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Brief Communication

Impact of students' use of technology on their learning achievements in physiology courses at the University of Dammam



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Abstract

Objective: This study was conducted to investigate the possible relationship between students' use of technology and their achievements in physiology courses at five health colleges of the University of Dammam.

Methods: This study was conducted on 231 students studying physiology during their 2nd year at one of five health colleges (Medicine, Dental, Clinical Pharmacy, Applied Medical Sciences, and Nursing). An online survey was sent to the students regarding their use of technology and the devices they use. The Pearson correlation coefficient and descriptive statistics were implemented to study the frequency of, and relationship between, technology and learning achievement in physiology courses.

Results: This study observed a significant relationship between students' use of technology and their achievements in health colleges. The study also demonstrated that the most-used devices are laptops (50%) and phones (42%) followed by tablets (7%) and desktop computers (0.5%). This paper reports on the results of the survey, documenting what was revealed regarding how technology is used among students at the health colleges, as well as the important benefits on their achievements during physiology courses.

Conclusions: Technology usage might produce comparatively more significant increases in academic achievement than would non-usage. Further research is warranted to examine its effects.

Keywords: Achievement; Health colleges; Learning; Physiology; Technology

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Introduction

Incorporating technology usage within Saudi university education is an initiative of relatively new provenance and one that has been struggling to secure rights and recognition, similar to how a new country struggles to establish internationally recognized sovereign boundaries.¹ It has been suggested that the application of technology should indeed encouraged and even be incorporated, routine part of students' daily activities within clinical activities and basic sciences.² The most important element that supports the use of technology in the educational system is the Internet. E-learning has become one of the fastest-moving trends in education and poses a promising alternative to traditional learning.³ Studies have shown that people learn considerably better from a combination of both words and images (which technology enables) than merely from words alone.⁴ Technology helps students become independent, proficient member and researchers.

The changing role of physicians in the new health care environment provides a stronger impetus than ever before

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for these ideas to be incorporated. Nevertheless, using technology in the classroom is a methodology not widely implemented in Saudi universities. Abouchedid and Eid stated that “The overwhelming traditional knowledge delivery system for higher education in the Arab world demonstrates the pronounced information (IT) gap between Arab countries and the developed world”.⁵

Research has indicated a need to change and revise the curriculum within health colleges to cope with this revolution in technology⁶ because technology is becoming a highly important source of maintaining currency and gaining knowledge within the health profession.⁷ Research has demonstrated that smartphone applications and the Internet are introducing a new degree of responsiveness and flexibility within educational processes. This responsiveness is facilitated by the ease with which content can be updated, instruction can be personalized, information can be accessed, information can be distributed, and content can be standardized.^{7,8}

Increased implementation of technology will increase students' comprehension of content and development of skills in such areas as analytical reasoning, problem solving, information evaluation, and creative thinking.⁹ In KSA, there is a dire dearth and paucity of information regarding the effect of technology usage on learning achievement. Rather, studies conducted within KSA have found that students are used to a comparatively more traditional model of learning.^{6,10} However, the comprehensive use of technology would create a good environment facilitative of learning. This approach would shift education from the classical approach (which has not prioritized students' pursuit of understanding) toward the deep-meaning approaches that would help students seek a true understanding of the central principles, themes, and applications of any given area of study.¹¹ Using technology would support the active learning of students in an educational environment designed to help students achieve meaningful learning — which, in turn, could result in positive, cumulatively progressive gains in learning outcomes.¹²

Technology has been argued as having a positive impact on our way of thinking. Steve Johnson (2005), in his nationally bestselling book *Everything Bad is Good for You*, posited that technology is making us more intelligent due our means of obtaining, interpreting, and processing information. Many studies have discussed how technology affects our brains and impacts how much its use affects the way that we think and perform.^{13,14}

The present study involves physiology courses taught in five University of Dammam colleges of health: The College of Medicine, College of Dentistry, College of Nursing, College of Applied Medical Sciences, and College of Clinical Pharmacy. Lectures using PowerPoint presentations are used regularly in the classroom. The presentations are then uploaded on Blackboard (an online system). Course websites function as resource centres, providing access to all related documents along with links to additional resources, as well as group e-mail lists and an interactive discussion board. In addition, AD instrument recordings have become an integral component of laboratory teaching sessions, making them comparatively more interactive and even more valuable learning experiences than previously.¹⁵

The present study's principle aim was to identify the impact of technology usage on student learning achievement

in the physiology courses taught in five colleges of health. The study attempted to answer the following research questions:

1. Is there a relationship between students' use of technology and their achievements in physiology courses in the health colleges?
2. Which device is most used by participating students?

Materials and Methods

An online survey was sent to all second-year students (231 students) in the five colleges of health. The respondents comprised 219 students, per a response rate of 95%. The survey consisted of six questions with five Likert-scale response options (ranging from 1 = Strongly Disagree to 5 = Strongly Agree) regarding the use of technology and the smart devices that they use. The sum of the sub-questions constituted a total score for their use of technology. Each of these total sums was correlated with students' final cumulative physiology course score. The measure of students' performance-based achievement in the physiology course included Final Exam 35%, Mid-year Exam 25%, Quizzes 20%, Lab Exam 10%, Self-Study 5%, and Tutorials 5%.

The questionnaire was developed in consultation with two experts in the medical profession, each of whom validated the objectives-based content and questions of the measure. A psychometrician also checked the internal consistency of the questions. The reliability coefficient was found to be 0.73.

Statistical analyses were performed using the Statistical Package for the Social Sciences (IBM SPSS Statistics, Version 20.0).¹⁶ The Pearson correlation coefficient and descriptive statistics were implemented to present the frequency of, and examine the relationship between, technology and learning achievement in physiology courses.

Results

The study was conducted for five colleges of health. The sample of the study included 219 male Saudi second-year students. The distribution of the students in the five health colleges is presented in Table 1. The focus of the study was to find out if there is a significant relationship between students' use of technology and their achievements in physiology courses in five colleges of health. The most used devices were indicated by the participants, which may indicate that

Table 1: The distribution of participants in the five health colleges.

Colleges	Frequency	Percent	Valid percent	Cumulative percent
Clinical Pharmacy	13	5.9	5.9	5.9
Dentistry	46	21.0	21.0	26.9
Medicine	89	40.6	40.6	67.6
Nursing	23	10.5	10.5	78.1
Applied Medical Sciences	48	21.9	21.9	100.0
Total	219	100.0	100.0	

the most used device is the one most related to students' achievements in the health colleges.

The results showed that there is a significant relationship between students' use of technology and their achievements in physiology courses at the colleges of health. That relationship was found to be $r = .42, p < .05$ as shown in Table 2. It also showed that the most used devices are laptops (50%) and phones (42%), followed by tablets (7%) and desktop computers (0.5%) (see Table 3).

Discussion

There are several studies in literature investigating the possibility of using technology on teaching and learning in medical fields. However, the application of technology in medical education has been demonstrated to be a potentially productive means of creating a good learning environment that can help instructors become more efficient in improving students' abilities and understanding through critical analysis. This study is the first to evaluate the impact of technology on students' learning achievement in physiology courses in the health colleges at the University of Dammam, KSA. According to the results, technology usage was directly correlative and statistically significant with student achievement in physiology courses. Our finding is in agreement with other studies. Taradi and his colleagues (2005) found that the use of technology positively affected learning outcomes in acid-base physiology.¹⁷ This finding is very motivating, especially at the University of Dammam. It also added many benefits to the course, in support of curricular objectives. For instance, a project-learning approach and technology tools offer ways for students to conduct experiments, observe phenomenon, and view results in graphic ways that can aid in understanding. Students are more likely to stay engaged and technology helps make teaching and learning physiology more meaningful than without such opportunities. Furthermore, research has indicated that a comparatively higher degree of students learning and effective teaching can be achieved when the use of technology is incorporated than when it is not.¹⁸

Technology plays an important role in facilitating learning. It has facilitated many effective educational methodologies such as self-directed, independent, and collaborative learning. It can connect people whom, separated by schedule and location, might otherwise not be able to learn from each other. And it can provide the opportunity of receiving immediate feedback and assessment, making learning appear comparatively more achievable than it would without instant feedback.^{19,20} However, far too few instructors use technologies effectively in their courses.²¹ This presents a very important challenge: to enhance the use

Table 3: The order (in frequency) of device usage.

Devices	Frequency	Percent	Valid percent	Cumulative percent
Laptop	110	50.2	50.2	50.2
Cell phone	92	42.0	42.0	92.2
Tablet	16	7.3	7.3	99.5
Desktop	1	0.5	0.5	100.0
Total	219	100.0	100.0	

of technology in education to achieve greater understanding by the students in physiology. It has been suggested that those instructors who rely primarily on traditional teaching methods tend to be more structured in the classroom and to stress on content over practice in their courses. It has also been posited that, by comparison, those with a high level of technology in their teaching may be better at instilling students with a desire to learn and the development of critical thinking skills.²² In a study conducted in KSA, Al-Zahrani found that there was a shortage of qualified instructors to meet an ever-increasing demand. Qualified instructors are those who have the content knowledge and teaching skills to teach at the university.²³

The analysis of the responses to the questionnaire shows that the majority of participants have indicated they use the devices frequently and would be favourably disposed to the use of such devices in the teaching and learning process. Laptop computing may be superior to the traditional computer lab. They are considered superior because most students use laptops to do their assignments and projects. This technology has been shown to improve instructor and student technology literacy, student responsibility and independence, and the quality of student products.^{24–26}

The rate of technological advancement is advancing with notable rapidity. The combination of smart devices and/or handheld computers already allows connection to the internet from nearly any location on campus, providing instant access to the electronic resources provided by the University of Dammam. The challenge for pedagogy will be to identify what types of information are better accessible with the help of technology and what types of information require a more traditional, face-to-face learning methodology.

New difficulties of classroom management and organization have required that instructors take on the additional role of change agent/manager.

Conclusions

The present study has shown that many students are relying on technology for their academic needs. It is recommended that future studies should continue to monitor students' usage and attitudes toward technology. It is also important that we study how to best support those students who are not using the technology, in spite of efforts made by the university authorities to assist them. Future studies are needed to address how using technology may contribute to the long-term retention of knowledge and acquisition of skills such as interpersonal communication, psychomotor (a skill that requires the involvement of both mental and physical abilities), and cognitive skills within different courses.

Table 2: Relationship between students' use of technology and their academic achievements.

		Total GPA	Total survey
Total GPA	Pearson correlation	1	0.421**
	Sig. (2-tailed)		0.000
	N	213	213

** . Correlation is significant at the 0.01 level (2-tailed).

Limitations

There are some limitations to this study:

- (1) Although the focus of this study was students' interaction with curricular content, it would also be beneficial to conduct the survey with administrators, instructors, and other related personnel.
- (2) Students' degree of experience (encompassing those with a high degree of experience) in using technology might have been specifically measured.

Conflicts of interest

The authors have no conflicts of interest to declare.

Authors' contribution

AHM conceived and designed the study, conducted research, provided research materials, and collected and organized data. HA analyzed and interpreted data. All authors wrote initial and final draft of article, and provided logistic support. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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