The Academic
International Journal of Multidisciplinary Research

An Online Peer Reviewed / Refereed Journal
Volume 4 | Issue 5 | May 2026
ISSN: 2583-973X (Online), SJIF IF: 5.6
Website: www.theacademic.in

Impact of ICT on Students' Academic Performance in Indian Universities: An Empirical Study

Dr. Abdul Wahid Farooqi

Associate Professor, Department of Commerce, Zakir Husain Delhi College, University of Delhi (DU),

Email - drabdulwahid12@gmail.com

DOI : https://doi.org/10.5281/zenodo.20606748

ARTICLE DETAILS

Research Paper

Accepted: 19-05-2026

Published: 10-06-2026

Keywords:

Online, Blended, Higher Education Institution, Information and Communication Technology, e-Learning Academic Performance, pedagogy-centered technology.

ABSTRACT

E-learning is a new concept and approach to education that has brought rapid dissemination of knowledge and communication technology. The present study primarily focused on assessing the impact of e-learning on higher education institutions, especially universities. The present study was conducted in the post-COVID-19 era. In this study, an attempt is made to depict. The real scenario of e-learning platforms within the government universities in Delhi. This study is academically significant and useful to the learners because, by this study, we can understand and analyze e-learning service quality factors. In order to understand the emerging issues and bottle/necks related to e-learning implementation in the Delhi state. This study will create more insight among the learners' perception on quality education regarding e-learning. The prime objective of the present research is to evaluate the performance and quality of education among the teachers and learners using e-learning technologies. Another significant objective of the present study is to measure the key e-learning service quality dimension of traditional learning methods, such as personal instruction, with the learners who have had to adopt and switch over to online mode because of the need to work from home. E-learning is a learning situation that comprises of information and communication technologies(ICTs) as a major and popular platform for teaching and learning process. It is also regarded as

pedagogy-centered technology. An online learning system is a digital platform created to help distance learning and education. It includes course management, content delivery, evaluation, collaboration, reporting security, and data protection. The major aspect NEP2020 has emphasized is how to utilise this new technology to pave the way to education. The present study also intends to achieve the following objectives: a. To identify and study the emerging trends of e-learning in higher education institutions. b. To measure the impact of service quality of e-learning. c. To understand the various determinants of e-learning in higher education institutions in Delhi. The present research will be equally useful to government as well as HEIs, policymakers, etc. for developing new policies of online, blended programs under various disciplines. An exploratory, descriptive, and conceptual research methodology is used to accomplish its objectives. The information was basically obtained from secondary sources and primary data through a survey method.

1. Introduction

In today's world, education with the availability & relevance of various information and communication technological (ICT) tools is providing new and exciting opportunities to both students and teachers. Higher educational institutions have been investing heavily in acquiring educational technology in teaching, learning, and research for the last two decades. In the University's context, ICTs became inevitable and have their implications. Universities play an important role in the diffusion of ICTs as well as in the spreading of technological change. In India, the history of ICT inculcation in higher education is not new. The government, through various reforms, acts as a key catalyst for the acceptance and adoption of technology in higher education. India's educational system is utilizing the honorable ICTs incorporation in the form of satellite technology, open source software, digital libraries, simple to perform human-computer interfaces, regional language interfaces, etc., in order to reach the farthest of places. E-learning started to gain momentum and is getting promoted across the country by the community service centres (CSCs) (Bhattacharya & Sharma, 2007). In many academic debates, the academic achievement of students remains central. One puzzling question is whether the technology has a significant impact on the academic performance of students and provides sufficient returns to

education. Many researches has been done to answer this question at various empirical and theoretical levels. They mainly faced two difficulties; firstly, students' academic performance is hard to measure, and there is a lot of confusion about its definition. Secondly, ICTs are developing gradually, and they cannot be isolated from their environment. As a result, the relationship between usage of ICTs and students' academic performance is still unclear and provides contradictory results in the literature (Youssef & Dahmani, 2008).

2. Literature Review

This section provides a review of the findings from earlier studies related to attitude, access, and practice of ICT in university education and their impact on academic performance of university students. The educational importance of ICT is gaining the attention of research scholars around the globe, and a number of studies have been carried out to examine the relationship between technology and the quality of higher education. In the first body of literature, emphasis was given on measuring the impact of computers on students' achievements. However, with the revolution of internet, a shift has been noted in the literature where focus has been given to measuring the impact of online activities such as- use of wikis, blogs, internet, digital devices, educative online platforms, etc., but very few studies have investigated the impact of attitude, access and practice of ICT on university student's academic performance. Also, most of these studies provided a mixed result, where a few researches demonstrates that there is no significant role of ICTs in higher educational context. There are several factors that affect the adoption of ICT in education, namely attitude, access, and practice of ICT which are discussed below.

2.1 Attitude towards ICT

According to Smith et al. (2000), ICT attitude can be referred to as a person's general feeling toward computers, ICTs, and activities related to the internet. Wilkinson and Schilt (2008) define ICT attitudes/attitude towards ICTs as the ways in which people react to ICTs, their thinking and demeanour, and their reaction to the ICT change initiatives. A lot of attention has been given to students' attitudes towards internet tools because their attitudes and performance on such tools will determine the introduction of ICT materials in the future (Abedalaziz et al., 2013). If a student's attitude towards the internet is positive, then it will lead to increased success in learning activities (Tuncer et al., 2013) and is a prerequisite for success of Internet-based instructions (Wu & Tsai, 2006). Islam and Fouji (2010), conducted a study and provided that student's attitude towards ICT based learning is not positive, they are not taking it a tool for enhancing their overall academic performance and that there exists a very weak positive relationship between uses of ICT by students and their performance in higher educational

context. Shaw (1999) provided that first-year students shown to have a more positive attitude towards ICT-based learning as compared to second and final year students as they were not comfortable with ICTs, want more personal contact and will prefer to study in a more traditional classroom setting.

2.2 Access to ICT

Today's ICTs – including cell phones, personal digital assistants (PDAs), laptops connected to wireless networks, low cost video cameras, etc. are available at reasonable price, and became integrated in all the sections of society throughout the world. Other mobile devices like tablets and iPads have much potential and can be incorporated into the teaching-learning processes and help improve students' performance (Haydon et al., 2011; Cohen, 2012; Sullivan, 2013). There is little local academic research on ICT access, specifically in the higher educational context. We have noted that research considerations related to access to ICT are disappearing from investigations; for example, recently, in two higher educational studies in the U.S., it was assumed that access to technology is in place (Allen & Seaman, 2003; Jones, 2002). Kozma (2008) provided that some studies showed a positive relation between access to computers and students' educational attainment, whilst other studies provided no correlation between the two. However, all the students should have equitable ICT access so as to develop higher-order thinking skills, in meaningful authentic tasks.

2.3 Usage/Practice of ICT

There are several ways in which ICTs can be used by teachers to teach students such as the use of computers, mobile phones, conferencing, e-newspaper, e-mail, blogging and a lot more. With the help of these ICT tools, information can be processed, stored, accessed, and spread wherever necessary (McGorry, 2002). There are several studies which have investigated the relation between usage pattern of emails and learning outcome of students and provided that e-mail application uses leads to enhanced the student's learning; it has also provided that usage of other ICT tools such as iPads, leads to enhanced task time as compared to the ordinary independent practices. Khan et al. (2015) found out that there exists a small positive relationship between ICT usage and students' academic performance and that there are some ICTs that are related positively to academic performance while some others are not. To date, there is no consensus as to the effect of ICT usage on academic performance, although reports by any popular media would suggest that there exist negative impacts of usage of technology among youth (Young, 2002).

2.4 Impact of ICT on Higher Education

During the last two decades, many researchers have focused on the direct link between the usage of ICTs and students' academic performance. Where theoretical arguments provide a strong rationale for ICT usage in education, in reality, its usage depends on the fact that in practice, it positively impacts teachers, learners and the learning. For example, Kachala and Bialo (2000), provided that student's achievement was significantly affected when engaged in technology-rich learning environments in all domains from pre-school to high school, regular and special students, and also leads to improved learning attitude and enhanced self-esteem. International Institute for Communication and Development (IICD) in their study found out that when students were exposed to educational technology – 80% felt more empowered and aware and 60% stated that the teaching-learning process was directly and positively affected with ICT usage. In past studies, researchers failed to recognize ICT's impact on the students' success and could not provide the clear impact of ICTs on overall teaching-learning effectiveness in the higher educational context. Thus, the impact of ICT usage on university students' academic performance is still questionable.

3. Need for the Study

During the past few decades, innovative uses of technology have changed the face of education. Owing to ICT practices, teachers' teaching and students' learning styles have notably changed and their Attitude, Access, and Usage/Practice are getting new dimensions. There are inadequate studies that consider all the factors of ICT, i.e., attitude, access and practice (AAP), which are necessary to examine the overall impact on students' academic performance in Higher Educational Institutions. Furthermore, very few research studies have used Structural Equation Modelling (SEM) for describing the relationship between the factors (i.e., attitude, access and practice) of ICT and its impact on Higher Education. Thus, this study attempted to describe the relationship via SEM Methodology and draw upon some meaningful conclusions.

4. Research Objectives

The following research objectives have been framed in the present study :

- To examine the relationship between students' attitude towards ICT and its impact on Higher Education.
- To study the relationship between students' access to ICT and its impact on Higher Education.

- To examine the relationship between students' usage/practice of ICT and its impact on Higher Education.

5. Hypotheses of the Study

Based on the research model (see Figure 1), the following null hypotheses have been framed

- Null Hypothesis (H1): There is no significant relationship between attitude towards ICT and impact on Higher Education (HE).
- Null Hypothesis (H2): There is no significant relationship between access to ICT and impact on Higher Education (HE).
- Null Hypothesis (H3): There is no significant relationship between the usage of ICT and its impact on higher education (HE).

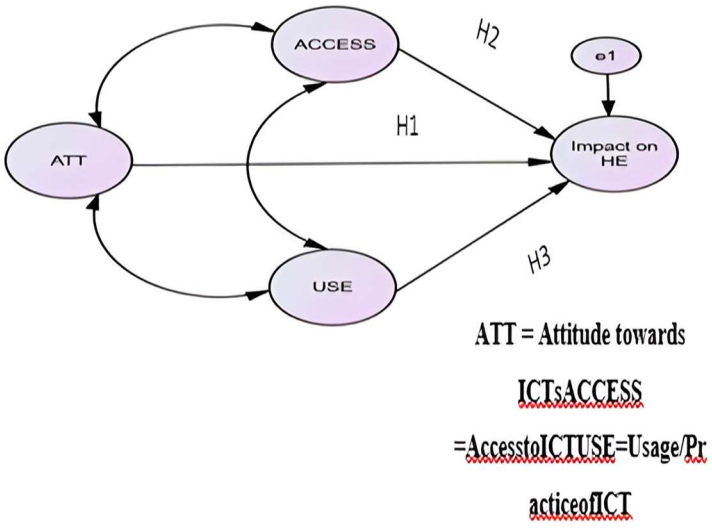

Figure 1: The research model

6. Methodology

6.1 Research Design

The present study has adopted the survey method and descriptive research design, describing the current ICT practices among the students of seven government universities in Delhi. The study attempts to

describe the students' attitudes, access, and practices of ICT in the process of learning. Structural Equation Modeling (SEM) using Analysis of Moment Structures (IBM SPSS AMOS v. 26.0) software was used for determining the relationship between students' attitude, access, practice of ICT, and impact on higher education. As suggested by Anderson and Gerbing (1988), the present study used a two-step procedure in the SEM analysis, wherein at first the measurement model was evaluated, followed by the structural model. For missing values and outliers, the data was screened in the Excel sheet itself.

6.2 Sampling and Population

The survey was conducted in seven pioneering government universities in Delhi, namely – Delhi University (DU), Delhi Technological University (DTU), Jawaharlal Nehru University (JNU), Jamia Milia Islamia (JMI), Jamia Hamdard (JH), Guru Gobind Singh Indraprastha University (GGSIPU) and Ambedkar University Delhi (AUD) during the month May and June, 2021. Since all the universities have adopted ICTs in educational processes, the data have been collected from all seven government universities in Delhi for better representation and a holistic view on the subject. The final sample size consists of 226 students from 7 government universities from Delhi. Table 1 provides a few details regarding the sample composition of respondents who finally participated in the research. Female respondents were more than male respondents where 28.8% were male while 71.2% were female. 77.4% of the respondents were in graduation, and 22.6% were in post-graduation. By taking up students from different educational levels, we can understand the variations in perceptions and usage of ICT.

Table 1: Sample description

Total	DU	DTU	JNU	JMI	JH	GGSIPU	AUD
226	40	30	32	35	35	28	26
100%	17.7%	13.3%	14.1%	15.5%	15.5%	12.4%	11.5%

6.3 Measures

The present study used a closed-ended questionnaire for collecting data from students of selected universities. The variables used in the study have been derived from the previously validated works, such as those conducted by Maheshwari (2013) and Karamati (2016). Four-point and five-point Likert Scales were used. For ATT and IMPACT on HE, the measurement scale ranges from "5" strongly agree to "1" strongly disagree. For USE, the measurement scale ranged from "5" most often to "1" never, and for ACCESS, the four-point Likert Scale ranged from "4" always to "1" never. The final version of the tool

comprised of the questionnaire divided into five parts as follows: Demographic details; Attitude towards ICT; Access to ICT; Practice of ICT; ICT impact on learning. The Survey was administered for collecting quantitative data through social media platforms such as WhatsApp, Facebook and LinkedIn. Convenience sampling, a non-probability technique, was used for data collection. Before the analysis was performed, the scoring for all items was reversed.

7. Data Analysis

7.1 Assumptions of Normality

The normality of the data set using AMOS is the first and main assumption before building the CFA model and checking its fit indices. Researchers generally report the skewness and kurtosis of such data. However, Byrne and Van de Vijver (2010) opined that for data to be normally distributed, the skewness should be within a value range of ±2, while its kurtosis should be within a value range of ±7. In the present study, Table 2, depicting the results of skewness and kurtosis analysis performed on each of the items that measures the constructs of our study and the results indicated that both the skewness and kurtosis values are well within the specified limits.

Table 2: Assumptions of Skewness and Kurtosis for normality of study data

Contstruct	Item	Mean	Standard Deviation	Skewness	kurtosis
Attitude	1	4.38	0.758	-1.751	4.810
	2	3.95	0.894	-0.959	1.294
	5	4.10	0.930	-1.207	1.699
Access	12	2.473	1.0421	-0.95	-1.180
	13	2.487	0.9717	-1.68	-0.982
	14	2.500	1.0760	-0.65	-1.256
Usage/Practice	1	4.009	1.3165	-1.113	-0.29
	2	3.518	1.3604	-0.561	-0.834
	5	3.960	1.2519	-0.994	-0.067
	7	3.796	1.2660	-0.910	-0.111
	8	3.951	1.2009	-1.087	0.381
	14	3.996	1.2596	-1.163	0.310

ICT Impact on HE	4	4.040	0.9156	-1.271	2.141
	5	3.827	0.9575	-0.935	0.879
	7	4.106	0.9509	-1.466	2.585
	8	3.982	0.9332	-0.958	0.808
	9	4.080	0.9057	-1.172	1.687

Table 2 also provides the respective means and standard deviations associated with students' responses on all the variables used in our study. Among all the constructs, indicators for Access to ICT seem to have the lowest mean ratings, which can be interpreted as a low level of ICT access among students. The highest mean rankings are among the indicators for Attitude, Usage, and ICT Impact on HE, indicating that students have positive attitudes towards ICT and they want to use it more to increase its overall impact on Higher Education.

8. The Measurement/CFA Model

The Confirmatory Factor Analysis was performed on 43 items in the survey instrument, and in the final analysis, only 17 items were retained (See Annexure-I). The measurement/CFA model of the present study has a sufficient number of valid indicators for each construct. In assessing the CFA/measurement model, each construct should have a minimum of three indicators and the respective loading for each indicator should be above 0.50 (Hair et al., 2010). As shown in Table 3, there are at least three indicators for each of the constructs investigated, also, the loading of each indicator is well above the cut-off value of 0.50.

Table 3: Reliability of CFA Model

Scale	**No. of items**	**Items**	**Factor loadings**	**Crobach's Alpha(α)**	**Composite Reliability (CR)**
Attitude	3	Opinion 1 Opinion 2 Opinion 5	0.763 0.794 0.702	0.717	0.727
Access	3	Access Access Access	0.851 0.897 0.787	0.816	0.833

Usage/practice	6	PC1 PC2 PC3 PC4 PC5 PC6	0.741 0.767 0.779 0.793 0.802 0.782	0.892	0.887
ICT Impact on HE	5	Impact4 Impact5 Impact7 Impact8 Impact9	0.614 0.718 0.783 0.850 0.810	0.870	0.874

8.1 Reliability of measurement model

Reliability refers to the consistency of a measure. The reliability of constructs in the CFA model can be computed via two main measures, i.e., Cronbach's alpha (α) & Composite Reliability (CR). Cronbach's Alpha value of 0.70 and above is regarded as a reliable and consistent scale (Hair et al, 2017) and Composite Reliability (CR) should be above the cut-off level of 0.70 (Pallant, 2010; Gefen et al, 2000; Fraenkel, Wallen & Hyun, 2012; Hair et al, 2017). Table 3 shows that each and every construct has Cronbach's alpha and composite reliability values well above the cut-off value of 0.70; in this way, the reliability of the constructs is ensured.

9. The Structural Model

Figure 2 shows the structural model on the impact of ICT among students in Indian institutions of higher education. In this model, we have three exogenous variables (i.e., ATT, ACCESS AND USE) and one endogenous variable (i.e., IMPACT on HE). With only 17 indicators, this model has validly explained the impact of ICTs on students' academic performance while satisfying all the model fit criteria. The present study has used absolute and incremental fit indices to measure the overall fitness in relation to the baseline model. These include CMIN/DF score if less than 2 is considered very good. CFI is the most widely used index; a value of over 0.90 is considered very good. RMSEA, which indicates a badness of fit index, and its value should be less than 0.08. GFI should be greater than 0.80. In Table 4, fit statistics

of structural model indicates: CMIN/DF is 1.901, calculated Goodness of Fit Index (GFI) value is 0.903 and is greater than 0.90, Adjusted Goodness of Fit Index (AGFI) value is 0.869 and is greater than 0.80; Comparative Fit Index (CFI) value is 0.945 thus, represents it as a good fit. The RMSEA value is 0.063, which is less than 0.08 and indicates it is a perfect fit. Thus, the structural model has met with all the criteria for its fitness, indicating the stability of the model in all theoretical parameters.

Table 4: Model Fit Acceptable Values for Structural Model

CMIN/DF	CFI	GFI	TLI	IFI	RMSEA	AGFI
1.9012	0.945	0.903	0.934	0.946	0.063	0.869

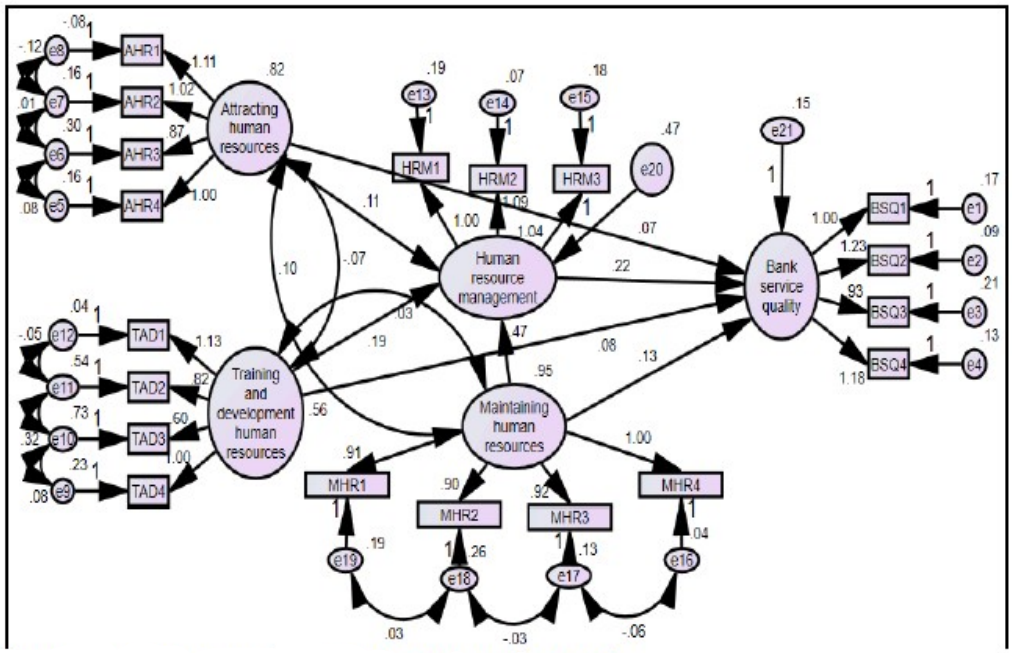

Figure 2: Structural Model on the impact of ICT among Students in Indian Institutions of Higher Education

10. Test of the structural model/Path Analysis

Table 5 elucidates the structural relationships among the variables of the study. Hypotheses H1 and H3 postulate that attitude towards ICT and practice of ICT have a positive impact on Higher Education. The

direct path is ATT. The impact on HE is significant since the Pearson correlation, r = 0.456, with t-value of t = 6.009 and p<0.01 (see Table 6). Therefore, the hypotheses, H1 is supported, which means that attitude towards ICT has a significant positive direct impact on HE. Moreover, the direct path USE. The impact on HE is significant since the Pearson correlation, r = 0.127, with t-value of t = 2.823 and p<0.01, and hence hypothesis H3 is also supported, which means that the practice of ICT has a positive direct impact on HE. However, the direct path, ACCESS. Impact on HE is not found to be significant since r = 0.048, with t-value, t = 1.039 and p>0.05, hence the hypothesis, H2 is not supported. The test results of the structural model have provided that two out of three hypotheses of our study (H1 and H3) are supported here. Attitude towards ICT and usage/practice of ICT shown to have significant impact on Higher Education. However, H2 is not supported by this model, which indicates that access to ICT has no significant influence on Higher Education.

Table 5: Hypotheses testing using SEM/ Path Analysis

Path	Unstandardized coefficient	t- value	P- value	Standardized coefficient	Result
H1: ATT Impact on HE	0.456	6.009	***	0.555	Reject Null Hypotheses(H1)
H2:ACCESS impact on HE	0.048	1.039	0.29 (NS)	0.068	Fails to reject Null Hypotheses(h2)
H3:USE Impaact on HE	0.127	2.823	0.005***	0.199	Reject Null Hypotheses(H3)

*****p<0.01,NS = not significant**

11. Discussion and Conclusion

The SEM (Structural Equation Model) analysis has explained the role of two exogenous variables, i.e., student's attitude towards ICT and usage of ICT in determining ICT impact on higher education. These findings are consistent with position of studies such as Maheshwari (2013); Mothibi (2015); Sosin et al (2004); Ullah et al (2019); Kulik (2003); Islam and Fouji (2010), which provides that student's attitude and usage of ICT had a significant positive impact on their academic performance. Impact on HE is highly affected by students' attitude towards ICT and usage of ICT was more affected by their attitudes

and access to ICT which in turn have an impact on Higher Education. There are several factors that can have an effect on access to ICT facilities such as need, interest, availability, economic conditions, peer influence, belief, organizational policies and knowledge and attitude of technology provider. However, the exogeneous variable – access to ICT has an impact on higher education is not supported in our study and these findings are in line with the study conducted by Wurst et al (2008); karamati (2016); Fairlie and London (2012); Becta (2006), which provided that mere access to ICT shown to have no impact on student's academic performance but types of uses are more important however, it improves student's digital skills. Also, in our sample, we found out that more than 50 % of the students reported having a PC/laptop at home, but it does not provide any empirical association with their educational achievement. Hence, the impact of 'access to ICT facilities' on academic performance of students is strongly determined by their specific uses, therefore it would be more insightful to examine the intensity of time spent on different types of ICT gadgets within a definite time-period (e.g., within a week) and see their effect on academic achievement of students. Although only 20% of the variance in student's academic performance is explained by their attitude towards ICT, access to ICT, and practice of ICTs, it can be interpreted that there are some other important explanations regarding 80% of the variance in students' academic performance. Today, most of the reputable researchers in the academic field will agree that there can never be a direct link because academic performance is mediated by several environmental factors and ICT is just one part of that environment. Many researchers have tried to identify and remove the mediated effect of other elements on the learning environment and found that it is impossible to remove the effects entirely. Some additional dimensions, such as the cognitive or moral development of students, also need to be studied. Moreover, the exploration of ICT usage's impact on the university student's development is still at the outset. Further research is required to determine the suitability of the findings of this study in the context of students in different types of institutions, demographic groups, and academic programs.

12. Implications

In the present study, we have attempted to depict the real scenario of ICTs within the government universities in Delhi in terms of attitude, access, usage/practice, barriers, impact on higher education, and solutions/opportunities, which have rarely been examined in the mentioned literature. This research is important to graduate and postgraduate educators and researchers in lengthening their awareness and perspective about real aspects which have an effect on ICT adoption, availability and usability, crises and solutions to the crises that are faced by them in the educational institutions. This study is academically important and beneficial for them because there exists very little experimental-based research that

focuses on numerous factors of ICT awareness and implementation in the institutions of higher education and research. Students ought to allocate their personal budgets in acquiring ICT devices for their deployment in educational activities so as to improve their academic performance. Similarly, it puts a responsibility on higher educational institutions to invest more in ICT devices for enhancing the access both in-campus and off-campus, in response to complementing the student's efforts which all emphasised on full utilization of ICTs potential in improving academic performance. The overall AAP of ICT should be increased among the students. Universities should make appropriate policies and guidelines for the effective utilization of ICT for achieving educational excellence.

References

- Byrne, B. M., & Van de Vijver, F. J. R. (2010). Testing for measurement and structural equivalence in large-scale cross-cultural studies: Addressing the issue of non-equivalence. International Journal of Testing, 10(2), 107-132. doi: 10.1080/15305051003637306.
- Cohen, S. (2012). Apps meet the Common Core State Standards in writing. Teacher Librarian, 40(2), 32-39.
- Cotten, S. R., McCullough, B., & Adams, R. (2011). Technological influences on social ties across the lifespan. Handbook of lifespan psychology, 647-671.
- Fairlie, R.W., & London, R.A. (2012). The Effects of Home Computers on Educational Outcomes: Evidence from a Field Experiment with Community College Students. The Economic Journal, 122(561), 727-753.
- Fornell, C.G., & Bookstein, F.L. (1982). Two structural equation models: LISREL and PLS applied to consumer exit-voice theory. Journal of Marketing Research, 19(4), 440-452.