

Government Science teachers' perception on ICT Integration and instructional materials in Bangladesh

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Abstract:

Despite world wide acceptance of ICT in education and after providing several interventions to integrate ICT in classroom, teachers of higher education (HE) in Bangladesh remain passive. Classroom practice reflects the image of direct instruction using the textbook to transmit knowledge irrespective of subjects which eternalizes incoherence from the modern concepts and technologies resulting less involvement of students and demotivation. Therefore, the aim of this research is to understand science teachers' perception on integrating ICT in their subject as instructional materials. A quantitative study of 72 teachers revealed that almost every subject teacher has computer facilities at their college and availability of multimedia is also remarkable. Almost every teacher also has personal computer that they can use for their content teaching. However, internet facilities are not adequate for every subject teacher. Perception to integrate was found to vary according to subject but the barriers were found same mentioning insufficient time to plan instructions. Limited accessibility and network connection is also noteworthy. To overcome the barriers, this study suggests focusing on class duration and gaps between classes to provide teachers to plan instructions. Network and technological supports along with continuous in-service training is recommended.

Introduction:

Recent emergence of technology enhanced learning has posed several challenges on the 'dispensers of knowledge' role of teachers. This challenge necessitates a rethinking of many current practices and additional efforts to cope with the new role. One way could be engaging students in technology enhanced learning. Realizing this, the Government of Bangladesh (GoB) has declared a vision namely Vision-2021 where emphasis is given on information and communication technology (ICT) to improve the quality of education. Despite being late, the GoB has realized that the use of ICTs for innovation, capacity building and mentoring in the education sector is immensely important to equip the students with the necessary skills and prepare them for the globalized and competitive economy of twenty first century. Therefore, several trainings on ICT has been provided to teachers from all levels irrespective of subject and content. The overall purposes of these training were firstly to provide an overview of the most important new technologies and of the growing trend of integrating ICT into education. Secondly, to make teachers familiar with new perspective on ICT tools and learn new ways and best practices to integrate IC. However, after the training, teachers are expected to create engaging and interactive multimedia content and presentations and use ICT tools to make

education more engaging, motivating and innovative. Such efforts clearly demonstrate the concern of the country to promote technology enhanced instruction in classroom. Despite such sincere interventions, literature reveals traditional teacher centered approach still persists in educational practice particularly in science education at higher education (HE). Mojumder and Keast (2018) mentioned all the teaching learning activities in the classroom come from the textbook and science teaching approach involves direct instruction using the textbook to transmit knowledge. They mentioned “just the content of science is being read and lectured” and “rather than being shown a diagram, or completing a practical task, students are required to contemplate the text and ‘make sense’ of the words on the page”(pp.209) which perpetuates detachments from the modern concepts and technologies. This does not help embracing the attention of students in active learning. Therefore, innovative teaching for knowledge generation is not practiced to meet the educational needs of the new generations. On the other hand, to generate and innovate knowledge, National Education Policy (2010) emphasized integration of ICT at every level of education aiming to build up a skilled manpower to strengthen Bangladesh to work with equal capacity and pace of the global community. Accordingly, National Curriculum was developed in 2012 where science education at HE was given priority to produce the human resources equipped with necessary knowledge and skills. Even though educational policy directives and curriculum have articulated clear and unambiguous statements about encouraging the use of ICT but science teachers seem impassive concerning ICT. The reasons for remaining apathetic are still unexplored and their perception is unknown. So, the aim of this research is to understand science teachers’ perception on integrating ICT in their subject as instructional materials.

1. Which ICT resources do science teachers’ use?
2. What are the teachers’ perception about using technology in science classroom?
3. What are the challenges for teachers’ technology usage?

2. The Theoretical Framework:

The aim of this research is to understand science teachers’ perception on integrating ICT as instructional materials according to their subject. According to them, ICT integration is influenced by how teachers perceive the usefulness of ICT and how easily they can integrate it in their daily practice. Thererore, the framework of Ghavifekr and Rosdy (2015) was used in this research.

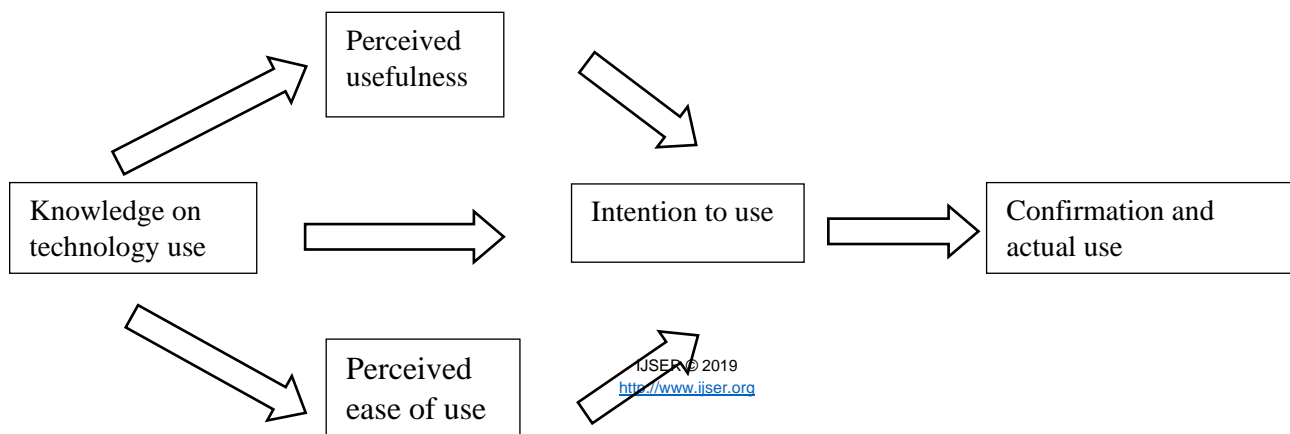


Figure 1. Framework of Ghavifekr and Rosdy (2015)

3. Method

3.1 Study context:

National Academy for Educational Management (NAEM) is an affiliated academy to the Ministry of Education (Bangladesh), Government of the People's Republic of Bangladesh. This academy is dedicated to conducting training on education management, research and planning to ensure quality education in the country. NAEM provides in-service training to the heads of secondary schools, principals of colleges and education administrators for enhancing their professional efficiency in educational planning and management in order to achieve their institutional objectives. Newly recruited government teachers from all over the countries irrespective of their subjects are also provided foundation training here. Therefore, it provides an excellent platform to understand science teachers' perception on integrating ICT in their subject as instructional materials.

Data Type and Sources:

The aim of this research is to understand science teachers' perception on integrating ICT in their subject as instructional materials. The study employed quantitative data. In this research basically, primary data source was employed to gather first-hand information to achieve the objectives of the research. Data obtained from respondents through questionnaire was the sources of primary data.

In order to investigate the participants' integration of ICT into their teaching practices, questionnaire was adopted from Gebremedhin and Fenta (2015). The total population is 72 teachers. Thus, the researcher takes all these teachers using census study. Based on the list of teachers in the training, the researcher distributed the questionnaire appropriately to every teacher. Generally, 74 questionnaires were distributed for the respondents/ teachers. Rate of return is 97.28%.

Research strategy and design: There are 74 teachers in the training. Since the population is manageable, it is census study. The study employed quantitative method. In the data collection the study used individual unit. The study employed cross-sectional study.

Data collection: In this research, primary data source was collected through questionnaire. A five point likert-scale was used ranging from 1 (strongly disagree) to 5 (strongly agree) . The questionnaire was composed of four parts. The first part of the questionnaire consisted of demographic information of the participants. The second part was regarding teachers' software

usage as well as other instructional tools and materials. The purpose of this part was to find out the self-expertise level of the teachers. The next part consisted of items about preferences for professional development on information gathering and support. In the third part of the questionnaire there were 11 items related to teachers' perceptions of self-efficacy. Finally, the last part was composed of 08 items regarding the barriers that teachers faced during technology utilization in the teaching-learning process. To collect data through questionnaire, the researcher distributed the questionnaire to the college teachers. Since the respondents found in a one working place, the researchers did not hire enumerators at all. Data was collected on the month of August, 2018.

Table. 4.1 Reliability of the Instrument

	Issues	No of Items	Cronbach Alpha
teachers' software usage	to find out the self-expertise level of the teachers	7	.92
Professional development	teachers' perceptions of self-efficacy	11	.94
Challenges	barriers that teachers faced during technology utilization in the teaching-learning process	08	.89

Data processing and analysis

A descriptive study was conducted to investigate the participants' integration of ICT into their teaching practices as the research questions aimed at investigating the different dimensions of ICT integration into education. The information collected from questionnaire was organized and statistical computations were made to explore the relationships among different variables. The quantitative data obtained through open ended questions in the questionnaire is described qualitatively in sentence form. Responses for the closed end questions are fed into a computer and analyzed using SPSS version 20.0 software. Descriptive statistics was applied to compute the percentage and frequency distributions of the respondents on the variables. Finally, the results are summarized and meaningful interpretations of result are made to draw the conclusions and implications.

Participant

The sample was selected purposefully who participated in a 154th foundation training course held on 10.04.2018 - 07.08.2018. A total 72 college teacher participated in the study.. Demography of participants is given below:

Table 1: Demographic Characteristics of the Participants (n=72).

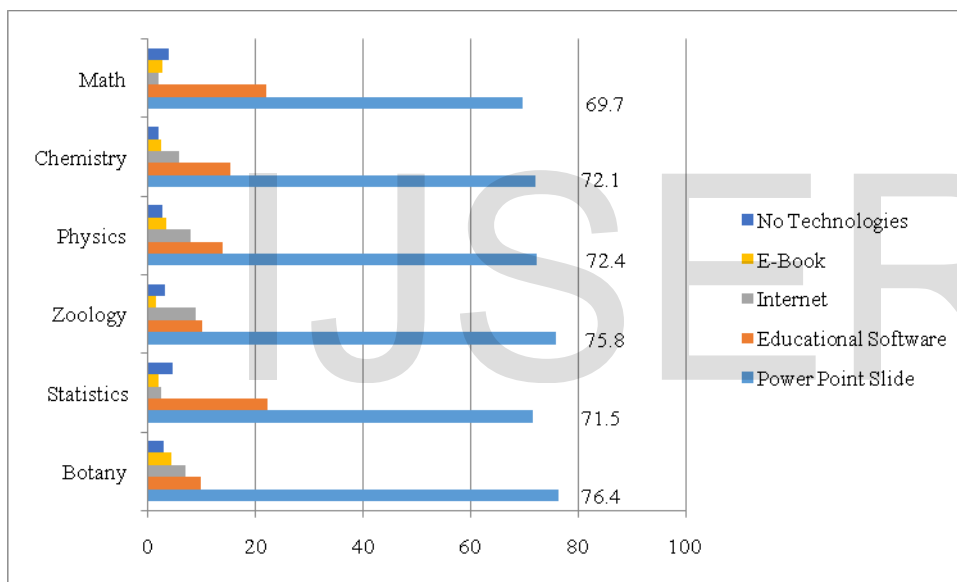
	Range	Frequency	Percentage
Age	25-30	19	26.39
	31-36	32	44.45
	37-50	21	29.17
Gender	Male	34	47.22
	Female	38	52.78
Subject Area	Botany	10	13.89
	Statistics	6	8.33
	Zoology	12	16.67
	Physics	16	22.22
	Chemistry	17	23.61
	Mathematics	11	15.28

Findings:

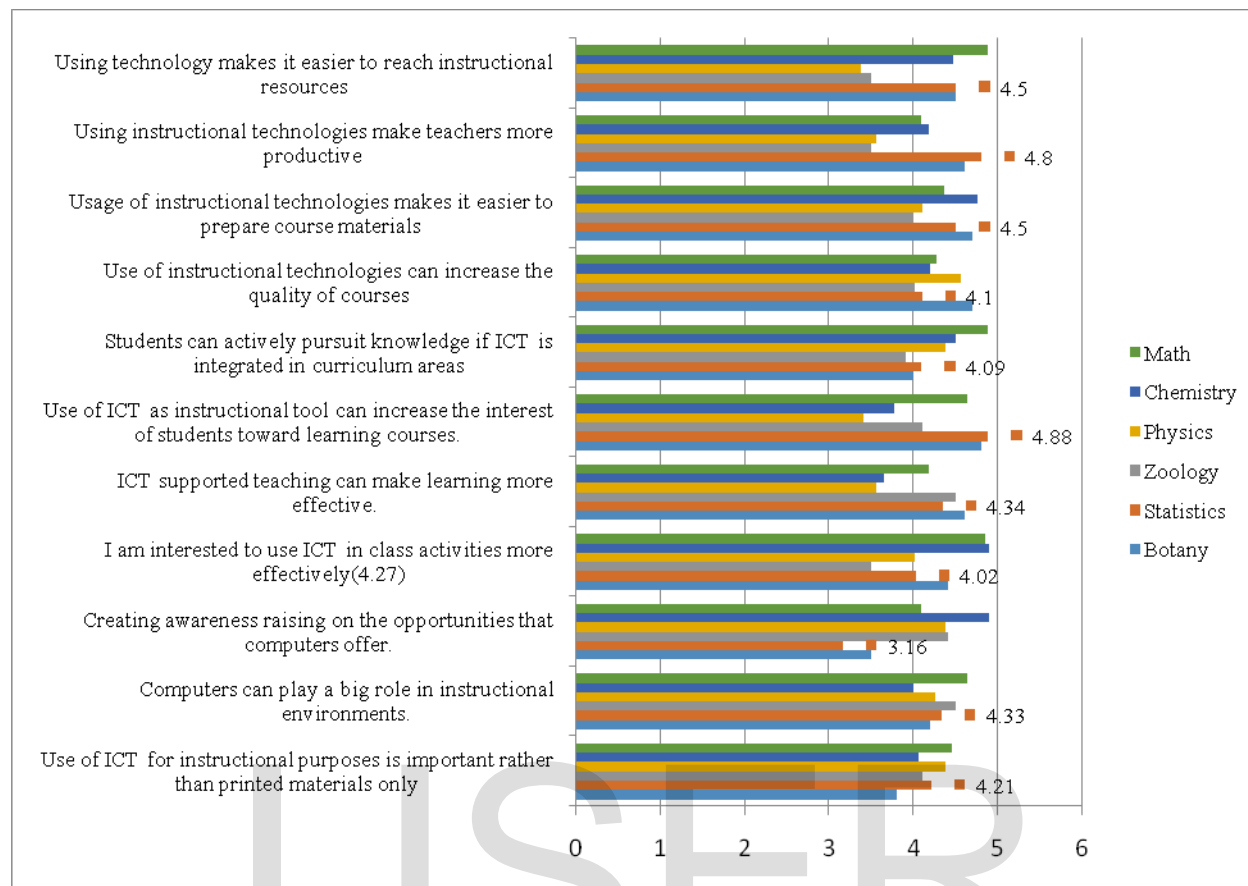
Do you have computer in your college?											
Botany		Statistics		Zoology		Physics		Chemistry		Math	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
88.3	11.7	92.8	7.2	89.4	10.6	93.4	6.6	90.2	9.8	84.6	15.4
Do you have your personal computer to use at classroom?											
Botany		Statistics		Zoology		Physics		Chemistry		Math	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
94.3	5.7	96.2	3.8	96.8	3.2	98.2	1.8	95.2	4.8	93.3	6.7
Do you have multimedia at your college											
Botany		Statistics		Zoology		Physics		Chemistry		Math	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
84.6	15.4	89.1	10.9	86.5	13.5	88.9	11.1	82.4	17.6	85.3	4.7
Do you have internet facilities at your classroom											
Botany		Statistics		Zoology		Physics		Chemistry		Math	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
22.3	77.7	18.9	81.1	16.6	83.4	18.4	81.6	12.1	87.9	6.8	93.2

The data shows that almost every subject teacher has computer facilities at their college and availability of multimedia at their classroom is also mentionable. Almost every teacher has personal computer that they can use for their content teaching. However, internet facilities are not adequate for every subject teacher.

Use of Power Point is popular and most frequent among all content teachers and both Botany and Zoology teachers prefer to use it mostly than others. Frequency of using educational Software, internet, E-book is less than power-point but still statistician and mathematician have prone to use educational software (mean 15.52). Like educational software, use of internet is not very popular also. Yet from the mean (5.63), it can be said that, unlike other subject teachers, both Statistics and Mathematics teachers do not use internet in classroom activity. Following the use of internet, use of e-book is not common. The mean (2.63) indicates that the frequency is lowest among Zoology teachers whereas maximum for Physics teachers. Lecture method is preferred by Chemistry teachers mainly



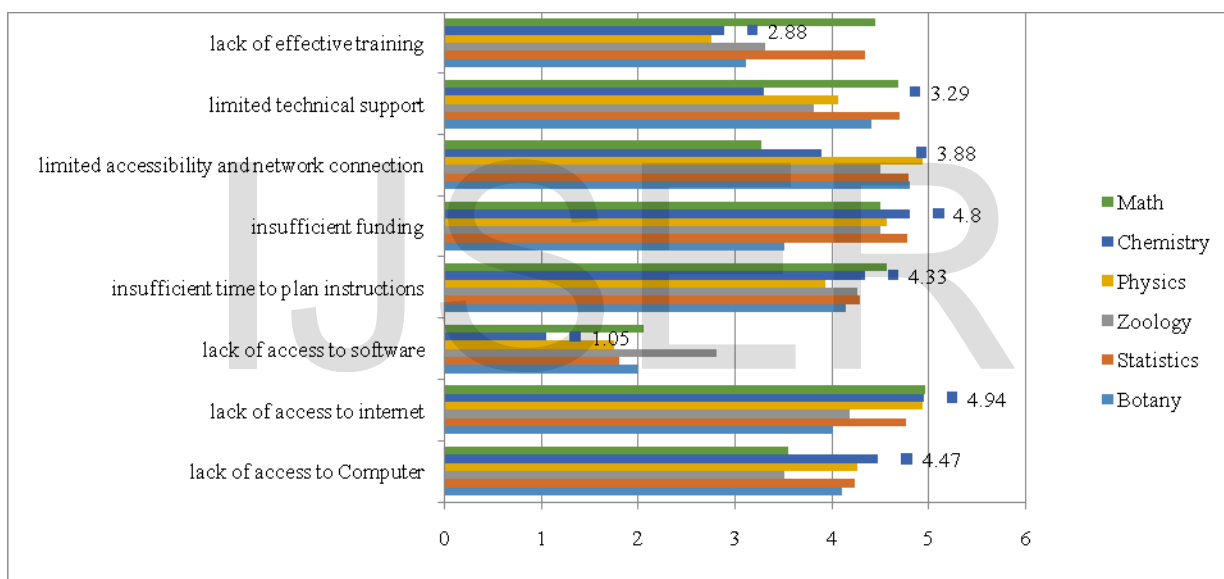
Perception



The mean for the perception of teachers about ICT usage varied according to the subject taught. Most of the teachers agreed to “Use of ICT for instructional purposes is important rather than printed materials only” except teachers from Botany. But almost all subject teachers perceive that “Computers can play a big role in instructional environments” particularly Zoology teachers. Perception varied on “Creating awareness raising on the opportunities that computers offer”. Both Statistics and Botany teachers deviated from the average value of Mathematician (mean 4.09) whereas the rest have positive perception. Chemistry teachers strongly expressed their interest to use ICT in class activities more effectively where Zoology teachers remained behind. Teachers varied in their opinions on “ICT supported teaching can make learning more effective” and “Use of ICT as instructional tool can increase the interest of students toward learning courses”. Physical science teachers agreed but Biological science teachers strongly agreed that ICT supported teaching can make learning more effective and use of ICT as instructional tool can increase the interest of students toward learning courses. But all teachers perceived positively that students can actively pursuit knowledge if ICT is integrated in curriculum areas and use of instructional technologies can increase the quality of courses. To prepare course materials, teachers agreed that usage of instructional technologies makes it easier. Both Zoology and physics teachers remained neutral to Using instructional technologies make teachers more productive and Using technology makes it easier to reach instructional resources whereas others teachers agreed to these.

Challenges to Technology Usage

Criteria	Botany	Statistics	Zoology	Physics	Chemistry	Math
lack of access to Computer	4.10	4.23	3.5	4.25	4.47	3.54
lack of access to internet	4.01	4.76	4.18	4.93	4.94	4.96
lack of access to software	2	1.8	2.8	1.75	1.05	2.05
insufficient time to plan instructions	4.13	4.28	4.25	3.93	4.33	4.56
insufficient funding	3.5	4.77	4.5	4.56	4.8	4.5
limited accessibility and network connection	4.8	4.78	4.5	4.93	3.88	3.27
limited technical support	4.4	4.69	3.8	4.06	3.29	4.68
lack of effective training	3.1	4.34	3.3	2.75	2.88	4.44



Lack of software facility was not at all challenge for teacher. Most teachers found lack of access to internet most challenging. Next most challenging factor for teachers was insufficient funding and insufficient time to plan instructions. Insufficient funding was a challenge for all subject teachers except botany teachers. Physics teachers mentioned their sufficient time to plan instructions whereas other subject teachers found insufficient time to plan instructions as thought-provoking. Both Chemistry and Zoology teachers found limited technical support as an important barrier to technology usage less challenging than other teachers. For the Zoology teachers, lack of access to computer was not a challenge. This was also true for Math teachers. Math teachers suffered mostly for lack of internet access. Limited accessibility and network connection was also a challenge for Botany and Physics teachers.

Discussion:

The aim of the study is to explore how ICT can be used in various ways where it helps to learn about respective subject areas. The result shows that technology- based teaching and learning offers various interesting ways like educational videos make the learning process more fulfilling and meaningful. It is persistent with the study of Finger and Trinidad (2002). On the other hand, students will benefit from ICT integration where they are not bounded to the limited curriculum and resources, instead hands-on activities in a technology enhanced classroom stimulate understanding of the subject. According to this study, ICT also helps teachers to design their lesson plans in an effective, creative and interesting approach that would result in students' active learning. Previous researches proved that use of ICT in teaching enhances the learning process and maximizes the students' abilities in active learning (Finger & Trinidad, 2002; Jorge et al., 2003; Young, 2003; Jamieson-Procter et al., 2013). Such findings are also similar in our context also.

Lack of adequate ICT equipment and internet access is one of the key problems found in this research. Mahdi, Laafou, and Janati-Idrissi (2015) found training for teachers as a major challenge for physics teachers. In our context this study shows trainings do not take into account the specific needs of the physics science teachers. The previous trainings do not take into consideration the material taught of teachers nor their ICT level. Teachers group should take on consideration the basics of their material taught. For biology teachers, along with training, inadequate infrastructure and lack of enough computer hardware facilities in schools, lack of interest in use of computer technology in teaching and learning process and lack knowledge and skills on computer technology applications were the major challenges to integrate computer technology in teaching Biology. Mwanda ,Mwanda, Midigo and Maundu (2017) also added software to this as a major impediment which has been found contradicting in our context. But Jackson (2017) also found using the software was the most significant factors in explaining actual and intended use of technology in mathematics classroom which is not true according to our study. Again Helppolainen and Aksela (2015) mentioned inadequate software along within sufficient training were found to pose challenge for chemistry teachers which were found partially true in this study.

Technical difficulties sought to become a major problem and a source of frustration for students and teachers and cause interruptions in teaching and learning process. If there is lack of technical assistance and no repair on it, teachers are not able to use the computer for temporarily (Jamieson-Procter et al., 2013). The effect is that teachers will be discouraged from using computers because of fear of equipment failure since they are not given any assistance on the issue. Türel and Johnson's study (2012) revealed that technical problems become a major barrier for teachers. These problems include low connectivity, virus attack and printer not functioning. Current study also finds these as barriers.

Conclusion

To sum up, it can be said that, even after several attempts from the government, the perception and the issues remain same. Therefore, policy maker will have to come up with some new sorts

of remuneration to motivate teachers to integrate ICT in classroom in order to increase the competency of the country's education system. This will help in increasing the world ranking of the national education and produce better future work force. Steps can be taken to consider class duration and gaps between two classes so that sufficient time to plan instructions remain available to teachers. Limited accessibility and network connection may be checked down in this regard. Other initiatives like ensuring technical support to overcome software and hardware problems may also work for such purpose. GoB may also arrange and strengthen continuous in-service training for the teachers to promote effective learning as well as to meet the demand of the 21st century teaching skills.

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