation
- To create a presentation for oral use
- To effectively utilize a presentation tool

Web Based Presentation

- Create an online presentation
- Create a hyper structure
- Use accurate citations, references, and URLs
- Effectively utilize a web/ publishing tool
- Choose and employ multiple media

D. Adaptive and Assistive Technologies

Those who cannot use computers owing to physical or learning challenges will be increasingly behind in the current educational options, job skills, and employability as ICT dominates the world of work, school, and training. Search engines cannot see audio material. Different adaptive and assistive technologies are employed in education and training, as well as frequently in special needs schooling, to lessen these issues. Assistive technology is defined as "software or hardware that had been specifically designed to assist people with disabilities in carrying out our daily activities" by the World Wide Web Consortium (W3C). Adaptive technologies aid by adapting content or user responses from one form to another (George & Alison, 2010).

Text enlargement software, braille systems, voice synthesizers, screen readers, and optical character recognition systems are some of the technologies available to help the visually handicapped. Alternatives to the keyboard and mouse, such as trackballs, foot mice, and mouth joysticks, are available to help people who have physical limitations. Teletypewriters or text-telephones can be used by people with hearing impairments to make phone calls. ICT has the potential to significantly increase people's access to high-quality education and training, but there is a risk that it will exacerbate already-existing disparities between urban and rural areas, rich and poor, people with and without literacy and numeracy skills, and developed and developing countries in terms of education and training (Viswanath & Tracy, 2012). Although there is some risk, there is mounting evidence that ICTs can help with concerns of equality in the delivery of active skill development. This topic continues to receive funding and political attention.

E. Changes After Implementing Active Learning with ICT

i. Changes in Paradigm

The Educational system is undergoing a major model shift for teaching and learning practice under the ICT enabled atmosphere in the globe. Previously it was common to learn by practicing facts and tools, rules and procedures. At present, students have to learn through assignments and problems, investigation and style, innovation and creation, variety and vision, action and reflection. The foremost hallmark of this learning transition is from teacher centered to learner focus paradigm.

ii. Active Teaching-Learning Environment

The educational environment has remarkably changed over the last few decades. The Table 1 shows the model focusing on the role of the learner and technology that has been changed significantly from regular instruction to a virtual learning atmosphere.

Table 1

Changes in trainers' and teachers' roles

From	То
Knowledge Ttransmissions	Guide and Knowledge Facilitator
Controller of Learning	Creator of Learning Environment
Always Expert	Collaborator and Co-learner
Learning to use ICT	Using ICT to Enrich Learning
Directive/ Expository	Interactive/Experimental/
	Exploratory

iii. Changes in Trainers'/Teachers' Roles

The importance of shifting from teaching to learning can create a more collaborative and attractive learning atmosphere for educators/ trainers and students. The new atmosphere enables both the teachers and learners role-play. These trainers'/teachers' role will change the technique of knowledge transmitter, facilitator, knowledge navigator and sometime as co-learner. The new role of teachers required a different way of thinking and understanding of the new way of learning process. As they gather, locate, synthesize, and impart their information to others, learners will be required to take on greater responsibility for their own learning. ICT offers a strong infrastructure to support the shift from a teacher-centered to a learner-centered model, as well as new roles for teachers, students, curricula, and new media. Table 2 to Table 5 have a description of the key changes.

Table 2 Changes in Trainers'/Teachers' roles				
Model	Focus	Role of Learner	Tools used	
Traditional	Teacher	Passive	Blackboard &	
			discussion	
Information	Learner	Active	PC	
Knowledge	Group	Adaptive	Personal Computer	
			with internet	

Table 3

Changes in Learners'/	Students' roles
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From	То
Passive Student	Active Student
Information Reproducer	Information Producer
Dependent Student	Dependent Student
Solitary Student	Collaborative Student
Solely Learning Content	Experience to learn/ reason/
	generate/ connect

Table 4

E V. Changes in curricula and delivery

From	To
Memorizing Facts	Inquiry-Based
Exercises in Artificial Teaching	Authentic Learning
Rigid Delivery (Fixed Time &	Open & Flexible Delivery
Space)	(any time & anywhere)
One-Path Progression	Several Paths of Progress

Table 5

Media App	lications	Changes
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From	То
Single Sense Stimulation	Multi-Sensory Stimulation
Single Media Application	Multimedia Application
Delivery of Information	Exchange of Information
Monologue Communication	Dialogue & Collaborative
Analogue Resources	Digital Resources

For effectively harnessing the power of ICT will improve teaching and learning by taking its place with the help of a new learning environment system. Therefore, ICT has the ability to change the educational environment, including where, when, and how learning occurs. It will prioritize lifelong learning through engaging and entertaining social learning opportunities by facilitating the development of knowledge.

F. A Case on Active Learning Material Development by an Educational Institute

An ICT Training Material is prepared for a case study on active learning material development for an educational institute under UCEP project. It is prepared also to draw the attention of the stakeholders and beneficiaries, and find out the impacts of the system to adopt. It is for EIM (Electrical Installation & Maintenance), Trade of UCEP Gazipur Technical School.

The types of learning system added-

- Active Learning System
- Classrooms of doers
- Audio-Visual & Animation
- Multimedia Projection based Application

Adobe Flash CS6 and Action Script 3.0. Software used to develop AL material. The Figure 3 to Figure 8 mentioned here are about the developed application.



Figure 3: Active Learning teaching material



Figure 4: Active teaching material



Figure 5: Active Learning teaching material



Figure 6: Active Learning teaching material



Figure 7: Active Learning teaching material



Figure 8: Active Learning teaching material

G. The hardware required by this system

- Computers/Laptops
- Multimedia Projector
- Projection Screen
- Heavy Duty UPS
- Digital Whiteboard (Optional)
- Sound System
- LAN Devices and Accessories
- 3G or Higher Bandwidth Internet Connective Devices and Peripherals

H. The Drivers of ICT in Active Learning

ICT is currently considered by many governments as an essential component of a flexible, demand-driven education and training system that is tasked with meeting students' demands for more individualized training. This is very clear in Bangladesh. Instead of going over the well-documented challenges that education and training systems confront, we'll concentrate on five generally accepted factors that will foster the growth of ICT in education and training:

- Demands of a knowledge economy
- Growing use of ICT in the workplace
- Need for more vocational training and education
- Lack of qualified technical teachers
- Need to provide chances for ongoing professional training, re-skilling, and skills upgrading

I. Success Factors and Challenges

ICT has been more prevalent in education and training during the past ten years, both in developed and developing countries. Recent studies show that ICT in education and training has a favorable impact on student outcomes in nations like Australia where it has evolved. According to the Australian 2011 e-learning benchmarking Survey, 55% of students claimed that e-learning improved their ability to do their current job, and 42% said that it helped them land a higher one. What lessons have the forerunners or early adopters learned that will help other nations who are still starting along this road? How are these solutions being contextualized to fit the situations of developing countries, and can the lessons acquired in wealthy countries be transferred to developing countries?

To successfully integrate ICT into education and training, four key success elements have been identified:

- Enabling national policy
- Institutional Commitment
- Champion support for online e-learning
- Recognition of the changing roles of the teachers

Bangladesh must figure out how to develop into a learning society and make sure that its people have the information and communication technology (ICT) knowledge, abilities, and credentials they will require in the coming years. Bangladesh's education and training systems face significant challenges because of the ICT revolution. These difficulties can be divided into three categories.

- Firstly, regarding involvement in the information society
- Secondly, consider how ICT affects accessibility, efficiency, and educational quality
- Finally, discover how ICT alters the educational process

However, the so-called "digital divide" that separates Bangladesh from those who are ICT-literate and the rest who are not is one way that ICT is contributing to the country's growing disparities. In Bangladesh, most women lack access to computers and the Internet. Due to a variety of factors, including literacy and education levels, language difficulties, time restraints, cost, the location of facilities, social and cultural norms, and women's skill sets in information search and broadcasting, women are unable to access information technology. The Bangladesh Government and the Development Partners are playing a big role in providing computer and Internet facilities in the rural areas to bridge the "digital divide" and create prospects for addressing and eliminating poverty and hunger via education with ICT envelopment. The government of Bangladesh and the development partners have established several institutions, including the University of Science and Technology, the Institute of Literacy and Adult Education, the Non-Formal Basic Education Program, the Continuing Education Initiative, and the ICT Ganokendra (a community learning center with access to computers and internet). To provide adult and remote education for disadvantaged rural people, the Bangladeshi government and development partners are working to build a link between Ganokendra and Bangladesh Open University, a government-run institution for distance learning.

Despite the fact that they can offer new information resources and communication channels for rural areas, information and communication technologies cannot, by themselves, fix or alleviate any of Bangladesh's difficulties. It provides innovative suggestions for bridging knowledge gaps through dialogue and engagement, building new social networks of friends and acquaintances, and linking organizations from other industries. Benefits include more efficient resource distribution for development activities, a reduction in activity overlap, lower communication costs, and global accessibility to knowledge and labor.

It is clear that the ICT integration transition process necessitates a long-term vision even though there is evidence of distinct national victories. Even with significant investments in infrastructure and staff development, it has taken developed countries some time to develop policy that is sufficiently flexible to new technological advancements that have the potential to alter learning and teaching. The different structural models of education and training don't seem to have affected the number of people using ICT. The formation of new ICT support organizations, the inclusion of new duties in the existing curricula, or the provision of sector-wide development aid could all be contributing factors to this. The institutions have realized that creating new posts and divisions is also essential to fostering institutional growth.

The circumstances of many developing countries, particularly those in Africa, are not favorable. At the ministry level, national policy is formed, although it is typically framed in terms of reaching measurable objectives, such as student-to-computer ratios. Even if the adoption of ICT may have some support from the government, it is mostly targeted at schools, with little to no consideration given to education and training. The institutions are largely left to develop their own strategies to address national policy in cases where they have inadequate infrastructure, which is improving, low ICT skill levels among teaching staff, and no institutional experience with how to respond to technical, pedagogical, cultural, and social changes. Since government subsidies for educational and training institutions are generally minimal (less than 6% in some cases), it is prohibitively expensive for institutions to promote the use of ICT in Zambia. Due to the costs having to be passed on to students in the form of higher tuition, the population's capacity to pay for education and training programs is lowered. Even with established support organizations, it could be difficult to have the desired impact.

4. RECOMMENDATIONS

People must develop the following three distinguished types of skills:

A. Course Related Skills

Students learn how to solve quadratic equations in math class. They learn how to handle glassware and the titration procedure in chemistry. It is obvious that the instructor of the course has accountability for these kinds of talents.

B. ICT Skills

Over the past few decades, ICT has swept the globe, and it now plays a significant part in daily life, including at work, home, in entertainment, and in schools. It is crucial for educators to concentrate on imparting the essentials to pupils for them to use ICT properly. In their academic settings, most students get knowledge of operating systems, word processing, and file systems. These sessions are typically delivered by an ICT specialist who is designated by the schools who prepare them.

C. Essential of Soft Skills

Soft skills are just as crucial as technical knowledge in the context of active ICT learning. These competencies empower students to adjust, cooperate, and flourish in dynamic and ever-evolving ICT environments. Respected soft skills like information literacy, communication skills, teamwork, collaboration, problem-solving and project management are linked to the expectations of modern society, where people are expected to study throughout their lives, grow constantly, and actively participate in their own education. It is not often clear who is teaching in academic institutions, what subject matter he is an expert in, or even if he has taught at all. The most efficient way to use ICT more and more to acquire these abilities is to start doing so in every course.

Three factors, the expanding role of emotional intelligence in society and education, the lack of clarity regarding who oversees cultivating these skills in the classroom, and the growing use of ICT force educators to consider solutions. To develop their soft skills, they can consider accepting and utilizing ICT opportunities. They should make advantage of ICT enhanced educational strategies.

According to our research, teachers should consistently integrate ICT into their lessons, focus students' attention on it, and have them focus on mastering the most basic ICT skills. ICT, merged into the teaching-learning process must be successful, according to the factors that positively influenced teachers' and administrators' use of ICT in education. These factors include teachers' prerequisites, ICT skills, computer efficiency, teaching experience, level of education, professional expertise, accessibility, technical sound, leadership, and technological characteristics.

However, the percentage of each element improves the possibility of ICT integration in the teaching-learning process. The scope of ICT-based training inside the educational institution needs to be increased to urge instructors to incorporate ICT systems into their teaching-learning process.

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5. CONCLUSION

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REFERENCES

- Bruner, J. S. (1961). The act of discovery. *Harvard educational* review.
- Forcheri, P., Molfino, M. T., Van Diepen, N., Stefanova, E., & Sendova, E. (2007). Giving Teachers a Hand (book) to Develop ICT-enhanced skills. Proceedings of 3rd Balkan conference in Informatics BCI2007 "Research in informatics and information society technologies.
- Gagne, R. M. (1974). Instruction and the conditions of learning. Psychology of school learning: Views of the learner, 1, 153-175.
- Keller, J. M. (2009). The Arcs model of motivational design. In Motivational design for learning and performance: The ARCS model approach (pp. 43-74). Boston, MA: Springer US.
- Ali, M. S., Chowdhury, M. S. A., Quaderi, S. M. U., & Akhter, F. (2024). Roadmap for Access and Adaptation of Cloud Computing in Bangladesh.
- Piaget, J. (1970). Science of education and the psychology of the child. Trans. D. Coltman.
- Stefanova, E., & Sendova, E. (2007). Innovative Teacher Style of Teaching. In *iTeach methodology handbook on ICT-enhanced skills*. University of Sofia, Bulgarije.
- Vygotsky, L. S., & Cole, M. (1978). *Mind in society: Development of higher psychological processes*. Harvard university press.