Enumerating the obstacles of accelerating the use of digital classroom: Lessons from Bangladesh

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1. Introduction

Information and communication technology (ICT) has become an important part of most organizations and businesses in the last few years (Zhang & Aikman, 2007). Modern technology offers many means of improving teaching and learning in the classroom (Lefebvre, Deaudelin & Loiselle, 2006). The main obstacles to use digital classroom in secondary & higher secondary education is the lack of quality of the content, effective usage and timely modification. Government of Bangladesh (GOB) has provided digital content development training to root level teachers and developed content repositories for teachers to upload and share digital content. Bairagi A. K. , Rajon S. A. A., Roy T. (2011) revealed in their research that application of ICT in managing educational institutions should be encouraged, and use of ICT by instructors to gain access to educational materials should be increased. One such web platform is Shikkhokbatayan (www.teachers.gov.bd). Our scrutiny of that website shows that the usage of the platform is not satisfactory.

Use of ICT in education sector is one of the primary tasks to build Digital Bangladesh. To achieve this goal, Bangladesh Government (GOB) has taken a timely initiative to setup digital classrooms in schools countrywide. Though, the use of digital classroom in most of the school is absent. From our survey we have found that almost every teacher is assigned to different tasks from a school authority other than regular classes. Again private coaching, tuition & other personal work keep teachers occupied. In this case, preparing content for digital classroom & regular update on that content is not possible for teachers to deliver in class. At the same time, teachers are willing to use the digital classroom as it helps students to understand subject matter easily with quality content on relevant subjects. Empirical research shows that positive attitude is an important factor to use ICT. When people frequently use and expose to ICT, it indicates that ICT is helpful and beneficial to them thus creating a positive attitude towards ICT usage (Zhang & Aikman, 2007). Cunska A., Inga Savicka I. (2012) said in their research that educational process does not stay only in the classroom, it is uninterrupted and there the use of ICT can help a lot if the student understands the goals and expected results and teacher is able to lead and motivate successfully. ICT gives access to non-traditional information sources, raises effectiveness of self-education, promotes creativeness, and brings to realization new educational forms and methods. Success of education depends on that how quickly and easily we can get information of different amount. They also showed that use of ICT in classroom can increases students motivation for learning, make the educational process more visual, colorful and attractive, create feelings of comfort for students so that they can learn in their own pace and cooperate with other students. On the other hand, using ICT in classroom demands specific skills from teacher like compute3r uses skill, using multimedia technologies in class and prepare a class lecture attractively and a lot of time. The class loses its attractiveness if the teacher fails to present subject matter with proper linkage to non-traditional information sources other than a text book. Therefore it is utterly important to pin point the necessary actions to spread the use of digital classroom all over the country. Hence the research question this paper tries to answer:

What is the effective model to ensure regular use of digital classroom with quality content in secondary & higher secondary level education in Bangladesh?

Mathevula M. D., Uwizeyimana D. E. (2014) revealed in their research that teacher training in ICT, teachers' attitude toward ICT, ICT policy issue and poor infrastructure are the common obstacles to successful ICT integration in schools. Our hypothesis of this paper is to provide a third party content developer and lecture delivery using digital classroom support to the teachers at their premises when required to effectively use Digital classroom all over the country. We

conduct a survey among 73 teachers of 28 secondary and higher secondary level schools in four different districts in Bangladesh to answer our principal research question. We have found that teachers are very interested in the concept of digital classroom. Teachers who have heard or got some training in ICT or digital content development have much interest to use it in class. But, inadequate support of content development, lack of practice in lecture delivery style and lack of incentive in using digital content are the three main barriers behind the proliferation of digital classroom. For this research, we have used uniquely developed questionnaire to find the answer to our research question. We see that teachers prefer having a third party content developer with whom they can interact in their school premises. The result of this study can be insightful for the policy makers in the developing world who is contemplating in enhancing quality of education via ICT and connecting the next billion.

2. Background Study

Common crisis in the classroom or face to face education includes student depends too much on the teacher. The lecture delivery is one way from teacher to students and interactivity is missing like student feedback on a lecture delivered by the teacher. The lesson plan prepared by the teacher is sometimes boring and students are inattentive or distracted by other issues in class. Students are not motivated to pay attention to the subject matter as he may sometimes lose track in the lecture. Another important factor is shyness. Students feel shy to ask questions to the teacher even if he has questions on the lecture delivered. Sometimes students are not prepared well enough on the subject matter. These reasons make the student feeling guilty and unconfident on his ability to learn or to perform well in school. Thus slowly he becomes a loosing attachment to the education process and at the end most of the students are dropped out from school.

The Government of Bangladesh is very positive to use ICT in Education sector. Recently government has been set up 38,000 digital classrooms with laptop, internet modem, projector, projector screen and sound system in schools all over the country (http://a2i.pmo.gov.bd/multimedia-classroom/) and providing digital content development training to 200,000 teachers like subject topic wise power point presentation preparation to some teachers of each school all over the country. Hoping these trained teachers will act as a trainer to their colleagues. It is hoped that using ICT in education will impact the access, cost-effectiveness and quality of education. ICT implementation can reduce digital divide and provide access to quality education for students especially in remote areas. Again, participation of the female population can be increased by using ICT in education process through well planned implementation strategy.

Initiative taken by the government in recent years made significant progress in primary and secondary level education in increasing access and gender equity. Gross enrollment rates at the primary level rose from 93.7% in 2005 to 108.6% in 2013, where gross enrollment rate is 63% (2010) in secondary level and 45% (2010) in higher secondary level (http://unesdoc.unesco.org/images/0023/002305/230507e.pdf). Access to education for girls has been increased in secondary level education by 102.53% (BANBEIS Education Statistics).

The secondary school dropout rate in Bangladesh is significantly high. Currently it is 46.70% for male & female in secondary school, (BANBEIS dropout rate, 2012). The reasons for dropout are, relationship between child and its relationship within the household, cost of schooling, distance to school, low income of parent, parent education, early marriage etc. (Ricardo, et al., 2010) & (BANBEIS Secondary School Dropout Survey, 2012). Among these reasons we noticed that no discussion has been made for the motivation of students towards learning. According to the information of Bangladesh Bureau of Educational Information & Statistics (BANBEIS, http://banbeis.gov.bd) current education statistics are,

Table 1 Year wise educational information (Source: Banbeis, 2012)

Year/parameter	2009	2010	2011	2012	2013	2014
Total High school	19083	19040	19070	19208	19602	19684
Enrollment Rate	17018112	15770000	15768000	15964494	16183208	16404918
Teacher Student Ratio	N/A	1:34	1:30	1:36	1:37	1:39
Dropout rate	55.31	55.26	53.28	44.65	43.18	41.94%
Assistant Teacher (Computer)	8290	8921	9828	10225	10610	11749

Assistant Teacher Mathematics and General Science)	21390	22118	23048	22078	21086	22939
Computer Teacher(only govt school)	N/A	36	12	62	12	8
Computer Teacher(non govt school)	N/A	3460	9816	10163	10610	14711
% of schools with Computer facilities	N/A	59.21	65.06	70.3	78.77	80.35
% of schools with Internet Connection	N/A	18.18	29.73	45.7	63.37	69.11
% of school with electricity connection	N/A	71.71	75.98	77	81.38	83.17
% of school having multimedia facility	0	0	0	10.1	57.92	66.22
% of School having solar system	0	0	0	0	7.71	7.52

Sabates R., Hossain A., Lewin K. M. (2010) showed in their research that in many cases, children enter school but remain 'silently excluded' (Lewin 2007), which indicates poor attendance records and very low school performance. In addition, they suffer from a lack of learning materials, the inability to pay school fees and employ private tutors (Karim, 2004). They showed the two major reasons for dropout. 40% children who dropped out of primary schools indicated that poverty was the main reason. Disliking school was cited by 37.5 percent as a main reason (Ahmed et al, 2005). Hossain et al. (2009) found that:

"Drop out children came from households with significantly lower income, and which were twice as likely to be 'always in need' on the food security measure. Similarly, these households were more likely to have a household head working in unskilled work, less likely to own a desk, radio, television or mobile phone, less likely to have electricity and more likely to have poor ventilation (Hossain et al., 2009:50)"

The main reason for dropping out at the secondary level by girls was due to marriage. For boys this is less significant. On the other hand , for boys earning for the family is the main reason for dropping outwhich is less significant for girls dropout (Nath, et al., 2008).

The dropout rate is decreasing but still not satisfactory. BANBEIS has conducted secondary school dropout survey and some recommendation has made for reducing dropout rate among which free education for poor students, flexible & distance learning, direct interventions for identified dropout etc. are important, (BANBEIS Secondary School Dropout Survey, 2012). Only 5.8% of the primary school is equipped with computer, projector and laptop where 94.2% schools are out of these facilities, Primary School IT Facility (2016). ICT is also used for supplementary content development for children. Save the Children has developed supplementary teaching learning content based on the national curriculum and it is uploaded at www.dpe.gov.bd for easy access by teacher & student by the government, (ICT for Learning, 2016). Also training for teacher led content development initiative has been taken to empower teachers to develop their skills in ICT area and use ICT in their daily class lectures for better learning, (ICT for Learning, 2016).

Currently, Bangladesh has 130.881 million mobile phone subscribers as of March, 2016, [http://www.btrc.gov.bd/content/mobile-phone-subscribers-bangladesh-march-2016]. It shows the wide coverage of mobile phone access in the country. Currently mobile network coverage is available almost all over the country.

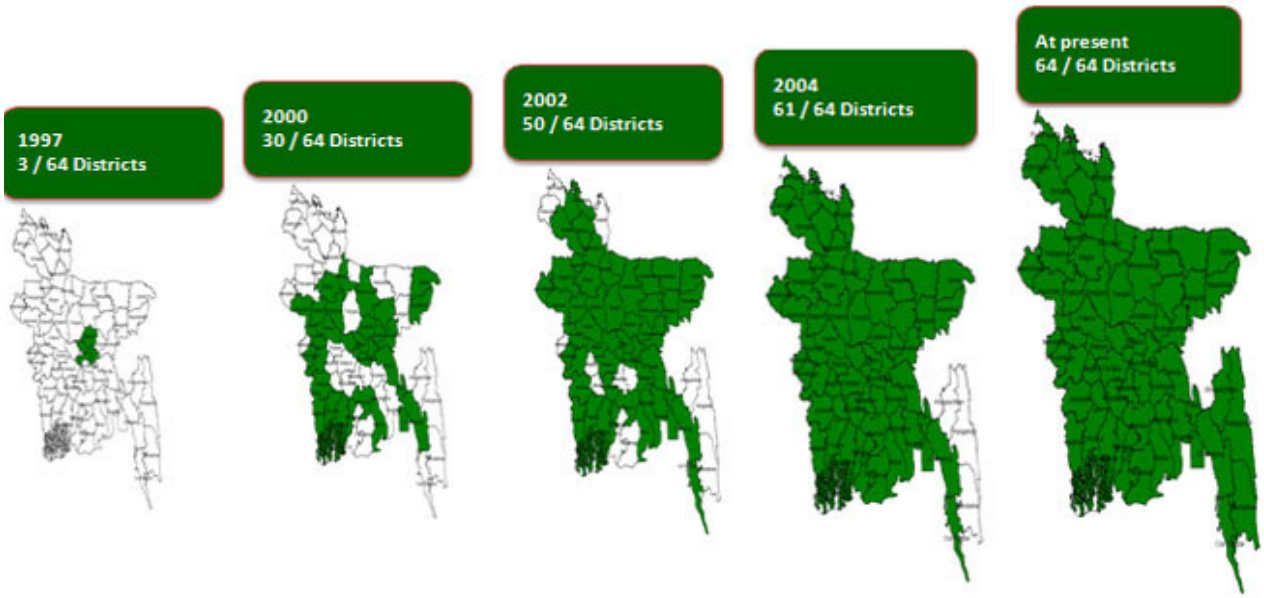


Figure 1 Mobile network coverage in Bangladesh, [source: http://www.amtob.org.bd/index.php/home/industry_statistics]

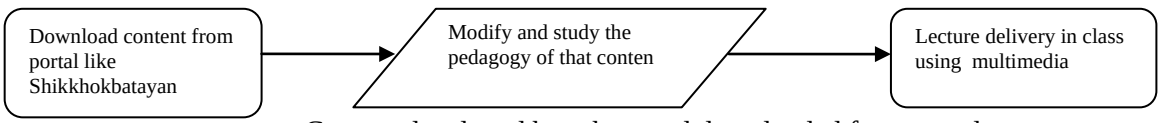
With mobile internet and initiatives of using a digital classroom in schools help teachers and students to get the benefit of ICT equally with access to resources. Thus findings of this research will help to see how the use of effective digital classroom with internal or external support may boost the maximum benefit of ICT and ensure a better teaching learning environment for all.

In this paper, we try to identify the barriers of the successful implementation of digital classroom in Bangladesh To achieve the goal of proliferating digital classrooms, we believe there are three solutions. Firstly, encouraging teachers to build their own content. Secondly, building a centralized digital repository for the teachers to share and use digital content among them. Thirdly, engaging a third party to build the content for the teachers. The first solution is time consuming and need skilled teachers. To build effective and attractive content involves a multiple skill set like skills in animation, content design & development, pedagogy, inclusion of non-traditional sources like internet and language skill. These are difficult for a teacher to manage and develop content by himself. Again regular modification of that content is equally important. The diagram below shows the process of self content development,

Content developed by teachers

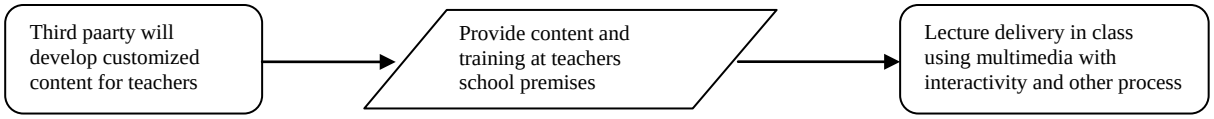
Thus the first solution is very difficult to use by mass teachers countrywide for the successful implementation of digital classroom in Bangladesh.

The second solution is to use the content developed by others from a central repository or content portal like Shikkhokbatayan. In this case, a teacher does not necessarily have all those skills to prepare content, but he should be able to use that content effectively. This requires lecture delivery skill, using multimedia in class and pedagogy. The teacher should use the content attractively so that students will not get distracted. This solution is much easier, but requires confidence on which content he is going to use for his class. Sometimes not all content matches with ones requirements. Thus this solution is not that effective for most of the teachers.



Content developed by others and downloaded from portal

The third solution proposed a new approach for the teachers to use digital content using digital classroom. In this approach we have proposed to provide a third party professional content developer with all necessary skills to develop content to the teachers. Teachers will be able to get customized content for their class developed by the third party and teachers will be able to provide their requirements at their school premises which will save time and travel to a remote place. Teachers will get all necessary training on developed content and how to use this in their class with specific guideline. This process will be much relaxing and help teachers to focus on the subject matter. Students will be able to get much space for interaction with teachers and groups.



Content developed by third party experts

To answer our research question, we have conducted a survey. We have included questions on teacher demographic information like name, gender, district, educational qualification, teaching experience, subject taught etc. We would like to see if teachers who use digital content, prepare the content by themselves and/or update his lecture contents regularly or they don't use digital classroom/content for time constrains or just not that motivated to prepare digital content for his class. Again, if content tailor cut for one's own preference will be a motivational factor to use digital content using digital class for teachers where digital classroom setup is available. Again we included questions regarding technical support availability for teachers at school, number of hours per day to use computer at home or school, how many computers are available at school and if computer is accessible by teachers at school. Other questions include motivational factor like if teachers feel good when they heard someone else is using digital classroom, if they got inspired from school authority to use digital classroom. Lastly, we would like to hear from them about the steps to improve classroom teaching.

3. Methodology

In our research, we have used scalar questionnaire to conduct survey to our sample group. The sampling of our target group is done by following stratified sampling method. Then we have collected data from our sample group by performing structured interview by visiting each participant at their school. Data collected in printed form was collected centrally using electronic survey form developed by google form and simple analysis is done using excel sheet.

We have selected 4 districts for our survey named Dinajpur, sylhet, Mymensing and Khulna. Dinajpur is located in the north eastern region of Bangladesh within the Rajshahi division. Dinajpur is bounded by Thakurgaon and Panchagarh districts in the north, Gaibandha and Joypurhat districts in the south, Nilphamari and Rangpur districts in the east, and the state of West Bengal, India in the west. Sylhet is located in the north eastern region of Bangladesh within the Sylhet Division, within the Sylhet District and Sylhet Sadar Upazila. Mymensingh is one of the districts of Mymensingh division, Bangladesh, and is bordered on the north by Meghalaya state of India and Garo Hills, on the south by Gazipur district, on the east by districts of Netrokona and Kishoreganj, and on the west by districts of Sherpur, Jamalpur and Tangail. Khulna is the 3rd largest city after Dhaka and Chittagong. Khulna is located in south-western Bangladesh on the banks of the Rupsha and Bhairab river. (Ref: en.wikipedia.org/wiki/). Divisional map of Bangladesh is given at Appendix-B.

In our research, we have selected teachers who got training on digital content and/or ICT from two types of schools. One, schools where at least one digital classroom available. Two, schools where no digital classroom available. The teachers from each type of school were selected randomly. From those teachers, we have created two groups where one group of teachers uses digital classroom using digital classroom and content downloaded from Shikkhokbatayan (www.teachers.gov.bd). Another group of teachers does not use digital classroom or content from Shikkhokbatayan (www.teachers.gov.bd) though they got some sort of ICT or content development training. There is a general consensus that the larger the sample the more the results of the study would represent the entire population, and that if time and cost allows, it would be better to study the entire population (Mugo, F.W., 2002). The research population comprises a total of 73 teachers out of 100 teachers from the 28 secondary and higher secondary schools from 4 different districts named Dinajpur, Sylhet, Mymensing and Khulna. Fgure 2 shows the district wise survey participants.

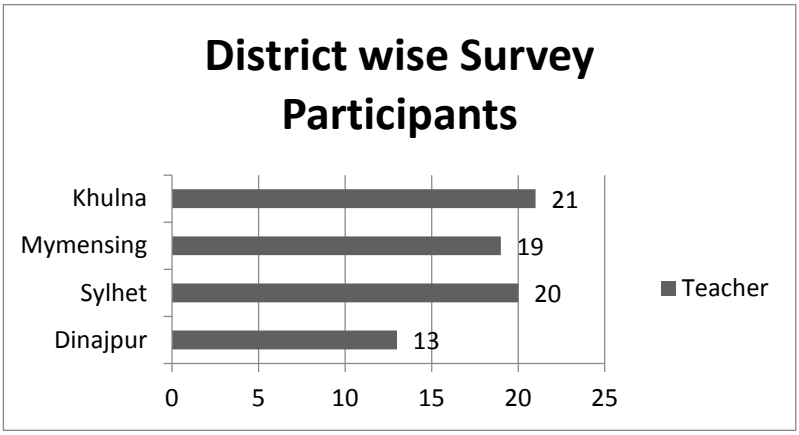


Figure 2 District wise Participants

The schools are selected equally from both urban and rural area of each district. Again, we have selected schools with and without digital classroom setup equally and both private and public schools. Thus the intention of the researcher was to solicit responses from as many secondary school teachers (from Grade 9 to Grade 12) as possible from these 28 schools in 4 districts. As a result, a total of 73 responders (out of 100 possible participants) was randomly selected and agreed to participate in the research. For a sample to be deemed appropriate, the researcher should select a minimum of 10% of the given research population (Babooa, S.K., 2008). Thus, 73 participants out of 100 teachers who participated in the survey represented 73 % of the population and the sample chosen is representative enough. In terms of teaching experience, 57.53% of respondents have more than 10 years of teaching experiences, 13.70% of teachers have 7 to 10 years of teaching experiences, 10.96% teachers have 4 to 7 years, 13.70% teachers have 1 to 4 years and 4.11% teachers have 0 to 1 year of teaching experiences. In terms of qualification of the respondents, most of the respondents had obtained a Bachelor's degree or Masters Degree. Only 3 participants had obtained a diploma among 73 participants. After receiving the appropriate authorization from the school authority, the questionnaire was personally hand-delivered to each respondent at their work-places. Hand-delivering the questionnaires, prevented possible delays resulting from posting questionnaires and also helped to establish a good relationship between the researcher and the respondents. The researcher also did whatever possible to personally collect all the completed questionnaires directly from the respondents' hands in order to ensure anonymity and to avoid a situation in which third-party could access to the data collected by the researcher. The primary data collected is then entry to a central database from 4 different districts by the research assistant. After that the data is observed and analyzed by the researchers to prove the hypothesis.

Description of the Survey Questionnaire:

The questionnaire consisted of two sections. The first section included demographic data related to teachers' name, gender, district, education, school, subject taught, number of students, teaching experiences etc. Bingimlas, K.A. (2009) showed that lack of confidence, teacher competence, resistance to change & negative attitudes towards technology are the teacher level barriers for integrating ICT in Education. Again, lack of time, effective training, accessibility to ICT resources and technical support are the school level barriers for ICT integration in Education. Buabeng-Andoh, C. (2012) revealed in his literature review that teacher's attitude, gender, ICT competence, professional development, accessibility to ICT resources, teaching experience, technical & leadership support are the key factors for integrating ICT in Education. Lau & Sim (2008) conducted a study on the extent of ICT adoption among 250 secondary school teachers in Malaysia. They found that older teachers frequently use computers in the classrooms more than the younger teachers. The major reason could be that the older teachers having rich experience in teaching, classroom management and also competent in the use of computers can easily integrate ICT into their teaching (Buabeng-Andoh C., 2012). Several studies have revealed that whether beginner or experienced, ICT related training programs develop teachers' competencies in computer use (Bauer & Kenton, 2005; Franklin, 2007; Wozney et al., 2006), influence teachers' attitudes towards computers (Hew and Brush, 2007; Keengwe and Onchwari, 2008) as well as assisting teachers reorganize the task of technology and how new technology tools are significant in student learning (Plair, 2008). Access to ICT infrastructure and resources in schools is a necessary condition for the integration of ICT in education (Plomp, Anderson, Law, & Quale, 2009). Jones (2004) reported that the breakdown of a computer causes interruptions and if there is a lack of technical assistance, then it is likely that the regular repairs of the computer will not be carried out

resulting in teachers not using computers in teaching. In our survey questionnaire we have included questions about teaching experience, teacher's familiarity with digital content and digital classroom setup, whether he got training on ICT or digital content development, if he is familiar with content platform like Shikkhokbatayan (www.teachers.gov.bd), if he develop content by himself for his class or use content developed by others, how much time he can manage to develop or modify content, if he has access to computer at home or school, if technical support is available, if school has enough computers for teachers and students and access to computer is available at any time etc. Later we asked teachers if he would like to get training on lecture delivery style using digital classroom and how they currently got student feedback. Also, if teachers want to get help from third party to develop customized content for using in digital class and the teacher would like to give his requirements at his school premises which reduce travel time. This is because the teacher cannot manage much time as he is involved with other administrative task in school and has external coaching classes after school hour. Lastly, we asked teacher if they would like to use digital classroom regularly if a third party will help them developing it and if schools are encouraging them to use digital classroom. We also asked them to comment on steps to improve classroom teaching. The questionnaire is available in Appendix-A.

4. Results

We have found from our survey that 1.40% teachers have completed P.hd, 67.60% teachers have completed Masters level education, 25.35% teachers have completed Bachelor degree and 5.63% teachers have less than a bachelor degree.

Longer ICT training & teaching experience helps teacher to use the computer more

Teaching experience is one key factor to implement digital classroom as it is found that more experienced teachers are familiar with curriculum and can manage time to work with content development. Russell, Bebell, O'Dwyer, & O'Connor, (2003) found that new teachers who were highly skilled with technology more than older teachers did not incorporate ICT in their teaching. The researchers cited two reasons: new teachers focus could be on how to use ICT instead of how to incorporate ICT in their teaching. Secondly, new teachers could experience some challenges in their first few years of teaching and spend most of their time in familiarizing themselves with school's curriculum and classroom management (Buabeng-Andoh C., 2012). We have found that the majority of the teachers in our sample group has more than 10 years of work experiences. Teachers who have received ICT training for longer duration (in this case 28 days or more) have a positive attitude towards computer uses and they use a computer at home or school frequently. The chart shows the comparison below,

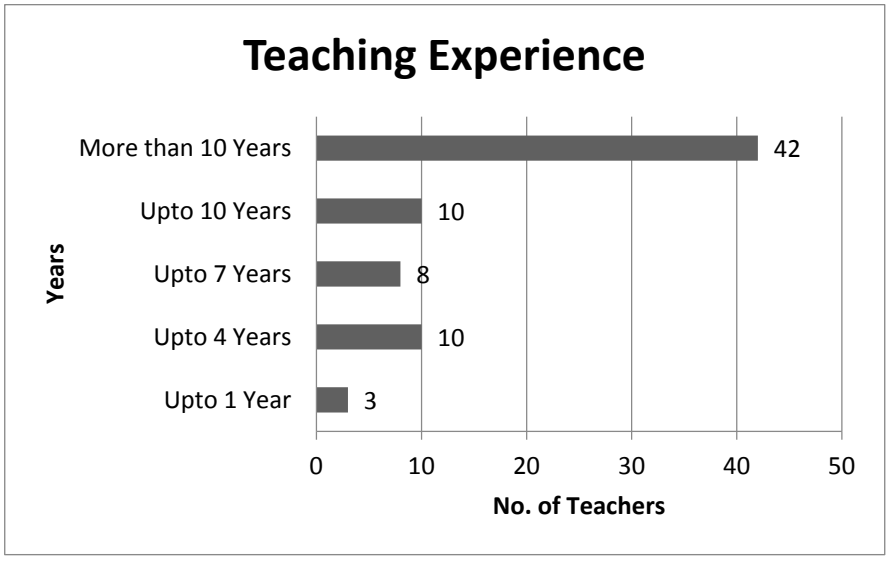


Figure 3 Teaching experience of participants

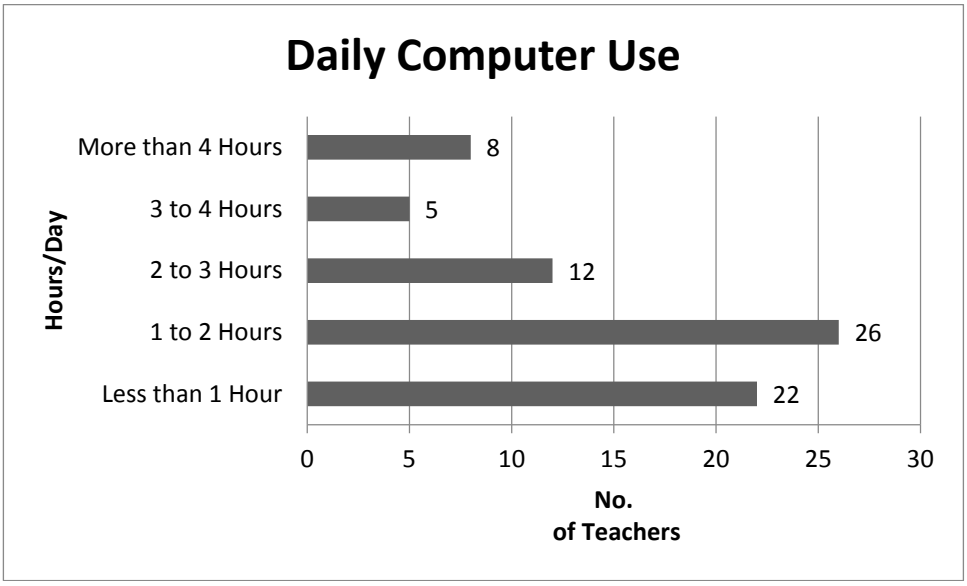


Figure 4 Daily computer uses by participants

We have asked teachers on how many hours they are able to use computer per day at home or school. 35.62% teachers are using computer for 1 to 2 hours per day and 30.14% users are using computer less than 1 hour per day. Buabeng-Andoh, C. (2012) mentioned that teachers' professional development is a key factor to successful integration of computers into classroom teaching. Muller and his colleagues (2008) related technology training to successful integration of technology in the classroom. They showed in a study of 400 pre-tertiary teachers that professional development and the continuing support of good practice are among the greatest determinants of successful ICT integration. Teachers require expert in technology to show them the way to integrate ICT to facilitate students' learning (Plair, 2008). Buabeng-Andoh, C. (2012) mentioned that teachers' understanding of content knowledge and how to apply technology to support students' learning and attainment are joined to their increase in knowledge level, confidence and attitudes towards technology. Chen, (2008) showed that professional training courses must be designed to identify beliefs about successful teaching, policies for enhanced teaching and learning and syllabus design for teaching purposes.

In our survey, we asked teachers if they have participated any training in ICT or content development. If so, what type of training and who provided that. Again, if they are interested to take any further training in ICT or lecture delivery using digital content to focus on pedagogical issues. The response we got is very impressive. 100% of our participants and willing to take further ICT and pedagogical training to use digital classroom and they are also interested to use technology like just-in-time educational aid tool (Zaber I., Sayed A. (2016)) to get student feedback. Currently, the teacher uses traditional method of asking one to one question in class to get feedback.

Regarding digital content uses in class, we asked teachers if they are informed about digital content portal Shikkhokbatayan (www.teachers.gov.bd) developed by the Government of Bangladesh (GoB). Only 17.81% of teacher in our research uses the portal regularly. 19.18% of teachers heard about it and 17.81% teachers want to know more.

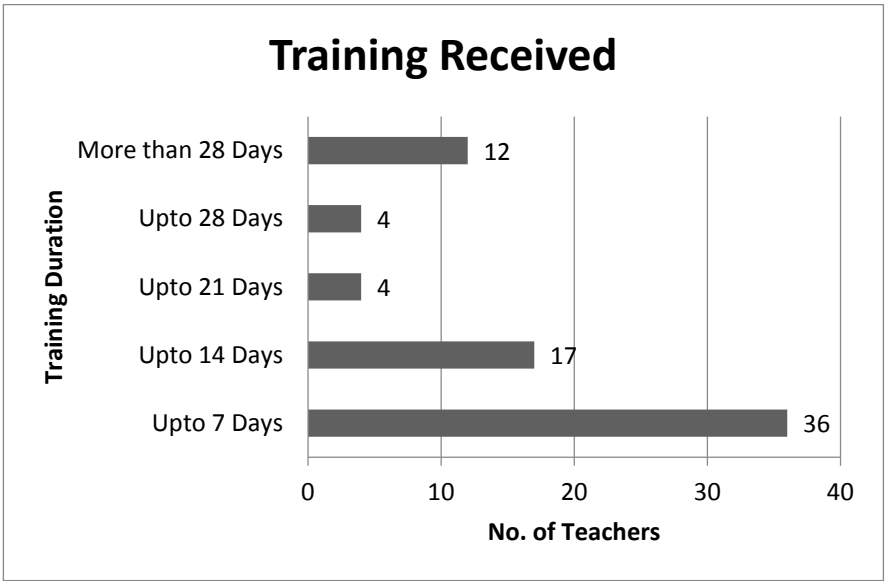


Figure 5 Training received by participants

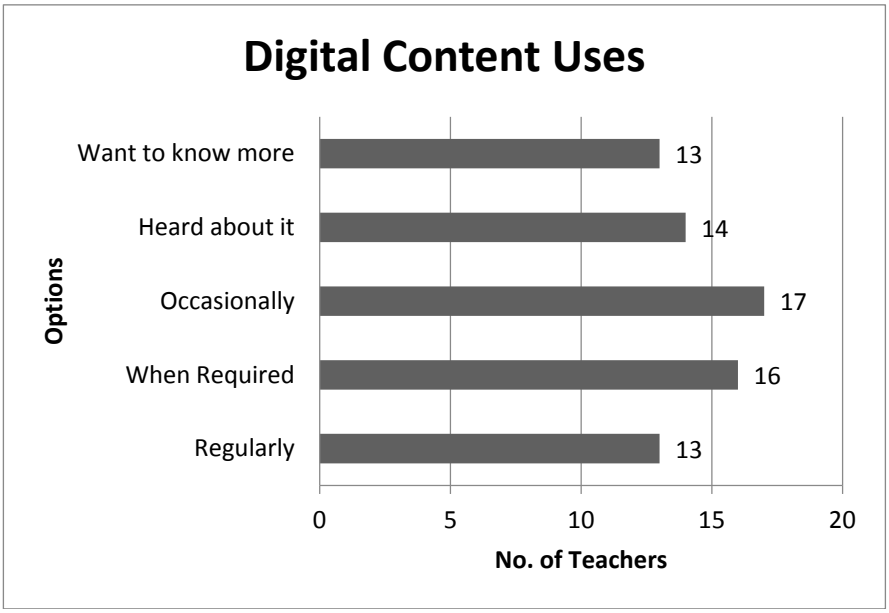


Figure 6 Digital content use by participants

We have found 53.42% teachers spend time to develop content or modify it when necessary. Again, 26.03% teachers spend 1 to 2 hours per day for content development of modifying it. But 89.04% teachers are strongly agreed that using ICT in lecture delivery like digital content using multimedia will help students to understand lecture topics easily and effectively.

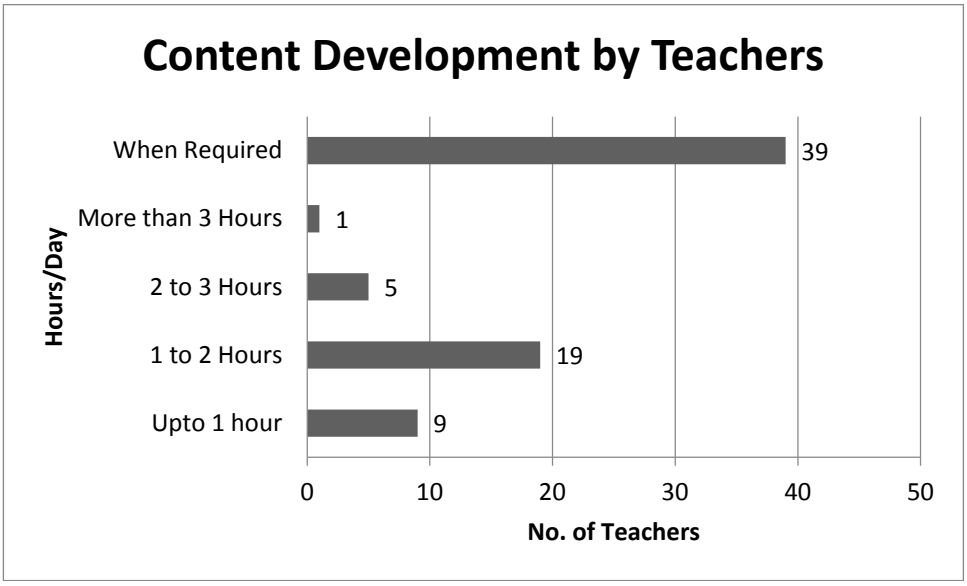


Figure 7 Using ICT in lecture delivery help students

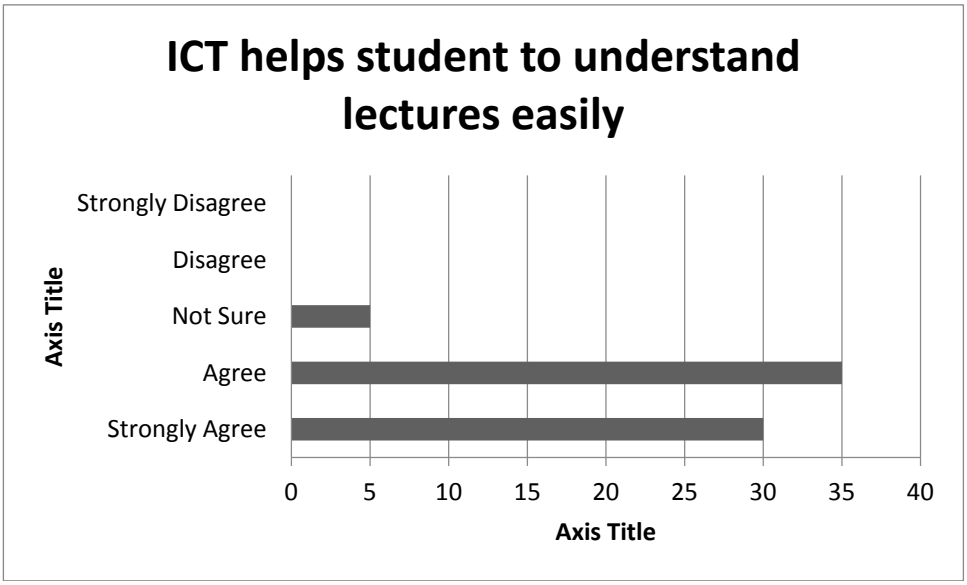


Figure 8 ICT helps student to understand lectures easily

Availability and accessibility to the ICT tools in school is the first condition to implement ICT in teaching. Teacher will only use ICT when they have frequent access to it. A study by Yildrim (2007) found that access to technology resources is one of the effective ways to teachers' pedagogical use of ICT in teaching. In our research, we have found that 63.01% teachers have access to ICT resources at school when they need it. 8.22% teachers said that their access to a computer is restricted. 75.35% teacher said that their school has 1 to 20 computers and they can access it anytime. If there is no technical support for teachers, they become frustrated when they cannot use the computer or other ICT tool resulting in their unwillingness to use ICT (Tong & Trinidad, 2005). We have found that 43.84% teachers said, they got technical support by calling the technical person from outside when required, 26.03% teachers said, no technical support is available instantly, 16.44% teachers said, it takes long time to solve any technical problem and 5.48% teacher said that they don't need technical support.

Developing digital content is a time consuming task and requires expertise to present it effectively. In the context of Bangladesh, teachers are not that expert to use ICT tools and only few teachers got content development training from government, which is not sufficient for teachers to use digital content effectively. Again, teachers are not very comfortable to use content from portal like Shikkhokbatayan where content is mostly uploaded by other teachers. Thus the other solution remains is developing customized content on behalf of the teachers by getting individual teachers

requirements from a face to face discussion at their school premises so that teachers will feel comfortable and own the content to use it in their class. We have found that 93.15% teachers strongly appreciate or agreed to get help from a third party content developer to develop customized content for them.

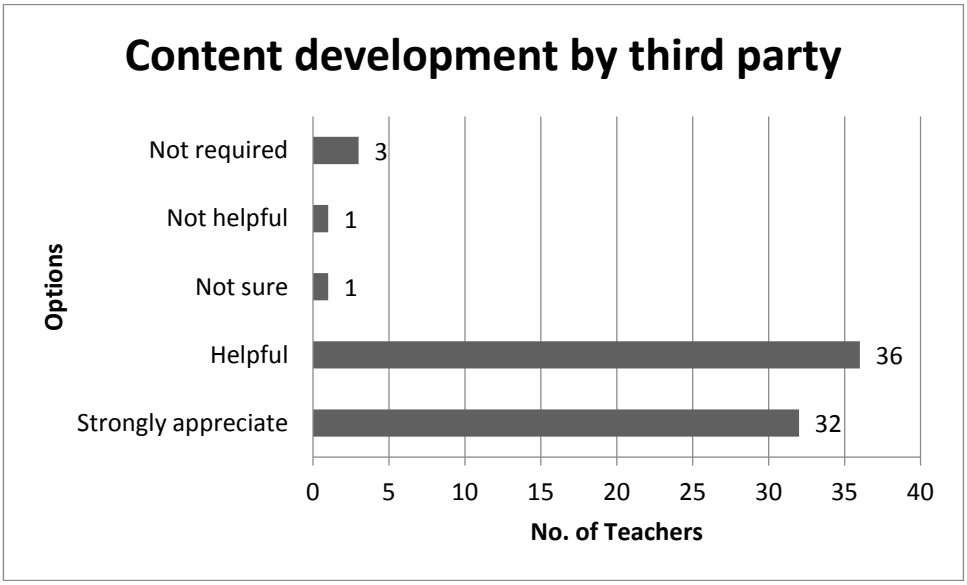


Figure 9 Content development by third party for teachers

We also asked teachers if they got motivation from school authority to use digital classroom for their lecture delivery. We have found that 89.04% teachers got motivation from school to use digital classroom for their lecture delivery.

Lastly, we asked each of them to comment on "Steps to improve your classroom teaching". Most of them mentioned valuable insights among which important factors includes, lack of computers and internet facility, expert teachers, lack of training and lab facility, quality content that can motivate students to learn etc.

5. Discussion

From our research results, we have identified some insights which can be useful for policy makers to decide on the implementation of the digital classroom implementation when required. We have seen that 57.53% of the teachers have more than 10 years of teaching experiences, but 65.76% teachers use computer at home or school for less than 2 hours per day. All of the teachers have received ICT training for 1 week to 4 weeks from different providers including government training. But only 17.81% teachers use digital content from portal like Shikkhokbatayan regularly. It shows a clear gap of positive attitudes towards ICT integration in education. To develop a teacher's positive attitude towards technology, school authority should take the leadership and help teachers to use technology in a regular manner for successful integration of ICT in Education.

Developing digital content takes much time with different skills like content design, graphics, animation, user experience to use different software etc. 65.76% teachers have access to computer less than 2 hours per day. He has to address many other tasks other than teaching. Thus, this is very difficult for a teacher to teach at school, maintain his regular life and manage time to develop content. 89.04% teachers believe that digital content help students to understand lecture easily and effectively. Clearly it shows that teachers have willingness to use digital classroom, but lack of content or customized content for teachers is a barrier to implement digital classroom effectively.

94.5% teachers get encouraged when they heard other teachers are using digital classroom. 98.6% teachers are willing to use digital classroom for lecture delivery, but suitable content is not available for them when needed. 93.15% teachers appreciate if a third party helps them to develop customized content for them. Again, most of the teachers want to get student feedback regularly and make the class interactive. Most of the teachers want to get pedagogical training and training on how to make the class interactive. Thus, it proves our hypothesis of introducing a third party to develop

customized content for teachers at their school premises for discussion and requirements collection. Also the use of Just in time tutoring will be a great tool for teachers to enhance teaching learning.

We have found that along with ICT infrastructure, regular maintenance and technical support to the teacher is equally important. Research shows that teacher with no technical knowledge fear to use computers or fear to breakdown. Teachers cannot overcome the barriers that prevent them from using ICT without good technical supports in the classroom (Lewis, 2003). The Becta (2004) report stated that "if there is a lack of technical support available in a school, then it is likely that technical maintenance will not be carried out regularly, resulting in a high risk of technical breakdowns" (p. 16). In our research, we have found that 8.227% teachers said that dedicated technical support is available at their school. 43.84% teachers said that they need to call if technical support is required. The rest of the teacher informed that no technical support or no instant support is available. It takes long time to get technical support. Thus maximum use of computers and smooth operation of digital classroom required dedicated technical support in each school. This will initially increase maintenance cost by in the long term it will improve the teaching learning quality and will be benefitted for overall performance in school.

6. Conclusion and policy relevance

The current challenge in education sector in Bangladesh is to reduce the dropout rate and retain students in school. The government has taken several steps to retain students in class. One of the major steps to modernaiz classroom is to integrate ICT in education. Set up digital classroom with multimedia equipments and empowering teachers with content dvelopment training and use of laptop projector in class. But proper use of already installed digital classroom is not fulfilled yet. It is important to get the teacher's perception on how they are taking the benefits of digital classroom. To use digital classroom proper and personalized content is important. We have identified three ways on how teacher is getting support for digital classroom. Firstly, encouraging teachers to build their own content. To fullfil this goal government has arranged content development training using power point presentation for teachers all over the country. Initially only few teachers from selected schools are getting the training. But from our research we have found that after the training, most of teachers are not using digital classroom. Reasons are, to develop content indivisually required different skills and with a short training focusing on power point presentation, this is not possible to achieve. Secondly, building a centralized digital repository for the teachers to share and use digital content among them. The government has developed portal named Shikkhokbatayan (www.teachers.gov.bd) where teachers all over the country upload their lecture presentation and share with others. Problem we have identified that quality of the content is not marked and most of the teachers in our sample group do not use them. It indicates that teachers do not use content from Shikkhokbatayan (www.teachers.gov.bd) which is developed by others. Thirdly, engaging a third party to build the content for the teachers. This is the model we have asked in our sample group to understand if teachers will be interested to use digital classroom if they get customized content developed by an expert. We have found almost all of the teachers are interested to use content provided in our proposed model and use digital classroom. Though this is not a long term solution for all. The summary of our findings are listed below,

1. Teachers albeit, having experience in personal use of computing devices are not motivated at using ICT for in-class lecture delivery. 35.6% teachers uses computer for 1 to 2 hours & 30.1% teachers uses computer for less than 1 hour per day. But they do not use multimedia/computer in class. Again, 57.5% teachers have more than 10 years of teaching experiences. It shows a clear gap of positive attitudes towards ICT integration in education. To develop a teacher's positive attitude towards technology, school authority should take the leadership and help teachers to use technology in a regular manner for successful integration of ICT in Education.

2. Busy schedule deter educators from making digital contents by themselves for class. However, they are eager to use contents from third-parties: Developing digital content takes much time with different skills like content design, graphics, animation, user experience to use different software etc. Teachers have to address many other tasks other than teaching. This is very difficult for a teacher to teach at school, maintain his regular life and manage time to develop content. 93.1% teachers appreciate more to get content from a third party who will meet them face to face in their school premises and prepare customized content for them than getting content from portal like Shikkhokbatayan. Teachers don't want to make content by themselves, they want it from third party.

3. Teachers would appreciate in-school content development with help of third party indicating they are eager to co-design: We have found from our survey that schools don't have dedicated person to provide technical support to use digital classroom. Schools have to call technical person for support like computer repair, software installation or maintenance if required. Teachers do not feel comfort to use ICT tools as if it gets damaged or any malfunction occurs. Provide technical support to teachers is as important as providing content development support for effective implementation of digital classroom.

We have done a small survey and not all the aspect and interest of teachers have been covered in this short span of time. We would like to take a large sample group and perform the survey in a big scale. The result of our survey shows the demand and need of our proposed model of third party content developer to develop customized content for teachers. They will help teachers to develop required skills to deliver lectures using digital classroom and proper pedagogy in the classroom. The effect of this model will be benefitted for both teacher and student. The more teacher use digital classroom facility, student will be able to attach themselves with subject matter more. Currently, technology uses in education is not working properly and stakeholders are not skilled enough to use those technologies for teaching learning effectively. Policy makers till not focused on hardware and infrastructure set up. They should also emphasis on teacher's training and empower teachers with quality content. Thus, policy makers can think of our third party content developer model to empower the teachers to use digital classroom effectively. Again, teachers who are not aware of digital classroom or want to use digital classroom can be benefitted from this model. This will help policy makers to implement their vision of digital classroom all over the country in a short period of time with effective monitoring by getting regular reports from third party content developers. This is how we can increase student retention rate and take one step forward to the overall goal of ICT in Education.

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Appendix – A

Research Questionnaire for Effective model of Digital Classroom in Bangladesh
Data & Design Lab, University of Dhaka

Name: **Highest education:** **Gender:**
Institute: **Area:** **Subject:** **Total Students:**

1. How many years of teaching experience you have?

   a. More than 10 years b. 7 to 10 years c. 4 to 7 years d. 1 to 4 years e. 0 to 1 years
2. What are the tools we can use to implement ICT in Education?

   a. Computer/Laptop b. Projector c. Photocopy Machine d. Mobile SMS e. Facebook
   f. Call g. Internet Others ……..……..
3. How many hours/day you use computer or access to computer at home/school?

   a. More than 4 hours b. 3 to 4 hours c. 2 to 3 hours d. 1 to 2 hours e. Less than 1 hour
4. Have you got any computer/ICT training yet, how many days?

   a. More than 28 days b. 22 to 28 days c. 15 to 21 days d. 8 to 14 days e. 0 to 7 days
   Type of training ……..... Training Provider:
   …..……

   Achievement ……. No training, Interested to get ICT training? a. Yes b. No
5. Do you use digital content from platform like Shikkhokbatayon.com in your class or self learning?

   a. Yes, Regularly b. Yes, When Required c. Yes, Occasionally
   d. No, Heard about it e. No, would like to know more
6. How many hours/day you spend to develop/modify lecture content for your class?

   a. More than 3 hours b. 2 to 3 hours c. 1 to 2 hours d. 0 to 1 hour e. When required
7. Do you think ICT based content will help your students to understand lectures more easily and effectively?

   a. Strongly agree b. Agree c. Not sure d. Disagree e. Strongly disagree
8. Would you like to share lecture content developed by you with others?

   a. Yes, Always to get Feedback b. Yes, To help others c. Yes, If asked by someone
   d. No, I will only share with my student e. No, I use contents developed by others
9. Do you have frequent access to computers at school when needed or to work with content?

   a. Yes, Always b. Yes, Pre-booking c. Not always d. Access to computer is restricted
   e. No computer for teacher
10. How many computers available for teachers and students at your school?

    a. More than 60 computers b. 41 to 60 computers c. 21 to 40 computers
    d. 1 to 20 computers e. No computers available
11. Do you get technical support at your school?

    a. Dedicated technical support team b. Call for technical support when needed
    c. No support team available instantly d. Takes long time to solve technical issues
    e. Technical support not required
12. Do you get training on how to deliver lectures using digital classroom and how to make the class interactive?

    a. Yes, I am frequently using digital classroom b. Yes, I sometimes use digital classroom
    c. Yes, I do not use digital classroom d. No, I want to get training and use digital classroom

e. No, I don’t need to use digital classroom

13. How do you feel if others use digital classroom?

    a. Very encouragingb. Encouraging c. Not sure d. Discouraging e. Very discouraging

14. Would you like to use Digital Classroom to deliver lectures?

    a. Yes, for all subjects b. Yes, for some subjects c. Yes, for difficult topics
    d. Yes, sometimes e. Not required

15. Would you like to get customized content from a third party to use it in your class and develop/modify content as and when required for you?

    a. Strongly appreciate b. Helpful c. Not sure d. Not helpful e. Not required

16. Would you like the third party content provider to visit your school for getting your requirements and training?

    a. Strongly agree b. Agree c. Not sure d. Disagree e. Strongly disagree

17. How do you get students feedback on your class content?

    a. One to one question in class b. Student visit after class c. Student Assignment/Exam
    d. Phone call when required e. No feedback mechanism available

18. Would you like to get regular student feedback to improve your class lectures?

    a. Strongly agree b. Agree c. Not sure d. Disagree e. Strongly disagree

19. Does your school encourage you to use digital classroom and digital content for lecture delivery?

    a. Strongly agree b. Agree c. Not sure d. Disagree e. Strongly disagree

20. Please comment on “Steps to improve your classroom teaching”:

Appendix – B

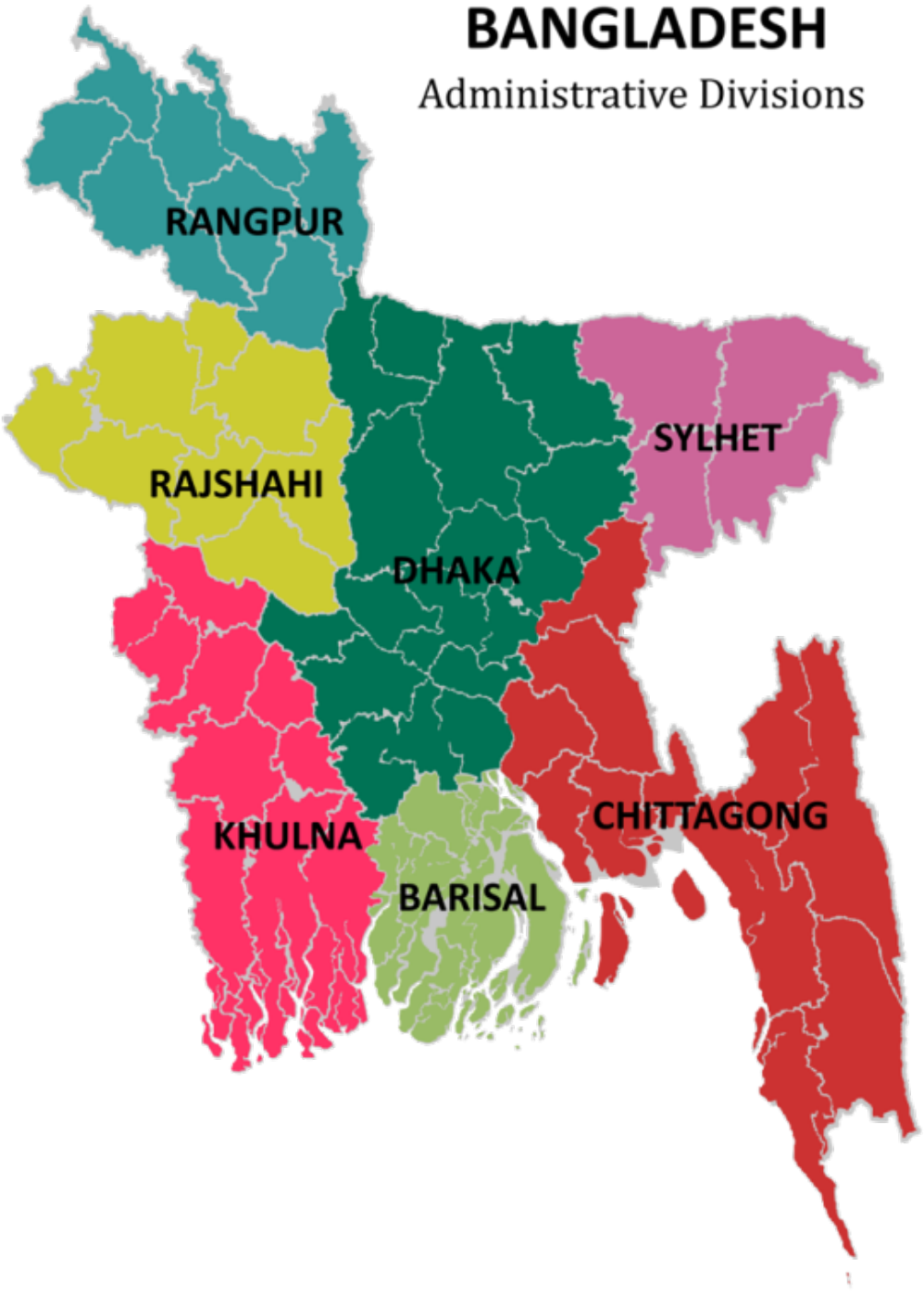

Figure 10 Divisions of Bangladesh