

Investment on IT: Students Perspective

Samsul Alam

Abstract - The focus of this study is to seek the relevance of investing in Information Technology (IT) by the students. The research takes into account 50 students studying at different disciplines at Dhaka University. The respondents were visited randomly to get the relevant data. The result of the study suggests that students' academic quality and knowledge enhancement have a relationship with investment in IT though the relationship is not significant. The result of hypothesis testing shows that students those have invested in personal computer and internet secure comparatively higher cumulative grade point average (CGPA) rather than those who haven't invested on these IT tools. But the likelihood of investing higher amount in IT will pay-off better CGPA is not found thus there is no association of good result and investing heavily on IT. However, the findings of this exploratory study offer insights that the money invested in IT for academic purpose is more advantageous than otherwise be invested especially for those students whose academic curriculum mainly decorated in accordance with the modern up-to-date era of Information Technology. Eventually, this study will help concerned students, guardians and academicians understanding how important IT is for student's academic performance.

Index Terms - Education, Information technology, Internet, IT investment, Personal computer, Smartphone, Students' performance

1 INTRODUCTION

The overriding message that can be gleaned from most current research on the implementation of computer-based technology in education is that technology is a means, not an end; it is a tool for achieving instructional goals, not a goal in itself. And yet, many schools and districts have invested in computer-based technology before establishing clear plans for how to use this important tool. In today's world, computer-based technology is not a frill, but an important component of any modern curriculum. During the last decade, technology expenditure by students is seen to be higher in Bangladesh. Since no one wants these funds to be wasted, educators need insight into how to maximize the positive impact of their technology. This paper is for educators and policymakers who want to learn from the research and experiences of others about how to make their technology investment a wise one. To address this issue, the researcher summarizes major research findings related to technology use and based on these findings, attempt to draw out implications for how to make the most of technology resources. This paper will focus on pedagogical and policy issues related to technology, not smaller issues such as what hardware configurations or software to use. This is not a "how to" paper, but rather a paper about the key policy issues to be addressed in order to make technology use the most effective. Rather than attempting a comprehensive review of the literature, this paper draws on a selection of research studies. It was tried to choose studies that were the most methodologically sound. It is favored those respondents who are the change maker in this sector. The students who doubt about whether he/she will invest in IT or not for their academic progress and other will be aware by being acknowledged of the study.

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2 BACKGROUND OF THE STUDY

The term "technology" can be used to mean a very wide variety of things, from computers to pencils. In this paper, it is used the term to refer broadly to computer-based tools-hardware and software, the Internet, and computer-based multimedia that have impact on students' performance. In the early sections of the paper, it was begun by describing research on the relation between technology and student learning-addressing the question of what kinds of impact technology has on education. In order to understand the impact of technology on education, it is helpful to consider the purposes to which technology is applied. When students are learning from computers, the computers are essentially tutors. In this capacity, the technology primarily serves the goal of increasing students' basic skills and knowledge. In learning with, by contrast, students use technology as a tool that can be applied to a variety of goals in the learning process, rather than serving simply as an instructional delivery system. Students use the technology as a resource to help them develop higher order thinking, creativity, research skills and so on. After discussing research on each of these kinds of technology, it can turn to the "lessons learned" from these studies and discuss a variety of key conditions that are necessary for technology to improve education.

Information technology (IT) is changing the competitive dynamics in the present educational system. For example, students are using technology to improve their educational efficiency and knowledge to adapt with the current competitive world. In general, investment on IT by the students plays a vitally important role to enhance their educational excellence. The key informants of this research are from undergraduate, graduate and post graduate students in Dhaka University. Though the explored study is using limited resources but its implication can shade light on very important aspects of IT pay-off. This research covers three IT investments by the students e.g. Personal Computer, Smartphone, and Internet.

2.1 Statement of Problem

This study is conducted "To measure the pay-off from the IT investment by the students."

2.2 Objective

This is a research work done by collecting data from respondents of university students. The specific aim of this study is to find out the pay-off from investing on IT by the students that will help take the exact decision whether the students will adopt IT or not. The specific objectives are as follows:

- ◆ To take the right decision whether they will invest on IT or deposit in bank
- ◆ To review the efficiency of the IT investment by the students in education
- ◆ To identify the percentage of students those who are using IT in their academic task
- ◆ To explore the perception of the students regarding the use of IT in accessing information
- ◆ To find out the change in the level of education quality among the students due to IT adoption
- ◆ To find out the opinion about the importance of IT tools for their academic course

2.3 Limitation

The following limitations have been identified for the preparation of study report:

- Lack of sufficient secondary data
- Difficulty in collecting information from students of diverse backgrounds
- Respondent' reluctance in disclosing some data and information for various reasons
- Lack of in-depth knowledge and analytical ability for writing such study report

2.4 Organization

The paper covers the following aspects sequentially:

- ➔ Introduction of the study
- ➔ Research background with problem statement, objective, limitation etc.
- ➔ Literature review of previously conducted research on the study
- ➔ Research methods including data collection, research model and technique
- ➔ Description of data used in the study
- ➔ Analysis of the obtained data in the study and findings of the study
- ➔ Recommendations for the users, practitioners and other stakeholders
- ➔ Conclusion of the study
- ➔ Future study and acknowledgment

3 LITERATURE REVIEW

Technology used by students leads to outcomes that tend to be difficult to measure [5]. With respect to IT sector pay-off, foreign and some national experts undertook some studies. Jian, Sandnes, Law, Huang and Huang [6] investigated the role of electronic dictionaries in English learning of undergraduates of engineering and humanities and found that the speed of reference was a very important merit of using

electronic dictionaries.

A study of Lindahl and Folkesson [9], studied 31 preschool teachers to examine the benefits and challenges of application of computers in preschool education. Research results have shown that there are multiple conflicts of emotion on the use of computers. The study also have been evaluated the fitting the use of computer to the traditions of the applications in preschool education. Computer applications can be included in preschool education by understanding and taking into account the traditions, the values and habits of teachers related to the educational settings. If teachers feel threat to their values, traditions, habits in educational settings; they can exhibit a negative attitude against the use of computers. As a result, the computer applications are suggested to use that it is suitable to the educational traditions of teachers. Practice is an important factor for computer applications for teaching and learning. Analyzing the use of computers in education, teachers' teaching habits in the classroom are more important than their beliefs. Besides, trained teachers are using computers for teaching purposes more than the untrained teachers.

Nearly every student at the university can afford to own a smartphone. The findings also suggest that students fully utilized smartphones as a regular mobile phones as well as a traditional computer and as a means to get connected to online social networks. Unfortunately the findings also suggest that the students lack of using smartphones as a means to support learning. Most of the students of Dhaka University do not use smartphone for their academic purposes properly. Most of the time, they get access to the internet through smartphone for using Facebook. Some of them use smartphone for academic purposes rightly. Postgraduate students are better than undergraduate students. Educators do not have very positive attitudes towards smartphone as tools for learning in higher education to date [8]. A survey by Nam [12] on how students of a university in South Korea use smartphones from 135 participants it is found that the most preferred usage and usual usages of the smartphone are evaluated. Perceived and relative significance of satisfaction to usages of the smartphone according to demographic variables such as gender and academic year have been evaluated. The results indicate that the most important usage of smartphone is 'real-time communication' rather than 'telephone' or 'internet search'. Study usage gets the least response in usual usage and the most important usage of smartphone. 'Real-time communication' usage received the most affirmative response in serviceability too. The utilization of mobile phone services in the educational environment, explore the nature of mobile phone use among university students and investigate the perception of university students on mobile phone uses in library and information services. The study describes the current status of wireless technology. It also identifies different wireless phone application for mobile phones which facilitate and enlarged the education [11]. Nortcliffe and Middleton [1] explored the hypothesis that students are being innovative in the ways in which they are using their smart devices to support their formal and informal learning. The study involved five students who own smart devices were

invited to discuss their ownership of smartphone and tablet technologies and the ways they used them in their studies. The students first completed a short questionnaire and were then interviewed in small groups. The results agree with previous research into student use of smart devices and describe autonomous engagement facilitated by personally owned smart technologies. The study identifies continuous patterns of pervasive engagement by students and concludes that more thought should be given to disruptive innovation, digital literacy and employability.

“The birth of high speed internet access and its availability on recently evolved smart phones has opened several new avenues for learning [10].” Many students (with 600 samples) of Ghana had learnt how to use the internet from their teachers and were more likely to use the Internet Cafés as access point. Many of them also believed the cost of access was expensive. More tertiary students were using the internet technology to look for information for assignments. The internet had also led to improved communications among tertiary students. Google and Facebook were the most preferred search engine and social network respectively. Poor internet speed, inadequate number of computers in computer laboratories and inadequate user skills were observed as the leading constraints to internet use. Since a significant number of tertiary students using internet, addressing the hindrances to its use will enhance teaching, research and learning [3].

4 RESEARCH METHODOLOGY

This study has tried to fulfill all the study objectives by following the methodology stated below:

4.1 Data Collection

In order to make the study more meaningful, both the primary and secondary data have been collected.

4.1.1 Primary Data

The primary data sources were a structured questionnaire survey. For this reason, it was prepared a questionnaire regarding the use of IT by the students. It was distributed among respondents randomly among undergraduate, graduate and post graduate students of Dhaka University studying at different disciplines.

4.1.2 Secondary Data

Secondary data sources were articles on the related factors in the conceptual framework, book etc. regarding IT investment.

4.2 Analytical Model and Scaling Technique

4.2.1 Analytical Model

An analytical model is a set of variables and interrelationship designed to represent, in whole or in part, some real system or process. Models can have many different forms. Here, graphical model is used. A graphical model provides a visual picture of the relationship between variables. It is used to isolate variables and to suggest direction of relationship but are not designed to provide numerical results. It is logical preliminary steps to develop mathematical model. The data was analyzed using IBM SPSS-20 and Microsoft Excel-2010.

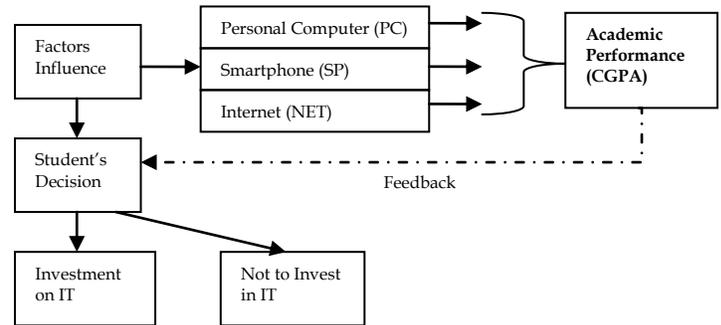


Figure 1: Factor influence for academic performance

4.2.2 Scaling Technique

5 point Likert scale is used in this study to collect primary data, which is a part of non-comparative scaling technique.

Model specification:

The purpose of this analysis is to measure the relative importance of each independent variable on the dependent variable. Here, multiple regressions have been used in order to find out how independent variables affect dependent variables.

Mathematical Model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e_i$$

Where,

Y = Academic performance (CGPA) of the students

X1 = Personal computer

X2 = Smartphone

X3 = Internet

β = parameter/coefficient of the model

e = error of the model.

5 DESCRIPTION OF THE STUDY

5.1 Overview of IT Investment

The undergraduate, graduate and post-graduate students who involve themselves in IT tools include a variety of tools. The followings are some of the generalizations:

5.1.1 Personal Computer

Personal computer or PC is probably one of the tools that anyone would like to have these days. It can be used for learning, researching, communicating even for playing games.

PC used by students:

Categories of computer used by students are as follows:

- ⊕ Handheld Computer (PDAs)
- ⊕ Mini Computer
- ⊕ Micro Computer
- ⊕ Tablet Computer
- ⊕ Laptop Computer
- ⊕ Desktop Computer

Reasons for buying PC by the students:

Non portable PCs:

- To improve research skill
- To enhance the presentation skill

- To perform assignment tasks
- To get up-to-date information about home and abroad
- To connect with the social media like Facebook, Twitter and professional site like LinkedIn and so on
- To influence career aspirations
- To gain enhanced creativity
- To make quick and easy information transfer
- To facilitate educational activities
- To improve grade in the examination
- To use as a medium of entertainment
- To use as a medium of communication
- To earn through freelancing and outsourcing
- To learn through distance learning

Portable PCs:

- ✿ It's portable
- ✿ It's a great e-book reader
- ✿ It's comfortable to use
- ✿ It's very functional
- ✿ It uses a reliable OS
- ✿ It has powerful social networking tools
- ✿ It's affordable
- ✿ It's great for meetings
- ✿ It's better than a smartphone
- ✿ It's a better user experience

5.1.2 Smartphone

Smartphone is one the most popular communication devices in this modern world. It is a mobile phone running a complete operating system in a manner similar to a traditional computer which offers advanced computing abilities and connectivity options. These features enable new kinds of mobile services that in turn shape the usage habits of smartphone users [7]. The potential for smartphones in education suggests that the ubiquity, multi-functionality and connectivity of mobile devices offer a new and potentially powerful networked learning environment [2]. University students are among the highest contributors to the increasing number of smart phone sales. The factor that most influences the increase in smart phone usage is to do many of the things that were once reserved for a PC, such as accessing the web at higher speeds, viewing/editing documents, downloading files, creating music playlists or managing multiple e-mail/messaging accounts. A study conducted upon the largest U.S. college survey assessment projects in USA and Canada by using National Survey of Student Engagement (NSSE) found that in 2011, only about 4% of respondents used a smartphone, but by 2013 that figure had increased to 13%. Preliminary results from the 2014 administration suggest the percentage continues to increase, with roughly 18% of respondents using smartphones [13].

Key reasons for buying smartphone by the students:

The following outcomes from Smartphone instigate students purchase it:

- ➔ To facilitate communication
- ➔ To solve any educational problem by contacting with teachers, peers, guardians etc.
- ➔ To use net for accessing voluminous data from large geographical area

- ➔ To get the facilities like PC
- ➔ To use like a camera or recorder
- ➔ To use Bluetooth infrared technology to transfer the data from smartphone to smartphone or to computer and computer to smartphone without any cost in a few seconds.
- ➔ To handle and carry easily because of its light weight
- ➔ To use as a digital dictionary
- ➔ To get up-to-date information
- ➔ To use as a medium of entertainment
- ➔ To make a call easily
- ➔ To get support of various apps
- ➔ To send and receive e-mail instantly
- ➔ To have GPS service or Google earth
- ➔ To send and receive short message service easily
- ➔ To get video calling facilities
- ➔ To know weather update
- ➔ To have self-camera and so on.

5.1.3 Internet

The Internet, sometimes called simply the Net is a worldwide system of computer networks-a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers). The Net is a vital part of the education process; resources for learning and educating are implemented into lesson plans and homework every day. Students and teachers can access unlimited information to broaden their education. With net access by students, there is almost no limit to what students can learn. "The use of internet for educational purposes has increased many folds among Indian youths [10]." In Bomhold [4] study, it was found that search engines, online encyclopedias, and libraries are used by 10.4% undergraduate students to get access to popular web sites and 76% students most frequently use search engines to find academic information. "The introduction of 3G technology is already being pinned as the next big thing in the mobile internet revolution [10]."

Reasons for using internet by the students:

a) Learning diverse cultures: There is so much that students can do with the Net. Not only can they communicate with international students, they can gain from others' knowledge and experiences, participate in chat rooms, share ideas and solutions and learn about the many diverse cultures out there.

b) Facilitate interactive learning: The interactive learning that the Net provides can help students with broader spectrum of knowledge increment.

c) Adjustment with different learning styles: Individual teaching techniques can become more available, which has been proven to be a factor in student achievement.

d) Linking with the teachers: Students have the chance to be able to learn at more than one place simultaneously. They may be in a small town but through the net, they can be linked to teachers in more populated areas.

e) E-mail: E-mail is an online correspondence system. With e-mail a student can send and receive instant messages, which work like writing letters & delivered instantly.

f) Access to Information: The Net is a virtual treasure

trove of information. Any kind of information on any topic under the sun is available on the net. The 'search engine' can help students to find any data subject that they need.

g) Shopping: Along with getting information on the net, people can also shop online. There are many online stores and sites that can be used to look for products as well as buy them using credit card. They do not need to leave their house and can do all the shopping from the convenience staying home.

h) Online Chat: There are many 'chat rooms' on the web that can be accessed to meet new people, make new friends, as well as to stay in touch with old friends.

i) Downloading Software: This is one of the most happening and fun things to do via the net. People can download innumerable academic files, games, music, videos, movies and a host of other entertainment software from the net, most of which are free.

j) Faster Communication: The foremost target of Net has always been speedy communication and it has excelled way beyond the expectations. New innovations are only going to make it faster and more reliable. Now, students can communicate in a fraction of second with a person who is sitting in the other part of the world.

k) Entertainment: Entertainment is another popular reason why many students prefer to surf the net. In fact, the net has become quite successful in trapping the multifaceted entertainment industry.

l) Social Networking: A student cannot imagine an online life without Facebook or Twitter. Social networking has become so popular amongst youth that it might one day replace physical networking. It has evolved as a great medium to connect with millions of people with similar interests. Apart from finding long-lost friends, students can also look for a job, business opportunities.

m) Online Services: The Net has made life very convenient. With numerous online services, students can now perform all transactions online.

6 DATA ANALYSIS & FINDINGS

The analysis of the data clarifies the factors affecting the decision in case of IT investment. From the collected data, the estimation is summarized.

Alpha (α) - To find out the effects of IT on Dhaka University students, a questionnaire-based survey was made. The questionnaire consisted of 32 questions. All these questions were specifically prepared and closely related with the use of IT.

The collection of data was done at Dhaka University campus from 1 January to 25 January, 2015. A total of 51 questionnaires were distributed among students in Dhaka University of which 50 (response rate 98.03%) completed questionnaires were retrieved from them. Among these participants 96% were unmarried and 100% were male.

The analysis performed below is based on survey feedback of students studying at DU. It will find out the real scenario for deciding on whether the student should invest on IT or not.

6.1 Respondents' Personal Information

As indicated earlier, 50 students participated in the survey. Among this information the following was found from the study as for the respondents' personal data.

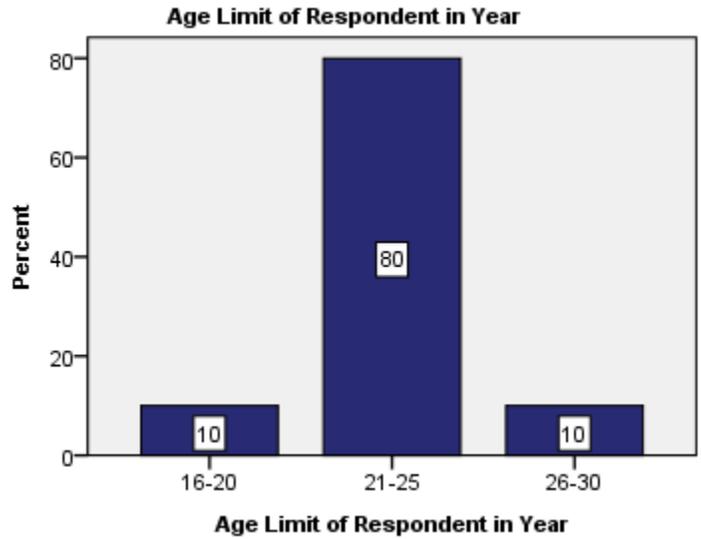


Figure 2: Survey participants' age limit
 From the figure as illustrated above, among the students, the largest respondent was from 21-25 years age group. The number of students from 21-25 age group was 40 (80%). The rest of the participants (10) were from 16-20 (5%) and 26-30 (5%) years age group respectively.

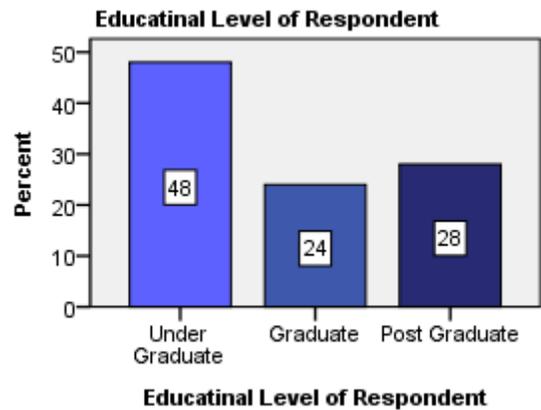


Figure 3: Survey participants' educational level
 As shown in the above figure, the largest group (24) was under graduate level. The second largest group (14) was post graduate. The third largest respondent (12) was from graduate level.

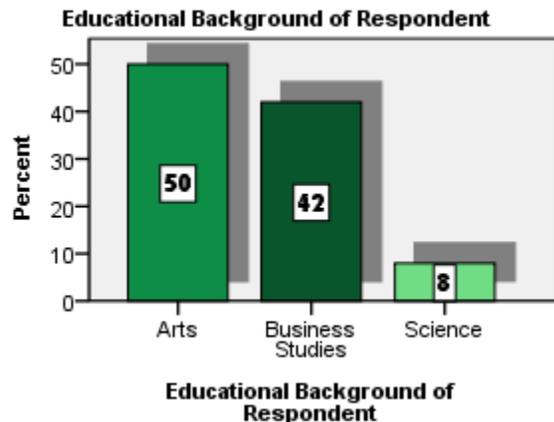


Figure 4: Survey participants' educational background

The largest group (25) was from the Faculty of Arts. The second largest group (21) came from the Business Studies Faculty. The third largest response (4) was from the Faculty of Sciences at Dhaka University.

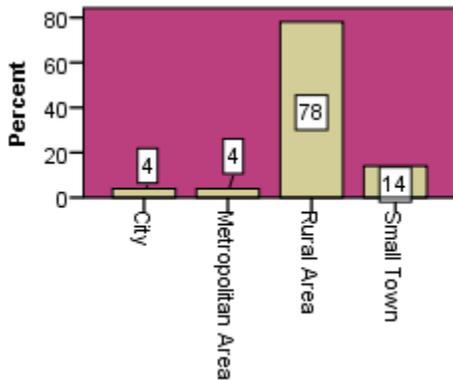


Figure 5: Survey participants' birth place

The largest number of participants (39) came from rural areas. The 2nd largest group (7) was from small towns. The rest groups are (2) from metropolitan area and the city area respectively.

6.2 Response to Students' Personal Computer Use

The respondents' given data are shown in the figure below for PC they use.

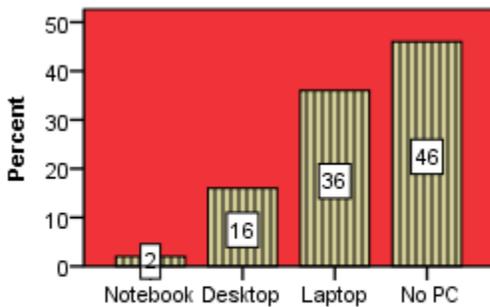


Figure 6: Survey participants' PC type

Among all respondents (27) who use PC include Laptop-18, Desktop-8 and 1 use Notebook.

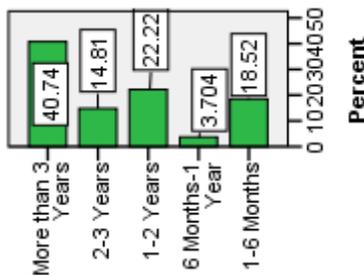


Figure 7: Survey participants' time duration of using PC

Among all respondents who have a PC (27) used time duration include highest usage of 40% more than 3 years, then 1-2 years of about 22%, 1-6 months of about 18%, 2-3 years of about 14%.

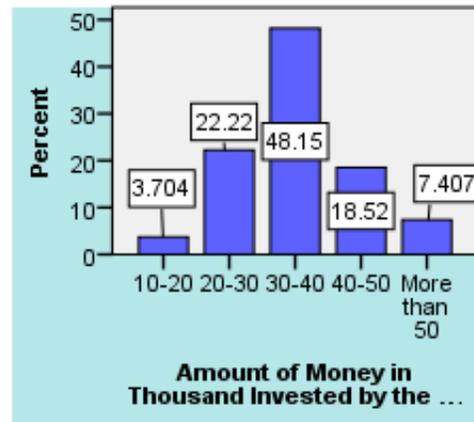


Figure 8: Survey participants' investment in purchasing PC

Among all respondents having PC spent the cost for purchasing the PC allowed highest number in TK.. 30,000-40,000 (about 48%), then 20000-30000 (22%) 40-50 thousands include 19%. The highest cost (50,000) incurred for 7% users.

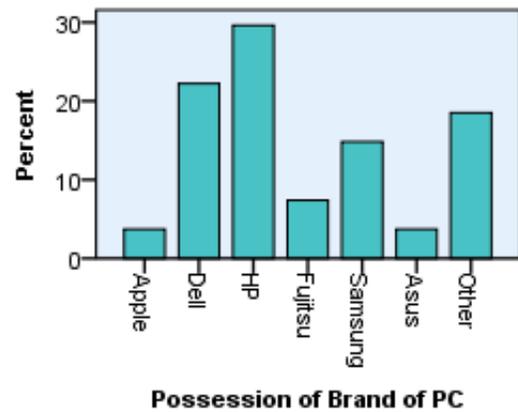


Figure 9: Survey participants' PC brand

The Participants use mostly HP brand (about 30%). Again, Dell (about 22%) and Samsung (about 15%) used by respondents. Other users use Fujitsu, Apple and more.

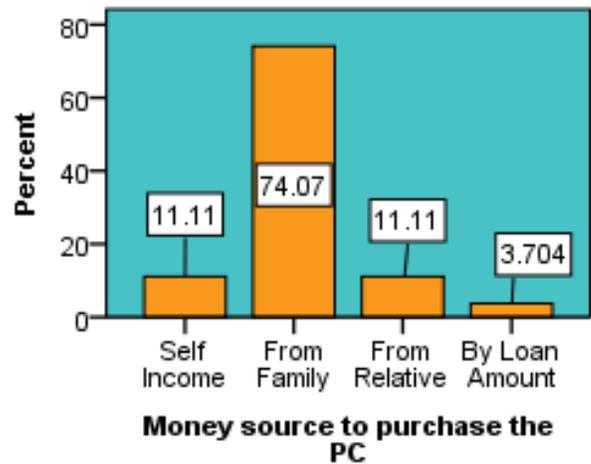


Figure 10: Survey participants' money source of buying PC

The users collected money for buying the PC mainly from family income (about 74%), self-income and relative (about 11%) respectively.

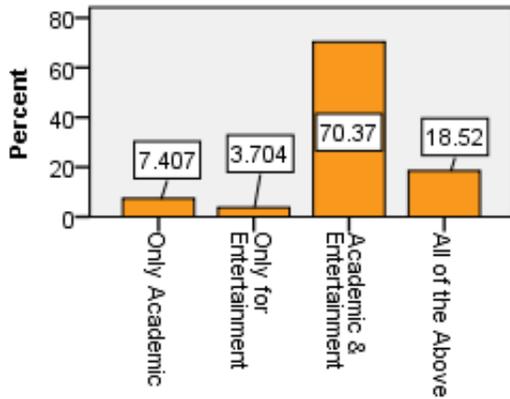


Figure 11: Survey participants' of using purpose

The users purchased the PC mainly for their academic and entertainment purposes (about 70%). Other purposes also include only for academic and only for entertainment and combination that are relatively low in percentage.

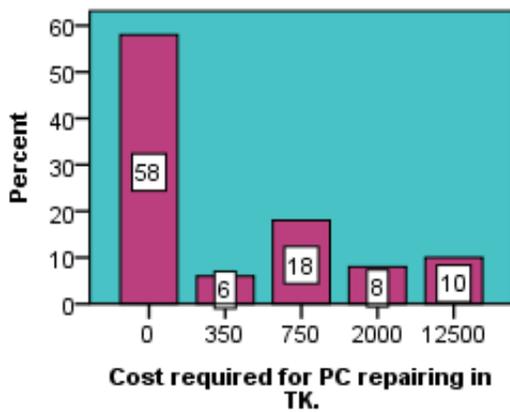


Figure 12: Survey participants' PC repairing cost

43% participants spent TK.. 500-1000 and 24% spent 1000-1500 for repairing their PC. Here, other amount also incurred.

6.2 Response to Students' Smart Phone Use

Among all respondents 32 (64%) students use Smart Phone. Other students don't have any SP. The other information regarding this tool is as follows:

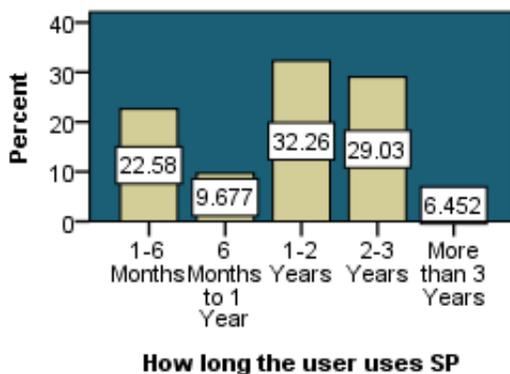


Figure 13: Survey participants' smart phone usage duration

The users having SP used maximum time of 1-2 (32%) years, 2-3 years (29%), 1-6 months (23%) and other time duration also has for using the SP.

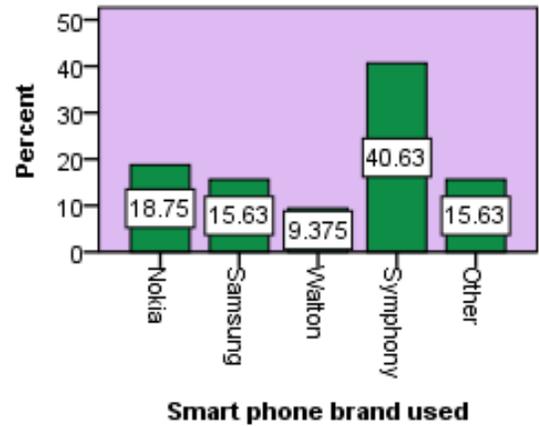


Figure 14: Survey participants' smart phone brand used

The Participants use mostly Symphony brand (41%). Again, Nokia (19%), Samsung (16%) and Walton (16%) used by users.

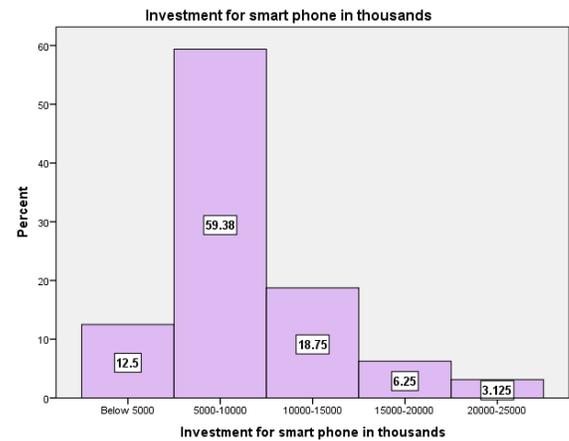


Figure 15: Survey participants' smart phone investment amount

Among all respondents the cost for purchasing the SP allowed highest number in TK.. 5,000-10,000 (about 60%), then 10-15 thousands (about 19%). Other amounts also incurred.

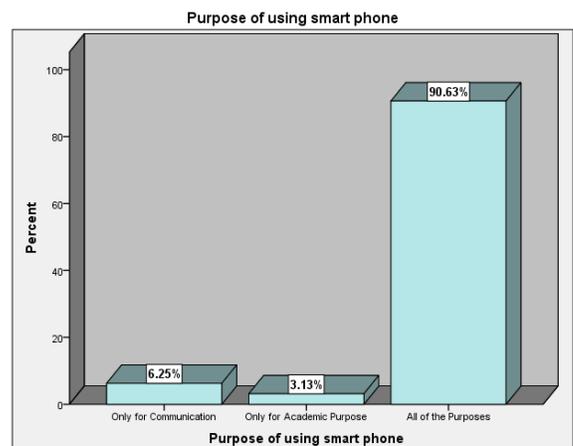


Figure 16: Survey participants' smart phone usage purpose

The users purchased the SP mainly for communication and academic purposes (about 91%) some purchase it only for communication and only for academic purposes.

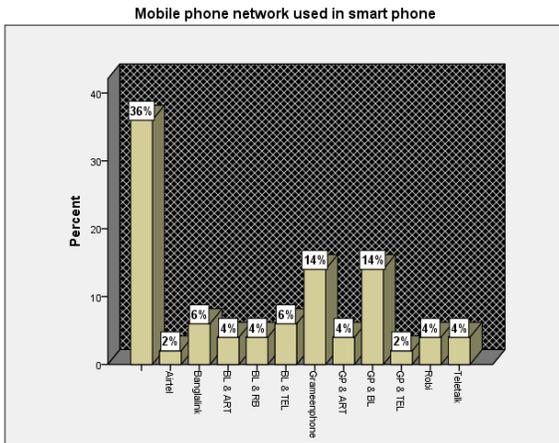


Figure 17: Survey participants' smart phone usage mobile operator
The highest number of users use only Grameenphone (7) mobile operator for their SP. Again, GP and BL used respectively by the users. After GP the users use only BL 3 for their network connectivity.

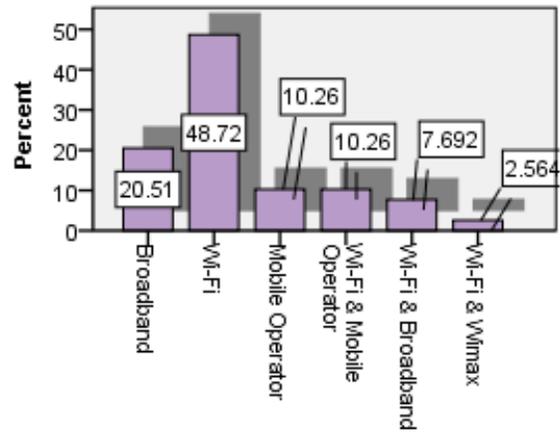


Figure 20: Survey participants' internet service provider
Among 39 participants, 49% use net through WiFi, 21% via broadband connection, 10% by mobile network and so on.

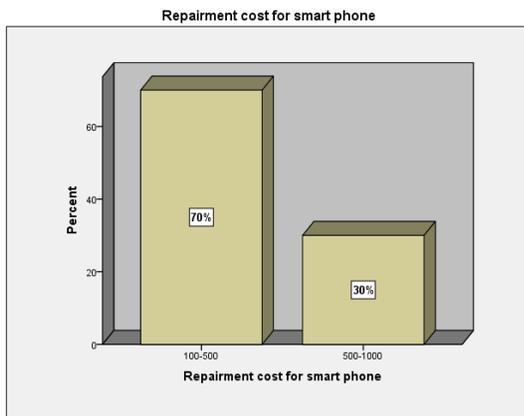


Figure 18: Survey participants' smart phone repairing cost
70% participants spent TK.. of 100-500 and the rest spent TK.. 500-1000 for SP repairing purposes.

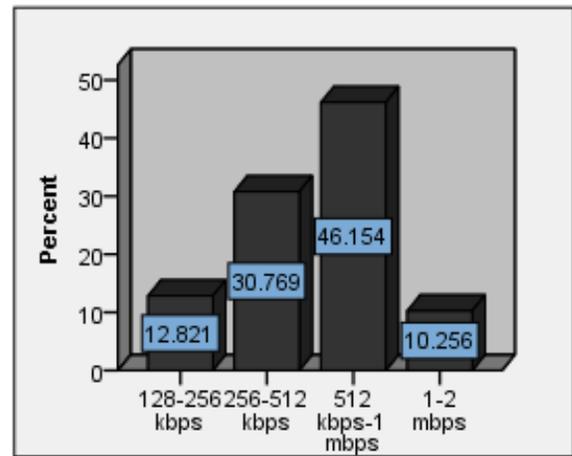


Figure 21: Survey participants' internet usage speed
Among 39 participants, mostly about 46% users use net through 512 kbps to 1 mbps, while others (31%) speed ranges from 256-512 kbps. The highest speed found in the survey, the respondent has a 1-2 mbps that is of 10%. Again still now students use low speed bandwidth of 128-256 kbps.

6.3 Response to Students' Internet Use

78% survey participants use net for different purposes while rest (22%) don't. Other information regarding net is as follows:

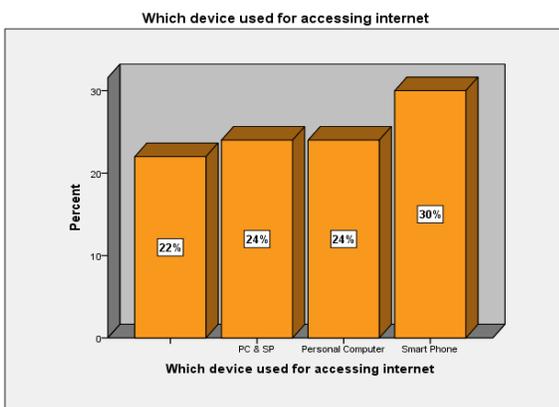


Figure 19: Survey participants' internet usage device
Among 39 participants 15 users use net on their SP while 12 students use it in their PC and other 12 use both of them.

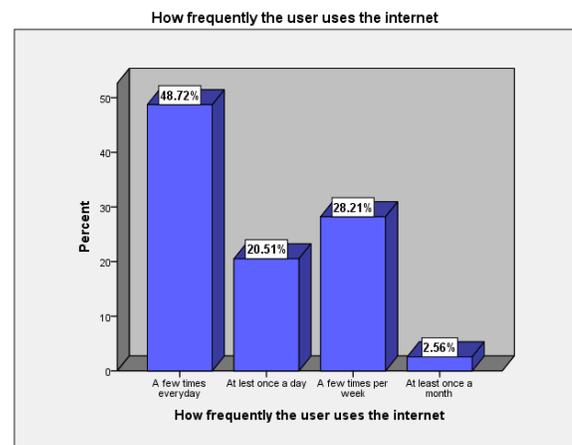


Figure 22: Survey participants' frequency of internet usage
Among all net users (39) mostly about 49% use net a few times every day, 28% at least once a day, 21% at least once a day, the rest (3%) at least once a month.

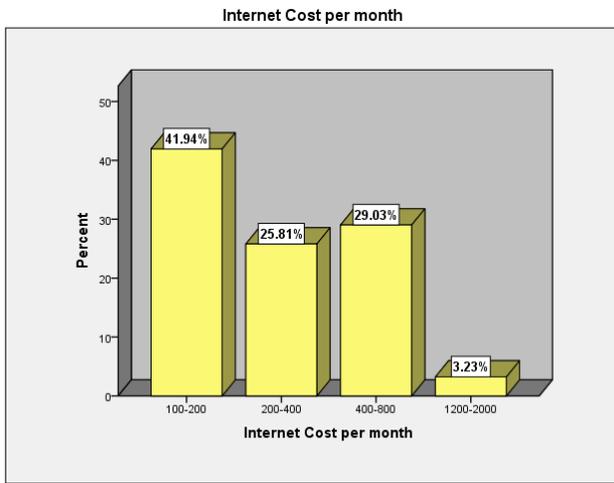


Figure 23: Survey participants' monthly Internet cost

Among 39 participants mostly about 42% users spent TK.. 100-200 in every month for using net, 29% spent TK.. 400-800, 26% spent 200-400, and the rest (3%) spent most 1200-2000.

6.4 Respondents' Satisfaction Level

The participants who participated in the questionnaire fill in all 50 (100%) agreed on a matter that IT investment is beneficial for their academic purpose. Again how IT is beneficial in study is illustrated below:

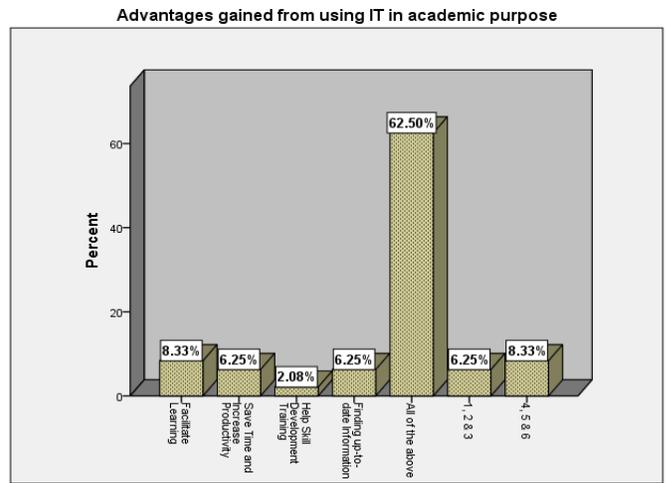


Figure 25: Survey participants' opinion for IT benefit in study

Mostly about 63% respondents think that IT is helpful in learning, time saving and productivity increasing, helping skill development, and finding up-to-date information. Some respondents check solely some of the boxes.

The respondents rated how IT is advantageous for their academic purposes. The rate is illustrated in the table below:

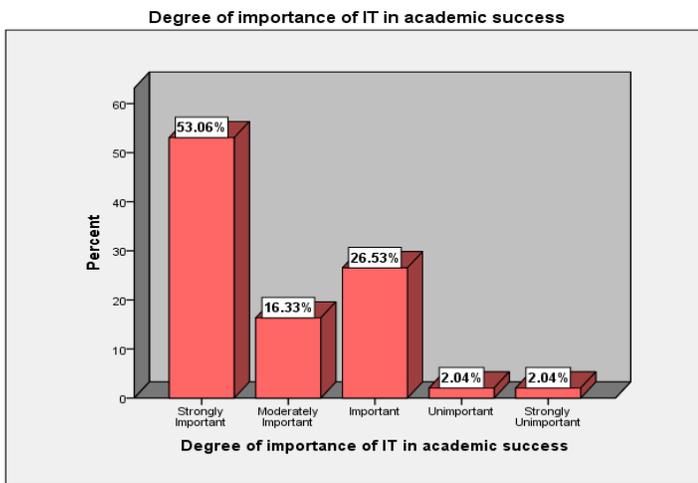


Figure 24: Survey participants' opinion for IT importance

Mostly 53% respondents agreed that IT investment is strongly important for their academic purpose. Again 27% agreed IT is important, 16% moderately important. Only 4% respondents think IT investment for academic purpose is not necessary and thus they check the unimportant and strongly unimportant box.

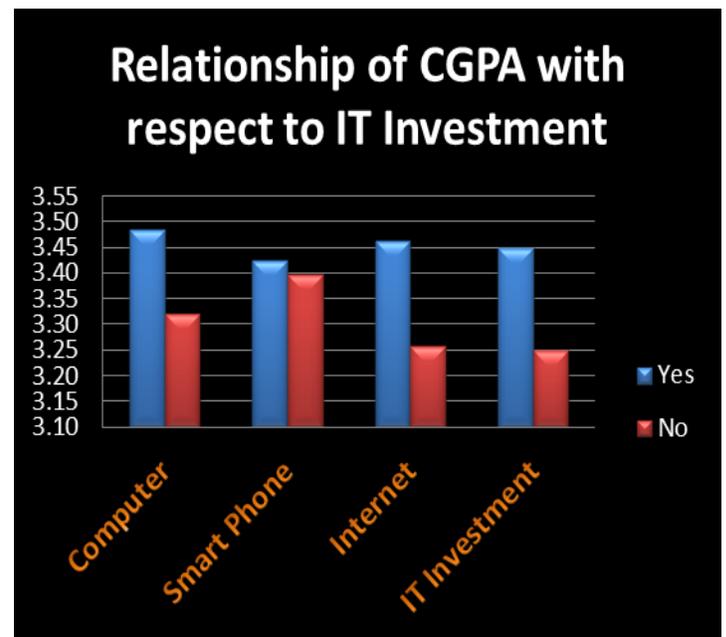


Figure 26: Graphical representation for the relationship of CGPA and IT investment

Table 1: Statistical calculation for the rate given by respondent

Statistics							
	Easy to search information rating	Improving study skills rating	Easier to access complete study rating	Easier to participate in class discussion rating	Helping increase knowledge rating	Increasing motivation towards completing study rating	Ensuring academic quality rating
N	50	50	50	50	50	50	50
Missing	0	0	0	0	0	0	0
Mean	5.74	5.24	5.38	4.84	5.62	4.64	5.68
Mode	7	5	7	7	7	4	7
Std. Deviation	1.322	1.271	1.510	1.683	1.244	1.535	1.236
Minimum	2	2	1	1	3	1	3
Maximum	7	7	7	7	7	7	7
Sum	287	262	269	242	281	232	284

Table 2: Statistical calculation for 1st year cost incurred for IT investment

Statistics						
	Cost for purchasing PC	Cost for repairing PC	Cost for purchasing SP	Cost for repairing SP	Yearly cost for using NET	1st year Total Cost IT investment
N	50	50	50	50	50	50
Missing	0	0	0	0	0	0
Mean (TK.)	19100	1567	5740	188	1805	28400

Table 3: IT pay-off in taka for 5 years

First Year Total Cost	4 Years Repairing Cost	4 Years Internet Cost	Total Cost
28400	7020	7220	42640
1 Year Total Including Return @ 14%	4 Years Total Incl. Return @ 20%	Total Return	
32376	55945	88321	
Total Return	88321		
Total Cost	42640		
Loss of Monetary Value for IT investment	45681		

Following is the comparison table of CGPA obtained by students who invested in IT and those who did not invested on it.

CGPA	Computer	Smart Phone	Internet	IT Investment
Yes	3.48	3.43	3.46	3.45
No	3.32	3.40	3.26	3.25

It is assumed that those who have CGPA of 3.45 will get job within at least 3 months before than those have CGPA of 3.25. So, the following table can be drawn based on this assumption:

3 Months' Salary	90000
Loss incurred for IT investment	45681
Profit incurred for IT investment	44319

Again those who have invested in IT will have higher technical knowledge than those who did not invest in IT. As a result the promotion will come earlier for IT investor than non IT investor. Finally, IT pays a lot off.

Table 4: IT pay-off

IT Cost	IT Return	IT pay-off
42640	90000	47360
42640	88321	45681
Investment Cost	Invest Return	Invest Profit

IT pay-off (3.94%) is more (+1,679) than investing otherwise.

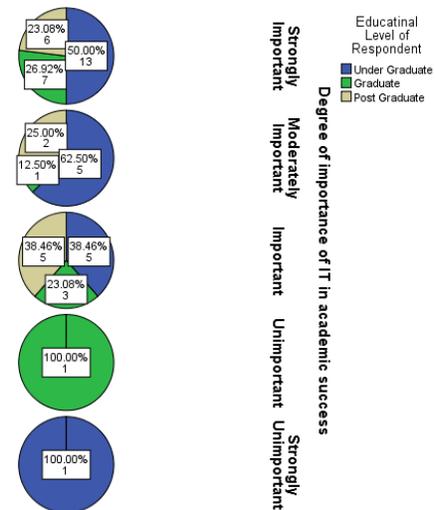


Figure 27: Graphical representation for the relationship of IT importance of education level

Among the 24 undergraduate students, 13 think IT is strongly important, 5 moderately important, 5 important, and the rest 1 think IT is strongly unimportant.

Among the 12 graduate students, 7 think IT is strongly important, 1 moderately important, 3 important, and the rest 1 think IT is unimportant.

Among the 13 post graduate students, 6 think IT is strongly important, 5 think IT is important and the rest 2 think it is moderately important.

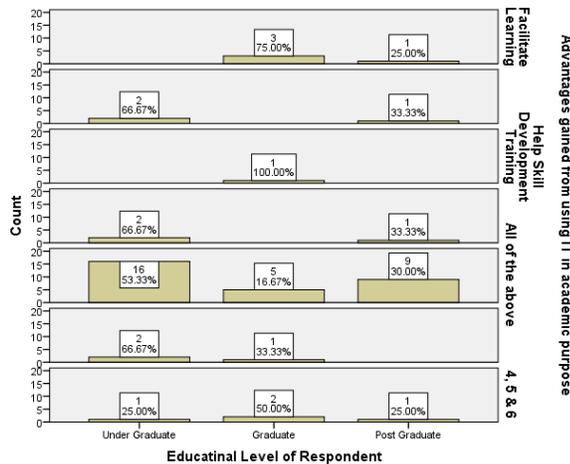


Figure 28: Graphical representation for the relationship of IT advantage and education level

Among the 23 undergraduate students, 2 think IT saves time & increases productivity, 2 IT helps finding up-to-date information, 16 all of the facilities, 2 facilitates learning, saves time & increases productivity and helps skill development training, and the rest 1 think IT helps in finding up-to-date information, assists research & increases grade.

Among the 12 graduate students, 3 think IT facilitates learning, 1 skill development, 5 all of the facilities, 1 facilitates learning, saves time & increases productivity and helps skill development training, and the rest 2 think IT is helpful in finding up-to-date information, assists research, & increases grade.

Among the 13 post graduate students, 1 think IT facilitates learning, 1 saves time & increases productivity, 9 all of the facilities, and the rest 1 think IT helps in finding up-to-date information, assists research, & increases grade.

6.5 Hypothesis Testing

Hypothesis 1:

Null hypothesis (H₀): Students who does not have a PC obtain less CGPA than those who did it.

Alternative hypothesis (H₁): Students who possess a PC obtains good CGPA than those who did not.

Table 5: Paired samples correlations

	N	Correlation	Sig.
Pair 1 Whether the Respondent has a PC or NOT & CGPA obtained by the respondent	36	.359	.031

Null hypothesis is rejected and alternative hypothesis of who invested in IT in purchasing PC has more CGPA than those who did not invest in IT is accepted as the Sig. value is less than 0.05 that means there is correlation between having PC and CGPA. Its interpretation says that with 96.9% confidence there is association between having a PC and CGPA and their relationship is 35.9%.

Hypothesis 2:

Null hypothesis (H₀): The improvement of academic performance (CGPA) is not dependent on using smart phone.
Alternative hypothesis (H₁): The improvement of academic performance (CGPA) is dependent on using smart phone.

Table 6: Paired samples correlations

	N	Correlation	Sig.
Pair 1 CGPA obtained by the respondent & Whether the Respondent has a Smart Phone or Not	36	.059	.734

Here, null hypothesis is accepted and there is no relationship between SP possession and the grade.

Hypothesis 3:

Null hypothesis (H₀): The improvement of academic performance (CGPA) is not dependent on using Net.

Alternative hypothesis (H₁): The improvement of academic performance (CGPA) is dependent on using Net.

Table 7: Paired samples correlations

	N	Correlation	Sig.
Pair 1 Whether the respondent uses internet or not & CGPA obtained by the respondent	36	.378	.023

Null hypothesis is rejected and alternative hypothesis of the improvement of academic performance (CGPA) is dependent on using Net is accepted as the Sig. value is less than 0.05 that means there is correlation between IT investment and CGPA. Its interpretation says that with 97.7% confidence there is association between IT investment and CGPA and their relationship is 37.8%.

Hypothesis 4:

Null hypothesis (H₀): Higher IT investment does not ensure better result.

Alternative hypothesis (H₁): Higher IT investment ensures better result.

Table 8: Paired samples correlations

	N	Correlation	Sig.
Pair 1 Total Cost occurred during 1st year of investing in IT & CGPA obtained by the respondent	36	.253	.136

Here, null hypothesis accepted as the Sig value is 0.136 that is greater than standard significance level of 0.05. As a result the association is poor of 25.3%. Now we assume that the tendency of investing more and more for making good result is not wise decision.

Hypothesis 5:

Null hypothesis (H₀): Without investing in IT securing good result.

Alternative hypothesis (H₁): Without investing in IT securing good result is not possible.

Table 9: Paired samples correlations

	N	Correlation	Sig.
Pair 1 Whether the respondent use IT or not & CGPA obtained by the respondent	36	.247	.146

Here, null hypothesis is accepted and there is some relationship (about 25%) relationship between IT investment by students and the good grade.

Table 10: Correlations with CGPA and PC

	CGPA obtained by the respondent	Whether the Respondent has a PC or NOT
CGPA obtained by the respondent	1	.359*
Whether the Respondent has a PC or NOT	.359*	1
	Pearson Correlation Sig. (2-tailed)	
	N	36
	Pearson Correlation Sig. (2-tailed)	
	N	36

*. Correlation is significant at the 0.05 level (2-tailed).

Table 11: Correlations of grade and smart phone

	CGPA obtained by the respondent	Whether the Respondent has a Smart Phone or Not
CGPA obtained by the respondent	1	.059
Whether the Respondent has a Smart Phone or Not	.059	1
	Pearson Correlation Sig. (2-tailed)	
	N	36
	Pearson Correlation Sig. (2-tailed)	
	N	36

Table 12: Correlations of grade and internet

	CGPA obtained by the respondent	Whether the respondent uses internet or not
CGPA obtained by the respondent	1	.378*
	Pearson Correlation Sig. (2-tailed)	
	N	36

Whether the respondent uses internet or not	Pearson Correlation Sig. (2-tailed)	.378*	1
	N	36	50

*. Correlation is significant at the 0.05 level (2-tailed).

Table 13: Correlations of grade and total IT cost

	CGPA obtained by the respondent	Total Cost occurred during 1 st year of investing in IT
CGPA obtained by the respondent	1	-.454
Total Cost occurred during 1 st year of investing in IT	-.454	1
	Pearson Correlation Sig. (2-tailed)	
	N	36
	Pearson Correlation Sig. (2-tailed)	
	N	13

Regression analysis

Table 14: regression model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.956 ^a	.913	.393	.18665

a. Predictors: (Constant), Advantages gained from using IT in academic purpose, Time of Using PC by the Respondent, Total Cost incurred during 1st year of investing in IT, How long the user uses the Smart Phone, Speed for net connection, Purpose of Using PC by the Respondent, Cost of buying SP, Degree of importance of IT in academic success, Net Cost per month, Purpose of using SP, How frequently the user uses the net, Total cost of IT Investment by the Respondent

Interpretation of R:

Here, the value of R= .956
There is a high degree of positive correlation among the independent and dependent variable.

Comment on model fitting:

Here the value of R² is .913.
So, 9% variation in dependent variable can be explained by the independent variables.

Interpretation of adjusted R² :

Here, the value of adjusted R² is .393.
Adjusted R² suggests that edition of other independent variables do not make a contribution in explaining the variation in the dependent variable.

Table 15: ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.734	12	.061	1.756	.420 ^b
	Residual	.070	2	.035		
	Total	.804	14			

a. Dependent Variable: CGPA obtained by the respondent
 b. Predictors: (Constant), Advantages gained from using IT in academic purpose, Time of Using PC by the Respondent, Total Cost incurred during 1st year of investing in IT, How long the user uses the SP, Speed of net connection, Purpose of Using PC by the Respondent, Investment amount for SP, Degree of importance of IT in academic success, Net Cost per month, Purpose of using smart phone, How frequently the user uses the net, Total cost of IT Investment by the Respondent.

Table 16: Coefficients_a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.488	1.347		3.332	.079
Purpose of Using PC by the Respondent	.029	.206	.050	.139	.902
Purpose of using smart phone	-.104	.148	-.337	-.702	.555
Speed for internet connection	-.207	.131	-.637	-1.581	.255
How frequently the user uses the internet	-.136	.149	-.473	-.912	.458
Total Cost occurred during 1 st year of investing in IT	1.157E-005	.000	-.501	-.740	.537
Time of Using PC by the Respondent	.008	.075	.046	.105	.926

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Amount of Money in Thousand Invested by the Respondent	.277	.178	1.057	1.556	.260
How long the user uses the Smart Phone	-.007	.105	-.035	-.066	.953
Investment for smart phone in thousands	-.106	.174	-.290	-.608	.605
Internet Cost per month	.095	.133	.352	.714	.549
Degree of importance of IT in academic success	.058	.100	.214	.583	.619
Advantages gained from using IT in academic purpose	-.044	.029	-.632	-1.527	.266

a. Dependent Variable: CGPA obtained by the respondent

Regression equation: CGPA = 4.488 + .029 - .104 - .207 - .136 - 0.00001157 + .008 + .277 - .007 - .106 + .095 + .058 - .044

7 RECOMMENDATIONS

Through the mixing and matching between the suggestions provided by the respondents and researchers' findings, the recommendations are summarized below:

- ▶ Teachers and the university authorities should encourage the use of IT to increase the broader spectrum of students' knowledge.
- ▶ Students should invest on those IT instrument that actually fit with his or her study needs.
- ▶ Parents and guardians of students should educate their wards towards appropriate use of IT while their wards studying at the university.
- ▶ Manufacturers of educational IT tools should enlighten the adolescence users of IT through their manuals and in

the spot training.

- ▶ Students should have to use IT instruments for their academic purposes properly.
- ▶ Students should have to use IT a limited amount of time that does not impact on their daily activities.
- ▶ Students should discard unnecessary android software that kills their important time.
- ▶ There should be rules and regulations against the use of IT, such rules should be well stated with appropriate measures and guidelines for its enforcement. This is important because, if allowed to be freely used by the student in the class rooms & others places would turn to be like market place or public square. It would also breed ill feelings among poor students who could not afford to purchase or lack the opportunity to purchase.
- ▶ Students should be guided and counseled on the use of IT at the point of entry for their academic program on the campus. This would require the services of the university guidance and counseling unit where they would be told how, when and why to use it. This is because they should know the advantages and disadvantages of appropriate time for using IT.
- ▶ Extravagant use of net can interrupt their study objectives. This should be stopped.
- ▶ Guardians should check their child's unnecessary chatting over computer and smartphone. Use of social media for a particular time and age should be strongly discouraged.

8 CONCLUSION

This study is essentially an exploratory type that aims to provide insightful analysis of IT investment by Dhaka University students rather investing in other cases. It has also provided preliminary analysis of available secondary data source.

As the data shows, all the respondents agree about the pay-off of IT in academic progress. The education system of developing countries might unarguably be the most prevalent beneficiary of the information technologies. IT is not just supplementary devices for developing countries, but these devices can play integral part of in their education systems. The IT provides access to modern society a massive amount of educational and learning resources. In developing countries PC and Smartphone can easily compensates the limited access of net and data access, which in turn help their infrastructure and education development.

Overall, research result shows that educators have positive attitudes towards IT as tools for learning in higher education to date. It is true, however, that students' attention in class needs to be managed by bring up a good idea to manage students' attention in the long run. It encourages professors and educators to design some portions of classes as technology on and other portions as technology off. The blessing of any technology depends on the best use of it. The common phenomenon is that most of the Dhaka University students seem to be unaware of the right use of PC, Smartphone and the Net.

Numerous researchers have pointed out measuring the impact

of technology use on student achievement is fraught with difficulties. Moreover, little reliable, valid, and cost-effective assessment exist that measure students' higher-order thinking skills, problem-solving ability, or capacity to locate, evaluate, and use information-skills that many researchers and teachers believe can be enhanced through technology use. Technology has also been shown to increase student motivation and engagement, prepare students for jobs, and enhance students' ability to work collaboratively, but people in developing countries have few, if any, tools and methods to measure impact in these domains. Thus, it is not surprising that the impact of technology on education continues to be debated by educators and researchers alike.

Debates aside, there is a substantial body of research that suggests that technology can have a positive effect on student achievement under certain circumstances and when used for certain purposes. However, there is no magic formula that educators and policymakers can use to determine if this return is actually worth the investment. Perhaps, rather than asking, "Is technology worth the cost?" the more important question is, "Under what condition does technology have the most benefits for students?" The research presented in this paper seeks to answer this question, and offers some suggestions that policymakers should seriously consider as they seek to enhance learning through technology use.

9 FUTURE STUDY

Some limitations of the present study should be noted. First, the sample is rather small and has employed simple statistical analysis. Second, participation of female respondent is not included in the study. Keeping these limitations in head, future research should investigate further analysis of IT use by students studying at different University of Bangladesh and its impact on academic performance.

10 ACKNOWLEDGMENT

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REFERENCES

- [1] A. Nortcliffe and A. Middleton, "Smartphone feedback: using an iPhone to improve the distribution of audio feedback", *International Journal of Electrical Engineering & Education*, vol. 48, no. 3, pp. 280-293, 2011. Available: 10.7227/ijee.48.3.6.
- [2] B. Woodcock, A. Middleton and A. Nortcliffe, "Considering the smartphone learner: developing innovation to investigate the opportunities for students and their interest", *Student Engagement and Experience Journal*, vol. 1, no. 1, pp. 1-15, 2012. Available: 10.7190/seej.v1i1.38.
- [3] C. Arthur and P. Brafii, "Internet use among students in tertiary institutions in the Sunyani municipality, Ghana", *Library Philosophy and Practice*, no. 859, pp. 1-16, 2013.
- [4] C. R. Bomhold, "Educational use of smart phone technology", *Program: electronic library and information systems*, vol. 47, no. 4, pp. 424-436, 2013. Available: 10.1108/prog-01-2013-0003.
- [5] C. Ringstaff and L. Kelley, *The Learning Return on Our Educational Technology Investment*. [S.l.]: Distributed by ERIC Clearinghouse, 2002.
- [6] H. Jian, F. Sandnes, K. Law, Y. Huang and Y. Huang, "The role of electronic pocket dictionaries as an English learning tool among Chinese students",

Journal of Computer Assisted Learning, vol. 25, no. 6, pp. 503-514, 2009. Available: 10.1111/j.1365-2729.2009.00325.x.

- [7] H. M. Alfawareh and S. Jusoh, "Smartphones usage among university students: Najran University case", *International Journal of Academic Research*, vol. 6, no. 2, pp. 321-326, 2014. Available: 10.7813/2075-4124.2014/6-2/b.48.
- [8] M. E. Hossain, "The Use of Smart phone in accessing information: a case of Dhaka University Students."
- [9] M. Lindahl and A. Folkesson, "ICT in preschool: friend or foe? The significance of norms in a changing practice", *International Journal of Early Years Education*, vol. 20, no. 4, pp. 422-436, 2012. Available: 10.1080/09669760.2012.743876.
- [10] M. Kumar, "Impact of the evolution of smart phones in education technology and its application in technical and professional studies: Indian perspective", *International Journal of Managing Information Technology*, vol. 3, no. 3, pp. 39-49, 2011. Available: 10.5121/ijmit.2011.3304.
- [11] N. S. A. Karim, S. H. Darus and R. Hussin, "Mobile phone applications in academic library services: a students' feedback survey", *Campus-Wide Information Systems*, vol. 23, no. 1, pp. 35-51, 2006. Available: 10.1108/10650740610639723.
- [12] S. Nam, "Evaluation of University Students' Utilization of Smartphone", *International Journal of Smart Home*, vol. 7, no. 4, pp. 175-182, 2013.
- [13] S. Sarraf, J. Brooks and J. Cole, "Taking surveys with smartphones: a look at usage among college students", in *Annual Conference for the American Association for Public Opinion Research*, California, USA, 2014, pp. 1-16.