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Constraints of Using Internet in Technical and Vocational Education: Bangladesh Context

Research Paper

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Abstract

The study aims at finding out and explaining the constraints of using the internet to facilitate teaching and learning processes at the government and private polytechnic institutes in the technical and vocational education (TVE) context of Bangladesh. The use of the internet in teaching and learning, especially in the classrooms, workshops, and laboratories are imperative for the students to learn, prepare and function in this current age of technology. Internet-facilitated environments may contribute to the teaching and learning process in the TVE setting, if it is properly implemented within the framework for providing required physical facilities, high speed internet connection and instructor-training then the use of internet in teaching and learning will be supportive for students and teachers to communicate well with many internet-based resources and allowing developing in-depth learning, creativity and versatility. Based on the analyses and interpretation of collected data, the findings, conclusions, and recommendations were made. The results provide useful information to the authorities of the 'Directorate of Technical Education' and 'Bangladesh Technical Education Board' and suggest that administrators should develop the curriculum and necessary compensation packages to provide appropriate internet facilities for achieving the desired outcome of TVE scheme.

Keywords: Teaching and learning, TVE, internet facilities, use of internet

1. Introduction

The polytechnic institutes in Bangladesh offers 4-years Diploma-in-Engineering programs that indeed covers the technical and vocational learning in different disciplines under the Bangladesh Technical Education Board (BTEB) after 10 years of schooling. Such polytechnic institutes are considered as the job-oriented and professional institutions. One of the national objectives regarding technical and vocational education (TVE) in Bangladesh is to produce polytechnic graduates as world-class engineering technicians for the current competitive world

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of hands-on works (National Skills Development Policy, 2011). Now a days, it is very easy and available for all to find out modern teaching and learning resources through the use of internet, but most of the government and private polytechnic institutes are far-away from the use of this available teaching and learning resources whereas Dillon (2006) along with Edmonds (2006) depicts the fact that the students are required to actively participate in the global economy for it has been an inevitable necessity for them to be conversant in the innovative digital practices (also cited in Casey and Evans, 2011). Merchant (2007) also supported that views though the teachers and students of TVE context in Bangladesh are not getting that opportunity to use internet resources to facilitate the teaching and learning process. Moreover, Burd and Buchanon (2004) considered the availability of technical resources is the prerequisite to online education where both teachers and students must have easy access to computers and a good internet connection. On the other hand, from other researchers' findings, it is shown that most of the students usually spend little time on their social networking sites (SNS) by logging in once a day. Majority of them use Facebook as their favorite SNS and mostly access it on their computers while in their hostels/residences. It can be clearly seen that students devote little time to these SNSs. However, Facebook and other social media are now being welcomed as bringing the potential of new, socially engaged educational experiences for students in under graduation and self-directed programs and other educational sectors (Friesen and Lowe, 2012). The findings continue to show that students use SNSs for academic and non-academic purposes but with academic purposes outweighing the non-academic. However, online resources are multi-dimensional for learning. So, both the teachers and the students can utilize the resources as per their needs. Asad, Abdullah-Al-Mamun and Clement (2012) reported that the students can design group discussions to exchange their thinking and ideas, share course content related materials with their colleagues communicate to their teachers, appeal to their friends about homework and assignments etc. Habibu, Abdullah-Al-Mamun and Clement (2012), also found the teachers have needed to take advantage of available ICT resources at institutions to access internet. Even where training is absent, teachers can prepare themselves by enrolling in private sessions or by self-training. Therefore, the results of the current study provide important information and suggestions which help to produce world-class engineering technician for the world of work as per present and future requirement (National Skills Development Policy, 2011).

2. Objectives

The objectives of the study are to finding out and explaining the constraints on the use of internet related teaching and learning process at government and private polytechnic institutes in Bangladesh, which can support on decision making on providing allocation to develop institutional internet facilities and teacher training to enhance skill in use of internet based high-tech services in teaching and learning process including change in interest and awareness.

3. Literature Review

The use of internet in education system has provided a tremendous development in teaching and learning process of educational institutions. According to the research the internet use in teaching and learning process is *Internet helpful for learning management system*. There also included the use of internet provides free educational software and content, educational resources, and course materials, which are helpful for the students and teachers of educational institutes (Garrote, Pettersson & Christie, 2011). The use of internet in education system is *helpful to establish* technology-enhanced learning (TEL), computer-based instruction (CBI), computer-based training (CBT), computer-aided instruction (CAI), internet-based training (IBT), web-based training (WBT), virtual learning environments (VLE), m-learning and digital education at

teaching and learning process of educational institutes to achieving predetermined desire outcome (Heidsiek, 2013). Internet helps teachers to learn latest development which improve their knowledge in teaching. Although internet is helpful for teacher to collect educational resources, but without proper *teacher training* it is very difficult for them to implement and use of those available resources in teaching and learning process in classroom environment (Lucas et al, 2012). In UK, researcher found *lack of teacher awareness* about what technologies are available and how they can be used to support the delivery of the curriculum into the classroom teaching learning process, as barriers to the use of internet/ICT. Therefore, appropriate teacher training program on "use of internet/ICT in classroom environment" are the main factor in preventing this problem or condition which helpful for teachers to get educational benefit from available resources (Morris, 2010). Internet can play a vital role in teaching and learning process but the success of educational strategies depends upon institutional infrastructural facilities, teachers' specific knowledge and skill, their awareness, responsibilities, interest and attitude. On the other hand, it is necessary to minimize the problems like lack of time, training, and interest, the ability of teacher's skills and knowledge, their prior field experiences, competence in the classroom, and willingness, etc (Kleiner, Thomas and Lewis, 2007).

Based on research of North Carolina State University they concluded online learning is not a substitute for face-to-face instruction; rather, it should be an additional means for instructors to enhance their courses. The success of online education depends on the willingness and readiness of faculty to explore and develop online options and constantly monitor their effectiveness. (Ernst, 2008). On the other hand, there are lots of barriers in using internet at teaching and learning process like student-level, teacher-level, school-level and system-level barriers. All those are in existing education systems around the world. Teacher-level barriers include lack of teacher skills in use of educational technology including internet, ICT; lack of teacher confidence on his/her ability; lack of pedagogical teacher training; lack of guidance, counseling, follow-up of new and lack of differentiated training programs. At the same time, there is a need to not only provide support in the training of academics before they board on online teaching but also to support their ongoing progress and proficiency in teaching online to ensure maximum learning opportunities are provided within the online environment (Bring, Cohen & Chang, 2003). The school-level barriers comprise absence of ICT infrastructure that require in use of internet in classroom teaching and learning process; old or poorly maintained hardware; lack of suitable educational software; limited access to ICT including internet; limited project-related experience; lack of internet related ICT mainstreaming into school's strategy and the system-level barriers include rigid structure of traditional education systems; traditional methods of assessment; restrictive curricula and restricted organizational structure. Knowing the extent to which those barriers affect individuals and institutions may help in taking a decision on how to tackle them (Andoh, 2012).

The more opportunistic and effective uses of internet in educational institutes including classrooms, workshop/laboratories, library and administrative office with high-speed connection can help to overcome those barriers through continuous monitoring by the authorities and educationist. Consequently, technology provides many new opportunities for issues like learning styles, student-centered instruction and promotion of higher-level thinking, the teacher's attitudes and beliefs often stop them from fully integrating technology into their course design. (Teo, 2008). Therefore, for the betterment of our nation through technological development it is necessary to find out the problems and barriers on the way of enhancing the capability of polytechnic graduate (outcome) as per world level engineering technician regarding on use the of internet in teaching and learning process in private and government polytechnic institutes in Bangladesh.

4. Methodology

Descriptive method and quantitative analysis of data were used in the study. Data collection for this study takes place at 51 government polytechnic institutes and 388 private polytechnic institutes in Bangladesh. Out of eight divisions, randomly three divisional areas were taken as area sample. From each area, best one (well-equipped and best result) Government's and one Private PI were taken as sample institute. Finally, according to the willingness of ten junior instructor/instructor/chief instructors of selected institute who know about use of internet or interested were taken as subject sample (purposive sampling). Moreover, for better judgment ten students under running TVE courses from each institute. List of the teachers and students were collected by researcher himself through discussing with principal, vice principal and head of the department (from whom those were available at institution) of listed polytechnic institute as well as according to teachers', students' and graduate students' own interest and willingness. Then questionnaires distributed among them and data were collected. Out of 150 distributed questionnaires 147 were received, return rate was 98%. After data collection, all that information was tabulated in terms of frequency distribution, count (f_o), expected count (f_e) and percentage and presented in their respective columns of tables. By using the following formula, Chi-square (χ^2) test was used to find out the significance of the problems in the use of internet in teaching and learning process at polytechnic institutes in Bangladesh.

$$\text{Formula } \chi^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$

Where f_o = (Observed) the number of cases in each category in the sample and f_e is the number cases we would expect to find in each category in the sample. As there are (a) three, (b) and (c) five categories of condition so degrees of freedom for all categories was calculated as df = (r – 1) (c – 1). Where r = number of rows and c = number of columns.

The items of the questionnaire were tested for the significance at 0.05 levels. For the various degrees of freedom at the 0.05 levels of significance the critical value of χ^2 i.e. (χ_c^2) has been taken from the chi-square distribution table. Some questionnaires were analyzed by weighted average (WA) based on two and five-point Likert scale.

$$\text{Formula weighted average} = \frac{\text{((factor for value 1)(value 1) + (factor for value 2)(value 2) + …)}}{\text{Sum of all values}}$$

5. Results and Discussions

In table-1 illustrated the internet facilities at classroom, laboratory/workshop, library, and administrative office of government and private polytechnic institutes in Bangladesh.

Table-1: Opinions of respondents regarding available internet facilities at classroom, laboratory/ workshop, library, and administrative office of government and private polytechnic institutes.

	Internet facilities at	Very Good	Good	Average	Poor	Very Poor	Total
Respondents	Classroom	6	34	18	25	57	140
	Laboratory/ workshop	18	43	43	17	22	143
	Library	24	46	21	21	32	144
	Administrative office	80	35	17	3	9	144

Table-1 illustrated the internet facilities at classrooms are poor, laboratory/workshops are average, libraries are average, and administrative offices are good at polytechnic institutes in Bangladesh.

Table-2 shown the spent time in use of internet for learning, for interested topics, for games, for leisure time, for social networking, for blogging/website publishing and for other purpose by the teachers, students and graduate students of private and government polytechnic institutes of Bangladesh.

Table-2: Opinions of respondents regarding the spend time in the use of internet for various purposes

	Internet use for	Never	Seldom	Sometime	Frequently	Always	Total
Respondents	Learning	7	4	69	11	55	146
	Interested topic	5	11	75	24	31	146
	Game	50	14	64	11	4	143
	Leisure	17	18	62	16	32	145
	Social networking	10	11	47	13	65	146
	Blogging/Website Publishing	71	15	45	3	7	141
	Others Purposes	17	10	26	10	2	66

Table-2 illustrated the timing on the use of internet for learning frequently, for interested topics sometime, for game seldom, for leisure sometime, for social networking frequently, for blogging/website publication seldom and for other purpose seldom by the teachers, students, and graduate students of polytechnic institutes of Bangladesh.

Table-3 shown the common use of internet for emailing, curriculum preparing, for preparing class lecture, for social networking and for others purposes by the teachers of private and government polytechnic institutes of Bangladesh.

Table-3: Opinion on common use of internet by the teachers of private and government polytechnic institutes of Bangladesh.

Common use of internet	E-mailing	Curriculum preparing	Preparing class lecture	Research data collection	Social networking	Others	Total
Respondent	48	8	39	16	29	7	147

Table-3 shown the common use of internet for emailing 33%, preparing class lecture 27%, social networking 20%, research data collection 11%, curriculum preparing5% and others purpose 5% by the teachers of polytechnic institutes of Bangladesh.

Table-4 illustrated the choice on the methods (instant feedback, written test, MCQ test, simulating result and others) of student learning evaluation through using internet by the teacher of government and private polytechnic institutes in Bangladesh.

Table-4: Opinion of respondents regarding how they are interested on student learning evaluation through using internet by the teachers of government and private polytechnic institutes in Bangladesh.

Opinions on student learning evaluation methods	Instant feedback	Written test	MCQ test	Simulating results	Others	Total
Respondent	44	13	50	35	5	147

Table-4 showed the methods of student evaluation through use of internet choice by the teacher of polytechnic institutes are MCQ test 34%, instant feedback 30%, simulating results24%, written test 9% and 3% others.

The table-5 illustrated the choice on the way of supply (online-lecture by YouTube, Drop-box information, e-book, PPT Slid sharing and others) the learning materials by the teachers of government and private polytechnic institutes in Bangladesh.

Table-5: Opinions of respondent on the choice teachers through which they like to supply the learning materials to the students at government and private polytechnic institutes in Bangladesh.

Way of supply the learning materials	Online lecture by YouTube	Drop-box information	E-book	PPT slide sharing	Others	Total
Respondent	37	6	23	43	25	134

Table-5 shown the ways of supply/distribution learning materials are chosen by the respondents PPT slide sharing 32%, online lecture by YouTube 28%, others 19% and e-book 17%.

At table-6, the importance given (by the teachers, students and graduate students) to internet facilities in teaching and learning process for downloading software, electronic journal, email, internet message, news groups, online databases and resources are shown.

Table-6: Opinions of respondent on the importance, relations and usefulness of internet.

Importance	Not important	Slightly important	Important	Very important	Very-very important	Total
Down-loading software	4	3	49	28	56	140
Electronic journals	6	11	24	47	29	117
Email	3	2	28	34	72	139
Internet message	12	19	57	28	21	137
News groups	10	22	65	25	11	133
Online databases	10	15	54	27	24	130
www resources	2	8	59	27	32	128

Table-6 shown the importance, relation and usefulness of internet by the respondents are as email, downloading software, electronic journals and www.resources very important and online database, internet message and news groups as important for teaching and learning process at polytechnic institute in Bangladesh.

Table-7 illustrated the opinion of respondents about relation among internet, teaching and learning process.

Table-7: Relation among internet, teaching, and learning process.

Statement	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Internet is helping to create new knowledge	0	1	0	63	78
Internet is essential for skill development	1	4	5	59	73
Internet is helpful to learn latest things	2	6	3	57	75
Internet is not helpful for in-depth learning	36	70	17	12	4
Internet is not suitable for classroom teaching	35	67	7	25	7
Internet is required for doing homework and assignment	0	11	11	83	36
Internet is required for solving engineering problems	1	3	6	46	86

Table-7 shown the study revealed strongly agreement regarding the relation among internet, teaching and learning process on statement, “Internet is helping to create new knowledge” and agreement regarding statements “Internet is required for solving engineering problems”, “Internet is essential for skill development”, “Internet is helpful to learn latest things”, and “Internet is required for doing homework and assignment”. The study revealed disagreement with the statements “Internet is not helpful for in-depth learning” and “Internet is not suitable for classroom teaching”

In table-8 illustrated opinions of respondent on more effective approach of high-tech services uses through internet for teaching and learning process at polytechnic institutes in Bangladesh.

Table-8: Opinion on more effective approach of high-tech services

More effective high-tech	Mobile-learning	Cloud-computing	One-to-one computing	Group-based e-learning	Artificial intelligence in education	Educational hypermedia system	Others
Respondents	55	27	17	51	9	15	9

Table-8 shown more effective approach of high-tech services uses through internet is found "mobile learning", "group-based e-learning", "cloud-computing", "one to one computing", and "educational hypermedia systems", "artificial intelligence in education" and others approaches. Overall, three approaches "mobile learning", "group-based e-learning", and "cloud-computing" are prevailed over other approaches by the teachers, student and graduate students of polytechnic institut**e.**

Table-9 illustrated the opinions on the common problems faced by the teachers and students of polytechnic institute while teaching/ learning occurred by using internet.

Table-9 opinions on the common problems faced by the teacher/student

Statements	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Weighted average
Lack of internet facilities	3	20	1	72	37	3.90
Low internet speed	3	17	7	66	44	3.96
Interest on traditional method	1	24	27	62	18	3.55
Shortage of time	15	48	11	53	10	2.96
Lack of training	4	22	17	74	21	3.62
Lack of awareness	2	22	12	84	17	3.67
Lack of guidance	4	28	4	67	35	3.73

Table-9 shown opinions on the basis on agreement regarding the common problems faced by the teachers and students of polytechnic institute while teaching and learning occurred by using internet are "low internet speed", "lack of internet facilities", "lack of guidance", "lack of awareness", "lack of training", "interest on traditional method", and undecided on statement "shortage of time". There were few numbers of respondents 34_T (teachers), 41_S (students) and 17_{GS} (graduate students) wrote their opinions on different statements, Form the respondents' opinions on open ended questions' responses researcher summarized, that their institutional internet connection too weak to transfer dada (low speed) and internet facilities at classrooms, laboratories, workshops and library of different polytechnic institutes are not satisfactory. Respondent also claimed shortage of internet related devices like computer, multimedia projector etc. need to consider as one of the major problems for the use of internet in teaching and learning process at polytechnic institute in Bangladesh.

6. Recommendations

From research findings and conclusions, the following recommendations can be made for the area of teaching and learning at government and private PI. Those can play a vital role in socio-economic development and quality improving the products of TVET system. To enhance knowledge and skills of TVET students at global level it is doubtless requirement to provide high-speed internet facility for classroom, laboratory, workshops, library, and administrative office of polytechnic institutes in Bangladesh. In a 2016 study, Manca and Ranieri depicted that the use of social media tool is still rather limited and restricted and academics are not much

inclined to integrate these devices into their practices for several reasons, such as cultural resistance, pedagogical issues or institutional constraints (also cited in Lopes et al., 2017). So, to maintain world level competencies of TVET graduate, it is essential to supply necessary computer, multimedia system, interacting board, and other necessary devices to classrooms, laboratory, and workshops of polytechnic institutes in Bangladesh as the learners get involved in various online learning activities. However, Salmon's (2000) view in this regard is also very realistic. He believed that the combination of online activities with frontal gadgets would empower students to join online activities which is pertinent for larger class size. He (Salmon, 2000) further opined that such system would also offer opportunities for the revision of materials, master classes, and idea generation while letting students to feel connected to other students, staffs and the institutes. As importance seems on the high-tech services in uses through internet for teaching and learning process it is necessary to include those content of learning and practice in the curriculum of diploma-in-engineering courses for quality ensuring the products of TVET system. To ensuring proper implementation of essential activities and utilization of available internet facilities in teaching and learning process it is most essential to provide sufficient teacher training program for the teachers of polytechnic institute. Those Program's strategies will be based on online teaching methods, online searching, downloading, uploading, accessing, internet applications and high-tech approaches on internet-based teaching and learning processes. Teaching and learning are challenging tasks in the internet world. The students must utilize the internet in a positive and effective way. On the other hand, it is necessary to make compulsory pedagogical training for all teachers of government and private PI to enhancing their awareness, and overcome interest on traditional methods. To enhance students' in-depth knowledge on their related technology through wide use of internet-supported education it is necessary to increase the rate of administering test and given homework or assignment through internet as formative assessment, which make them more collaborative, cooperative, and communicative. It is also enhancing their interest on group work, which will be helpful information and content collecting, exchanging, storing and shearing within them.

Further research in this topic is necessary as the findings based on a relatively small sample that may have influenced the nature of results that obtained. A strategic design should be drawn that incorporates the experimental and collaborative learning process which is essential as these processes can contribute to learning outcomes (Kezar, 2000). On the other hand, through direct observation, inventory of fields and face-to-face interview need to investigate the causes of problems related to the use of internet in teaching and learning process. The descriptive analysis, which used that, is always not sufficient to draw conclusions on a phenomenon, and to provide adequate information that can be used for policy development.

7. Conclusion

The findings of the study revealed that there are shortages in the internet facilities in polytechnic institutes of Bangladesh. Internet uses in teaching and learning processes, including supplying learning materials, evaluating student achievement is insufficient at government polytechnic institutes. All polytechnic institutes are facing low speed (data transfer rate) problems. Most of the polytechnic institutes are unable to provide better institutional internet facilities including classrooms, laboratories, workshops, libraries, and administrative offices. Their infrastructural facilities are not suitable for the use of internet in teaching and learning process. The teachers and students of polytechnic institutes spend their time in the use of internet for learning, interested topics, social networking and other purposes and for preparing class lecture, emailing and social networking but those are not under proper guidance as a result the spend time may not considerable as for academic purpose. The teachers of polytechnic

institute emphasis on learning evaluation through using internet by "instant feedback" and "simulating results" and "MCQ test". Supplying learning materials by the teacher of polytechnic institutes like to use of internet through "PPT Slide sharing", "Online-lecture by YouTube" and "e-book". In response of importance given to internet facilities at teaching and learning processes it is found that their opinions on the basis of hierarchy in succession "Email", "Downloading software", "Electronic journals", "www.resources", "online database", "internet message" and "News groups". They considered with strong agreement on relation among internet, teaching and learning internet for "helping to create new knowledge", "solving engineering problems", "skill development", "to learn latest things", "doing homework and assignment", and "helpful for in-depth learning" and "suitable for classroom teaching". Most of the respondents agreed on following teaching methods to follow for online teaching for "problem solving through internet", "online discussion and "video conferencing" and chose more effective approach of high-tech services uses through internet for teaching and learning process are "mobile learning", "group-based e-learning" and "cloud-computing". The study revealed strongly agreement regarding the relation among internet, teaching and learning process on statement that "internet is helping to create new knowledge" and agreement regarding statements like "internet is required for solving engineering problems", "internet is essential for skill development", "internet is helpful to learn latest things" and; "internet is required for doing homework and assignment". The study revealed disagreement with the statements "internet is not helpful for in-depth learning" and "internet is not suitable for classroom teaching". Most of the respondents' opinions on the common problems faced by the teachers and students while teaching and learning occurred by using internet are low internet speed, lack of internet facilities, lack of guidance, lack of awareness, lack of training, and interest on traditional methods.

8. Ethical Consideration

The subjects of this study were teachers, students, and graduates of government and private polytechnic institutes in Bangladesh. The selection process of respondents and collections of their opinions were required a request letter with questionnaires. The subjects were provided proper information and opinions regarding with questionnaires. Along with the data collection process, the subjects and researcher followed the ethical requirement of those particular government and private polytechnic institutes. Because especially for the teacher respondents had given time within the gap of his/her daily routine work. Thus, the process was not hampering any activities of their system.

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