ICT USAGE PATTERN AND PERCEPTION AMONG STUDENTS WITHIN BANGLADESH

Ruhul Amin, Md. Imran Sheikh and Md. Hossain Ali[12]

Abstract

ICT has appeared to play a crucial role in the enhancement of skills of pupils in academia, which is seen in the tertiary level education at its most. The present study aims at examining the perception and usage of ICT instruments, such as computer, smart-phone, and internet services and accessories for personal and educational purposes among the university students in Bangladesh. A sample of 300 students of undergraduate and graduate programs from 7 universities was constructed through 'Snow-Ball' technique. Questionnaire survey, following the personal interview method, was conducted to generate benchmark data. Survey data were analyzed through applying descriptive and inferential statistics. The outcomes of the study elicited that majority percentage of the students of the selected universities of Bangladesh use ICT for mostly personal and partly educational purposes though it is their belief that ICT instruments improve their academic capability, problem solving ability, and communication skills. Furthermore, correlation analyses showed that age, level of education, and place of residence have positive and significant level of association with most of the areas of ICT usage patterns. However, notable gender differences were not found in ICT usage pattern. Potential implications of these results are discussed in later section.

Keywords: Students, ICT, Usage Pattern, Perception, and Bangladesh

JEL Classification: L63, L86, C42

1. Introduction

The instruments, which are effectively used to create, collect, organize, process, and present data and information regardless of location and distance, are known as Information and Communication Technology (ICT) (Gay & Blades 2005; Dunmill & Arslanagic 2006; Blurton 1999). In line with this definition, it can be said that information technologies consist of all devices that assist us reach, process, and use knowledge (Sari 2014). However, ICT has already touched many aspects and changed the ways of our life (Schindler et al. 2017; Hossain & Haque 2013) through introducing abstract concepts (e.g., images, sounds, movement, animations, and simulations) to our life (Clark 1983; 1994). Particularly, it has become an undivided part of education and its

[12] Ruhul Amin is Lecturer of Management at the Jashore University of Science & Technology, Jashore, Bangladesh. E-mail: ruhulbsmrstu@gmail.com.

Md. Imran Sheikh is Lecturer of Management at the Jashore University of Science & Technology, Jashore, Bangladesh.

Md. Hossain Ali is Lecturer of Accounting and Information Systems at the Jashore University of Science & Technology, Jashore, Bangladesh.

impact on teaching, learning, and academic management is extensively accepted (Mahmood 2009; Jager & Lokman 1999) because ICT tool, particularly internet provides the members of academia (e.g., faculties, students, researchers) with a widespread access to both traditional and non-traditional sources of information (Mostofa 2011). In this way, the use of ICT devices ameliorates innovation, learning process, motivation, and academic success of students (Mir & Shakeel 2019; Sangrà & González-Sanmamed 2010; Sari 2014). ICT, therefore, is expected to enhance students' skills for cooperation, communication, problem solving, and lifelong learning in order to create future leaders (Plomp et al. 1996; Voogt 2004) through changing them into productive knowledge workers (Pelgrum et al. 1993). In light of the above discussed positive academic outcomes of ICT, it is expected from the students to develop ICT literacy skills (Gerick, Eickelmann and Bos 2017) because ICT has directly changed the nature of teaching and learning to the very extent cogitable (Kozma 1991; Dede 1996).

So, taking into considering the positive effects of ICT equipment, its usage rates are growing very fast in the European Union (Youssef & Dahmani 2008). Consistently, the Government of Bangladesh (GoB) is also engaging the academia in its pursuit of 'Digital Bangladesh.' The educational institutions, especially universities are making commendable contributions in the development of ICT in Bangladesh through increasingly using it in academic as well as administrative activities that acted as a catalyst for the use of ICT by the students as well (Miyan 2009; Bairagi *et* al. 2011; Huda *et* al. 2009). Thus, the universities in Bangladesh have become the pioneers in adopting and using ICT tools and techniques (Roknuzzaman 2006). As a result of these initiatives undertaken by the Government of Bangladesh, higher percentage of school and college going students of Bangladesh own and use different ICT devices (e.g., desktop, laptop, cellphone, iPOD, MP3 player) (Khalid 2011). However, research on actual ICT usage patterns among students, particularly university students is scarce in Bangladesh.

Therefore, the present study aims at assessing the perception and usage of ICT among selected university students of Bangladesh. This study differs from previous works performed in the context of Bangladesh in three ways. Firstly, it focuses on generating information as to the actual usage patterns of ICT among university students for their personal and educational activities. Secondly, it investigates the relationship of individual contributory factors (e.g., age, gender, type of residence, and educational background) with ICT usage pattern among students. Thirdly, it assesses the perception of ICT among the students in terms of the perceived advantages and scope of ICT as a resource in their personal and educational activities.

The rest of this paper is structured as follows. Section 2 reviews the existing past studies on ICT usage pattern and its perceived positive impact on students' academic life, whereas Section 3 is concerned with the methodology employed in this study. Data analyses and results are delineated in Section 4, while Section 5 enumerates discussion on major findings and their implications for practice. Section 6 points out some limitations and accordingly, provides directions for future research and finally, Section 7 draws conclusion.

2. Literature Review

2.1. Pattern of ICT Usage among Students

Mostofa (2011) conducted a study on ICT usage pattern among business students at Darul Ihsan University of Bangladesh and came up with the findings that 35 percent of the students use internet daily, 32 percent twice or three times a week, 10.9 percent twice or three times a month, 4.4 percent once in a month, 10.2 percent occasionally, and 7.5 percent rarely. This study also showed that 56.2 percent of the students use ICT devices (e.g., internet) for educational purposes. Consistently, a subsequent study by Senthil (2018) pointed out that lots of students use ICT instruments (e.g., internet and others) for academic purposes (e.g., to access their text books, reference books, and read daily newspapers) and to access the internet, most of the students use smart-phone (Apuke & Iyendo 2018; Senthil 2018).

A recent study on the impact of ICT on the academic performance of medical students within India revealed that most of the students had smart-phones and used ICT up to 3 hours a day. This study also depicted that 13.33 percent of the students use ICT tools (e.g., phone and laptop) for educational purposes, 9.33 percent for non-educational purposes, and 77.33 percent for both purposes (Mir & Shakeel 2019). So, keeping in view the above discussed research we can summarize that ICT diffusion level is increasing among the students around the world and they are using these ICT devices for both personal and educational purposes.

2.2. Perceived Impact of ICT on Students' Academic Life

Sari (2014) conducted a study on the influences of ICT usage patterns on learning process among the students of the department of computer and instructional teaching technologies of the American University and found that ICT-based education motivates the students and latterly, this motivation improves their academic performance. Furthermore, ICT devices improve the level of communication and interaction among the students, which was found from the subsequent work operated by Zweekhorst and Maas (2015). In line with these findings, Apuke & Iyendo (2018) depicted that students can use ICT tools and techniques (e.g., internet) for performing different academic related activities (e.g., conducting research, doing multiple homework, broadening the scope of learning, and uplifting peer learning, and examination preparation).

A recent study conducted by Senthil (2018) revealed that students' academic performance is influenced by their internet usage pattern. The relationship between ICT usage pattern (e.g., internet) and academic performance among students was empirically tested by some other researchers. For example, a very recent study by Mir & Shakeel (2019) found that possession of ICT devices (e.g., smart-phone and laptop) is negatively associated with students' academic performance. Moreover, time spent on ICT tools has moderate level of negative correlation with academic performance of the students. However, gender has significant level of positive correlation with academic performance. An earlier study in 2000 on gender differences in internet use patterns among introductory psychology students at Texas Tech University appeared with the finding that gender differences were found in ICT usage pattern. Specifically, females use ICT (e.g., internet) for communication and academic purposes, whereas, their male counterparts use ICT for amusement purposes (Weiser 2000).

2.3. Contribution to Knowledge

This literature review determines a gap in the study of ICT usage pattern and perception among university students of South Asian countries and particularly, Bangladesh. In the past, notable studies on the ICT usage pattern and its effects on the students' life were operated in USA (Sari 2014; Weiser 2000) and in India (Mir & Shakeel 2019). Henceforth, study on the ICT usage pattern among students is interesting in the context of Bangladesh. Considering this, a researcher (e.g., Mostofa 2011) conducted a study on ICT usage pattern among the university students of Bangladesh in narrow scale. Our study contributes to the existing literature review with the inclusion of comparatively more universities of Bangladesh. Moreover, the results of the correlation analyses of the study will help other researchers opt in significant variables when they conduct similar studies. This study is important because to the best of our knowledge, it is one of the few studies on the ICT usage pattern and its association with the individual contributory factors (e.g., age, gender, educational qualification, and place of residence) among students in the context of universities operating in Bangladesh.

3. Methodology

The research design adopted for this study is descriptive in nature; such designs are suitable for the cross-sectional type of study of a large variety (Kotahri 2006). However, we employed qualitative and quantitative data to generate the outcomes of present study. Secondary sources (i.e., journals, reports, conference proceedings, and books) were discussed to delineate the framework of the study. The benchmark primary data of the study was generated through survey using a respondent administered questionnaire. A sample of 300 university students from different public and private universities in Bangladesh was created following the 'Snow-Balling' approach for this purpose. Undergraduate and graduate level students from 5 public universities namely, University of Dhaka (DU), Bangabandhu Sheikh Mujibur Rahman Science and Technology University (BSMRSTU), Khulna University (KU), Jagannath University (JNU), and Jahangirnagar University (JU), and 2 private universities namely, Northern University (NU), and North South University (NSU) were included in the sample. The variables included in the study are age, gender, place of residence, level of education, and ICT usage patterns (i.e., time spent on computer and smart-phone, time spent on internet, type of internet connection used, purposes of the use of ICT, and per month expenditure for ICT facilities). The survey data were analyzed through the use of computer programs. Among the different analysis tools, descriptive statistics and correlation analysis were significant.

4. Projection of Data and Analyses

Table 1 below explains the characteristics of the sample elements. These sample elements were characterized by their age, gender, place of residence, and educational qualification. Among 300 respondents, the age group of 57% was ranged from 18 to 22 years and 43% from 23 to 27 years. The survey included 67.7% male and 32.3% female students. Of the respondents, 40% lived in sub-urban areas and 60% in urban areas. There were 208 under-graduate (69.3%) and 92 graduate students (30.7%).

Table no. 1 Characteristics of the study population, (n=300)

Particulars	Frequency	Percentage
Age		
18-22 years	171	57.0
23-27 years	129	43.0
Total	300	100.0
Gender		
Male	203	67.7
Female	97	32.3
Total	300	100.0
Place of residence		
Sub-Urban	120	40.0
Urban	180	60.0
Total	300	100.0
Level of education		
Undergraduate	208	69.3
Graduate	92	30.7
Total	300	100.0

Table 2 below shows the respondents' ICT usage patterns in terms of time spent on computer and smart-phone, time spent on internet, types of internet connection used, ICT usage purpose, and monthly internet expenses. Computer, laptop, and cell phones are one of the most important tools of ICT. Our study reveals that 59.7% of total respondents use computer and smart-phone up to 5 hours daily, 31.7% from 6 to 10 hours and only 8.7% use computer and smart-phone for more than 10 hours a day. Internet is another active service of ICT. Table 2 demonstrates that 79% use internet up to 5 hours a day and 21% for more than 5 hours daily. However, a student may use various modes to access internet (e.g., cell phone network, dial-up modem, Wi-Fi, and broad band connection). As the study shows that 36.3% of total respondents use cell phone networks for internet connection, 9% use dial-up modems, 9.3% use Wi-Fi networks, 4.3% use broadband cable connections, 8.3% use both cell phone networks and Wi-Fi networks, 10.7% use both cell phone networks and dial-up modems, 12.3% use both cell phone networks and broadband cable connections, only 4% respondents use all of the aforesaid modes for internet connection, and only 5.7% do not have any internet connection.

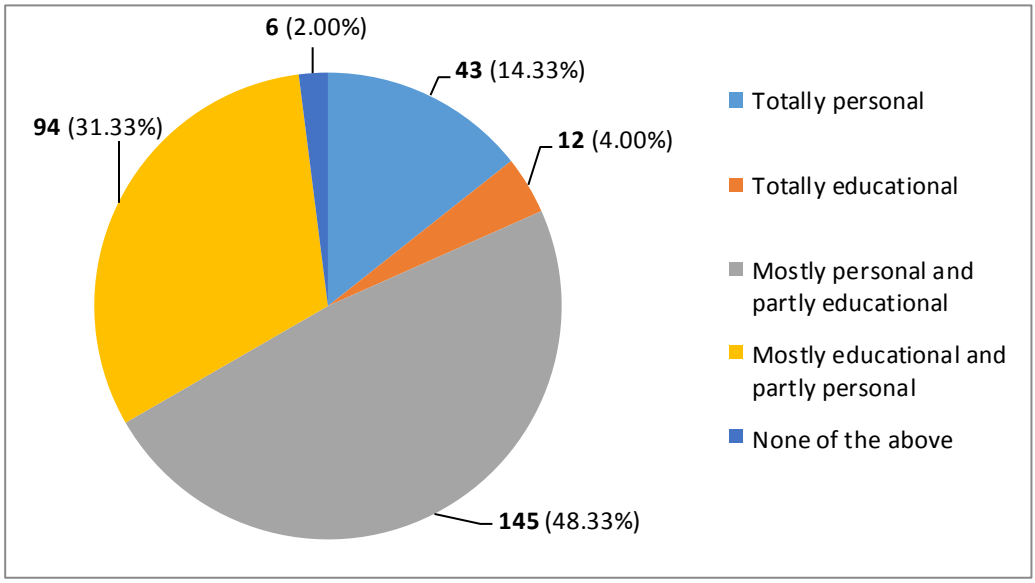
Table no. 2 ICT usage pattern among students in Bangladesh, (n=300)

Particulars	Frequency	Percentage
Time spent on computer and smart-phone in a day:		
Less than or equal to 5 hours	179	59.7
6-10 hours	95	31.7
More than 10 hours	26	8.7
Total	300	100.0
Time spent on internet in a day		
Less than or equal to 5 hours	237	79.0
More than 5 hours	63	21.0
Total	300	100.0
Type(s) of internet connection used:		
Only cell phone network	109	36.3
Only dial-up modem	27	9.0
Only Wi-Fi	28	9.3
Only broad band connection	13	4.3
All of the above	12	4.0
Cell phone network and Wi-Fi	25	8.3
Particulars	**Frequency**	**Percentage**
Cell phone network and dial-up modem	32	10.7
Cell phone network and broad band connection	37	12.3
None of the above	17	5.7
Total	300	100.0
Purpose of the use of ICT:		
Totally personal	43	14.3
Totally educational	12	4.0
Mostly personal and partly educational	145	48.3
Mostly educational and partly personal	94	31.3
None of the above	6	2.0
Total	300	100.0
Per month expenditure (in BDT) for internet usage:		
Less than or equal to 500 tk.	252	84.0
501-1000 tk.	46	15.3
More than 1000 tk.	2	.7
Total	300	100.0

Source: *Field Study*

University students use aforementioned ICT tools for different purposes. Among 300 students, 14.3% use ICT for totally personal purpose; only 4% for totally educational purpose; 48.3% use ICT for mostly personal and partly educational purpose; 31.3% for mostly educational and partly personal purpose and only 2% respondents do not use any ICT tools and techniques for any purpose. The expenditure for internet use varies from person to person. The results of the survey demonstrate that 84% of the respondents spend up to BDT 500 per month for internet use, 15.3% from BDT 501 to 1000, and only .7% spend more than BDT 1000 per month for internet use. The purpose of the use of ICT by the university students is graphically presented in the figure 1 below:

Figure no. 1 Purposes of the usage (value, percentage) of ICT, (n = 300)



From the table 3 below, it is found that respondents' age has significant level of positive correlation with their ICT usage patterns (i.e., time spent on computer and smart-phone in a day, time spent on internet in a day, and expenditure for internet use), whereas, age has no direct relationship with the types of internet connection used and purpose of use of ICT devices. These results signify that students from selected universities in Bangladesh with different age groups use ICT in different ways, specifically in terms of time spent on ICT tools (i.e., computer, smart-phone, and internet) and monthly expenditure for using internet.

Table no. 3 Correlation between age and ICT usage pattern, (n=300)

	Particulars	**Time spent on computer and smart-phone in a day**	**Time spent on internet in a day**	**Types of internet connection used**	**Purpose of the use of computer, smart-phone, and internet**	**Per month expenditure for internet use in BDT**
Age (18-22 or 23-27 years)	Pearson correlation	.170**	.142*	-.060	-.109	.160**
	Sig. (2 tailed)	.003	.014	.299	.060	.006
	Sum of squares and cross- products	366.100	212.140	-113.120	-64.320	24969.720
	Covariance	1.224	.709	-.378	-.215	83.511
	n	300	300	300	300	300

** indicates that correlation is significant at 1%
* indicates that correlation is significant at 5%

The table no. 4 below reveals that gender has significant negative correlation (-.128, i.e., -12.8% only) with time spent on computer and smart-phone in a day, and non-significant negative correlation with time spent on internet in a day, types of internet connection used, purpose of use of ICT devices, and per month internet expenditure. So, in light of the aforesaid results, it can be summed up that remarkable gender differences were not found in ICT usage patterns among the respondents.

Table no. 4 Correlation between gender and ICT usage pattern, (n=300)

	Particulars	**Time spent on computer and smart-phone in a day**	**Time spent on internet in a day**	**Types of internet connection used**	**Purpose of the use of computer, smart-phone, and internet**	**Per month expenditure for internet use in BDT**
Gender (Male or Female)	Pearson correlation	-.128*	-.071	-.081	-.011	-.098
	Sig. (2 tailed)	.026	.220	.163	.846	.089
	Sum of squares and cross-products	-65.608	-25.327	-36.137	-1.587	-3647.847
	Covariance	-.219	-.085	-.121	-.005	-12.200
	n	300	300	300	300	300

** indicates that correlation is significant at 1%

* indicates that correlation is significant at 5%

The outcomes of table 5 below demonstrate that respondents' place of residence is significantly and positively associated with their ICT usage patterns (i.e., time spent on computer and smart-phone in a day, time spent on internet in a day, types of internet connection, and per month internet expenditure). On the other hand, place of residence is negatively correlated with the purpose of use of ICT. In line with the above results, it is evident that students, living in sub-urban or urban areas, use ICT in different ways except in terms of the purpose of the use of ICT equipment.

Table no. 5 Correlation between place of residence and ICT usage pattern, (n=300)

	Particulars	**Time spent on computer and smart-phone in a day**	**Time spent on internet in a day**	**Types of internet connection used**	**Purpose of the use of computer, smart-phone, and internet**	**Per month expenditure for internet use in BDT**
Place of residence (Sub-Urban or Urban)	Pearson correlation	.128*	.187**	.150**	-.026	.299**
	Sig. (2 tailed)	.027	.001	.009	.657	.000
	Sum of squares and cross-products	68.500	69.600	70.200	-3.800	11607.800
	Covariance	.229	.233	.235	-.013	38.822
	n	300	300	300	300	300

** indicates that correlation is significant at 1%
* indicates that correlation is significant at 5%

The table 6 below comes up with the findings that level of education of the respondents has significant level of positive relationship with their ICT usage patterns (i.e., time spent on computer and smart-phone in a day, time spent on internet in a day, and monthly expenditure for internet use), while, it has non-significant level of negative correlation with the types of internet connection and purpose of the use of ICT devices. Consistent with the above mentioned results, it can be finalized that graduate and under-graduate students use ICT in different ways in terms of time spent on computer, smart-phone, and internet and monthly internet expenses.

Table no. 6 Correlation between level of education and ICT usage pattern, (n=300)

	Particulars	**Time spent on computer and smart-phone in a day**	**Time spent on internet in a day**	**Types of internet connection used**	**Purpose of the use of computer, smart-phone, and internet**	**Per month expenditure for internet use in BDT**
Level of education (Under Graduate or Graduate)	Pearson correlation	.308**	.296**	-.098	-.003	.158**
	Sig. (2 tailed)	.000	.000	.090	.955	.006
	Sum of squares and cross-products	155.433	103.907	-43.253	-.453	5779.187
	Covariance	.520	.348	-.145	-.002	19.328
	n	300	300	300	300	300

** indicates that correlation is significant at 1%
* indicates that correlation is significant at 5%

From the table 7 below, it is found that 46.3% of the respondents 'Strongly Agree' and 43% of the same 'Agree' that they freely spend money to avail ICT services, which constitutes nearly 90% of the total. This result implies that most of the students find ICT as an integral component of their academic and personal life.

Table no. 7 Perception about ICT among university students of Bangladesh, (n=300)

Particulars	Strongly agree N (%)	Agree N (%)	No Comment N (%)	Disagree N (%)	Strongly disagree N (%)
I willingly spend money to avail ICT facilities	139 (46.3)	129 (43.0)	18 (6.0)	11 (3.7)	3 (1.0)
The use of ICT enhances my academic skills and capabilities	144 (48.0)	133 (44.3)	21 (7.0)	2 (.7)	0 (0)
The use of ICT enhances my capability to solve the academic and personal problems	114 (38.0)	149 (49.7)	33 (11.0)	3 (1.0)	1 (.3)
The use of ICT enhances my skills and capabilities of communication	127 (42.3)	118 (39.3)	44 (14.7)	8(2.7)	3 (1.0)
The use of ICT provides access to sufficient information to fulfill my purposes	99 (33.0)	134 (44.7)	55 (18.3)	10 (3.3)	2 (0.7)
I prefer to use soft copies of documents over hard copies for their ICT compatibility	46 (15.3)	77 (25.7)	68 (22.7)	86 (28.7)	23 (7.7)
I believe that the use of ICT positively affects my academic and personal life	154 (51.3)	118 (39.3)	22 (7.3)	3 (1.0)	3 (1.0)

Source: *Field Study*

More than 92% of the respondents are in agreement (i.e., 48% and 44.3% respondents 'Strongly Agree' and 'Agree' respectively) that the use of ICT improves their educational skills and capabilities. Furthermore, nearly 88% of the respondents are in agreement (i.e., 38% and 49.7% respondents 'Strongly Agree' and 'Agree' respectively) that the use of ICT enhances their problem solving skills. ICT tools also improve the level of communication among the students (Zweekhorst and Maas 2015). Our study supports this by viewing that nearly 82% of the respondents conform that ICT usage augments their communication skills. In addition to the aforementioned positive outcomes, ICT (e.g., internet) also provides the members of academia with an extensive access to both conventional and non-conventional sources of information (Mostofa 2011). In line with this, our study puts up that more than 77% of the respondents concur that the use of ICT provides them access to enough information to accomplish their purposes (i.e., both academic and personal).

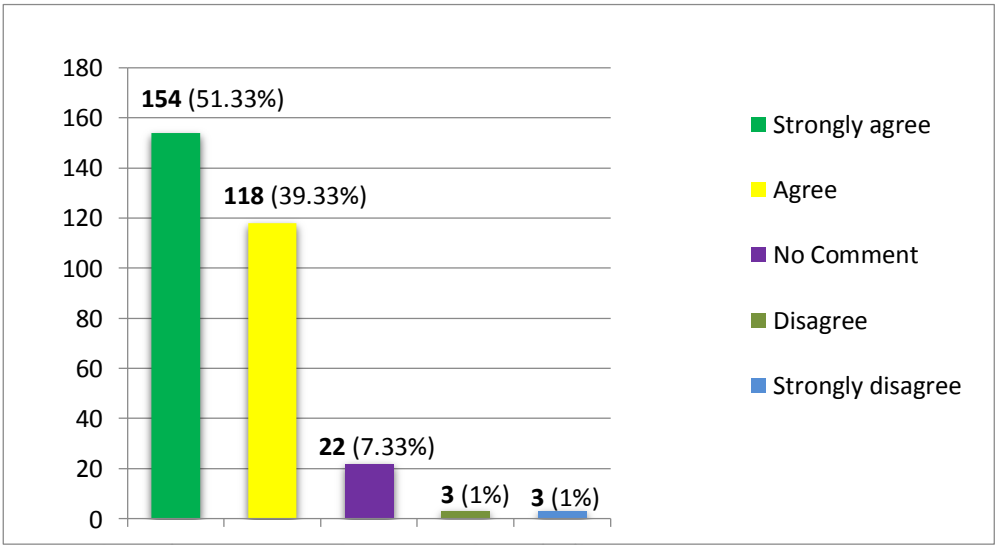
However, only 41% of the respondents agree that they prefer to use soft copies over hard copies of documents (e.g., books, articles etc.) for their ICT compatibility. Finally, more than 91% of the respondents agree on the positive effects of ICT equipment

on their both academic and personal life. The perception of the students towards the positivity of ICT is graphically presented in the figure 2 below:

5. Discussion and Implications for Practice

It is evident from the literature that ICT usage has incorporated various positive outcomes into our life, especially students' personal and educational life. Hence, it is the prime responsibility of the sovereign authority to ensure availability of ICT facilities across the country and afterwards, teachers, parents, and other helping hands should motivate the students to get engaged in rational and controlled ICT usage pattern. Taking the aforesaid imperative effects of ICT into consideration, the present study comes up with the actual usage pattern of ICT and its perception among university students in Bangladesh. Findings of this study have put forth some suggestions for the concerned stakeholders (i.e., government, ICT policy makers, teachers, guardians, and others concerned).

Figure no. 2 Perception about the positivity of the effects of ICT on academic and personal life (value, percentage), (n = 300)



First, an important finding of this study is that majority percentage of the selected university students of Bangladesh use computer, smart-phone, and internet on daily basis and they willingly spend money to use ICT. This scenario implies that ICT engagement level is increasing among the university students of Bangladesh. However, they believe that ICT usage improves their academic performance but most of them are using these instruments for personal and non-educational purposes. So, their actual usage pattern is not aligned with their perception. In regard to this, our study expects the influential stakeholders (e.g., teachers, parents, friends, government, NGOs) to extend their hands in order to create awareness among the students as to the positive outcomes of ICT usage in

academic fields and the negative results derived from the uncontrolled use of ICT devices as well (Mir & Shakeel 2019).

Second, positive and significant relationship between students' living place and ICT usage pattern was found in our study. This signifies that urban students' ICT engagement level is more than that of students living in sub-urban and rural areas. Henceforth, our study urges the Government of Bangladesh and private organizations to take steps in order to enhance ICT infrastructural facilities and expand internet services in rural and sub-urban areas as well because failure to do so will take notable portion of Bangladeshi population (i.e., rural and sub-urban) away from the blessings of ICT. However, our study did not find any citable direct and significant level of gender differences in ICT usage pattern among students. This finding is inconsistent with that of study operated by Weiser (2000).

Finally, looking into the students' perception about the positivity of ICT, our study appears with the result that ICT tools improve students' academic skills, problem-solving ability, and communication skills, which were perceived by most of the respondents of this study. This finding is also supported by previous research (e.g., Sari 2014; Zweekhorst & Maas 2015; Plomp *et* al. 1996; Voogt 2004). In this regard, students themselves should sketch a map in order to bring alignment between their perception and behavioural pattern about ICT.

6. Limitations and Directions for Future Research

Limitations do exist in all research. So, it would not be appropriate to state that our findings are applicable to all universities operating in Bangladesh. The limitations associated with this study are mentioned here. First, the sample volume of this study is not adequate to generalize the results. This study surveyed only 300 university students with the inclusion of only seven universities in Bangladesh. So, more studies are required to examine the result of the study by covering many more universities of Bangladesh.

Second, the present study has elucidated only the positive aspects and outcomes of ICT equipment but irrational and uncontrolled use of ICT elicits various negative outcomes (Mir & Shakeel 2019). So, this study leaves some light for conducting future research by looking on the negative aspects and effects of ICT tools on students' academic and personal life. Finally, this study did not investigate the relationship of ICT usage pattern with the students' academic performance. Future research, therefore, needs to be conducted by focusing on the impact of ICT usage pattern on the academic performance of the university students.

7. Conclusion

The outcomes clearly showed that there is a notable level of positive perception and attitude among the respondents about the capabilities and impacts of ICT in developing skills and knowledge among themselves. With the positive perception about ICT equipment, usage level of ICT is augmenting among the students of the selected universities of Bangladesh. However, the digital contents are yet to be widely accepted as the preferred most study material (i.e., text books) among the students. Moreover, a lion portion of the respondents use ICT for mostly personal and partly educational purposes. In respect of this,

our study with the above discussed suggestions turns up as a torch bearer for the students. Thus, this study is a significant platform to understanding actual usage pattern and positive perception of ICT among university students in a developing country.

References

1. Apuke, O.D., & Iyendo, T.O., (2018), "University students' usage of the internet resources for research and learning: Forms of access and perceptions of utility." *Heliyon* 4: 1-34.
2. Bairagi, A.K., Rajon, S.A.A., and Roy, T., (2011), "Status and role of ICT in educational institution to build digital society in Bangladesh: Perspective of a divisional city, Khulna." *International Journal of Advances in Engineering & Technology* 1(4): 374-383.
3. Blurton, C., (1999), *New directions of ICT use in education*. World communication and information report, UNESCO.
4. Clark, R.E., (1983), "Reconsidering research on learning from media." *Review of Educational Research* 53: 445-449.
5. Clark, R.E., (1994), "Media will never influence learning." *Educational Technology Research and Development* 42(2): 21-29.
6. Dede, C., (1996), "Emerging technologies and distributed learning." *American Journal of Distance Education* 10(2): 4-36.
7. Dunmill, M., and Arslanagic, A., (2006), *ICT in Arts Education: Literature Review*. Auckland: University of Canterbury.
8. Gay, G., and Blades, R., (2005), *Information Technology for CXC CSEC*. UK: Oxford University Press.
9. Gerick, J., Eickelmann, B., & Bos, W., (2017), "School-level predictors for the use of ICT in schools and students' CIL in international comparison." *Large-scale Assessments in Education* 5 (5): 1-13. DOI:10.1186/s40536-017-0037-7.
10. Hossain, M.A., and Haque, M.Z., (2013), "Perception and usage level of Information Communication Technology (ICT) at personal and professional arena by the lawyers in Bangladesh." *Dhaka University Journal of Business Studies* 34 (2): 171-186.
11. Huda, S.S.M., Tabassum, A., and Ahmed, J.U., (2009), "Use of ICT in the private universities of Bangladesh." *International Journal of Educational Administration* 1(1): 77- 82.
12. Jager, A.K., and Lokman, A.H., (1999), "Impacts of ICT in education: The role of the teacher and teacher training." *European Conference on Educational Research*. Lahti, Finland, 22-25 September.
13. Khalid, Md. Saifuddin, "Digital divide between teachers and students in urban bangladesh." *5th International Technology, Education and Development Conference.* Valencia: International Association of Technology, Education and Development (IATED), 2011. 2010-2020.
14. Kothari, C.R., (2006), *Research Methodology: Methods and Techniques*. India: New Age International.
15. Kozma, R., (1991), "Learning with media." *Review of Educational Research* 61: 179-221.
16. Mahmood, K., (2009), "Gender, subject and degree differences in university students' access, use and attitudes toward information and communication technology (ICT)." *International Journal of Education and Development using Information and Communication Technology (IJEDICT)* 5(3): 206-216.

17. Mir, S.A., & Shakeel, D., (2019), "The impact of information and communication technologies (ICTs) on academic performance of medical students: An exploratory study." *International Journal of Research in Medical Sciences 7(3):* 904-908.
18. Miyan, M.A., (2009), "Improving efficiency of the private universities." *The New Nation*, January 02 Friday.
19. Mostofa, S.M., (2011), "Internet access and use among business students of a private university of Bangladesh: A survey." *Annals of Library and Information Studies* 58: 79-86.
20. Pelgrum, W.J., Janssen Reinen, I.A.M, and Plomp, Tj., (1993), *Schools, Teachers, Students, and Computers: A Cross-National Perspective*. Twente, Netherlands: IEA.
21. Plomp, T, ten Brummelhuis, ACA, and Rapmund, R. (1996), *Teaching and learning for the future.* Report of committee on multi media in teacher training (COMMITT), Dutch Ministry of Education, Culture and Science, Den Haag, Netherlands: SDU, 68.
22. Roknuzzaman, M., (2006), "A survey of internet access in a large public university in Bangladesh." *International Journal of Education and Development using Information and Communication Technology (IJEDICT)* 2(3): 86-105.
23. Sangrà, A., & González-Sanmamed, M., (2010), "The role of information and communication technologies in improving teaching and learning processes in primary and secondary schools." *ALT-J, Research in Learning Technology* 18(3): 207-220. DOI: 10.1080/09687769.2010.529108.
24. Sari, A., (2014), "Influence of ICT applications on learning process in higher education." *Procedia - Social and Behavioral Sciences* 116: 4939-4945.
25. Schindler, L.A., Burkholder, G.J., Morad, O.A., and Marsh, C., (2017), "Computer-based technology and student engagement: A critical review of the literature." *International Journal of Educational Technology in Higher Education* 14: 1-28. DOI: https://doi.org/10.1186/s41239-017-0063-0.
26. Senthil, V., (2018), "Does the more internet usage provide good academic grades?" *Education Information Technology* 23:2901–2910.
27. Voogt, J., (2004), Consequences of ICT for aims, contents, processes and environments of learning. *Curriculum Landscapes and Trends* (pp.217-236). Dordrecht, Netherlands: Springer.
28. Weiser, E.B., (2000), "Gender differences in internet use patterns and internet application preferences: A two-sample comparison. " *Cyber Psychology & Behavior* 3(2): 167-178.
29. Youssef, A.B., & Dahmani., M., (2008), "The impact of ICT on student performance in higher education: Direct effects, indirect effects and organisational change." *RUSC. Universities and Knowledge Society Journal* 5 (1):45-56.
30. Zweekhorst, M., & Maas, J., (2015), "ICT in higher education: Students perceive increased engagement." *Journal of Applied Research in Higher Education* 7(1): 2-18; https://doi.org/10.1108/JARHE-02-2014-0022.