

Original Research Article

The impact of information and communication technologies (ICTs) on academic performance of medical students: an exploratory study

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ABSTRACT

Background: Information and Communication Technology (ICT) has a potential to improve teaching and learning process. There are conflicting reports on the effect of ICT on student's outcome. Though there is an early indication of positive impact, but the technology has a potential to have a detrimental effect. The present study was taken up to explore the effects of ICT on medical student's academic performance.

Methods: All the second professional students were given the questionnaire. Only 75 students had filled up the questionnaires completely.

Results: The study population consisted of 48.00% males and 52.00% females. 97.33% students had smart phones, 44.00% had a laptop too. 10.66% students got less than 50% marks in the second professional examination, 14.66% got 50-59% marks, 62.66% got 60-69% marks and 12.00% got 70% or more marks. A low negative correlation was found between academic performance and possession of a smart phone ($r = -0.062$), and between academic performance and possession of a laptop ($r = -0.029$). A moderate negative correlation was found between academic performance and the time spent on a smart phone or laptop ($r = -0.309$). The correlations between academic performance and gender, and academic performance and the time spent on mobile phones or laptops were found statistically significant ($p = 0.000$ and 0.007 respectively).

Conclusions: Though ICT has capabilities of improving student's academic performance, but it has a potential to have a negative effect if not used rationally. There is a vital need to sensitize the students about the potential academic risks associated with improper use of ICT. Students should be assisted and guided on how to use it judiciously.

Keywords: Academic performance, Information Technology, ICT

INTRODUCTION

Information and Communication Technologies (ICTs) are defined as all devices, tools, content, resources, forums, and services, digital and those that can be converted into or delivered through digital forms, which can be deployed for realizing the goals of teaching learning, enhancing access to and reach of resources, building of capacities, as well as management of the educational

system. These will not only include hardware devices connected to computers, and software applications, but also interactive digital content, internet and other satellite communication devices, radio and television services, web-based content repositories, interactive forums, learning management systems, and management information systems. These will also include processes for digitization, deployment and management of content, development and deployment of platforms and processes

for capacity development, and creation of forums for interaction and exchange.¹

The 21st century has seen ICT use becoming an inevitable part of life. The emergence and advancements of ICTs have changed the way teaching and learning processes are being conducted.²

ICTs have changed the way people live, work, play, communicate and learn, impacting the construction and distribution of knowledge and power around the world. ICT can impact student learning when teachers are digitally literate and understand how to integrate it into curriculum.³ It is affecting every aspect of education from teaching-learning to assessment and evaluation. It improves the effectiveness of education.

Students use technology on a daily basis. Among different ICT tools used by students, cell phones, tablets and small laptops are the commonest. Modern smartphones provide students with immediate, portable access to education-enhancing programs. The recent years have seen the expansion of mobile technology in educational field. Today almost all students have a mobile phone with a capacity to search for information.⁴ Recent research suggests that many students perceive the cell phone primarily as a leisure device, and most commonly use cell phones for social networking, surfing the internet, watching videos and playing games. If typically utilized for leisure than education, then cell phones may disrupt learning within academic settings.⁵

There is always a positive and negative side of every phenomenon and same is true for ICT. Students, and sometimes teachers, can get hooked on the technology aspect, rather than the subject content.

There are many definitions of academic performance. The standard definition focuses on how students understand the courses and obtain their degrees or their marks. However, a more extensive definition deals with competencies, skills and attitudes learned through the education experience.⁶ According to Basri WS et al, the student's academic performance refers to the enhancement of student's current state of knowledge and skills reflected in their GPA and also in formulation of their personality and academic growth.⁷

The link between the ICT use and student's academic performance has been the focus of research. But the results are conflicting. Academic research is continually attempting to assess the impact of ICT on student's academic performance.

Whether the effect of ICT on education is positive or negative is still unclear. Habler et al found that sixteen out of twenty-three papers they reviewed reported positive student outcomes, while five reported no difference and two reported negative outcomes. But a report by OECD argues that there is little evidence of

technology having a positive impact. The report concludes that computer use in schools has not led to improvements in attainment levels but in some cases has rather been associated with a negative impact on academic performance. A report by Beland and Murphy has argued that a ban on mobile phones in schools can positively impact examination results.⁸

Since there are conflicting reports about the effect of ICT on student's academic performance, hence this study was designed to have an insight into the issue.

METHODS

This was a questionnaire type of study conducted on Second MBBS students (because the principal author was in close contact with them for one and a half years and observed closely their academic performance).

Inclusion criteria

- Students of second MBBS.
- Reading in the institution of the study.
- Willing to participate in the study.

Exclusion criteria

- Students of other semesters.
- Students not belonging to the institution of the study.
- Not willing to participate.

Data collection tools

Pre-tested questionnaire which was prepared in English containing closed- ended questions. It had three sections. Section first included the questions about the general demographic information like age, gender, and semester.

Section second included the questions regarding the student's perception about use and perceived effects of ICT devices in education. Third sections included the questions about the pattern of usage of different ICT devices by students like, how many ICT devices are owned by the student, for what purpose these devices are used, how much time he/she spends on these devices per day. At the end of the study the marks obtained by the students in second professional university examination were noted and entered in their data sheets.

Data analysis

After the completion of data collection, it was analyzed to check identifiable errors and incompleteness. The data was analyzed by manual calculators and Statistical Package for the Social Sciences (SPSS) v20.

The objectives of the study were explained to the participating students prior to data collection and their consents were sought and the questionnaires were filled

only by those who agreed. The confidentiality of the responders was maintained.

RESULTS

Only 75 students had filled up the questionnaires completely. Hence data of only 75 students were considered for the study. Table 1 shows the characteristics of study population and pattern of ICT gadgets use.

Table 1: Characteristics of study population and pattern of ICT tools use.

Characteristic	No	%
Gender		
Male	36	48.00
Female	39	52.00
Own a mobile phone		
Yes	75	100
No	0	0
Own a smart phone		
Yes	73	97.33
No	02	2.66
Own a laptop and/or a desktop		
Yes	33	44.00
No	42	56.00
Purpose for which phone and/or PC or laptop is used		
Educational	10	13.33
Non-Educational	07	9.33
Both	58	77.33
Educational app(s) installed		
Yes	68	90.66
No	07	9.33
Time spent on phone/PC		
<3 hours	60	80.00
3-6 hours	12	16.00
>6 hours	03	4.00
Marks obtained in second professional examination		
<50%	08	10.66
50-59%	11	14.66
60-69%	47	62.66
70% or above	09	12.00

The study population consisted of 48.00 % (n=36) males and 52.00% (n=39) females. All the students owned a mobile phone. 97.33% students (n=73) had smart phones and only 2.66% students (n=2) had a feature phone with limited internet facility. 44.00% students (n=33) had a laptop too. 77.33% students (n=58) were using phone/laptop for educational as well as recreational purposes. Only 13.33% students (n=10) were using these ICT gadgets exclusively for educational purposes. 80.00% students (n=60) were using ICT gadgets for less than 3 hours a day, 16.00% (n=12) for 3 to 6 hours and 4.00% (n=3) for more than 6 hours a day. 10.66% students (n=8) got less than 50% marks in the second

professional examination. 14.66% students (n=11) got 50-59% marks, 62.66% (n=47) 60-69% marks and 12% (n=09) got 70% or more marks.

Table 2: Student's perceptions about ICT in academics.

m-Learning should be implemented in the institution(s)		
Yes	58	77.33
No	17	22.66
Phone is important in professional learning		
Yes	53	70.66
No	22	29.33
Perceived impact of ICT on academics		
Positive impact	47	62.66
Negative Impact	12	16.00
No impact	16	21.33

Table 2 shows the perceptions of the students about ICT use. Regarding the implementation ICT in the institution (s), 77.33% students (n=58) were in favor of incorporating ICTs into academics. 70.66% students (n=53) felt that ICT is important in professional learning. 62.66% students (n=47) were of the opinion that ICT had positive impact on academics. 16.00% students (n=12) thought it had negative impact and 21.33% students (n=16) thought that it had no impact on academics.

Table 3: Pearson's correlations.

Pair	Correlation (r)	Significance
Marks obtd vs Gender	0.461	0.000
Marks obtd vs having smart phone	-0.062	0.600
Marks obtd vs having Laptop	-0.029	0.806
Marks obtd vs hours Spent on phone/PC	-0.309	0.007

Dependent variable: Marks obtained

Table 3 shows pearson's correlation coefficient (r) between different variables with marks obtained in the university examination as dependent variable.

DISCUSSION

ICT provides opportunities to access an abundance of information using multiple information resources. It also makes complex processes easier to understand. Thus, ICT may function as a facilitator of active learning and higher-order thinking.⁹

The current generation of students has grown up surrounded by ICT. The ICT has been a critical component of teaching and learning in higher education over the last few decades. The widespread availability of mobile devices and wireless networks offer enormous opportunities for knowledge acquisition both in terms of

interaction with the source of information and in terms of collaboration.¹⁰

Among the ICT tools mostly used and owned among the students are the mobile phones, computers and laptops. These tools can provide suitable learning platforms as they have a lot of applications teachers and students may use in their academic activities, provided these devices are used in a responsible manner and judiciously.¹¹

The importance of use and abuse of technologies and their consequences for children and young people is a topic that occupies a large number of studies and research projects in the scientific community. Some investigations have pointed out that their use is more problematic in adolescence.¹²

The present study was taken up to study the effects of commonly used ICT tools i.e. smart phones and laptops on the student's academic performance. This study is exploratory in nature. Therefore, the findings are best understood as initial steps into a new line of inquiry.

A hierarchical model was developed which used gender, possessing a mobile phone, laptop or desktop and time spent on these ICT gadgets to predict marks obtained in professional university examination.

Females were found having secured better marks in the university examination as compared to males ($p=0.002$). These findings are consistent with those found by Lepp A et al.⁵

A small negative correlation was found between academic performance and possessing of a smart phone ($r=-0.062$), academic performance and possessing of a laptop ($r=-0.029$). A moderate negative correlation was found between time spent on a smart phone or laptop and academic performance ($r=-0.309$) The correlation between gender, time spent on phone or laptop and academic performance were found statistically significant ($p=0.000$ and 0.007 respectively).

Previous studies also found mobile phone use as a distraction in academic settings. Students perceived cell phone primarily as a leisure device rather than as an educational tool. There is a growing amount of research that suggests electronic media in any form encourages multitasking and task switching, both of which are negatively related to academic performance.⁵

Another study conducted in Taiwan found that using internet for information seeking was associated with better academic performance and using it for online gaming was associated with lower academic grades.⁵ Another study conducted in Saudi Arabia, found that there exists a relationship between ICT and academic performance and that ICT adoption resulted in the improvement of the academic performance of the female students more than male.⁷

In one more study conducted in Malaysia, it was concluded that smart phones have negative effects on student's academic performance.¹³

A report by the OECD, argues that there is little evidence of ICT having a positive impact on academic performance.⁷ Jumoke S et al also found that students are negatively influenced by mobile phone due to distraction.¹⁴

This study has following limitations:

There are many definitions for student academic performance. The standard approach focuses on how student's understand the courses and obtain their degrees or their marks. However, a more extensive definition deals with competencies, skills and attitudes learned during the course. Our study is based on standard definition. We suggest that further research should be conducted on the basis of extensive definition.

The collected data might have Omitted Variable Bias (OVB).

This single institution study on a small number of students adds to our understanding of impact of ICT on student outcome; however the pattern of ICT use by students may differ for students of other disciplines, institutions and academic levels. The present study is therefore exploratory in nature. There is a need to conduct multi-institution studies on large student population of different disciplines and academic levels to reach a definitive conclusion.

CONCLUSION

ICT has become a tool-of-choice for modern students, who are also called "digital natives" or "net generation". The direct link between ICT use and student's performance has been the focus of research during the last two decades. There are conflicting reports about the effect of ICT on academic performance of the students. Many researchers have investigated this issue. While some researchers have found a positive impact, others have found a negative or no impact. The question is not easy to answer because new technologies interact with students in several ways. The present study found a negative impact of ICT on student outcome, but these findings should not be used as an excuse not to use ICT in educational institutions. Students must be taught how to use ICT rationally.

The outcomes of ICT's involvement in student's academics depends upon several factors such as duration of usage, method of use, and apps or services that one uses. Authors of this study opine that implementation of ICT as a tool of education is a necessity in today's time and is integral to every person: equally important is the strategic teacher support to produce positive student outcome.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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