

FROM ICT ADOPTION TO ICT ADDICTION: THE MEDIATING FACTORS BETWEEN THE USE OF ICT AND LEARNING PERFORMANCE

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ABSTRACT

Information and communication technology (ICT) has emerged as a catalyst for development across the globe. Although ICT has been determined as a tool to enhance academic performance in the past, recent studies discuss the negative consequences of ICT addiction among students. ICT addiction has subsequently led to a new dilemma: whether or not to allow students to access ICT. This study attempts to identify the mediating factor(s) between the use of ICT and learning performance of students. In this research, data has been collected from a sample of 336 students studying business management at different universities in Bangladesh. The study applied the partial least squares (PLS) and structural equation modeling (SEM) tools to identify the factors that influence learning performance. The statistical results confirm that academic self-efficacy strengthens the relationship between the use of the Internet and learning performance. The outcome also identifies that professional Internet use is a stronger predictor of learning performance than general Internet use. These findings are useful for educators, policymakers, parents, and practitioners to enhance students' learning performance in Bangladeshi universities. The paper concludes by suggesting avenues for future research.

Keywords: ICT, Academic Self-Efficacy, Internet Use, Learning Performance, ICT Addiction, Bangladesh

1. INTRODUCTION

Earlier studies have quite extensively advocated for the increased use of ICT for enhancing students' performance. Such a stance resides in the fact that, several studies have identified a positive association between the use of ICT and students' performance¹⁻⁵. In contrast, recent literature sheds light on addiction to ICT and its negative impact on students' performance⁶⁻⁸. Few studies have found a lack of association between the use of ICT and students' performance.⁹⁻¹³ Furthermore, some studies have concluded that ICT has a negative impact on students' performance. These researchers point to the fact that students are distracted by social media apps (Facebook or WhatsApp) while in class.¹⁴⁻¹⁶ These studies also add that, rather than being attentive in class, students were found paying more attention to their virtual world. Under such circumstances, it is difficult to measure the direct impact of ICT on students' performance. One must not ignore the fact that several studies have also credited ICT as one of the key

development indicators that contribute to better performance.¹⁷ Therefore, previous research implies that we should not forbid students from using ICT; rather, there could be other underlying variables that mediate the role between the use of ICT and students' performance. This study endeavors to investigate these mediating variables by employing Internet use as an element of ICT and collected primary data from 336 respondents who are studying at different universities in Bangladesh.

In the meta-analysis, Kulik³ argues that, on average, students who have used ICT-based instruction performed better on the examinations than those students without computers. Furthermore, he adds that these students learned more in less time and enjoyed their classes more when the ICT-based teaching was incorporated. Sosin et al.⁴ analyzed a database of 3,986 students from 67 sections of introductory economics in the United States and found a significant impact of ICT use on students' performance. Woessmann and Fuchs⁵ analyzed data from the Programme for International Student Assessment (PISA) and revealed that the correlation between the availability of ICT and students' performance is positive when other characteristics of the student environment are taken into account. Cheung and Huang² demonstrated that more Internet use among university students leads to better perception of learning performance. Jackson et al.¹ found a positive relationship between Internet use and academic performance among children. Furthermore, Gil-Flores et al.¹⁸ explored the relationship between the extracurricular experiences of students on the use of the Internet and their performance in the Program for International Student Assessment by focusing on student competency in digital reading. Zhu et al.¹⁹ also suggested that a significant relationship exists between Internet information seeking and academic performance among high school students; thereby, their studies revealed a positive relationship between Internet use and academic performance among children. Kim et al.²⁰ conducted research using a large size sample in Korea and revealed that students who used ICT performed well on the examinations. Additionally, Skryabin et al.²¹ studied the relationship between the use of ICT and learning performance among students and found that ICT is a strong predictor of high academic performance. In short, plenty of research exists that suggests that the use of Internet has a positive impact on students' learning performance.

However, some studies have delineated that Internet usage (Internet addiction, or excessive use) has either a negative impact or a significant impact on student learning performance as well as other outcomes²²⁻²⁷. Young²⁷ explains that (1) the more interactive the Internet function is, the more addictive it becomes, and (2) although ordinary users report minimal

negative effects of Internet use, “dependents” spend more time online (38.5 hours per week) and report significant loss in many areas of their lives, including health, occupational, social, academic, and financial areas. Another study termed it “problematic Internet use” and said it has negative effects on academic success²⁸. Leuven et al.²² found insufficient evidence to justify the positive association between the use of ICT and students’ performance. In addition, they found a negative and marginally significant relationship between ICT use and achievement of some students. Odaci²⁴ demonstrated a significant negative correlation between problematic Internet use and academic self-efficacy. While researching primary school students in Thailand, Arukaroon and Krairit²⁹ determined that there is no significant impact of ICT on the academic performance of students. However, the relationship between problematic Internet use and academic procrastination is not statistically significant.

Inconsistent research results may be caused by generation differences, the availability of applications, Internet usage tasks, and the research tools used. Such results imply that not all Internet use is beneficial to individuals and that the benefits depend on the different way in which various types of Internet use can contribute to the positive effects on an individual’s perceived self-efficacy, learning performance, health, or other aspects. Nevertheless, the Internet is widely used in daily life, especially in educational environments. Therefore, the Internet can be a valuable learning and teaching tool when appropriately used. Subsequently, the focus of the current research is on the effects of Internet use on students. This remains a constant concern among stakeholders, especially parents and teachers.

It is a difficult task to monitor the trends of Internet usage among students over a lengthy period of time; subsequently, the primary concern is how to boost learning performance under autonomous conditions (i.e., without control from parents or teachers). Several studies have endeavored to examine the relevant predictors of student performance². Interestingly, prior studies revealed that academic self-efficacy could be a moderator or mediator between Internet usage and individual performance^{19,30}. This is largely because self-efficacy impacts academic performance by influencing some behavioral and psychological processes^{31,32}. As a consequence, academic self-efficacy plays a mediating role between Internet use and students’ learning performance. In addition, the intervention of academic self-efficacy may mitigate the adverse impact of Internet addiction, dependency, or excessive and problematic Internet use. Furthermore, such intervention may convert such effects into more positive ones.

Hence, the purpose of the paper is two-fold: first, to assess the

relationship of the mediating variable between the use of internet and learning performance in a previously unexplored country context, and second, to attempt to generalize the academic self-efficacy scale to encompass diverse courses.

The theoretical contributions of this paper are three-fold: First and foremost, this study tested academic self-efficacy as the mediating variable to verify the strength of the relationship between the use of ICT and learning performance. This study attempts to answer what mediates the relationship between the use of ICT and the learning performance of the students.

Second, this study is a novel work set within the Bangladeshi context. No previous study has been found to consider the context of Bangladesh.

Third, previous studies were mostly conducted by collecting data from the students of a particular course only (Introduction to Computer)^{19,33}. Consequently, findings from past studies lack generalizability. On the contrary, the current study adapts the measures to collect data from various courses and departments. Hence, the present study attempts to generalize findings from the previous studies.

The practical implications of the study are as follows:

Firstly, as academic self-efficacy can strengthen the relationship between the use of the Internet and the learning performance of students, this would allow educators, policymakers, and parents to focus on enhancing academic self-efficacy to elicit better performance outcomes from their children and students.

Secondly, since professional Internet use has a stronger relationship with learning performance, measures should be taken to facilitate convenient access to the Internet at the universities as well as where students reside.

The rest of this paper is organized as follows: Section 2 discusses literature review and hypothesis development. Section 3 describes the methodology of the study and elucidates the rationale behind it. Section 4 presents the data analysis and reports the empirical results from universities located in Dhaka, Bangladesh. Section 5 provides a rational description based on the results and review of the previous literature. The paper concludes by mentioning limitations and suggesting avenues for future research in Section 6.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The literature on Internet use demonstrated various approaches and

outcomes regarding the formation of ICT addiction^{34,35}. Several studies reveal no evidence of ICT role in the educational progress of the students^{9,36}. However, some studies validated that ICT has a real impact on students' achievement^{4,5,37}.

2.1 Internet use

As the Internet is becoming more and more accessible and powerful, its use should be seriously discussed. Though earlier studies have reported several types of Internet use and examined their causes as well as consequences, they primarily concentrate on the media used and purpose of going online; i.e. emailing or web surfing, the websites visited, and the search strategies applied^{38,39}.

Internet use may be defined in terms of its purposes to determine its effects on individuals. According to Cheung and Huang² Internet usage is considered by using four criteria: (1) frequency of use, (2) intensity of use, (3) use of applications or tools, and (4) use for a variety of tasks.

Internet usage is positively correlated with students' motivation to learn, to raise verbal communication skills, and to increase creative thinking abilities and skills.² Moreover, Internet use may enhance the general learning efforts of university students and aid students to improve their effective learning by guiding their motives and strategies. The study conducted by Zhang⁴⁰ on scholarly use of the Internet stated that all respondents indicated that they used e-mail at least once a week, whereas 93.6 percent of them used it on a daily basis.

Joiner et al.⁴¹ evaluated Internet use by assessing three items: (1) frequency of Internet use and time spent using the Internet, (2) public Internet use, and (3) professional Internet use. The frequency of Internet use indicates how long or how often a person uses the Internet. Public Internet use indicates the usage of Internet for general purposes, while professional Internet use refers to the educational purposes. Potosky⁴² recognized e-mail and information search as the two most prominent uses of the Internet. According to Davis²³ Internet use can also be classified as healthy or pathological. Healthy Internet use describes Internet use for a reasonable duration and an articulated purpose without behavioral discomfort. The pathological Internet is divided into two types: specific and generalized. The specific purpose is associated with only one aspect of the Internet and does not depend on multiple Internet functions. The widespread purpose, on the contrary, covers general and multidimensional Internet overuse²³.

In this context, Internet use can be explained as a set of behaviors

exhibited while using the Internet in specific environmental settings. This study attempts to articulate the impact of Internet use on students' academic self-efficacy and learning performance. To assess Internet use, this study adopted the three-measurement assessment of Internet use suggested by Joiner et al.⁴¹.

2.2 Academic self-efficacy

According to Bandura⁴³ self-efficacy refers to an individual's beliefs, expectations, and confidence in their ability to achieve a particular task. Academic self-efficacy indicates the beliefs especially shaped within the academic domain as opposed to general, emotional, physical, social, or non-academic arenas. The desire to perform successfully at different designated levels is also considered to be academic self-efficacy⁴⁴.

Bandura⁴⁵ acknowledged self-efficacy as a key factor in persuading both cognitive cultivation and task performance. He also postulated that four main factors affect efficacy: i.e., mastery experiences, vicarious experiences, social persuasion, and physical and emotional states. Mastery experiences are the most operative in developing a strong sense of self-efficacy, as they predicted self-efficacy beliefs and improvement of students' high self-efficacy beliefs, which suggested that teachers can design science-related learning activities⁴⁶.

Students can also develop common self-efficacy beliefs by observing tasks performed by others. As Bandura⁴⁵ explains, common experiences imply that people pursue individuals with skills they desire and consider these people as capable models. Mastery and vicarious experiences are more effective in enhancing self-efficacy as compared to the latter two sources. As Bandura's social cognitive theory explained, general and professional Internet use can also affect students' academic self-efficacy.

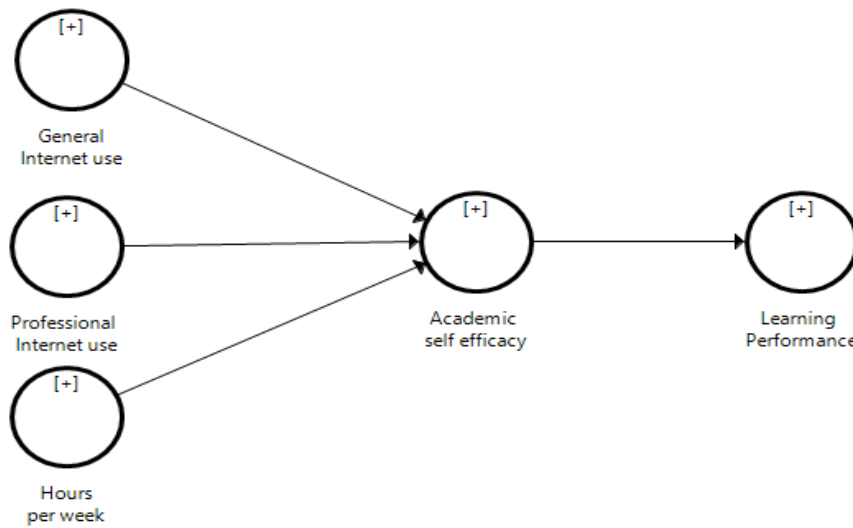


Figure 1. The mediating role of academic self-efficacy between the use of the Internet and students' learning performance (adopted Chen et al.³³)

2.3 The mediating role of academic self-efficacy

Earlier studies had reported that self-efficacy beliefs could enable integration and efficient Internet usage, and people with high efficacy may benefit more from Internet use^{47,48}. On the basis of mastery and vicarious experiences⁴⁵ and the triadic reciprocity of Bandura's social cognitive theory^{31,49,50}, human performance and achievement depends on relations and interactions between behaviors, personal factors, and environmental conditions. Self-efficacy beliefs are sensitive to contextual factors and are affected by individual behavior and environment. Students can acquire mastery or common experiences independently through Internet use and thereby increase their self-efficacy beliefs.

Self-efficacy can predict a student's learning strategies and its use and contribute to feedback behavior⁵¹. Internet usage inherits several traits from computer use and is preserved as a set of behaviors. Similarly, Internet use may increase self-efficacy and enhance Internet-related skills while being regarded as a set of feedback practices and as a proficiency or skill. Empirically and theoretically, Internet use is positively correlated with academic self-efficacy and may improve academic self-efficacy.

In the current study, we adapted the model³³ related to the classification of Internet use, students' academic self-efficacy, hours spent per week in Internet use, and subsequent learning performance. Accordingly,

we have proposed the following hypotheses:

Hypothesis 1. General Internet use is positively correlated with students' academic self-efficacy.

Hypothesis 2. Professional Internet use is positively correlated with students' academic self-efficacy.

Hypothesis 3. More hours spent on the Internet is positively correlated with students' academic self-efficacy.

Previous studies explored the relationship of self-efficacy with attributions⁵², problem-solving⁵³, goal setting⁵³, reward contingencies⁵⁴, teacher education and teaching^{55,56}, and academic performance.⁵⁷⁻⁶⁰ Research findings support Bandura's²⁴ argument that self-efficacy mediates the effect of other self-beliefs on subsequent performance by persuading effort, perseverance, and persistence. Collins⁶¹ reported that children with high self-efficacy accomplished more problems properly and correctly.

In the current study, we described self-efficacy as academic self-efficacy, as it is more appropriate for this topic. Academic self-efficacy is part of Bandura's self-efficacy framework²⁵. Academic self-efficacy is more closely related to students' performance and is also strongly associated with actual behavior and students' performance level.

Academic self-efficacy can enhance performance in several areas of education, such as mathematical performance⁶², computer-related success⁶³, science-related achievements⁴⁶, writing improvement⁶⁴, postgraduate business courses⁶⁵, and overall academic prospects and performance^{19,66}. Therefore, a vital link exists between academic self-efficacy and students' academic performance. Moreover, a positive relationship has been predicted between academic self-efficacy and performance. Subsequently, Hypothesis 4 is proposed, which includes the relationship between academic self-efficacy and learning performance.

Hypothesis 4. Academic self-efficacy is positively correlated with students' learning performance.

Self-efficacy beliefs can mediate the influence of skills and self-belief effectively on subsequent academic performance^{43,67}. In this respect, Zimmerman and Kitsantas⁶⁸ recommended that self-efficacy learning beliefs may have a significant mediating effect on academic attainment, achievement, and homework practices. Students with high self-efficacy show more progress and success in school activities and practice more effective learning strategies^{69,70}. Zhu et al.¹⁹ argues that academic self-efficacy can moderate and mediate the relationship between IT information

seeking and academic performance. This finding is also supported by Walumbwa et al.³⁰ who identified the role of the Internet in mediating and moderating the effects of self-efficacy on job performance. Furthermore, general and professional Internet use could be constructed within the range of students' activities at school, with academic self-efficacy probably mediating the effect between general and professional Internet use and learning performance among students. This contributed to the formation of H5, H6, and H7, as follows:

Hypothesis 5. Academic self-efficacy mediates the relationship between students' general Internet use and learning performance.

Hypothesis 6. Academic self-efficacy mediates the relationship between students' professional Internet use and learning performance.

Hypothesis 7. Academic self-efficacy mediates the relationship between hours spent on Internet use and learning performance.

In addition to Internet use, this study also tested the relationship between hours spent using the Internet and the learning performance of students. Students were asked how much time on average they had spent on the Internet in a week. The previous studies also tested this relationship^{33,41}. Similar to previous studies, this paper also assumes that hours spent on the Internet has a positive effect on students' academic self-efficacy and learning performance. Moreover, the study assumed that the time spent on the Internet would be a stronger predictor of students' learning performance if academic self-efficacy mediates it.

3. DATA AND METHODOLOGY

3.1 Samples and procedures

The population of this study includes students within the business discipline of selected universities in Bangladesh. Participants come from 10 universities: seven private universities and three public universities. The programs offered by these universities, under the faculty of business, were Bachelor in Business Administration (BBA) with a major in Management, Accounting, Marketing, and Finance; Management Information Systems (MIS); and International Business, among others. The participants were students who were studying in BBA programs and had completed at least one semester. The questionnaire was distributed by hand, with a response rate of 96%. A total of 336 students participated in the survey. Of these, 193 (57%) were male and 143 (42%) were female respondents. The age group ranged from 20 to 25 years. The sample is dominated by males, which offers a true representation of the universities in Bangladesh. Respondents

answered the questions anonymously. They answered independent variables first, such as general Internet use, professional Internet use, mediator variable academic self-efficacy, and finally dependent variable learning performance. They answered the questions about the time spent on the Internet per week last.

The questionnaires were distributed on the respondents' campuses during their leisure periods. Each questionnaire contains the following sections: (i) measurement items of general Internet use, (ii) measurement items of professional Internet use, and (iii) an academic self-efficacy scale, (iv) measurement items for learning performance, and (v) hours spent on the Internet per week.

3.2 Measures

The measurement for assessing Internet use was divided into three parts. The first part consisted of the measurement of general Internet use. This section measured 10 items: (i) e-mail use, (ii) chat room use, (iii) newsgroup use, (iv) online game use, (v) pornography use, (vi) online shopping, (vii) music downloads, (viii) Facebook use, (ix) YouTube use, and (x) blog browsing. The first seven items were adopted from Joiner et al.⁴¹ whereas the last three items were adopted from Zhu et al.¹⁹. This questionnaire used a five-point Likert scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always) to collect responses from the students. Two items were later dropped (newsgroup, blog browsing) from the 10-item scale, because their factor loadings were below 0.5.

In the second part, the issue being addressed was professional Internet use, and it had eight items adopted from Joiner et al.⁴¹. The objective of these items was to measure the productive use of the Internet for academic purposes only. This section used eight items regarding how often they (i) searched library websites for references; (ii) communicated with classmates via e-mail for information; (iii) communicated with teachers or external experts via e-mail for information; (iv) downloaded relevant materials for courses or learning; (v) used the web to search for relevant materials; (vi) interacted with Internet communities for learning; (vii) communicated with classmates using Yahoo! Messenger (YM), MSN, or Skype to obtain information; and (viii) communicated with teachers or external experts through YM, MSN, or Skype to acquire information. Respondents answered according to a five-point scale ranging from never to always.

Third, the academic self-efficacy scale was adopted from Pintrich and De Groot⁷¹ and Zhu et al.¹⁹ with some modifications. This study adapted academic self-efficacy items due to the fact that previous authors designed those items specifically for the Introduction to Computers course only. As a

result, all items were focused on that particular course. This study generalized those items so that the items could be used for any course. Moreover, the respondents of this study had not only completed the Introduction to Computers/Computer Application in the Business course but also passed other courses. An example of the items used in academic self-efficacy includes “Compared with other students in the class, I expect to do well,” “Compared with others in the class, I think I am a good student.” This scale was tested in different ways by several prior studies⁷¹⁻⁷³ applying multiple approaches. Students were asked to respond to the items using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) about their commitment to reading and learning.

Fourth, the dependent variable, learning performance, was measured using the students’ most recent semester grades and the most recent mid-term examination grades (grades ranged from D to A+). As all universities follow the same grading system set by the University Grants Commission (UGC) in Bangladesh, the same questions were fit for all respondents. These grades were considered the dependent variables for this study.

The final section contains time spent on the Internet (hours per week). The respondents were asked to report how many hours they spend online in a week. This study converted the hours spent on the Internet into a five-point scale (1 = 0–7 h, 2 = 7–14 h, 3 = 14–21 h, 4 = 21–28 h, and 5 = over 28 h).

4. DATA ANALYSIS AND RESULT

We have estimated the structural model and assessed the psychometric properties of the measurement model by using Smart PLS 3.0.⁷⁴ We have analyzed all path linkages in the research model for hypothesis testing.

4.1 The Measurement Model

This study employs the confirmatory factor analysis (CFA) approach, because the constructs used in this research model have been adopted and adapted from prior studies. Prior studies have already analyzed the exploratory factor analysis (EFA) of these constructs in different settings. Chin⁷⁵ argued that two applications of PLS are possible in general; it can either be used for theory confirmation or theory development. In the latter case, PLS is used to develop propositions by exploring the relationships between variables. Moreover, when the phenomenon under research is relatively new or changing, or when the theoretical model or measures are not well formed, a PLS approach is often more suitable.⁷⁶ Additionally, Urbach and Ahlemann⁷⁷ maintain that PLS is better suited for theory

development than for theory testing. Thus, employing the CFA approach in the current study is reasonable.

Table 1. Measurement items

Constructs	Items	Sources
General Internet use	E-mail use Chat room use Newsgroup use Online game use Pornography use Online shopping Music downloads Facebook use YouTube use Blog browsing	Joiner et al. ⁴¹ and Chen et al. ³³ Adopted
Professional Internet use	Searched library websites for references Communicated with classmates via e-mail for information Communicated with teachers or external experts via e-mail for information Downloaded relevant materials for courses or learning Used the web to search for relevant materials Interacted with Internet communities for learning Communicated with classmates using Yahoo! Messenger (ym), msn, or skype to obtain information and Communicated with teachers or external experts through ym, MSN, or skype to acquire information.	Joiner et al. ⁴¹ and Chen et al. ³³ Adopted
Academic Self-efficacy	Compared with other students in the class I expect to do well. I am certain I can understand the ideas taught in the class. I expect to do very well in the class. Compared with others in the class, I think I am a good student. I am sure I can do an excellent job on the problems and tasks assigned for the class. I think I will receive a good grade in the class.	Pintrich and De Groot ⁷¹ Adapted
Learning Performance	Students' GPA of recent semester Students' GPA of recent class test	Chen et al. ³³ Adapted
Hours per week	Time spent online in a week	Joiner et al. ⁴¹ and Chen et al. ³³ Adopted

In Table 2, all items demonstrated that loadings are less than 0.94 on the constructs on which they were measured. On the contrary, no items loaded higher on constructs that were not intended to measure⁸⁰. This confirms the convergent validity of the constructs.

This study then proceeded to test discriminant validity. Discriminant validity refers to the degree to which items differentiate among constructs or measure distinct concepts. This study estimated discriminant validity by examining the correlations between the measures of potentially overlapping constructs.

Table 2. Measurement of construct validity

Construct	Items	Loadings	CR	AVE
Academic self efficacy	ASE1	0.794	0.857	0.507
	ASE2	0.827		
	ASE3	0.779		
	ASE4	0.734		
	ASE5	0.511		
	ASE6	0.564		
General Internet use	GI1	0.623	0.855	0.558
	GI2	0.701		
	GI3	0.685		
	GI4	0.667		
	GI5	0.688		
	GI6	0.734		
	GI7	0.634		
Hours per week	HPW	NA		
Learning Performance	LP1	0.901	0.866	0.764
	LP2	0.847		
Professional Internet use	PI1	0.833	0.890	0.544
	PI2	0.556		
	PI3	0.843		
	PI4	0.741		
	PI5	0.748		
	PI7	0.52		
	PI8	0.846		

Note: Three items were dropped from general Internet use (GI8, GI9,GI10) and one item was dropped from professional Internet use (P6) because of their low loadings (below 0.5). HPW is a single item construct. Thus it is not applicable (NA) to check the loadings of it.

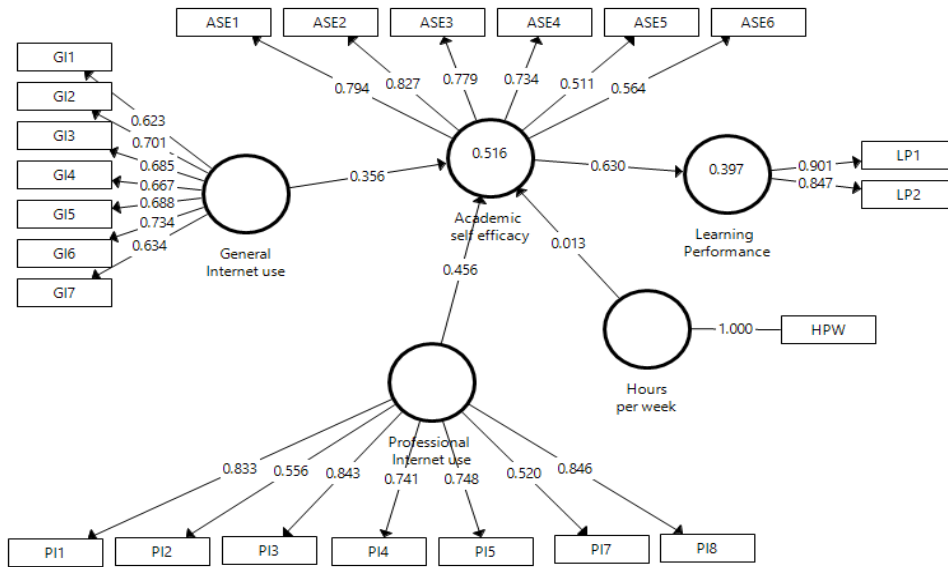


Figure 2. Analyzed research model

Items should load stronger on their constructs in the model and the average variance shared between each construct, and it should be greater than the variance shared between the construct and other constructs⁸¹. As shown in Table 3, the squared correlations for each construct are less than the average variance extracted by the indicators measuring that construct, indicating adequate discriminant validity. In short, the measurement model established adequate convergent validity and discriminant validity.

Table 3. Discriminant validity analysis

Constructs	Academic self-efficacy	General Internet use	Hours per week	Learning Performance	Professional Internet use
Academic self- efficacy	0.712				
General Internet use	0.611	0.677			
Hours per week	-0.028	-0.05	1		
Learning Performance	0.63	0.459	-0.049	0.874	
Professional Internet use	0.655	0.561	-0.05	0.659	0.738

Note: the bold values in the diagonal represent the square root of AVE while other values represent the correlations among constructs. To fulfill the criteria of discriminant validity the diagonal values should be greater than off-diagonal values.

4.2 The Structural Model

Our actual sample size was 336, and we used bootstrapping, which involved 500 samples. Tables 4 and 5 and Figure 2 exhibit the SEM results. All beta path coefficients were positive and in the expected direction, which were statistically significantly (at $p < 0.01$) shown in Table 5 and Figure 2. Explained further, general Internet use ($\beta = .356$, $p < 0.01$) and professional Internet use ($\beta = .456$, $p < 0.01$) significantly impact academic self-efficacy. However, the results regarding hours per week show that the p -value is greater than 0.01, which is not significant. Thus, according to Figure 2, the R^2 value suggesting 50% of the variance in the level of extent of academic self-efficacy can be explained by general Internet use and professional Internet use. These findings imply that H1 and H2 are supported, although H3 is not supported. Similarly, academic self-efficacy exhibits a significant relationship with learning performance ($\beta = .630$, $p < 0.01$). In addition, Figure 2 reveals that the R^2 value of learning performance is 0.397, suggesting that 40% of the variance of learning performance can be explained by academic self-efficacy. This result supports H4. The findings also reveal that professional Internet use is a stronger predictor of academic self-efficacy than general Internet use.

4.3 Hypothesis Testing

Table 4. Result of direct Effect

Hypothesis	Path	Std. Beta	Std. Error	t -value	p - values	Decision	R^2
H1	General Internet use -> Academic self-efficacy	0.356	0.06	5.948	0.001**	Supported	0.516
H2	Professional Internet use -> Academic self-efficacy	0.456	0.06	7.583	0.001**	Supported	
H3	Hours per week -> Academic self-efficacy	0.013	0.038	0.328	0.743	Not Supported	
H4	Academic self-efficacy -> Learning Performance	0.63	0.041	15.539	0.001**	Supported	0.397

Note: ** $p < 0.01$, * $p < 0.05$.

We have used Preacher and Hayes' ⁸² bootstrapping method for testing the indirect effect. At first, we want to know the indirect effect of general Internet use on learning performance. The indirect effect ($\beta = 0.356 * 0.630 = 0.224$) was significant at the t -value of 6.15 under bootstrapping analysis.

Table 5. Result of mediating effect

Hypo-thesis	Path	Std. Beta	Std. Error	t-value	p-values	Decision
H5	General Internet use-> Academic self-efficacy -> Learning Performance	0.224	0.036	6.158	0.001**	Supported
H6	Professional Internet use -> Academic self-efficacy- > Learning Performance	0.287	0.047	6.15	0.001**	Supported
H7	Hours per week -> Academic self-efficacy -> Learning Performance	0.008	0.024	0.326	0.744	Not Supported

Note: ** $p < 0.01$, * $p < 0.05$.

We can conclude on the basis of the above results that the mediation effects of academic self-efficacy on the relationship between general Internet use and learning performance is statistically significant. Hence, H5 is supported by the findings. The same procedures were repeated to examine the indirect effects of professional Internet use on learning performance, resulting in a t -value of 6.15, the indirect effect ($\beta = 0.456 * 0.630 = 0.287$). This testifies to the fact that academic self-efficacy significantly mediates the relationship between professional Internet use and learning performance. Consequently, H6 is also supported. However, hours per week revealed that the indirect effect ($\beta = 0.013 * 0.630 = 0.008$) with a t -value of 0.326 is not significant, thus implying that H7 is not supported.

5. DISCUSSION AND CONCLUSION

Parents and policymakers on most occasions are ardent proponents of the enhanced use of the Internet among students. This is mainly due to their widely held belief that the use of the Internet may enrich the academic performance of their children. Accordingly, students started adopting ICT in their non-academic life in addition to their academic life. On the flip side, students are now found to be spending unusually lengthy durations of time using the Internet from their smartphones. Recent trends reveal that technology or smartphones make students addicted to them, which has led to the emergence of the debate on ICT addiction among researchers. Scholars and policymakers are trying to urge parents not to allow children to use the Internet excessively. As a result, new debate has surfaced in the academic arena regarding whether the use of the Internet enhances students' learning performance or not. Does the amount of time spent on the Internet for general or educational purposes help students in their learning processes? If not, then what mediates the relationship between Internet use and learning performance? This study integrated concepts from Internet use

and academic self-efficacy literature to address this unanswered concern. The findings contribute to the consolidation of the prediction that academic self-efficacy does strengthen the relationship between the use of the Internet and learning performance. Findings from this study also confirm the results of previous literature by Chen et al.³³ and Zhu et al.¹⁹. In conducting the analysis, earlier studies had applied SPSS, whereas this study has applied PLS-SEM. Subsequently, this study has made another contribution to the existing literature from the methodology aspect.

Both general Internet use and professional Internet use have a positive correlation with academic self-efficacy. Although previous studies did not report a significant relationship between general Internet use and academic performance, this study has identified a positive relationship between these two variables. However, professional Internet use maintains a stronger relation with academic self-efficacy than general Internet use, which is a finding in line with the prior studies by Chen et al.³³ and Zhu et al.¹⁹. This makes sense, as the parents and educators must guide their children and students towards increased use of the Internet for professional use. However, the length of time spent on the Internet does not necessarily guarantee that learning performance will be high. Instead, this may lead to Internet addiction, and Internet addiction eventually leads to poor academic performance.

The results from the PLS approach reveal that professional Internet use is a stronger predictor of learning performance if mediated by academic self-efficacy. Enriching students with self-efficacy significantly impacts learning performance. This result is consistent with the previous literature by Chen et al.³³ and Zhu et al.¹⁹. If students have high academic self-efficacy, they are expected to demonstrate better academic results.

Academic self-efficacy mediates the relationship between Internet use and learning performance. The mediating effect of professional Internet use on learning performance is higher than the mediating effect between general Internet use and learning performance. This result also confirms the previous research. Moreover, unlike previous research, this study has found a positive relationship between general Internet use and learning performance. Furthermore, the current study confirms the results of previous literature by exhibiting that professional Internet is a stronger predictor of learning performance mediated by academic self-efficacy, because the items of professional Internet use are more closely related to their academic study and learning. Students who engage in professional Internet use exhibit a higher learning outcome. Our results also show that students with high academic self-efficacy tend to focus more on professional Internet use. Hence, their learning performance is better than those who spent more time

engaging in general Internet use.

On the contrary, the items of general Internet use are not related to the students' academic life affairs. Therefore, spending time with general Internet use will not enrich academic performance, like in the case of professional Internet use. This study further illustrates that ICT addiction is part of general Internet use, such as using Facebook, watching YouTube videos, online gaming, chatting, and using WhatsApp^{15,16,83}. This addiction can lead to poorer performance in students' academic life⁸⁴. Hence, ICT addiction will not contribute to their performance. By building stronger academic self-efficacy among students, ICT addiction can be avoided. Therefore, the debate on whether spending time on Internet use has an impact on learning performance or not depends on whether students have high academic self-efficacy. As it is unexpected to forbid students to use ICT, the superior option is to focus on their academic self-efficacy. Then the students with high academic self-efficacy can determine in which area to invest more of their time. Therefore, parents and educators should focus on building the academic self-efficacy of their children or students while directing them toward the use of ICT, as the use of ICT will eventually ensure economic growth for the nation^{85,86}.

In Bangladesh, studies have revealed that university students are addicted to the Internet^{87,88}. This study could provide an initiative to urge parents to uphold academic self-efficacy among their children to minimize Internet addiction. Furthermore, academic institutions can launch programs to enrich academic self-efficacy among their students to overcome the challenge of Internet addiction. This will benefit all stakeholders; students will get good grades and thereby secure good employment in the future, and parents can enjoy the prevention of their children's addiction to technology. In addition, institutions can uphold their reputation by producing good-quality students.

Furthermore, this study provides substantive implications for both theory and practice. Theoretically, the findings of this study have highlighted the effects of academic self-efficacy as a mediator in enhancing the learning performance of students and especially as a mediator between general Internet use and students' learning performance.

This study presented several implications for practice, parents, and educators. First and foremost, encouraging students to have higher academic self-efficacy for a specific subject by using the Internet for educational purposes may be a useful and practical way to boost their learning performance. Secondly, focusing on professional Internet use will enhance their academic performance. Thirdly, focusing more on the general Internet

use may lead to ICT addiction. Finally, academic self-efficacy strengthens the relationship between Internet use and learning performance. Therefore, this study both diverges from and extends prior research by addressing a different context: determining how students can enhance their academic performance while acknowledging the fear of ICT addiction.

6. LIMITATIONS AND FUTURE RESEARCH

First, data have been collected from an urban area, the capital city of Bangladesh. This study may not yield identical results in rural areas. Moreover, the study was conducted in universities, and the respondents were university students. To analyze ICT addiction, further study can be conducted at secondary school or higher secondary school levels. Then comparative studies between schools and universities regarding ICT addiction will be worthy of reading. This study has focused on students from the faculty of business studies as respondents, whereas previous studies have focused on a particular course. Consequently, there is room for further research to ensure the generalization of this measure.

Second, Internet addiction is new and might have many variables that influence addiction. The current study has attempted to address addiction based on limited variables. Moreover, this study addressed the ICT issue but did not use all items related to ICT. This study used only the Internet to address the ICT issue. Apart from the Internet, ICT comprises other items such as personal computers, cell phones, and broadband connection on a home computer/school computer. Future studies may employ other items of ICT to address this context.

Third, the current study is a random snapshot, thus restricting its ability to accurately predict causality. Accordingly, a binominal study in future is recommended to produce a more reliable result.

Fourth, to make the model simple, we did not introduce any moderators. Future studies can introduce moderators such as teaching quality, and family stress between the use of ICT and learning performance.

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