

Print or Electronic: Preferences of the New Generation of Medical and Dentistry Students

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ABSTRACT

Objectives: To assess the preference for print or electronic media among undergraduate students of medical and dental colleges of Karachi and to compare the students of public versus private medical and dental colleges according to the study methods they prioritize

Methodology: A cross-sectional survey was conducted over a period of more than a year. At the confidence level of 95% and bound on error of 5%, a minimum sample size of 384 was calculated and sample size of 477 was finalized after allowing for a non-response rate of 24%. The convenience sampling technique was employed to select medical students. Data was collected using a structured, self-administered questionnaire in English language after a written Informed Consent was obtained from each participant. Data was analysed using SPSS version 20. The quantitative variables were represented as mean and standard deviation. The qualitative variables were represented as frequencies and percentages. Chi-square test of significance was applied for finding any significant differences. P-value of less than 0.05 was taken as significant.

Result: The mean age of n=477 students was 21± 2 years. Majority were MBBS students, with 53% from public institutes. We found that 52% students preferred print medium, whereas 26% students preferred screens. There was an association between public sector colleges and preferring print medium (p= 0.0001). A significant association was found between gender and method of study (p=0.0001). Age was associated with preference for print medium (p=0.02), also higher level of study was associated with preferring print medium (p=0.001). Most students prioritized books (71%) but retained better with videos (63%). Most students (56%) preferred textbooks over reference books. Dr. Najeeb's videos were the most preferred videos (75%), furthermore, the most used site was Wikipedia (48%). Internet was the top source for preparing for PBLs (50%).

Conclusion: The study showed that majority students still prefer print medium and prioritize books over other methods. Students claimed that they retain best with videos and books. So, increasing the use of videos for teaching is recommended. The Pandemic has necessitated the increased use of online teaching modalities. Students should be encouraged to use more reliable websites.

Key words: Print, electronic, medical students, study methods

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INTRODUCTION

Medical education is a basic pillar of clinical medicine.¹ Modernization, accessibility, and reliability has rendered technology as essential in the field of medicine for

both students and the educators. However, this has posed problems in developing countries owing to limited access to technology^{2,3}. In 2014, a research done by the US Coast Guard Leadership Development Centre showed that 63% of colleges reported using e-textbooks, while 27% planned to do this in the near future⁴. Health science libraries are at the centre of knowledge dissemination. With the reported decrease in books circulation and increasing popularity of e-books, studies show that efforts are being made towards producing more e-books and materials⁵⁻⁸. The medical library of the University of Lausanne, has confirmed that book circulation is on a downward trend⁹. It has also been observed that students engage in different

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learning strategies with digital devices that might help in quicker comprehension than printed material^{10,11}. Students, however, prefer to base their examination preparation on handouts provided in their courses, possibly because of the pressure to pass in standardized examinations⁹.

This topic has been widely discussed and researched on in the developed world. According to a 2013 survey in the United Kingdom by the National Literacy Trust on students aged 8 to 16, 52% preferred reading on electronic devices whereas 32% preferred print.¹² According to John Douglas, the Director of the National Literacy Trust, those who read books online were three times less likely to enjoy reading^{11,12}. In a research conducted by Nishtar Medical College, Multan, Pakistan, on postgraduate medical students in 2014, almost 99.4% used the Internet¹³. Respondents mentioned that lack of information and searching skills caused problems in searching authentic information on the Internet. They also mentioned that the speed of the Internet was very slow which obstructed searching for information¹³. This study clearly states one of the major issues faced by developing countries in utilizing e-learning for multiple purposes. McCann et al studied the e-teaching and learning preferences of dental and dental hygiene students and identified students' preference for electronic technology for learning and teaching¹⁴. Other researchers have shown that students prefer textbooks over digital media¹². The contradicting results seen among different studies prove that this topic needs to be further researched and solutions need to be found and implemented especially when the pandemic has made online teaching the new norm. Not much has been studied in this regard in the developing world. Medical Education is still developing in our part of the world. Evidence is necessary for the progress of Medical Education. Thus, the rationale for this study is the need for evidence in order to devise recommendations for Medical Education. The objective of this study was to assess the preference for print or electronic medium among undergraduate students of medical and dental colleges of Karachi and to compare the students of public and private medical colleges with regard to the study methods they prefer. This study also compares male versus female medical students with regard to the study methods that they prefer and measures the study methods preferred by students of first three academic years in medical colleges. To the best of our knowledge, this is the first study to provide data on the study preferences of medical students in Pakistan.

METHODOLOGY

A cross-sectional survey was conducted from 1st Jun 2018 to 1st Nov 2019. Sample size was calculated through open epi sample size calculator. The hypothesized frequency of outcome in population (p) is unknown, so was taken at 50% as no previous estimates were available from similar populations. At the confidence level of 95% and bound on error of 5%, we obtained a minimum sample size of 384. Considering a non-response rate of 24%, the adjusted sample size of 477 was finalized. Data was collected from purposefully selected seven public and private sector medical colleges on the basis of feasibility. The convenience sampling technique was employed to select medical students from each study site or medical college. A variable number of students were recruited from each medical college due to limited availability or differences in response rates at different study sites. Students of both genders from 1st to 3rd year MBBS/BDS participated. Data was collected using a structured questionnaire in English language. It was self-administered after a written, Informed Consent was obtained from each participant.

Permission for the study was taken from Ziauddin University. Complete confidentiality of all respondents was ensured and data was used for academic purposes only.

Data was analysed using SPSS version 20. The quantitative variables were represented as mean and standard deviation. The qualitative variables were represented as frequencies and percentages. Chi-square test of significance was applied for finding any significant differences among the students. P-value of less than 0.05 was taken as significant.

RESULTS

A sample size of n= 477 students was taken with the mean age of students of 20.4+ 1.6 years. Total of n=303 (63.5%) were females and n=174 (36.4%) were males. Total 77% were MBBS students and 23% in BDS. Students were from public sector colleges were n= 252 (53%) and from private sector colleges 225 (47%). Out of the total number of students participating in this research, n=116 (24%) were students of 1st year, n=170 (36%) of 2nd year and n= 191(40%) of 3rd year of college.

The major reasons cited for preferring print media were that 'it was easy to understand' n=215 (45%) and 'reliable' n=147 (31%). Only n=173 (36%) found print feasible and n=181(38%) easily accessible. Students who preferred print (255), explained that they believed screens were less reliable n=72 (28%).

Students' learning preferences

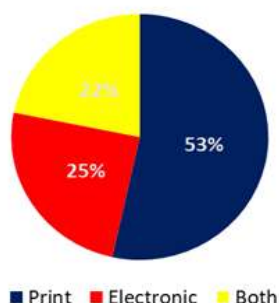


Figure 1: Preference of print or screening, n=255 (53%) students preferred print medium while n=118 (24%) preferred screening and n=104 (22%) preferred both media.

From the 118 students who preferred screens for studies, the most frequently given reason was n=41 (35%) it being easily accessible, n=41 (35%) found it easy to understand and n=26 (22%) found it feasible. Out of the students who preferred screening modalities for studies, only n=18 (15%) students thought screens were reliable.

When inquired about the prioritized method for studies, most students replied that they prioritised books n=347 (72%), n=295 (62%) prioritized videos, n=131 (26%) prioritized lecture slides, and n=159 (33%) internet.

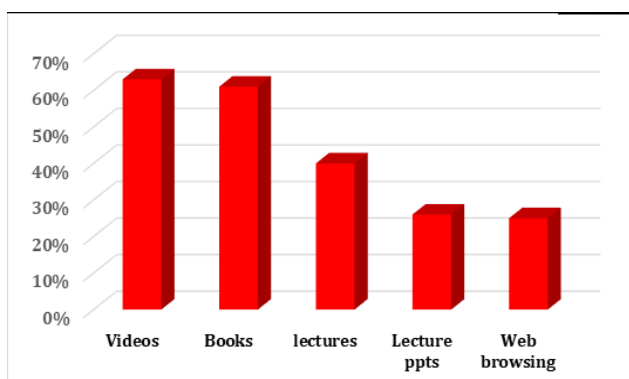


Figure 2: Methods of study that lead to best retention of the topics according to the students.

Over all, books and videos are considered best for retention by most students. Most students shared that they retain best with videos n=300 (63%).

Internet websites were the top source for preparing for PBLs n=282 (59%). Online Videos were viewed by n=119 (25%) and lecture slides were referred by n=164 (34%) for PBL preparation. Total n=230 (48%) students use books for PBLs.

Text books recommended by the university were used by n=327 (68%) as compared to short books n=262 (55%) (Table 1)

Table 1: Comparison of the Study Methods Prioritized by the Students of Public Versus Private Medical Colleges

Learning preferences		Public College		Private College		P-value
		N	%	N	%	
Print	Yes	266	55.7	211	44.3	0.009
	No	191	40	286	60	
Screen	Yes	214	44.9	263	55.1	0.0001
	No	320	67	157	33	
Attending lectures	Yes	214	44.9	263	55.1	0.0001
	No	320	67	157	33	
Going through lecture ppts	Yes	133	27.9	344	72.1	0.0001
	No	323	67.7	154	32.3	
Books	Yes	256	53.7	221	46.3	0.001
	No	311	65.3	166	34.7	
Short books	Yes	215	45	262	55	0.0001
	No	345	72.4	132	27.6	
Textbooks	Yes	265	55.5	212	44.5	0.006
	No	282	59.1	195	40.9	
Videos	Yes	250	52.4	227	47.6	0.001
	No	306	64.1	171	35.9	
Internet	Yes	247	51.7	230	48.3	0.003
	No	283	59.4	194	40.6	

Videos too were highly preferred in both the sectors, 67% in private and 58% in public. Among videos, the videos by Dr. Najeeb were the most preferred n=342 (75%) followed by the Kaplan videos n=204 (43%) and other animated videos n=187 (39%). YouTube tutorial videos were watched by n=11 (2%) (Table 1).

Dr. Najeeb videos were preferred equally in both sectors: 72% in private and 71% public. Kaplan was watched more in private at 56% than in public at 30%. Internet preference was low in both sectors (Table 1).

Among websites, Wikipedia was found to be the favourite site n=228 (48%), overshadowing the use of authentic medical literature such as WebMD n=140 (29%), Medscape n=132 (28%) and MayoClinic n=90 (19%), (Table 1).

Regarding testing themselves before examinations, it was found that 81% of medical students from public colleges based their examination preparations on past examination papers whereas only 67% of private medical students used past examination papers. Questions from BRS (Board Review Series) was used more by private sector students (49%) than public (19%). On a larger scale, 33% used BRS and 75% used past examination papers to test themselves. Online apps were seldom used (25%).

As many as 94% of the private college students said they receive study guides from their institutions compared to 46% of the public sector colleges.

Table 2: Comparison of the learning preferences among male versus female medical students with regard to the study methods that they prefer

Learning Preferences		Male		Female		P-value
		N	%	N	%	
Print	Yes	98	73	186	77	0.042
	No	36	27	57	23	
Screen	Yes	70	51	109	45	0.001
	No	65	49	134	55	
Attending lectures	Yes	64	47	117	48	0.0001
	No	71	53	126	52	
Going through lecture ppts	Yes	35	26	70	29	0.001
	No	100	74	173	71	
Books	Yes	104	77	178	73	0.001
	No	31	23	65	27	
Short books	Yes	83	62	132	54	0.001
	No	52	38	111	46	
Textbooks	Yes	88	65	171	70	0.001
	No	47	35	72	30	
Videos	Yes	89	66	152	63	0.001
	No	46	34	91	37	
Internet	Yes	47	35	92	38	0.001
	No	88	65	151	62	

When questioned about which method they retained better with, 43% females and 37% males claimed that they retained better through attending lectures. There was no significant association of gender with using the Internet for PBLs (Table 2).

Comparison of students in various years of MBBS:

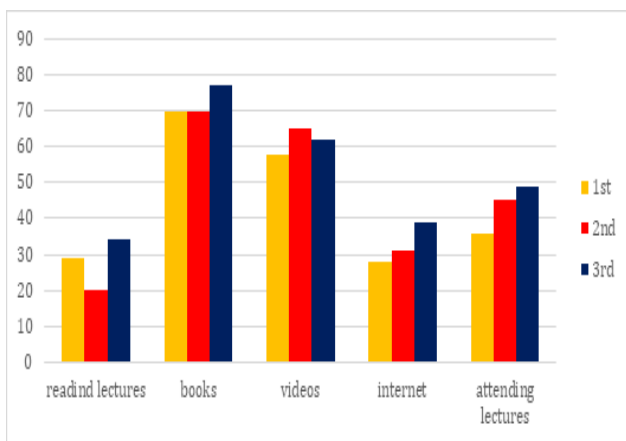


Figure 3: Prioritized study methods in various years

Higher year of study was associated with preference for print medium (p=0.001). It was observed that as years of college progressed, so did the perceived retention capacity of students from various sources (Figure 3).

With the progression of years and age, students used knowledge from lectures to solve their PBLs. The 1st years were 28%, 2nd years were 32% and 3rd years were 40% (Figure 3).

As the years at college progressed, an increase was seen in the using of books, videos and lectures as more helpful methods for retaining purposes (Figure 3).

Book use for PBL preparation increased significantly as the years of education progressed. However, the Internet still remained the top source to search for PBL sessions, among all students.

DISCUSSION

The study has yielded interesting results. With daily advancement in technology, things such as annotation of text, highlighting and use of sticky notes has made on screen text easier to use. Despite the current technology and widespread use of screening, the majority of students still prefer print over screens in both public and private sector colleges. However, the students from public sector colleges are more likely to prefer print. A study conducted by Jolanda E. et al, in 2016 found similar results in a survey in which they concluded that print on paper is the preferred medium for most medical students of the medical faculty of the University of Lausanne⁹. Myberg et al believe the reason was that technology does not respond to the shortcomings of screens¹⁴. The study conducted in Nishter Medical college found that the majority of postgraduate students relied on print format.¹³. According to Naomi Baron, about 90% of university students sampled in the United States, Germany and Japan, prefer hard copy or print for school work. Baron also states that digital reading makes it easier for students to get distracted and multitask¹⁵.

Muller et al report that students showed higher recall and conceptual scores when studying handwritten notes as compared to electronic note taking¹⁶. Mangen et al recorded that students who used hard copy texts had greater frequencies of higher scores for both multiple choice recall and short answers that measured comprehension¹⁷. Students from our research also preferred printed books and considered them better for understanding and retention of topics.

The methods that helped medical students to build their basic concepts are the most important in building their clinical reflexes. The students felt that videos helped better retention of topics. A unique finding in our study was the increased use of videos for learning, understanding and retaining purposes, currently no other research has been done in this regard. Dr. Najeeb’s videos topped the chart. Other sites such as random

YouTube videos, Kaplan videos, 3D anatomy tutorials were also used significantly, majorly because they gave students a better insight of how and what to learn. Students reported better retaining with these tools. Although no structured examination was performed to confer with these findings and all findings were subjective, it can be recommended that universities make more use of videos and other visuals as teaching methods.

We found a significant difference between students of public and private sector colleges with respect to the study methods they prefer. There was an association between public sector students and preferring print medium (0.009). It was found that 56% students from public sector colleges chose printing compared to 44% of students from private colleges. Students from public colleges were more likely to prioritise books for studying (0.001). Moreover, there was a significant difference in the students in public and private medical colleges in preference of textbooks and short books. While a higher percentage of medical students in public colleges preferred textbook, the higher number of private college students preferred short books (Table 1). These are noteworthy findings.

The student preference for attending lectures was lower in the public sector 44%, however it was found to be relatively higher at 55% in the private sector. The factors responsible need to be assessed further.

More private college students used lecture slides (72%) as compared to the public sector with only 27% of students using lecture slides and preferring self-study. This shows that the students from public sector colleges spent more time self-studying than students from the private sector, however, further research is recommended.

Despite both genders preferring printed versions, more males were found to be using the e-medium as compared to females. This was consistent with other researches in which a significant difference was seen between the two genders, for example in a research done by Daniel Hernandez et al, "First Year medical students' learning style preferences and their correlation with performance in different subjects within the medical course"¹⁸. Contradictory to this, a survey performed in the UK in 2021 showed that more females tended to use and buy printed versions as compared to their male counterparts.¹⁹

A research conducted by Apuke et al concluded that Internet sources enabled students to perform research work ahead of time²⁰. We found that most students relied on the Internet for PBL preparation. But although

the Internet and e-learning were helpful for working speedily and on time, students, however, trusted print medium more. From our findings, we noted that Wikipedia was the highest used website, overshadowing the use of authentic medical literature such as WebMD, Mayo Clinic and Medscape. Our research also showed that many students were unaware of these websites. Studies have concluded that Internet is more of an information seeking tool. Zhou et.al in their research claimed that Internet serves as a hands on library for the purposes of being adept and improving decision making skills²¹. Research indicates that with the help of a Personal Digital Assistant (PDA), medical or health professionals seek required information and find answers for better patient safety and decision making^{14,15}. On the contrary, R. Bhatti et.al, in their research "experience of internet utilization by postgraduate students at Nishtar medical college, Multan, Pakistan" share that postgraduate students majorly faced difficulty in finding authentic information on the Internet¹¹. Our findings coincide with the former researches, as about 59% students in our study used the Internet for Problem Based Learning sessions, for the reason that it was easy and quick to use.

The accessibility of the Internet and the multitude of available learning media in higher education have an increasing impact on the way students access information for learning²². This has become amplified in a post-Covid world in which students were forced to move to e-learning. Morehead et al has concluded that the key attentional differences exist between longhand note-taking and photo-taking that impact learning—knowledge that is easily and conveniently acquired in a snap may not be better remembered.²³

Poonam et al, in their research, stated that majority of the students preferred kinaesthetic mode of learning that included visualisation, hand written notes, lectures, problem based and audio learning²⁴. Piolat et al determined that from a purely behavioural standpoint, both readers and writers performed better when working in Page than in Scroll.²⁵ As quoted by developmental psychologist and cognitive scientist Maryanne Wolf of Tuft University, "As we lurch into digital reading—and move forward perhaps with too little reflection, I would like to save the best of the older forms but know when to use the new"²⁶.

The limitation is that, although an equal percentage of students from all colleges and universities of both public and private colleges according to their respective student strength was approached, the response rate from different colleges was varied. Therefore, a disproportionate number of participants from different colleges was included in the study. This research was

completely based on students' memories and their own ability to judge their progress, no validated tests or quizzes were taken to judge their performances. The research was done pre Covid-19, hence the latest usage of electronic medium post pandemic has not been taken into consideration.

CONCLUSION

While the use of screens has increased and is more accessible, it has not replaced print as students finds books (print) and videos (electronic) to be the best methods for studies. The use of reliable websites still remains scarce. It was also found that there was a vast difference in preference of study methods between the public and private medical universities.

Conflict of interest: The authors declare that they have no conflict of interest

Authors' contribution: SAC, AAS, MD & AL: Worked on Data collection, discussion and questionnaire and introduction, GA: Worked on Methodology, Data Analysis and results, AKK: Worked on Data collection, and discussion. All authors participated in final proofreading of the manuscript.

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