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**COMPARISON BETWEEN E-LEARNING AND CLASSICAL TEXTBOOK LEARNING  
AMONGST MEDICAL STUDENTS FROM KSA**

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**Abstract**

**Background:** Variations in the different forms of reading and writing mediums have continued to be a major focus for research. Studies are mostly concerned in how altering the textbook medium impacts the reading/writing process, the reading/writing output itself and the resultant cognitive repercussions e.g. improvement of learning in an educational setting.

**Objectives:** To determine the preference of medical students to digital tablets for reading and digital pens for writing. To determine the relationship between GPA scores and medical students preferences to digital tablets for reading versus digital pens for writing

**Methods:** During the academic year 2022-2023, King Abdulaziz University in Jeddah conducted a cross-sectional study. 115 Participants in the study ranged in age from 19 to 26 years old and were undergraduate medical students at King Abdulaziz University. Data was analyzed through SPSS version 23.

**Results:** Out of 115 participants, 2.6% participants (n=3) answered Textbooks or lecture notes, 65.2% participants (n=75) answered Electronic devices (Tablets or Laptops) and 32.2% (n=37) participants

answered both at the same time when asked about the method they used to study/learn. Non-significant association was found ( $p>0.05$ ) between of GPA and methods used to study/learn.

**Conclusion:** The study concluded that majority of students' preferred method of studying/learning was electronic devices (Tablets or laptops), however no significant association was found between GPA obtained by students and their preferred method of studying/learning.

#### Introduction

The fast development of the internet and wireless communication technologies in recent years has resulted in the creation of many interactive multimedia networks, including mobile voice, mobile learning, and instant messaging. Traditional education would be replaced by using the Internet's convenience and popularity to apply digital teaching resources and achieve the goal of national competitiveness. Because of this, extensive research is being done on mobile learning to provide better transmission performance and widespread adoption. The technology of small, portable smartphones is becoming so advanced that nearly everyone owns one. In contrast to the traditional method of browsing the Internet, a user can connect to the server over a network to choose the appropriate digital teaching resources for the learning process. Instant tests also let students control the content of these materials. As a result, realistic teaching strategies might be devised by integrating current teaching trends and utilizing the benefits of digital learning to improve teaching effectiveness [1].

Variations in the different forms of reading and writing mediums have continued to be a major focus for research. Studies are mostly concerned with how altering the textbook medium impacts the reading/writing process, the reading/writing output itself, and the resultant cognitive repercussions e.g. improvement of learning in an educational setting [2, 3]. Understanding the links between these variables is crucial for students, educators, and institutional officials since some of these elements, particularly in the context of education, can significantly affect a student's academic outcome [4]. While most students are readily adaptable and desiring of such a change, mostly because of growing up with electronic-based textual medium, teachers/instructors have not had a smooth conversion into using the latest tech [5]. This changed with the advent of the covid-19 epidemic which expedited the shift into electronic-based mediums for most students who had to study from home.

Electronic learning is a process that has led to significant improvements in educational learning and the addition of knowledge and usability of technology in recent years. Numerous studies have shed light on numerous methods of accessing available information through the development of technological tools and their impact on the educational sector [6]. Some of the advantages of using tablets or devices with keyboards include faster input, more eligible text for easier discerning and convenience for those students with handwriting problems [7].

However, the use of newer technology in a school setting is not without flaws or risks. Since word processors and apps come with auto-correction of spelling and grammar, students can potentially become less adept in the language since they become overly dependent on the software [8, 9]. Students also are at risk of forgetting the art of handwriting which has been around for multiple generations. Owing to the lack of clarity on which electronic medium is more efficient for student use, or whether

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these forms of reading/writing technology are effective at all, the majority of schools and colleges still haven't standardized a uniform approach, despite the majority of tests nowadays being online or digital [10, 11]

The standard classification approach is required for the comparison of e-learning and traditional coursework learning. The majority of learners are helped and inspired to manage their work as unlimited open databases and open time of use of learning, student peer observation, peer assessment, faculty moderation instructions, and videos of course materials learning through effective use of e-learning models for all diploma or bachelor's students. Learning professionals working together in teams create a catalyst for developing the course outcomes evaluation [12].

The pace of obtaining various sorts of content, best optional opinion, knowledge conversion, and coming to new conclusions for both professors and learners has risen with the use of e-learning processes as opposed to individualized learning through coursework. The method focuses on learning and teaching to accept and implement a hybrid learning and technology development method [13]. Standard evaluation essentially results in a self-evaluation in opposition to the standards. To demonstrate the actual output of universities, which includes elements like student motivation and perception, learning acceptance, interactivity, student happiness, and academic success, the research on this phase of assessment firstly focuses on students learning through coursework programs.

Using e-learning approaches with teaching experience in assessment to improve both academic performance and establishing teaching assessment methods with updated criteria for educational institutions is made helpful by choosing the proper application. The previous research examined the use of e-learning to enhance student academic performance in universities, as well as the mechanisms by which this relationship is assessed, created, and put into practice for better assessment outcomes [12, 14]. This was done to classify the teaching staff's efforts to produce strong student results on fixed-matched standard tests [15]. The use of mobile and portal computers with extensive community connections and sharing, together with the most recent technological advancements, help students understand how they learn and how to develop, experiment, enquire, and reflect on the results based on prior experiences to rebuild, design, and implement new methods of teaching and learning. Numerous external application tools have been added to the learning process in education. Students have the opportunity to learn from other students by using various tools, such as wiki chat, video blogs, Google forms, differently adapted programming languages, and software programs, which are all used as inter-conversation online chats [16, 17].

A comparative study conducted in 2013 by Rockinson determined the influence of preferred methods of learning on students. The study concluded that students opted for electronic devices because of cost-effectiveness [18]. Different studies conducted on college and university students concluded that using electronic devices as a preferred method of learning improved their learning outcomes and helped in the educational process. It also concluded that it can cater to every student's educational needs individually [19-22].

Aside from filling in the literature gap, results from this research can give an understanding of student's preferred mode of reading/writing which should serve as an incentive to alter learning methods in colleges/schools in Saudi Arabia. If GPA results prove significantly different between students of the classical approach and students of the modern approach, this can also be used to push for educational reforms on a more national scale or at least encourage more research on the given subject. The primary aim of this study was to determine the preference of medical students for digital tablets for reading and digital pens for writing, by administering a survey containing 18 questions inquiring about the student's choices and opinions. It also aimed to determine the relationship between GPA scores and medical students' preferences for digital tablets for reading versus digital pens for writing

## **Methods**

### **Participants**

During the academic year 2022/2023, King Abdulaziz University in Jeddah conducted a cross-sectional study. Participants in the study ranged in age from 19 to 26 years old and were undergraduate medical students at King Abdulaziz University. The questionnaire was completed by 115 people.

### **Tools/Questionnaire**

The 18-point survey was uploaded online and links were shared with all medical students from every department of King Abdulaziz University; there was no time limit for completing the questionnaire. After completion of the questionnaire data was exported into Excel spreadsheet software. This was then imported into SPSS for running statistical tests.

### **Procedure**

Ethical approval for the study was obtained from the Ethical Committee of King Abdulaziz University. This survey was voluntary, and all answers were kept strictly confidential. An online questionnaire was developed utilizing Google Forms and published on social media platforms. The first page included an informed consent form that participants have read and agreed to. The questionnaire was separated into three sections and consisted of fourteen items in total.

### **Statistical Analysis OR Data Analysis:**

Data was entered and analyzed through SPSS version 23. First of all normality of the data was checked so that the tests could be decided. Descriptive statistics were applied, and the chi-square test found the association. Statistics would be considered significant for  $p < 0.05$ .

## **Results**

### **Descriptive Statistics**

Out of 115 participants, 58.3% (n=67) were males and 41.7% (n=48) were females. 20% of participants (n=23) were in the academic year 2, 13% of participants (n=15) were in the academic year 3, 40% of participants (n=46) were in the academic year 4, 25.2% of participants (n=29) were in the academic year 5, 0.9% (n=1) were in the academic year 6 and 0.9% (n=1) were in the academic year 7.

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## **GPA**

Out of 115 participants, 0.9% (n=1) participants have GPA between 0.00-2.74, 4.3% (n=5) participants have GPA between 2.75-3.74, 42.6% (n=49) have GPA between 3.75-4.49 and 52.2% participants (n=60) have GPA between 4.50-5.00.

## **Which of these methods did you use to study/learn?**

Figure 1 illustrates the methods used by participants to study/learn.

### **Electronic Devices**

75 participants who voted for electronic devices as their method to study/learn answered a few questions which are mentioned in Table 1.

### **Both at the same time (Electronic devices & Textbooks)**

Out of 37 participants who voted for both at the same time (electronic devices & textbooks/lectures as their method to study/learn, 8.7% (n=10) answered Textbooks or lecture notes, and 23.5% (n=27) participants answered Electronic devices (tablets or laptops) to the question "What is your preferred method for writing and reading?" 4.3% (n=5) answered Textbooks or lecture notes and 27.8% (n=32) participants answered Electronic devices (tablets or laptops) to the question "What is the best method that makes the transfer of information and storing it easier?" 12.2% (n=14) answered Textbooks or lecture notes and 20% (n=23) participants answered Electronic devices (tablets or laptops) to the question "What is your preferred method for memorizing the information?" They were also asked a few more questions which are mentioned in Table 2.

### **Textbook or Lecture Notes**

3 participants who voted for textbooks or lecture notes as their method to study/learn were asked a few questions which are mentioned in Table 3.

### **Normality of data**

The Shapiro-walk test was used for testing the normality of data. Data was not normally distributed ( $p=0.000$ ) therefore we will apply the chi-square test to find the association between variables.

### **Association between Variables**

Association between GPA and methods used to study/learn is illustrated in Figure 2. Non-significant association was found ( $p>0.05$ ) between GPA and methods used to study/learn.

### **Discussion**

In the present study students who chose a textbook as their preferred method of learning marked strongly agreed were 2.6%, when asked if carrying heavy textbooks was a disadvantage. A previous study by Rockinson et al. reported that 8.1% of students chose textbook learning because of its portability [23]. Here, the results are contradictory to each other in both studies. In the present study,

1.7% and 0.9% chose strongly agree and agree respectively when asked if reading from a textbook was comfortable and not irritating to the eyes. Of those who voted for both methods of learning, 10.6% strongly agree with the same question. Participants who voted for electronic devices also strongly disagreed (20%) with the question that if they find reading from an electronic device comfortable. In the same group, 10.4% and 12.2% chose strongly agree and agree respectively. A previous study by Rockinson shows that 3.8% of the participants said that it is not easy to read from a screen [18]. Here the results of both studies are quite similar.

In our study, students who voted for textbooks said that they strongly agree (0.9%) that textbooks are expensive. In a past study, 63.2% of students opted for electronic devices because of cost-effectiveness. In the same study, 1.9% reported that due to their learning preference, they go for textbooks [18]. In our study, 12.2% and 20% chose textbooks and electronic learning as their preferred method of memorizing information. In the same previous study, 31.1% of students who used e-textbook took notes while only 11.3% took notes who used printed books [18]. In the present study, the electronic devices group reacted strongly agree (13.9%), agree (21.7%), and somewhat agree (19.1%) to the question that their handwriting was legible. The results of the group that voted for both methods show that 8.7% and 23.5% used textbooks or lecture notes and electronic devices respectively for writing and reading of information and 9.6% strongly agreed to the question that their handwriting was legible and beautiful on textbooks. The participants of the textbook group were 0.9% who strongly agreed to the same question. This shows that the results are similar to the present study.

In the present study, 2.61% and 65.22% used printed textbooks and electronic devices respectively. 32.17% said they used both at the same time. A study conducted by Millar et al. showed that 57.4% like to use textbooks, 25% said e-textbooks, and 18% had no preference. This is not in accordance with our study. In the same study, 31.2% of participants said the textbook was convenient. In our study, the electronic devices group was 35.7% who strongly agreed that e-learning was easy, smooth, and comfortable. This is also not in accordance with our study. 47.3% said that it was easier to make notes and highlight while using printed textbooks. The same group in the past study showed that 5.3% of participants said that printed material was not harmful to the eyes. 1.7% of participants in our study said that printed textbook was comfortable and not irritating to the eyes. In our study, 1.7% of the textbook group reported that writing on textbooks was convenient. This contradicts our study. The previous study by Millar et al. shows the results for those students who prefer electronic learning as follows. Among this group, 23.4% said it was more convenient, 14.9% said it was less expensive, 8.5% reported less weight to carry around and 18.8% said all material was in one place all the time. The results of our study are as follows. 35.7% said it was easy to use, 13.9% said it was reasonable regarding prices, and 57.4% strongly agreed that there was less backpack weight. The group that voted for both showed that 20% of individuals in this group reported that the transfer and storage of information were easier. Whereas, 12.2% chose a textbook for the same question. The results are in accordance with our study [24].

A survey was conducted by Milushkina O. Y. in which they studied some health aspects and the use of electronic devices. Their results showed that 60.6% of students complained of eye fatigue, 27% had pain in their eyes and 19.4% had blurred vision. Moreover, 37.6% complained of back pain associated

with the use of Electronic devices. In our study, 20% of the students marked disagree and 1.7% strongly disagreed with the question that electronic devices were comfortable and not irritating to the eyes. The group that preferred both methods shows that they find reading from electronic devices irritating to the eyes. 10.4% marked strongly agree, 5.2% agree and 6.1% somewhat agree. The results here are in accordance with our study [25].

A study by Ming-Hung Ling et al. concluded that students were more satisfied with digital learning methods. This is similar to our study as the group that voted for both methods show that the preferred method of memorizing information was through electronic devices (20%). 23.5% preferred reading and writing through electronic devices. In the electronic devices group 35.7% marked strongly agree, 26.1% agree and 3.5% somewhat agree to the notion that these devices facilitate the educational process. This relates to the present study [1].

Olsen et al studied E-book readers in university students. They found that 4% of the students said that through digital learning their learning outcomes were improved. 46% claimed that there was no difference in both methods. Whereas, 41% believed that learning outcomes were reduced. In the same study, the results showed that 61% of the students said that e-textbook was beneficial for reading as compared to traditional printed books. 11% preferred electronic devices and 28% preferred that printed material and electronic reading material should both be incorporated [19]. This is also in accordance with our study of participants who voted for electronic devices and both methods.

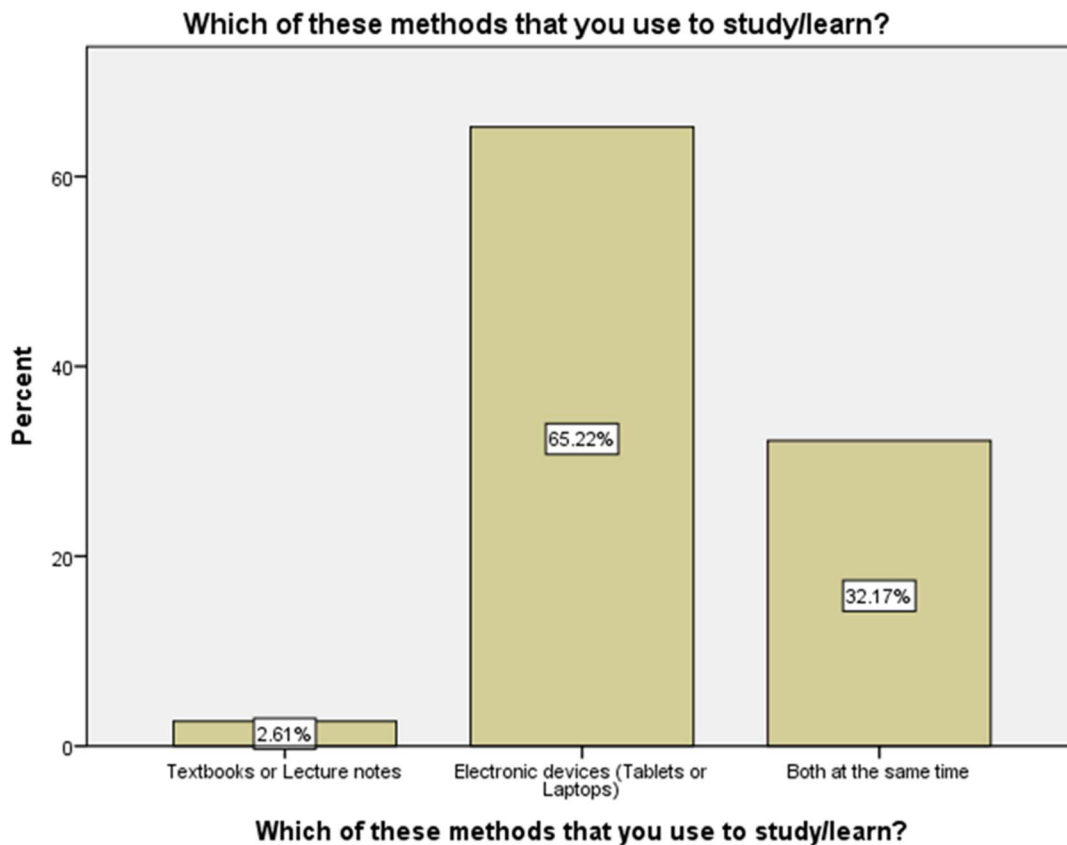
In a previous study conducted in UAE, the results showed that 70.3% of the subjects were of the view that technology improved learning outcomes. In the present study, 35.7% strongly agree that electronic devices help in the educational process. This relates to our study [21]. A study by Weisberg et al. focused on student behaviors toward electronic learning. It was found that 54% would use a tablet device for study purposes but as a secondary device. 29% said they would use it as a primary device [22]. In our study of the group that preferred both methods of learning the data shows that more individuals preferred electronic devices (23.5%) and only 8.7% preferred printed texts. Here the studies are contradictory in terms of results.

McGowan et al studied students' perceptions regarding digital learning methods. They compared perceptions regarding printed material and electronic learning. The advantages of printed textbooks were regarded as ease of reading and convenience. The disadvantage was the weight and cost. The advantages of electronic learning were cost and weight [26]. This is in accordance with our study. In another study done by Gayle R Jesse on college students, it was shown that 73% of the students find tablets to be helpful for their education, 47% of view that they could study more efficiently, and 36% preferred electronic devices over printed material for study purposes [23]. In our study, 23.5% preferred electronic devices in the group that voted for both methods, and the electronic group also showed that electronic devices help them in the educational process as 35.7% marked strongly agree, 26.1% agree and 3.5% somewhat agree. Here the results are according to our study. A study by Al Rawashda et al. in 2021 showed that 81% strongly agree that the content through electronic learning is given interestingly. 57% strongly agree that electronic learning helps as it can cater to every student's educational needs individually [20]. This relates to our study as participants that voted for the

electronic group were 35.7% who strongly agree that it helped in the educational process and suited the needs of the students.

### Conclusion

According to the findings, it was concluded that the majority of students' preferred method of studying/learning was electronic devices (Tablets or laptops). However, no significant association was found between GPA obtained by students and their preferred method of studying/learning. The study also concluded that those who voted for electronic devices strongly agreed that it helped in the educational process and suited the needs of the students. The advantages of printed textbooks were regarded as ease of reading and convenience. The disadvantage was the weight and cost. The group that preferred both methods showed that they find reading from electronic devices irritating to the eyes and reported that transfer and storage of information was easier.



Figures

Figure 1: Methods that you use to study/learn



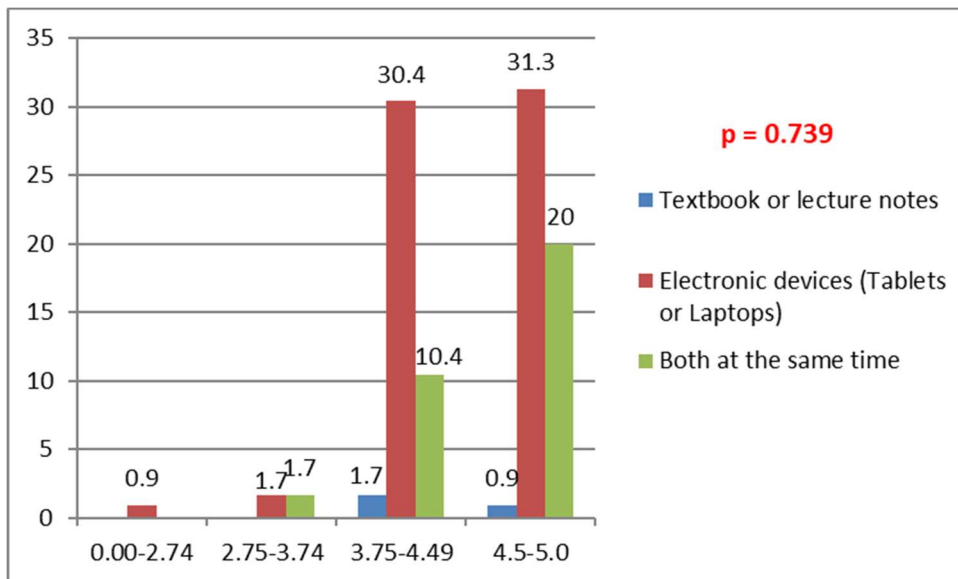


Figure 2: Illustrates non-significant association ( $p=0.739$ ) between GPA and Method used to study/learn

**Tables**

**Table 1: Questions asked from those who voted for Electronic Devices**

						One of the reasons for my preference for electronic devices is that they come at reasonable prices and their accessories in sizes and prices suitable for me	Electronic devices are easy to use and are available in several operating systems and applications that facilitate the educational process and suit the needs of the student.
Writing on electronic devices is easy, smooth and comfortable:	Reading on electronic devices is comfortable and does not irritate the eyes.	One of the advantages of electronic devices that it helped me reduce the load of my backpack.	One of the disadvantages of electronic devices is the availability of an internet connection, which might impact the transfer of the information and lectures.	When I write on an electronic device, I find that my handwriting is legible and readable.		%	%

<b>Strongly Agree</b>	38.3	10.4	57.4	8.7	13.9	13.9	35.7
<b>Agree</b>	13	12.2	6.1	20.0	21.7	18.3	26.1
<b>Somewhat Agree</b>	8.7	20	0	20.9	19.1	13.9	3.5
<b>Strongly disagree</b>	1.7	2.6	0	5.2	4.3	6.1	0
<b>Disagree</b>	3.5	20	1.7	10.4	6.1	13	0

**Table 2: Questions asked from those who voted for both at the same time**

	<b>When writing on textbooks, I find that my handwriting is readable and beautiful compared to writing on an electronic device</b>	<b>When reading on electronic devices, I feel that the screen can be irritating to the eye compared to textbooks reading</b>
	<b>%</b>	<b>%</b>
<b>Strongly Agree</b>	9.6	10.4
<b>Agree</b>	9.6	5.2
<b>Somewhat Agree</b>	9.6	6.1
<b>Strongly disagree</b>	1.7	0.9
<b>Disagree</b>	1.7	9.6

Table 3: Questions asked from those who voted for Textbooks or lecture notes

	Writing and taking notes on textbooks and notes is easy, smooth and convenient %	Reading through textbooks and notes is comfortable and not irritating to the eye. %	One of the disadvantages of textbooks and notes is that they are heavy to carry. %	Carrying textbooks and notes caused you some health problems (such as low back pain). %	One of the disadvantages of textbooks is that they take up a lot of space to store it. %	When writing on textbooks and notes, I find that my handwriting is beautiful and legible to me and others. %	One of the disadvantages of textbooks is that they are expensive. %	One of the disadvantages of textbooks is that it is difficult to obtain them for various reasons (such as the distance to the school library). %	One of the disadvantages of textbooks is that it is difficult to transfer the notes and highlighted information from others. %	One of the disadvantages of textbooks is that they are easily lost or damaged. %
<b>Strongly Agree</b>	1.7	1.7	2.6	0.9	1.7	0.9	0.9	1.7	0.9	1.7
<b>Agree</b>	0	0.9	0	0	0.9	0	0.9	0	0	0.9
<b>Somewhat Agree</b>	0.9	0	0	1.7	0	0	0.9	0	0.9	0
<b>Strongly disagree</b>	0	0	0	0	0	0.9	0	0	0	0
<b>Disagree</b>	0	0	0	0	0	0.9	0	0.9	0.9	0

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