Research Article

Use of electronic devices by the medical students of UniKL-RCMP, Malaysia, and its influence on academic performances

ATM Emdadul Haque[1], Sandheep Sugathan[1], Osman Ali[1], Zakirul Islam[2], Mainul Haque[3]

[1]Faculty of Medicine, Universiti Kuala Lumpur Royal College of Medicine Perak, Jalan Greentown, Ipoh, Perak, Malaysia.
[2]Department of Pharmacology, Eastern Medical College, Comilla, Bangladesh.
[3]Unit of Pharmacology, Faculty of Medicine, Universiti Sultan Zainal Abidin, Jalan Sultan Mahmud, Kuala Terengganu, Terengganu, Malaysia.

Correspondence: ATM Emdadul Haque, E-mail: emdad0103@gmail.com

Received September 27, 2015. Accepted October 16, 2015

Abstract

Background: The availability and the use of electronic devices among the students of higher education have been continuing to grow. The devices connect the users to the world instantly, allow access to information, and enable interactivity with others. The uses of these devices are playing an important role, especially in their academic lives. **Aims and Objectives:** To identify the types of devices used for the students, the purpose of their use, and its influence on their academic performances. **Materials and Methods:** A questionnaire was developed, and its content validity was tested by a survey expert. About 300 questionnaires were later distributed among the available year-I, -II, and -III students, and 230 completed questionnaires were collected back from the participants. The data collected were inserted in the SPSS (version 17.0) program and analyzed accordingly. **Results:** Descriptive analysis showed that 71.7% of the respondents were female students; 68.7% were in 20–21 age groups; and 42.2% were from year I, 42.6% from year II, and the rest from year III. A total of 65.7% of the respondents admitted that they used to use electronic devices in the classroom, and 89.6% of which use a smartphone. Among the smartphone users, about 48% scored >65% marks in their last examination. **Conclusion:** It has been found that the students' performance was directly associated with the use of electronic devices for academic purposes. In this study, students' learning behavior with electronic devices, especially smartphones, was explored, and the data indicated that they want more access to the academic-friendly devices. The smart uses of electronic devices, therefore, help to improve the academic performance of the students.

KEY WORDS: Electronic Devices; Medical Students; UniKL-RCMP; Malaysia

Introduction

The use of electronic gadgets such as laptop computers, smartphones, and tablets in day-to-day work is increasingly frequent in any society of developing and developed countries, especially among young university students, even during class hours.[1,2] These devices have been extensively embraced by the medical students and professionals.[2–6] Smartphones now actually transformed as mobile computers as it provides instant, handy access to numerous of the identical education-enhancing competencies as an internet-connected computer.[7,8] Therefore, use of these devices not only increased any society's daily life and business but also have become essential for the same. Similar to smartphones and tablets, new-generation laptop, has also eased our life. These not only ensure keeping touch with family and friends, but similarly resolve many issues of our professional life and avoids the need of carrying bundles of files with us.[2] Probably, these are the reasons that medical community has embraced technology in daily life. Therefore, these gadgets are rapidly becoming one of the leading gears for reading and retrieving all kind of

Access this article online	
Website: http://www.njppp.com	Quick Response Code:
DOI: 10.5455/njppp.2015.5.2709201577	

relevant information required by the medical and health professionals, including medical students.[9–14]

In these days, smartphones are used in a number of clinical and academic settings, in particular to right to use medication,[15] appropriate information about diseases,[15] interconnecting colleague for any particular and critical issue regarding teaching and prescribing,[16–18] "viewing images,"[19] "listening to podcasts,"[19] and downloading necessary references as article and even books.[13,20] "The number of smartphone users worldwide will surpass 2 billion in 2016, according to new figures from eMarketer—after nearly getting there in 2015. Next year, there will be over 1.91 billion smartphone users across the globe, a number that will increase another 12.6% to near 2.16 billion in 2016."[21] It has been reported that at least 10 million Malaysians are using smartphones.[22] It has been reported in 2010 that about 70% of US[23] and 80% of Chinese[24] physicians were using smartphones. Recently, one Malaysian study reported that over 94% of consultant physicians and surgeons possess smartphones, and they use it in "remote and daily medicine" practice.[25] Another study reported that younger physicians were more inclined to use smartphones and ladies show more acceptances regarding using smartphones in their professional field.[26]

It has been revealed that 94% of the study participants of Najran University, Saudi Arabia, owned smartphones.[27] Similarly, study reports from the faculty of medicine of four Canadian leading Universities were also obtained that 93% of medical students held a smartphone.[28] About 98% of medical students of the University of Toronto[29] and at least 79% British medical students[30] owned smartphones. Malaysian medical students' picture is almost same, and one study reported in 2014 that nearly 90% of them have smartphones or devices.[31] Although many medical faculties and universities are quite slow in understanding the potentials of these smart devices,[32] but there are exceptions such as University of Leeds, UK,[33] and Stanford University, USA.[34] The University of Leeds[33] lends iPhones to all year-III and -IV medical students while Stanford University[34] provides iPads to all the medical students. "Innovative roles of the smartphone in the field of internal medicine, which includes patient care, medical reference, and continuing education, and in medical education, communication, and research" promote its use by both students and professionals.[34] Multiple studies of advanced countries reported that handheld electronic gadgets were regularly used by the medical students, medical lecturers, and house officers to obtain references and necessary information for diagnosis and prescribing.[13,30,35] It has been reported that, before the development and marketing of iPhone, medical students and faculties were using "specific clinical apps" to resolve any practical hurdles in managing patients.[11] But, in recent years, the use of smartphones has been in much increase among medical professionals from India and the United States including students, especially for retrieving articles and books and for clinical evidence.[36,37]

Although there are very high uses of electronic handheld gadgets among Malaysian young generation, the exact prevalence of use of these smart devices among medical students is

Table 1: Demographic profile of the study respondents

	Frequency	%
Gender		
Male	65	28.3
Female	165	71.7
Total	230	100.0
Age group (years)		
18–19	15	6.5
20–21	158	68.7
22–23	54	23.5
24 and above	3	1.3
Total	230	100.0
Year of study		
First	97	42.2
Second	98	42.6
Third	35	15.2
Total	230	100.0

Table 2: Frequency table of students' and teachers' electronic device use and teachers' encouragement to use electronic device during class

	Frequency	%
Students' electronic device use		
Yes	152	66.1
No	78	33.9
Total	230	100
Teachers' electronic device use		
Yes	145	63.0
No	85	37.0
Total	230	100
Teachers' encourage to use electronic device		
Yes	89	38.7
No	141	61.3
Total	230	100

Table 3: Frequency table of students' electronic device use for educational and noneducational purpose

	Frequency	%
Educational purpose (h)		
<1	22	9.6
1–2	86	37.4
3–4	78	33.9
>4	44	19.1
Total	230	100
Noneducational purpose (h)		
<1	18	7.8
1–2	80	34.8
3–4	64	27.8
>4	68	29.6
Total	230	100

Table 4: Students' grade in immediate last examination

Grade	A	A-	B+	B	B-	C+	C	C-	D	F	Total
Frequency	14	27	33	38	37	38	28	5	2	8	230
Percentage	6.1	11.7	14.3	16.5	16.1	16.5	12.2	2.2	0.9	3.5	100.0

Table 5: Cross tabulation of students' gender, year of study, and types of electronic device use

Year of study	Gender	Types of electronic device, *n* (%)					Total
		Laptop	Smartphone	Tablets	Dongle	Kindle	
I	Male	22 (25.3)	20 (21.7)	6 (26.1)	2 (66.7)	0 (0)	22 (22.7)
	Female	65 (74.7)	72 (78.3)	17 (73.9)	1 (33.3)	0 (0)	75 (77.3)
	Total	87 (89.7)	92 (94.8)	23 (23.7)	3 (3.1)	0 (0)	97 (100)
II	Male	22 (26.2)	22 (25.6)	7 (15.9)	0 (0)	0 (0)	24 (24.5)
	Female	62 (73.8)	64 (74.4)	37 (84.1)	0 (0)	0 (0)	74 (75.5)
	Total	84 (85.7)	86 (87.8)	44 (44.9)	0 (0)	0 (0)	98 (100)
III	Male	13 (54.2)	15 (53.6)	5 (45.5)	0 (0)	0 (0)	19 (54.3)
	Female	11 (45.8)	13 (46.4)	6 (54.5)	0 (0)	0 (0)	16 (45.7)
	Total	24 (68.6)	28 (80)	11 (31.4)	0 (0)	0 (0)	35 (100)
I, II, and III	Male	57 (29.2)	57 (27.7)	18 (23.1)	2(66.7)	0 (0)	134 (27.8)
	Female	138 (70.8)	149 (72.3)	60 (76.9)	1 (33.3)	0 (0)	348 (73.2)
	Total	195 (84.8)	206 (89.6)	78 (33.9)	3 (1.3)	0 (0)	482 (100)

Table 6: Correlation between year of study and use of laptop

Year of study	Gender	Laptop, *n* (%)		Total	Pearson's χ^2 (Fisher's exact test)	*P*
		Yes	No			
I	Male	22 (25.3)	0 (0)	22 (22.7)	3.270 (0.110)	0.071
	Female	65 (86.7)	10 (13.3)	75 (77.3)		
	Total	87 (89.7)	10 (10.3)	97 (100)		
II	Male	22 (91.7)	2 (8.3)	24 (24.5)	0.920 (0.507)	0.338
	Female	62 (83.8)	12 (16.2)	74 (75.5)		
	Total	84 (85.7)	14 (14.3)	98 (100)		
III	Male	13 (68.4)	6 (31.6)	19 (54.3)	0.000 (1.000)	0.983
	Female	11 (68.8)	5 (31.3)	16 (45.7)		
	Total	24 (68.6)	11 (31.4)	35 (100)		
I, II, and III	Male	57 (29.2)	8 (22.9)	65 (28.3)	0.595 (0.543)	0.543
	Female	138 (70.8)	27 (77.1)	165 (71.7)		
	Total	195 (84.8)	35 (15.9)	230 (100)		

not much available. The purpose of this fact-finding study is verifying the trends in electronic gadgets usage among medical students of Universiti Kuala Lumpur-Royal College of Medicine Perak. This study will try exploring two types of usage: average daily usage and usage for learning.

Materials and Methods

This was a cross-sectional study involving year-I, -II, and -III medical students at Universiti Kuala Lumpur-Royal College of Medicine Perak, Ipoh, Malaysia. We developed a 10-point close-ended questionnaire. Questionnaire was designed to find the proportion of students possessing smart devices; how many hours a day they used for educational purposes; and any correlation between academic grades and use of gadgets. Academic grades were A (80–100), A- (75–79), B+ (70–74), B (65–69), B- (60–64), C+ (55–59), C (50–54), C- (45–49), D (40–44), and F (0–39). The questionnaire also contains three questions regarding demographic data. A survey expert tested the questionnaire and its content validity. Three hundred questionnaires were distributed among the available year-I, -II,

Table 7: Correlation between year of study and use of smartphone

Year of study	Gender	Smartphone, *n* (%)		Total	Pearson's χ^2 (Fisher's exact test)	*P*
		Yes	No			
I	Male	20 (90.9)	2 (9.1)	22 (22.7)	0.902 (0.317)	0.342
	Female	72 (96.0)	3 (4)	75 (77.3)		
	Total	92 (94.8)	5 (5.2)	97 (100)		
II	Male	22 (91.7)	2 (8.3)	24 (24.5)	0.453 (0.725)	0.501
	Female	64 (86.5)	10 (13.5)	74 (75.5)		
	Total	86 (87.8)	12 (12.2)	98 (100)		
II	Male	15 (78.9)	4 (21.1)	19 (54.3)	0.029 (1.000)	0.865
	Female	13 (81.3)	3 (18.8)	16 (45.7)		
	Total	28 (80)	7 (20.0)	35 (100)		
I, II, and III	Male	57 (27.7)	8 (33.3)	65 (28.3)	0.340 (0.633)	0.560
	Female	149 (72.3)	16 (66.7)	165 (71.7)		
	Total	206 (89.6)	24 (10.4)	230 (100)		

and -III students. This survey was predominantly quantitative serving to describe and explain current behaviors of study participant medical students regarding smart devices. The data collected were inserted in the SPSS (version 17.0) program and analyzed accordingly. Most of the sections of this questionnaire demonstrated acceptable values, with a range between 0.672 and 0.882, which indicated that both instruments possessed good internal consistency and reliability. Authors obtained necessary approval from the faculty to conduct the research. The evidence of convergent validity was shown by the significant correlations between the items of each section and the total mean in each section (r_s = 0.332–0.718; $P < 0.05$).[38,39]

Results

Of 300 questionnaires distributed, 230 completed questionnaires were returned from the participants, giving a response rate of 77%. Among the respondents, 72% (165) were female and 28% (65) male students. Among them, 69% (158), 24% (54), 7% (15), and 1% (3) were in 20–21, 22–23, 18–19, and 24 and above age groups, respectively. Again, 42% (97), 43% (98), and 15% (35) were from years I, II, and III, respectively (Table 1). A total of 66% (152) study respondents admitted that they used electronic devices regularly in the classroom and rest 34% (78) disagree; 63% (145) and 39% (89) of the study respondents reported that their teachers' use and encourage the use of smart devices during class hours, respectively (Table 2). UniKL-RCMP medical students use a number of electronic devices, and many of them have and use more than one device: laptop (195, 85%), smartphones (203, 90%), tablet (78, 34%), and dongle (3, 1%). Thirty-seven percent (86), 34% (78), 19% (44), and 10% (22) of the study participants use smart devices for academic purpose for 1–2, 3–4, >4, and <1 h, respectively. Again, 35% (80), 28% (64), 29% (68), and 8 (18) of the study participants use smart devices for nonacademic purpose for 1–2, 3–4, >4, and <1 h, respectively (Table 3). Immediate last examination results of the study

Table 8: Correlation between year of study and use of tablet

Year of study	Gender	Tablet, *n* (%)		Total	Pearson's χ^2 (Fisher's exact test)	*P*-value
		Yes	No			
I	Male	6 (27.3)	16 (72.7)	22 (22.7)	0.200 (0.776)	0.655
	Female	17 (22.7)	58 (77.3)	75 (77.3)		
	Total	23 (23.7)	74 (76.3)	97 (100)		
II	Male	7 (29.2)	17 (70.8)	24 (24.5)	3.179 (0.099)	0.075
	Female	37 (50)	37 (50)	74 (75.5)		
	Total	44 (44.9)	54 (55.1)	98 (100)		
III	Male	5 (26.3)	14 (73.7)	19 (54.3)	0.504 (0.716)	0.478
	Female	6 (37.5)	10 (62.5)	16 (45.7)		
	Total	11 (31.4)	24 (68.6)	35 (100)		
I, II, and III	Male	18 (23.1)	47 (30.9)	65 (28.3)	1.564 (0.221)	0.211
	Female	60 (76.9)	105 (69.1)	165 (71.7)		
	Total	78 (33.9)	152 (66.1)	230 (100)		

Table 9: Correlation between students' genders, grade in last examination, and electronic device use for academic purpose

Electronic device use for educational purpose (h)	Gender	Grade in last examination, *n* (%)										Total	Pearson's Chi-Square	*P* Value
		A	A-	B+	B	B-	C+	C	C-	D	F			
<1	Male	1 (17)	0 (0)	1 (20)	0 (0)	0 (0)	1 (13)	0 (0)	0 (0)	0 (0)	2 (33)	5 (8)	34.102	0.163
1–2		0 (0)	5 (56)	1 (20)	5 (50)	3 (30)	6 (75)	2 (29)	1 (50)	1 (50)	0 (0)	24 (37)		
3–4		4 (67)	2 (22)	2 (40)	4 (40)	6 (60)	1 (13)	4 (57)	0 (0)	1 (50)	1 (17)	25 (39)		
>4		1 (17)	2 (22)	1 (20)	1 (10)	1 (10)	0 (0)	1 (14)	1 (50)	0 (0)	3 (50)	11 (17)		
Total		6 (9)	9 (14)	5 (8)	10 (15)	10 (15)	8 (12)	7 (11)	2 (3)	2 (3)	6 (9)	65 (100)		
<1	Female	1 (13)	4 (22)	1 (4)	5 (18)	2 (7)	1 (3)	3 (14)	0 (0)	0 (0)	0 (0)	17 (10)	25.166	0.397
1–2		2 (25)	4 (22)	12 (43)	11 (39)	8 (30)	15 (50)	6 (29)	2 (67)	0 (0)	2 (25)	62 (38)		
3–4		5 (62)	5 (28)	8 (29)	8 (29)	12 (44)	6 (33)	8 (0)	1 (38)	0 (20)	0 (0)	53 (32)		
>4		0 (0)	5 (28)	7 (25)	4 (14)	5 (19)	8 (27)	4 (19)	0 (0)	0 (0)	0 (0)	33 (20)		
Total		8 (5)	18 (11)	28 (17)	28 (17)	27 (16)	30 (18)	21 (13)	3 (2)	0 (0)	2 (1)	165 (100)		
<1	Male and female	2 (9)	4 (18)	2 (9)	5 (23)	2 (9)	2 (9)	3 (14)	0 (0)	0 (0)	2 (9)	22 (10)	30.694	0.284
1–2		2 (2)	9 (11)	13 (15)	16 (19)	11 (13)	21 (24)	8 (9)	3 (4)	1 (1)	2 (2)	86 (37)		
3–4		9 (12)	7 (9)	10 (13)	12 (15)	18 (23)	7 (9)	12 (15)	1 (1)	1 (1)	1 (1)	78 (34)		
>4		1 (2)	7 (16)	8 (18)	5 (11)	6 (14)	8 (18)	5 (11)	1 (2)	0 (0)	3 (7)	44 (19)		
Total		14 (6)	27 (12)	33 (14)	38 (16)	37 (16)	38 (17)	28 (12)	5 (2)	2 (1)	8 (4)	230 (100)		

participants was 6% (14), 12% (27), 14% (33), 17% (38), 16% (37), 17% (38), 12% (28), 2% (5), 1% (2), and 3% (8) secured A, A-, B+, B, B-, C+, C, C-, D, and F, respectively (Table 4). Details of the use of laptop, smartphone, tablets, dongle, and kindle with year of study and gender are given in Table 5. There was statistically no significant ($p > 0.05$) difference observed between the year of study and gender in using laptop (Table 6), smart phone (Table 7), and tablet (Table 8). Again, there was no significant ($p = 0.284$) relation found between hours of use of electronic devices for academic purpose and performance (Table 9). But, significant ($p = 0.001$) relation found between hours of use of electronic devices for nonacademic purpose and their performance in last examination (Table 10). There were also no statistically significant ($p = 0.527$) differences observed between gender and use of electronic devices (Table 11). Similarly, there were also no statistically significant ($p = 0.695$)

Table 10: Correlation between students' genders, grade in last examination, and electronic device use for nonacademic purpose

Electronic device use for noneducational purpose (h)	Gender	Grade in last examination, *n* (%)										Total	Pearson's χ^2	*P*
		A	A-	B+	B	B-	C+	C	C-	D	F			
<1	Male	1 (50)	0 (0)	0 (0)	0 (0)	0 (0)	1 (50)	0 (0)	0 (0)	0 (0)	0 (0)	2 (3)	38.473	0.071
1–2		0 (0)	7 (33)	2 (10)	1 (5)	3 (14)	2 (10)	4 (19)	1 (5)	1 (5)	0 (0)	21 (32)		
3–4		2 (12)	1 (6)	1 (6)	3 (18)	5 (29)	3 (18)	1 (6)	0 (0)	1 (6)	0 (0)	17 (26)		
>4		3 (12)	1 (4)	2 (8)	6 (24)	2 (8)	2 (8)	2 (8)	1 (4)	0 (0)	6 (24)	25 (39)		
Total		6 (9)	9 (14)	5 (8)	10 (15)	10 (15)	8 (12)	7 (11)	2 (3)	2 (3)	6 (9)	65 (100)		
<1	Female	4 (25)	2 (13)	0 (0)	2 (13)	1 (6)	6 (38)	0 (0)	1 (6)	0 (0)	0 (0)	16 (10)	43.004	0.010
1–2		1 (2)	3 (5)	12 (20)	13 (22)	9 (15)	10 (17)	10 (17)	0 (0)	0 (0)	1 (2)	59 (36)		
3–4		3 (6)	8 (17)	9 (19)	6 (13)	6 (13)	8 (17)	7 (15)	0 (0)	0 (0)	0 (0)	47 (29)		
>4		0 (0)	5 (12)	7 (16)	7 (16)	11 (26)	6 (14)	4 (9)	2 (5)	0 (0)	1 (2)	43 (26)		
Total		8 (5)	18 (11)	28 (17)	28 (17)	27 (16)	30 (18)	21 (13)	3 (2)	0 (0)	2 (1)	165 (100)		
<1	Male and female	5 (28)	2 (11)	0 (0)	2 (11)	1 (6)	7 (39)	0 (0)	1 (6)	0 (0)	0 (0)	18 (8)	54.057	0.001
1–2		1 (1)	10 (13)	14 (16)	14 (18)	12 (15)	12 (15)	14 (16)	1 (1)	1 (1)	1 (1)	80 (35)		
3–4		5 (8)	9 (14)	10 (16)	9 (14)	11 (17)	11 (17)	8 (13)	0 (0)	1 (2)	0 (0)	64 (29)		
>4		3 (4)	6 (9)	9 (13)	13 (19)	13 (19)	8 (12)	6 (9)	3 (4)	0 (0)	7 (10)	68 (30)		
Total		14 (6)	27 (12)	33 (14)	38 (17)	37 (16)	38 (17)	28 (12)	5 (2)	2 (1)	8 (4)	230 (100)		

Table 11: Cross tabulation of students' electronic device use according to gender

	Gender (%)		Total	Pearson's χ^2(Fisher's exact test)	*P*
	Male	Female			
Students' electronic device use in class					
Yes	45 (30)	107 (70)	152 (66)	0.400 (0.643)	0.527
No	20 (26)	58 (74)	78 (34)		
Total	65 (28)	165 (72)	230 (100)		
Students' number of electronic device use					
Use of laptop	10 (28)	26 (72)	36 (16)	0.729	0.695
Use of smartphone	41 (30)	95 (70)	136 (59)		
Use of tablet	14 (24)	44 (76)	58 (25)		
Total	65 (28)	165 (72)	230 (100)		

differences observed between laptop, smartphone, and tablet use (Table 11). Moreover, no statistically significant (p = 0.812) correlation observed when compared with teachers' and students' use of electronic devices in class (Table 12).

Discussion

In this study, the recovery rate was 77% that was fairly similar to other Malaysian studies.[42,43] Female respondents have surpassed their male colleagues in this study. These findings also became very common with some Malaysian and Asian studies.[40–43] The difference observed among the number of the study respondents in this study may be because of their availability during the time of data uptake. The study respondents (66%) agreed that they use electronic devices during the class hours. Our findings were to some extent less than the findings of Canada (93%) and the USA (80%).[44,45] Our respondents opined that their teachers encourage them to use smart devices; similar finding also reported from the UAE and USA[46,47]; such corroboration was also witnessed even in medical schools.[48,49] The study respondents used a number of electronic devices, which was also observed among the US health-care professionals and four Canadian university students.[14,28] The study respondents (<1 to >4 h) used electronic devices much more time than medical students of the United Kingdom (0 to 1 + h).[30] But, almost similar findings were reported by one Saudi Arabian study.[2] The majority (92%) of our respondents spent 1 to >4 h for the nonacademic purpose. Similar findings were also reported by other studies.[50,51] Use of electronic devices has actually showed no statistically significant (p = 0.284) correlation with their academic performance. This finding is also similar to one recent study of Middle-East,[2] but it has been reported from The National University that high internet usage was associated with the academic performance.[52]

Electronic devices permit health-care experts to interact and transfer information rapidly and competently and ensure apposite health for the common people of the community. However, health-care connoisseurs and medical faculty must be much careful about these smart devices and not to become to be troublesome high-tech. Therefore, these high-tech devices' mis-application may lead to a deleterious move toward the physician–patient relationship and overall health care.[53–55] The current study conducted with limited sample size also finds a statistically significant (p = 0.001) correlation with smart device uses with nonacademic purpose. There should be no compromise in maintaining the high professional standard of the medical doctors and school.[56–59] Medical academicians and authorities should generate precise policy for using smart devices to preserve our high proficient quality. This is a cross-sectional study with its inherent limitation and with a minimum number of participants.

Conclusion

In this study, students' learning behavior with electronic devices was explored, and the data indicated that they want more access to the academic-friendly devices. Although the students' performance was not significantly associated with the use of electronic devices,

Table 12: Cross tabulation and correlation of teachers' and students' electronic device use in class

Teachers' electronic device use in class	Students' electronic device use in class (%)		Total	Pearson's χ^2	*P*-value
	Yes	No			
Yes	95 (62.5)	50 (34.5)	145 (63.0)	0.057 (0.886)	0.812
No	57 (67.1)	28 (32.9)	85 (37.0)		
Total	152 (66.1)	78 (33.9)	230 (100)		

but the smart use of them might have helped in improving the academic performance of the students. Nonetheless, it is important to provide adequate facilities for students' entertainment and educate them regarding the rational use of electronic devices.

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How to cite this article: Haque ATME, Sugathan S, Ali O, Islam MZ, Haque M. Use of electronic devices by the medical students of UniKL-RCMP, Malaysia, and its influence on academic performances. Natl J Physiol Pharm Pharmacol 2016;6:38-45.

Source of Support: Nil, **Conflict of Interest:** None declared.