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# Medical Students' Perceptions towards Smart Devices and Their Relationship with Academic Performance

**Rasheed Khalid Barradah[1], Elsadig Yousif Mohamed[2]*, Waqas Sami[2], Rakan Jaser Alsahly[3], Thamer Ahmed Alghannam[3], Mohammed Abdulrahman Alrawsaa[3], Abdullah Yahya Abumaghayed[3], Naif Zayed Almutairi[3]**

*[1]Department of Dermatology, College of Medicine, Majmaah University, Al- Majmaah 11952, Saudi Arabia*

*[2]Department of Community Medicine and Public Health, College of Medicine, Majmaah University, Al-Majmaah 11952, Saudi Arabia*

*[3]Medical student, College of Medicine, Majmaah University, Al- Majmaah 11952, Saudi Arabia*

## ABSTRACT

*Background: Smart devices turned into a basic tool of medical students' academic life. Smart devices are utilized throughout the day for numerous reasons including learning, communication, productivity, entertainment, utilities, social networking and gaming. The objectives of the current study were to determine the use and perceptions of medical students at Majmaah University, Saudi Arabia towards smart devices and its relationship with academic performance.*

*Methods: This was a cross-sectional study to determine the use and perceptions of medical students at Majmaah University, Saudi Arabia towards smart devices. The total enumeration of all eligible students was considered in this study. Data were collected by a questionnaire. Analysis was performed by SPSS.*

*Results: All students (n=174, 100%) use smart devices and 37% use them more than 6 hours per day. 141 (81.0%) students preferred to study using smart devices. Most students utilize smartphones in studying lectures and preparing PBL/CDs 79.3% and 75.3% respectively. Eighty-seven (49.7%) have a good perception towards smart devices. Nine (47.4%) students with high academic performance study less than three hours/day with smart devices.*

*Conclusion: Most students at the College of Medicine, Majmaah University use smart devices, mostly for more than six hours every day. Studying lectures constitute the most use of smart devices. Most students have good perception towards smart devices. There is a significant relation between the number of hours spent on smart devices and academic performance.*

**Key words:** Medical students, Perception, Use, Smart devices, Academic performance

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**Corresponding author**: Elsadig Yousif Mohammed

**e-mail**✉: ey.mohamed@mu.edu.sa

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## INTRODUCTION

A smart device is a physical object with an embedded processor, memory, sensors and/ or actuators and network connection that interacts with its environment, they include smartphones and tablets [1]. Smart devices are utilized throughout the day for different reasons including communication, productivity, learning, entertainment, utilities, social networking, and gaming [2]. These devices are currently used internationally as one of the main information and communication technologies (ICTs), these devices have turned out to be helpful for medical professionals and medical students as a potential instrument to "learn anywhere" [3,4]. Smart devices are becoming a basic tool for medical education nowadays [5,6,7]. In a survey done in the United Kingdom, there were 84% of medical students believed that smart devices usage was a useful addition to their education [8]. Other studies showed that interactive lessons using tablets and smartphones enhance student learning and engagement [9-11]. Other studies reflected the opposite, stating that spending a reasonable amount of time studying with smart

devices showed negative effects on student's Grade Point Averages (GPAs) [12,13]. Studies conducted in China and south Korea showed that 29.8% and 61.3% of the students had a smartphone addiction [14,15].

A study conducted at Qassim University, Saudi Arabia reported 60.3% of smartphone addiction among medical students [16]. Another study stated that University students in Riyadh, Saudi Arabia are at risk of smartphones addiction [17]. On the other hand, Sirajudeen, et al reported a prevalence of musculoskeletal, visual symptoms and sleep disorders among Majmaah University students as 52.7%, 54.8% and 56.8% respectively [18].

A study conducted among King Saud University students in Saudi Arabia showed that 27.2% of the subjects expressed that they spent more than eight hours daily utilizing their smartphones [6]. Social networking during academic activities and assigning more hours/day for social networking were associated with lower academic performance in a study conducted on dental students at Jazan University, Saudi Arabia [19]. Concerns of smart devices education are the loss of touch with older skills that do not use smart devices, distracted learning and lack of recall and retention of information due to loss of notetaking using a pen and paper [20]. Smart devices addiction and pain are inevitable [21].

The marked increase in smart devices usage among medical students triggered an interest in assessing the effect of smart devices uses in all aspects of their lives, particularly academic performance [17]. Adequate data regarding smart devices' effects on medical students' academic performance in Majmaah University and Saudi Arabia, in general, are scarce. The disparity of conclusions toward the academic impact of smart devices on education is an area that needs further investigation. The objectives of the current study were to determine the use and perceptions of medical students at Majmaah University, Saudi Arabia towards smart devices and its relationship with their academic performance.

## METHODS

This cross-sectional study was conducted to study the medical students' use of and perceptions towards smart devices and its effect on their academic performance. The study was conducted in college of Medicine, Majmaah University, Saudi Arabia from April 1 to May 31.2019. The population of the study was second to fifth batches of College of Medicine students. Students of the preparatory and first years were excluded from the study along with the interns. The total enumeration of all eligible students was considered in this study.

The data were collected by a pre-tested and self-administered questionnaire. The questionnaire included social characteristics of the students, data related to perceptions, use of smart devices and relationship with academic performance. Students with Cumulative Grade Point Average (CGPA) of 4.1–5 were considered as having high academic performance. Students with CGPA of 3.1 – 4 and less than 3.1 were considered as having average and low academic performance, respectively.

Data were analyzed by the Statistical Package of Social Sciences (SPSS), version 23 (SPSS, Chicago, Illinois USA). Descriptive statistics were used. The comparison between qualitative data was done by Chi-square test and p-value < 0.05 was considered as significant. The ethics approval was obtained from Majmaah University IRB (MUREC- Dec.24lCOM-201 8/l 3). An informed consent was obtained from all participants.

## RESULTS

Table 1 shows the demographic characteristics of the participants. The male students were 123 (70.7%). Most students were in the 2nd year (n=63, 36.2%). Most students resided in Majmaah (n=124, 71.3%), followed by the capital Riyadh (n=26, 14.9%). Most participants had an average academic performance (n=92, 56.4%), followed by high academic performance (n=63, 38.7%) and low academic performance (n=8, 4.9%).

Table 2 shows the use of smart devices by the students. One hundred and forty-one students (81%) used smart devices for studying while 129 (74.1%) for entertainment and 149 (85.6%) for social networking. Most of the participants (n=138, 79.3%) used smart devices for studying lectures while (n=131, 75.3%) in preparing for problem-based learning (PBL) and case

discussion (CD). Reading books, preparing seminars, and making notes during lectures were used by 58.6%, 49.4%, and 24.7% respectively. Most students used mainly smart devices in studying at their home (n=120, 69.77) while (n=52, 30.2%) used them at the college. Most participants (n= 86, 49.71%) believed that the smart devices use in studying would improve their academic performance, while (n=9, 5.2%) believed that it had a negative impact on their academic performance. Some participants stated that it has no effect (n=35, 20.23%).

Table 3 shows the relation between hours spent studying on smart devices and their academic performance. Most students had an average academic performance (n=92, 52.9%). Students with high, and low academic performance were 36.2% and 10.9% respectively. Nine (47.4%) students with high academic performance study less than three hours/day with smart devices compared to (37.7%), and (30.84%) of the students who study 3-6 and more than 6 hours/day, (p=0.02).

Table 4 shows the limitations of utilizing smart devices as a tool for studying. Most students (n=93, 53.4%) reported that internet access was one of their limitations in using smart devices for studying. Other limitations included short battery life, distractions from studying and difficulty of use constituted 47.1%, 37.4% and 5.2% respectively.

**Table 1: Demographic characteristics of the sample.**

| Demographic characteristics | Frequency | Percent |
|---|---|---|
| **Gender** | | |
| Male | 123 | 70.7 |
| Female | 51 | 29.3 |
| **Academic year** | | |
| 2nd year | 63 | 36.2 |
| 3rd Year | 47 | 27 |
| 4th Year | 27 | 15.5 |
| 5th Year | 37 | 21.3 |
| **Residency** | | |
| Majmaah | 124 | 71.3 |
| Riaydh | 26 | 14.9 |
| Others | 24 | 13.8 |
| **Academic performance (CGPA)** | | |
| High (4.1-5) | 63 | 38.7 |
| Average (3.1-4) | 92 | 56.4 |
| Low (Less than 3.1) | 8 | 4.9 |

**Table 2: Use of smart devices (n=174).**

| Variable | Frequency | Percent |
|---|---|---|
| **Main reasons behind smart devices use** | | |
| Studying | 141 | 81 |
| Entertainment | 129 | 74.1 |
| Social networking | 149 | 85.6 |
| **Type of use in study** | | |
| Studying lectures | 138 | 79.3 |
| Making notes during lectures | 43 | 24.7 |
| Reading books | 102 | 58.6 |
| In PBLs/CDs sessions | 131 | 75.3 |
| Preparing seminars | 86 | 49.4 |
| **Main site of use smart devices for studying** | | |
| At home | 122 | 69.8 |
| At the college | 52 | 30.2 |
| **Perception of outcomes of use for studying** | | |
| Improved performance | 87 | 49.7 |
| Decreased performance | 9 | 5.2 |
| No effect | 35 | 20.2 |
| Not sure | 43 | 24.9 |

**Table 3: The relation between time spent using smart devices and the academic performance.**

| Frequency of use/hour | Academic performance | | | Total | Chi- square | p |
|---|---|---|---|---|---|---|
| | Below average No (%) | Average No. (%) | High No. (%) | | | |
| Less than 3 | 01 (5.2) | 09 (47.4) | 09 (47.4) | 19 (10.9%) | 11.74 | 0.02 |
| 3 to 6 | 07 (7.7) | 49(54.4) | 34 (37.7) | 90 (51.7%) | | |
| More than 6 | 11 (16.9) | 34 (52.3) | 20 (30.8) | 65 (37.4%) | | |
| Total | 19 (10.9) | 92 (52.9) | 63 (36.2) | 174 (100%) | | |

**Table 4: Limitations of using smart devices for studying (n=174).**

| Limitation | No | % |
|---|---|---|
| Lack of internet access | 93 | 53.4 |
| Short battery life | 82 | 47.1 |
| Distraction from studying | 65 | 37.4 |
| Difficult to use | 9 | 5.2 |

## DISCUSSION

174 medical students responded to the questionnaire, giving a response rate of 70%. Most of the students believed that smart devices had a positive effect on their academic performance (n=86, 49.4%) while only 5.2% of the students (n=9) believed that smart devices had a negative impact on their academic performance. This finding points to the positive perception of smart devices among medical students. Other studies showed similar perception, a study conducted in the US revealed that 61% of participants believed that medical applications and smart devices had a positive impact and were as reliable as textbooks [22]. In contrast, other studies showed a negative perception towards smart devices, a study at King Abdulaziz University, Jeddah, KSA revealed that most students did not find medical applications helpful [23].

Most students use smart devices for more than 6 hours per day (n=65, 37.4%). This finding is in line with other studies [24,25]. In contrast, studies conducted in the UK and India showed a shorter time was spent on medical applications ranging from zero to twenty minutes [8,26].

In our study students utilize smart devices for different academic issues such as studying lectures, making notes, reading books, and preparing PBLs/CDs sessions. This finding is consistent with studies where respondents use applications in reviewing medical knowledge and looking up different medical information [27,28]. However, 12% of respondents don't use smartphone applications [27]. The main sight for using smart devices is at home as reported in this study which is consistent with another study done by Shailesh Rai [29].

Perception of the students towards the usefulness of smart devices use was reported, 49.7% of respondents stated good perception that smartphones improve their academic performance. In contrast to another study in Saudi Arabia among healthcare workers concluded that use smartphones are useless and not practical [23].

A statistically significant difference was observed (p=0.02) between time spent using smart devices in studying and the academic performance of the students estimated by their Cumulative Grade Point Average (CGPA). Conversely, other studies have identified a statistically significant association between average usage of medical applications and academic performance [30,31]. Assigning more hours/day for social networking was associated with lower CGPA scores in a study conducted on dental students at Jazan University, Saudi Arabia and Malaysia [19,32].

The limitation of smartphones use in studying is the short battery lifetime due to energy drain [28,33]. In the current study, 53.4% of respondents stated that a lack of internet access is a limitation for smart device usage for studying. This finding is consistent with a study conducted in Palestine [34]. The limitation of this study is that students of one college of Medicine formulated the population, since the results can't be generalized to all Colleges of Medicine and University students.

## CONCLUSION

All students of the college of medicine, Majmaah University use smart devices, mostly for more than six hours every day. The most use of smartphones is for studying especially in revising lectures, case discussions and problem-solving. Most of the students have a good perception towards smartphone use which helps in improving their academic performance. There

is a significant relation between the number of hours spent on smart devices use and academic performance, the academic performance improves when the number of hours spent using smart devices decreases.

Since all students use smart devices educational strategies are advised to move partly towards e learning specially after COVID-19 pandemic. According to our findings, students learning through smart devices is advised to be limited, e learning can't replace traditional class teaching. Further multicenter researches including different universities and medical schools are recommended.

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**CONFLICTS OF INTEREST**

There is no conflict of interest in this research.

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