Original Research Article

Exploring the Usage and Advantages of Wireless Local Area Networks (WLANs) in Education Sector: Milieu from the University of Dhaka, Bangladesh

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Abstract

Of late, world are getting change with the help of technology. Wireless Local Area Networks (WLANs) is such a technology which have swifter the changes as well as become familiar in every possible sector. Henceforth, WLANs are rapidly used in the education sector for its' numerous advantages. Plenty of budget and planning are distributed for upholding digital skills amongst the students by using WLANs in the education especially higher education. But it is yet unidentified to the higher education authorities either WLANs effects' good or bad on students. Present study has explored the usage and advantages of using WLANs in education sector from the context of the University of Dhaka. The study followed by convergent parallel mixed method (Creswell, 2012) using semi-structured interview schedule for the faculty member and administrative personnel, semi- structured questionnaire and FGD for the students. The data was analysed using both simple statistics e.g. percentage, average etc. and thematic analysis. Result of the study revealed that most of (in 18% cases) students use WLAN in campus for their entertainment. On the other hand, this study also discovered that students of Dhaka University get three major advantages e.g. (i) a platform for education, (ii) self-development and (iii) 'By-product' advantages in using on campus WLAN. Finally, some recommendations are provided on the basis of the findings.

Keywords: WLANs; mixed method; usage, advantages; University of Dhaka.

1. INTRODUCTION

The paradigm of education is drastically shifted from analogue mode to digital mode with the passage of time. The emergence of Wireless Local Area Network (WLANs) has predominantly swift this shifting. It is therefore imperative to extend the WLANs connection and promote teaching-learning process by using this indispensible technology medium.

Now-a-day maximum educational institutions embraced and adopted WLANs technology to be blown with its' multiple benefits and want to be updated their students, staffs and faculty by it. Like as others, the University of Dhaka has also adopted WLANs for the advancement of teaching-learning process. This research study was carried out to reconnoitre the usage and advantages of WLANs in education sector of the University of Dhaka.

A wireless local area network is a wireless computer network that links two or more devices using wireless communication within a limited area such as a home, school, university, computer laboratory, or office building. Zaenal (2013) affirmed that WLAN or wireless LAN is a local area network that uses radio waves as transmission media used last link is a wireless, to provide a network connection to all users in the surrounding area. On the other hand, Computer Networking Basic Tutorials and Study Guide (2018) mentioned that WLANs are the same as the traditional LAN but they have a wireless interface.

The nature and upgrade features of the WLANs make it more users friendly, easy, comfortable as well as affordable. Thus, almost in the all sectors as well as all types of organizations, business farm, industries etc. are attracted by it and used it widely to enjoy the facilities of internet and technology in the full rhythm. Consequently, many higher education

authorities adopted WLANs and allocated enough fund to uplift its usage for their institutions. Schwartz (2002) asserted that WLANs offer learners to access a wealth of learning resources, to communicate with others outside the classroom. Further he also added that it gives new opportunities for collaborative learning, to work with individualized learning styles. In addition to opening up new avenues for education, the growing ubiquity of WLANs services offers special opportunity and manifold advantages like block inappropriate content with web content filtering, easy access for students & staff, a "WLANs like at home" experience, top-level security and reliability, share content with WLANs users (Sharp, 2001), improve academic grade, enhance technology skills (Terrill, 2006) etc. which are offered and maintained centrally by the university.

Similarly many researchers supported this although some researchers alarmed to utilize properly otherwise it will harm the students learning. To understand and measure the situation, the researchers were keenly interested in conducting such a research study. The prominent research objectives of this study were:
i. to figure out the usage of WLANs in campus by the students of the University of Dhaka
ii. to find out the advantages of using WLANs in education sector of the University of Dhaka

Based on the review of the literatures, research objectives and research variables, a conceptual framework is developed to guide the conceptualisation of this study which is mentioned below:
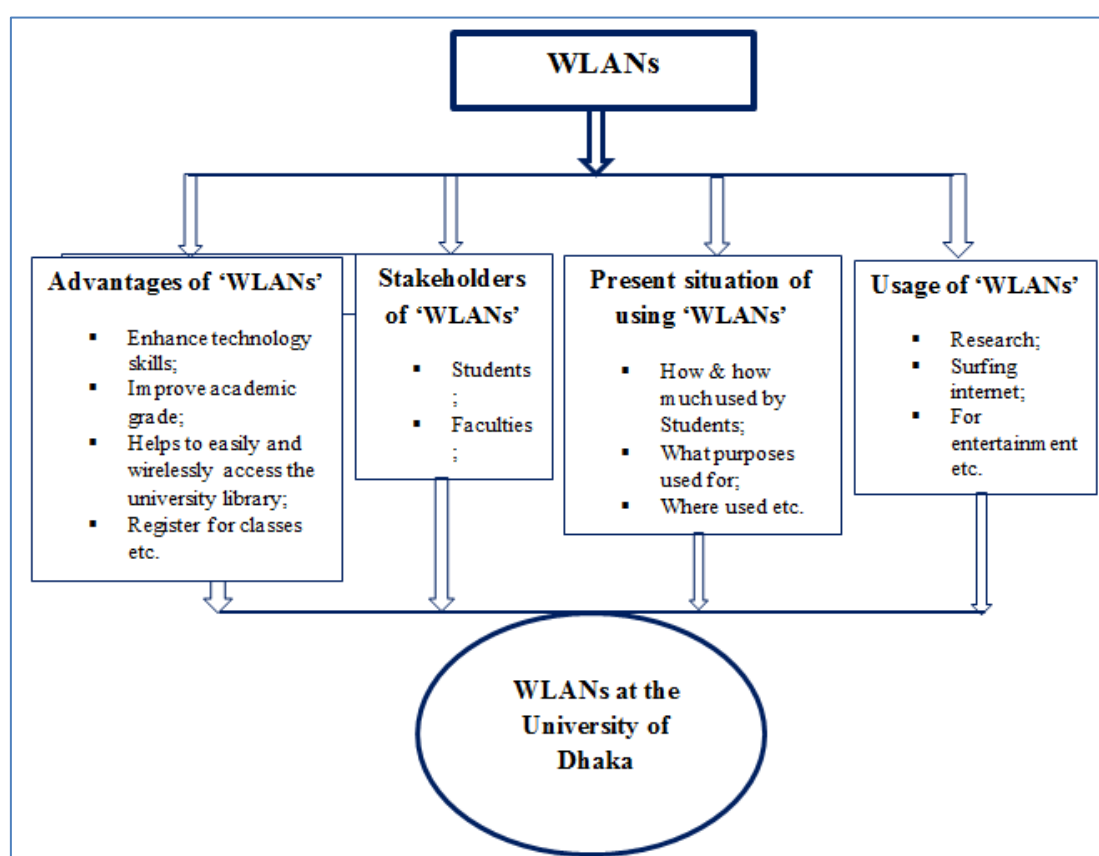

Fig-1: Conceptual framework of the study (Source: Authors)

2. MARTIALS AND METHODS

This study employed a mixed method research design, particularly 'Convergent Parallel Mixed Method' applying both qualitative research methods and quantitative approaches. Convergent Parallel Mixed Method approach is used to simultaneously collect both qualitative and quantitative data, to merge them and use the result to understand the phenomena. Another reason

for using this approach was that one form of data collection supplies strengths to 'offset weaknesses' of the other forms (Creswell, 2012, p.540). This research design is the most desirable because the study describes the present situation of using WLANs in university campuses and the advantages of using it. Method of the current study is shown in the following figure:
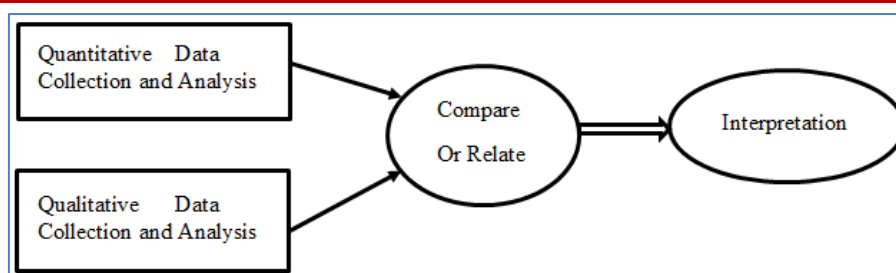
Fig-2: Convergent Parallel Mixed-method Design followed by the study (Adapted from-Creswell, 2012)

2.1 Sampling and Sample size of the study

The University of Dhaka was selected purposely for this study. Four faculties and one institute were nominated through random sampling. Students were selected through random sampling process and teachers were selected by purposive sampling process.

2.2 Source of Data and Sampling Design of the study

Respondents and various related documents of university like budget book of university was the primary data source. Secondary data was collected from related articles, journals, books and documents etc. In the sampling frame there were 370 samples in total wherein 350 students, 15 teachers and 05 administrative personnel. The entire sample design is presented underneath-
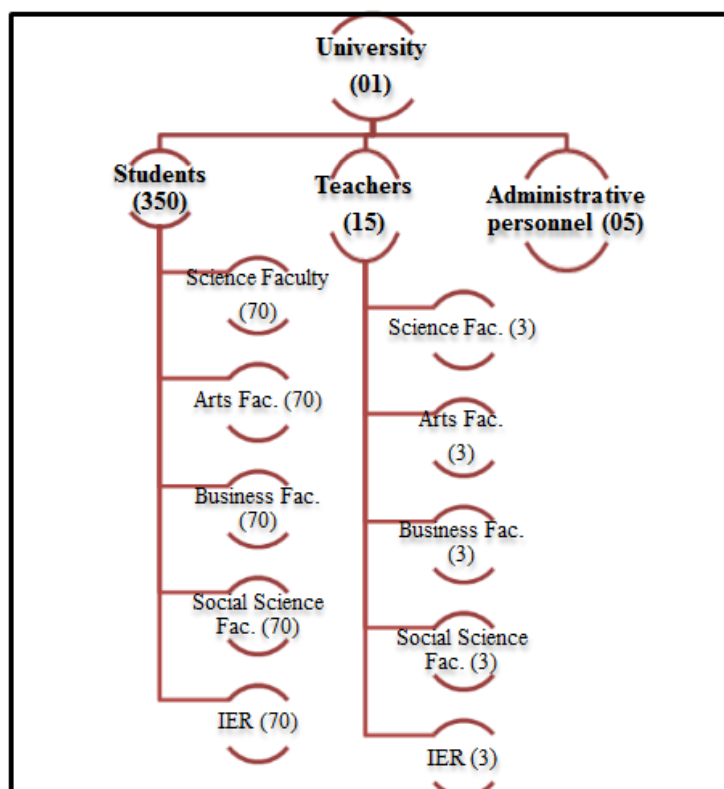

Fig-3: Sample of the study (Source: Authors)

2.3 Materials of Data Collection

In this study, following data collection materials were used:

● **Semi-structure Questionnaire**

It was used for students. By questionnaire some related data about uses, advantages etc. of WLANs was collected.

● **Semi-structured Interview Schedule**

The interview schedule was developed for teachers and administrative personnel in semi structured style. By interview schedule some related data about uses, advantages etc. of WLANs was collected.

● **Focus Group Discussion Protocol**

FGD Protocol was conducted with the students. Five FGD's were conducted in four faculties and one institution. In every group, there were ten

students. Different agenda was thrown to the students for discussing and sometimes very specific quantifiable data were asked.

2.4 Data processing and analysis technique

Two types of analyses were conducted in this study- the Quantitative data was analysed using Quantitative approaches of analysis and qualitative data in qualitative approach.

● **Quantitative Data Analysis**

The semi-structure interview schedule, semi-structure questionnaire and all the demographic information were treated as quantitative data. Hence these were analysed using quantitative approach. Simple descriptive statistics like mean, frequency, and percentage, minimum and maximum value were used to present and IBM SPSS statistics 20 software were used to analyse quantitative data. Output frequency tables, graphs and charts were also produced through Microsoft Excel. Firstly frequencies of each response were calculated.

Then frequencies were converted into percentages and the data were presented in the form of table and graphs.

● **Qualitative Data Analysis**

To analyse data researcher was followed the steps of organizing data, developing theme and then interpretation of data (Marshall & Rossman, 1999). The Focus group discussion, the semi-structure interview and the semi-structure questionnaire were also provided qualitative data for the study. The qualitative data was analysed thematically in this study.

3. RESULTS AND DISCUSSION

3.1 Prominent Results of the Study

In attempt to reach to research objectives, all important data was analysed to determine the usage and advantages of using WLANs in education sector of the University of Dhaka. The foremost findings regarding these are summarized below (rank order of significance):

● Maximum time (18% cases) students use WLAN in campus for their entertainment. Secondly, they use it in surfing internet (in 16.46% cases), and, thirdly in downloading (in 16.40% cases).

● The prevalent advantages of using WLAN in education sector of the University of Dhaka are:

1. A Platform for Education
a) Get information about class and exam schedule
b) Group Discussion
c) Download study materials; Data/information collection
d) E-learning
e) Help to find e-book, journals

2. Self-Development
a) Motivate students
b) For clearing concept
c) Getting information as per necessity
d) The opportunity of being upgraded

3. 'By Product' Advantages
a) Easy access of information
b) Savings of time
c) Savings of money
d) Help to anywhere and anytime learning

3.2 Discussion of the Research Objective one: Usage of WLAN in DU

This portion is deals about the different usage of WLAN by the students. The responses from the students are tabulated below according to frequencies. Multiple answers were seeking from the students in the times of data collection.

Table-1: Students' responses about the usage of WLAN in different areas (Multiple answers were accepted from the respondents)

Responses	Frequency of Responses	Percentage (%)
Surfing internet	290	16.46%
Research	121	6.87%
Entertainment	317	18%
Chat	282	16%
Internet Game	105	5.96%
Discussion	107	6.06%
E-learning	251	14.25%
Download	289	16.40%
Total	= 1762	100%

In the table above, it is highlighted that in maximum time (18% cases) students use WLAN in campus for their entertainment. Secondly, they use it in surfing internet (in 16.46% cases) and in downloading (in 16.40% cases) although download is slightly differing to surf internet.

Apart from these, in 16% cases students use WLAN in the campus of University of Dhaka. In addition, students also concurrently used WLAN for e-learning (in 14.25% cases), for research (in 6.87% cases), for discussion (in 6.06% cases) and for internet game (in 5.96% cases).

Data in the table specify that students use WLAN in the maximum cases for their entertainment. These findings are supported by a research study conducted by Kotz & Essien (2005) who concluded that the wireless network activities varied between users to users, buildings to buildings, access points to points etc.

3.3 Discussion of the Research Objective two: Advantages of using WLAN in Education sector of DU

In this segment, this prominent research objective is analysed and discussed under several sub-segments in turn by using thematic analysis process followed by Creswell, J.W., 2012.

Advantages of using WLAN in campus are documented here from what teachers and administrative personnel say during the semi-structured interview and what students say during the FGD and semi-structured Questionnaire in time of the data collection stage.

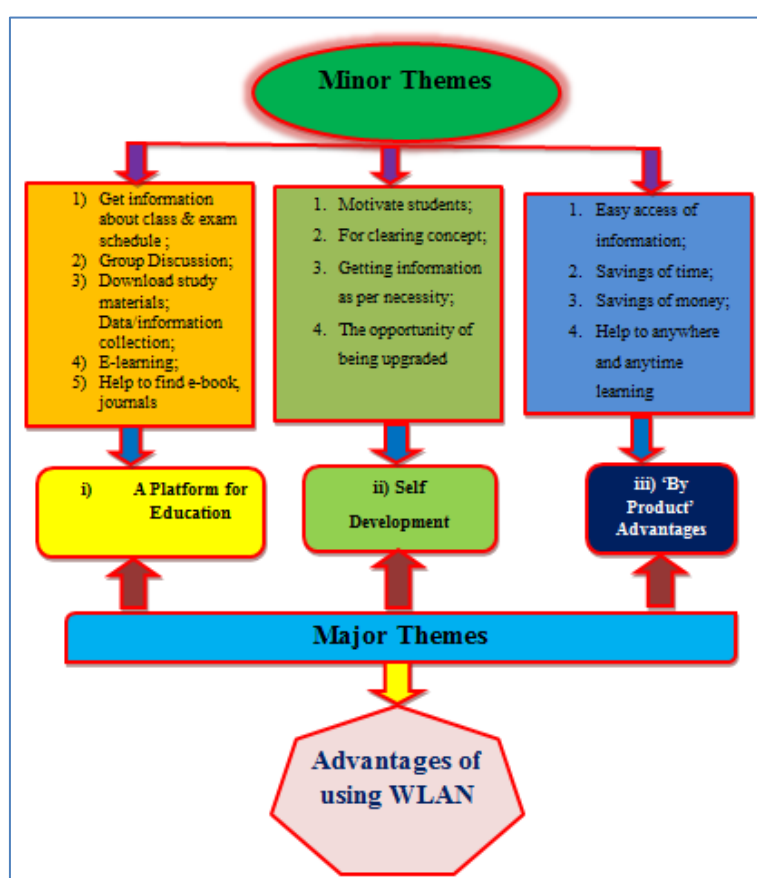The following figure presents the total thematic analysis process of this research objective-

Fig-3: Advantages of using WLAN (Source: Authors, on the basis of the thematic analysis of Data)

3.3.1 Major theme – 1: A Platform for Education
This is one of the major advantages of using WLAN in the campus. There are also five other minor advantages under this theme which are analysed below:

1) Get information about class and exam schedule
In the semi-structured interview, teachers have been asked about the advantages of using WLAN in the campus. Most of the teachers **(45%)** indicate that now WLAN is used as a platform for education. One of the teachers says,

"Now, WLAN is used as platform for education. Many teachers and students use it as online platform. For example- for facilitating teaching-learning process we open Facebook group to inform students about the notice and information about class schedule, exam date etc."(TI$_7$, Here, TI indicates Teacher Interview)

In this regard, an administrative personnel remark that- "We provide WLAN connection to bear in mind that- with the help of it both teacher and students use it as an online educational platform."(AI$_3$, Here, AI indicates Administrative Personnel Interview)

One response from students FGD is quoted here to understand the existence of this advantage. Rhohan (Pseudonym) has stated that-
"I use it as an educational platform to know about class and exam schedule by our online educational group."(FGD$_2$)

2) Group Discussion
Most of the students (32%) said that they use WLAN for taking advantages from the group discussion. Here group discussion refers online group which can able students to express themselves.

In the FGD session one of the students uttered that-
"We 35 students of our friend circle open an online whatsapp group for increasing our English four skills by using WLAN connection. Here we attend in a group discussion to express ourselves. (FGD$_{15}$)"

In line with the students opinions teachers also agree that one of the big advantages of using WLAN is facilitating group discussion. One teacher asserted that-
"Group discussion helps students to understand any concept clearly through group interaction. Today online group discussion is getting popularity due to free WLAN connection. (TI$_9$) "

3) Download study materials; Data/information collection
This is another advantage of using WLAN in the campus. Most of the students (Approx. 37%) opined that they getting advantages using WLAN in the campus by downloading study materials and collecting data/information.

In the time of FGD session many students give their opinion towards this advantage. Among them one student posited that-
"I mainly use WLAN for downloading related study materials and information from the websites. (FGD$_2$) "

The teachers also said that WLAN is using for downloading and gathering information from the internet. They also themselves use in this purposes and getting advantages.

4) E-learning
The teachers and students both said that E-learning is the most advantages of using WLAN in the campus.

Data from the student's questionnaire reveals that maximum students (47%) use WLAN in the purpose of getting advantages from e-learning.

Besides in the FGD session it also proved by the students. One quotation regarding this is that-
"It is very beneficial for our e-learning. We gather knowledge form internet by searching different issues. (FGD$_4$) "

Teacher's opinion also goes to in this topic. They delineated that-
"By the help of the WLAN students as well as we getting the advantages of E-learning. (TI$_2$) "

5) Help to find e-book, journals
This is another important advantage of using WLAN in the campus. Both teachers and students give their opinion towards this advantage.

In the questionnaire maximum students (almost 40%) opined that they use WLAN for finding e-books and necessary journals. This scenario also found in the times of FGD session. One student's remarks present here-
"It helps me finds e-books, journals etc. (FGD$_4$)"

The administrative personnel also agree on this advantage. They said that-
"One of the aims of spreading out WLAN throughout the whole campus is that to help faculty member and students to find their necessary e-books and related journals. (AI$_5$)"

3.3.2   Major theme-2: Self – development
This is another major advantage of using WLAN in the campuses. Beneath this advantage, there are four minor advantages which are analysed below through gathered substantiation from teachers, students and administrative personnel.

i)   Motivate students
Usage of WLAN in the campus helps students to motivate themselves. Most of the students (52%, data collected from the questionnaire) opined that they feel motivation to learn through online by using WLAN in the campus.

In the FGD session they also give same opinion. One of the students said that-
"It helps me to learn more and more. Because it motivates me to know new things by searching through internet using WLAN (FGD$_2$)"

Teachers also give same opinion in line with the student's opinions. They asserted that-
"Using of internet by WLAN is very much alluring which motivates students to learn beyond the conventional method of learning in anytime they feel comfortable. (FGD$_4$) "

ii)   For clearing concept
Many of the teachers and students give their opinion in favour of this advantage. Data collected from the questionnaire reveals that most of the students (37%) say that they use WLAN for clearing their concept.

Besides in the FGD session the students also opined to this point. One remarks from FGD-
"For clearing concept I usually use WLAN. For instance, once my teacher taught us about the cone of experiences, firstly I am not fully understand, but when I went through internet by using WLAN then my concept was clear. (FGD$_1$) "

In accordance to students opinions teachers also give emphasise on this advantages of using WLAN. The quotation from teacher's interview-
"Sometimes for clearing concept on critical or ambiguity issues we take help from the internet by using WLAN. Similarly students also need it for their clear concept. (TI$_1$) "

iii)   Getting information as per necessity
Another remarkable advantage of using WLAN in the campus is that getting information as necessary- opined by teachers, administrative personnel and students.

Data from the student's questionnaire prove that maximum students (54%) use WLAN for getting their required information. Students FGD also support this statement.

"The most unique advantage of using WLAN is that to find an idea about an unknown things and new things as our necessity. (FGD$_5$)"

Interview from the administrative personnel exposed that they also agree on this topic. One of the remarks from them is present below-

"For getting available and necessary information we provide smooth WLAN service. Hence students, teachers and each member of Dhaka university family will get the enough flow of true information. (AI$_3$)"

Teachers also give their opinions in the favour of these points. They uttered that –
"Most of the time I use WLAN for getting information as my requirement so I can properly do my job. (TI$_{14}$)"

iv)   The opportunity of being upgraded
This is the important advantages of using WLAN in the campus opined by the teachers, administrative personnel and students.

The teachers said that they often use WLAN for getting updated frequently. One comments from the teachers interview is presented below to understand the matter clearly-

"By the use of WLAN we frequently find the update news, updated version of teaching materials, upgraded version of software and other related educational elements. I think it is one of the big advantages of using WLAN. (TI$_{10}$)"

Data from the student's questionnaire also reveals this. Most of the students (29%) say about this. Students FGD also add strength of this point. One of the students remark that-
"The opportunity of being upgraded of my study is provided WLAN. By the connection of WLAN I will go through any types of websites which helps me to get updated information and learning materials. (FGD$_3$)"

The administrative personnel also gave same opinions. One of them exposes that-
"WLAN helps the member of this university to get latest and updated information so that they can parallel run with the digital age. (AI$_2$) "

3.3.3   Major theme-3: 'By Product' Advantages
This is another important advantage of using WLAN in the campuses. In this research study 'By Product Advantages' refers advantages which automatically come from using WLAN itself. Beneath this advantage, there are four minor advantages which are analysed below through gathered evidence from teachers, students and administrative personnel.

1.   Easy access of information
By using WLAN one can easily access in the information superhighway. This study also reveals that teachers, students and administrative personnel of the Dhaka University have gotten the easy access of information through WLAN.

Maximum students said that they use on campus WLAN and getting advantages by easy access of information. One of the students in the FGD session mentioned that-
"Once, my teacher gave an assignment on bulling in the school level. Firstly I felt upset that how I complete my assignment without viable information. Then one of my senior brother suggested going through the websites using WLAN and to collect required information. As per his direction I used WLAN for easy access of information. (FGD$_2$) "

In line with the student's sayings, all of the teachers opined that easy access to information in one of the advantages of using WLAN. One quotation from teacher's interviews presented below for the support of their remarks-
"For any necessary information students including teachers can get support from WLAN. It helps students to get any kinds of information regarding their subject matter. You know WLAN provide a lot of avenues to get connect with necessary information with easy access. Usually we also use WLAN for our research work, class material etc. because of its' easy access to information. (TI$_3$) "

Administrative personnel also opined in favour of this advantage. They opined that most of the teachers, students and also administrative personnel use

WLAN for getting advantage in terms of easy access. One remark from interview-

"The most of the member of this university easily access in the information superhighway using WLAN. It helps teachers, students and every administrative personnel. (AI₁)"

2. Savings of Time

Another important advantage of using WLAN is saving of time. All the respondents give their opinion in the favour of this.

Most of the students said that usage of WLAN helps them to save their valuable time. When researcher asked that how WLAN help them to save time. They replied that-

"Suppose we have no access in internet, and then if one wants to know about Hall mark scandal in Bangladesh, he/she goes hither and thither for collecting information about the topics. On the other hand, if he gets access in the internet via WLAN then s/he will surf in the internet about the topics and get a lot of information through it. So it can be crystal clear that WLAN helps us to save our valuable time. (FGD₅)"

The response from the teachers also provides almost similar opinion in this connection. Most of the teachers (11 out of 15) agree on the advantage of WLAN in saving of time. One of the teachers posited that-

"Sometimes we give students assignment, group work, presentation etc. to complete within a short period of time. In these cases, WLAN helps students a lot. They can surf internet by using WLAN and complete the assigned work within the short span of time. Thus it can be said that usage of WLAN saves their precious time. (TI₁₃)"

3. Savings of Money

Moreover, saving of money is another significant 'By Product Advantage' of using on campus WLAN. In the times of data collection most of the respondents opined that WLAN helps to save money in various way. The ways which helps to save money using WLAN are mentioned below:

- WLAN allows to access in the maximum websites by which one can collect necessary information If there is no WLAN connection, one have to go to concerned organizations for collecting information which may be time consuming and matter of money spending.
- On campus allows visiting some specific websites like jstore, springer etc. if one can want to go these websites they will not allowed and if allowed they should register and have to give some charge.
- Sometimes students need to buy some reference books for which they should spend money. But if he use on campus WLAN then he will be able to download PDF version of their required books. In this way WLAN helps to save money.

- Sometimes, some books are so rare that one copy of book is demanded most cost. In this regards WLAN helps the person to save money by collecting books using WLAN.

Here, one remark from the teacher's interview is presented to make the evidence stronger enough.

"WLAN allows students, teachers and any person to collect various information, news, PDF books etc. for example- many students read online newspaper which help them to save money from buying print version of the newspaper. (TI₃)"

4. Help to anywhere and anytime learning

This another precious advantages of using on campus WLAN. Now in the present age learning is not confined to a fixed place and fixed time. WLAN make possible to learn in the anywhere in the university campus and anytime that learner wish.

Most of the respondents of this research study opined about this advantage of using on campus WLAN. In the time of data collection students give their opinion in the open ended question. Most of the students (78%) give their opinion in the favour of this advantage. This similar opinion also found in the FGD session. One of the students said that-

"I use WLAN in my hall when I take my food which allows me to proper utilize my time. Besides I use WLAN in our TV room in the off time which also helps to utilize my leisure time. (FGD₁)"

Other students from the FGD said that-

"I use WLAN before my sleeping in my room to read article or novel PDF books. This way WLAN helps me to learn anywhere and anytime. (FGD₃)."

Teachers also give their opinion in this connection. Most of the teachers (12 out of 15) agree with this advantage. One of the teachers said that-

"In our free time we use on campus WLAN. We use it for our betterment. Place and time is not matter to use WLAN. Because, WLAN allows learn in anywhere and anytime. This is also attributed for the entire user of WLAN. (TI₁₅)"

The researcher found that students of Dhaka University get three major advantages: a platform for education, self-development and 'By-product' advantages in using on campus WLAN. In a similar fashion, some results of different related research study also give almost adjacent proves.

Schwartz (2002) stated the reasons for installing WLANs were horizontal applications with the highest score of 83%, conference room connectivity with 57%, specific vertical applications with 53%, and telephony with 32%. The number of WLANs getting the green light showed the popularisation of WLANs

was increasing and "no need for WLAN" was decreasing from 2001 to 2002 (Schwartz, 2002).

Campbell & Pargas (2003) stated the background to a variety of experiences of taking wireless services into classrooms. They gave many examples of how each college or university implemented this. For example "the University of Arizona, Tucson, is developing learning centres…. Clemson University began a pilot laptop program for 100 freshmen in the fall 1998 semester…. Carnegie Mellon is working on 'invisible halos' of computing surrounding participating student and faculty" (Campbell & Pargas, 2003). All of these universities were trying to enhance the classroom experience by providing wireless services.

McLaughlin (2008) reported that one university – Carnegie Mellon University – adopted 802.11n devices on campus and one other – Duke University – planned to adopt the campus-wide 802.11n wireless network. Duke University's chief information officer believed "the value of a technology like 802.11n is about enabling new kinds of uses on our campus, giving our students new opportunities, and enabling faculty to push the limits and try things that were not possible before on previous wireless technologies" (McLaughlin, 2008).

Easy access of information is one of the prevalent advantages getting by the user of WLAN is found in this study. The study conducted by Communications News (2006) supported this finding. Communications News (2006) reported that universities across the United States, including the Universities of Texas and Dallas, were providing wireless networks for staff and students. It brings universities decided that a wireless LAN would better satisfy UTD's needs for anytime anywhere access and, simultaneously, would be less expensive to deploy and maintain" (Communications News, 2006). The wireless LAN project would "provide the coverage necessary to give our students and employees ubiquitous access to the applications they need" (Communications News, 2006).

Help to anywhere and anytime learning is another findings of this study which is similarly supported by Roshan & Leary (2003) who asserted that "WLANs give them the opportunity to provide ubiquitous coverage so that they can bring networks to the students instead of bringing the student to the network" (Roshan & Leary, 2003, pp. 246-247).

The present study discovered that saving of money is a advantage of using WLAN which is also proved by Roshan & Leary (2003) who delineated that "As computers have become a larger part of the learning process, the time and resource savings that wireless brings has proven to be rewarding" (Roshan & Leary, 2003, pp. 246-247).

Furthers, Bruns (2005) reported that Charleston Southern University (CSU) calculated it would save at least $250,000 if wireless technology was selected.

Moreover, according to "Government Solution Blueprint" (2003), the e-U project involved three main areas of the university campus: students, teachers and university services. The demands for adoption of WLANs on campuses were mainly from students. By this token, students would be benefit on a large scale and most students would be satisfied. From a business perspective adopting wireless network solutions was cost effective if the institute owns multi buildings. In education, students and teachers are benefit from easier access to information (Government Solution Blueprint, 2003).

The most supporting results were showed by Benson (2004). Students' desire for wireless was supported by many reasons, for example "unwired connectivity in high-traffic areas such as the student centre and college quad," and "the ability to easily and wirelessly access the university library, register for classes, as well as have a more interactive relationship this their professors and fellow students" (Benson, 2004). The flexibility and freedom made students happy with the school's wireless laptop (Benson, 2004).

4. RECOMMENDATIONS AND CONCLUSION

Detailed analysis and findings of the study put forward some recommendations to take active steps. The considerable recommendations are:-

- Spread out the WLAN connection throughout the each and every corner of the University of Dhaka
- Provide high quality bandwidth
- Provide strong and high quality router
- Use minimum security portion to avoid unethical connection
- Full area of the campus should be under the coverage of WLAN
- Awareness based initiative e.g. campaign on advantages of WLAN, how to properly utilize WLAN in education sector etc. should be taken to change the attitude towards the WLAN.
- Teachers and students should have the resources to use WLAN (including access to hardware and software, 'how to' guides, and expert technical and educational support).
- Teachers and students require clear guidelines and advice about the capabilities and skills required to access and use WLAN for teaching and learning.

Current study tried to focus only the usage and advantages of using WLAN in education from the perspective of the Dhaka University. It is expected that the effects and challenges of WLAN in education to be explored by future researchers in a large scale

throughout the country. As this topic is a hot cake and very crucial for the digital Bangladesh, so more research on it is imperative to conduct for the overall development of the WLAN and advancement of the technology based digital education system.

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