



No More Live Lectures - Quixotism or Realism-? Association between Learning Preferences and Attendances at Live Lectures

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Authors' contributions

This work was carried out in collaboration between all authors. Author SCL participated in the conception of the study, designed the study, carried out the research i.e. students' recruitment and questionnaires distribution, performed the statistical analysis and is the primary author of the manuscript. Author JS participated in the recruitment of students and drafting of the manuscript. Author AB participated in the inception of the study design and performed the statistical analysis. All authors read and approved the final manuscript.

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ABSTRACT

Background: The increasing decline in medical students' attendances at live lectures left educators with differing views on its acceptability.

Aim: The aim of this study was to look at the association between the medical students' attendances at live lectures and their learning preferences and outcomes.

Study Design: University based, cross sectional study.

Place and Duration of Study: The study was conducted at International Medical University, Malaysia from April to July 2015.

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Methodology: All the pre-clinical medical students (Year 2 and Year 3) were invited to participate in this study. A total of 776 students, Year 2 (397) and Year 3 (379) students participated in this study. The students' recorded attendances at live lectures were compared to their (i) learning preferences; VARK (Visual/Aural/ReadWrite/Kinesthetic) and ASSIST (Approaches and Study Skills Inventory for Students) and to their (ii) performances at the summative examinations. Data was analysed using Pearson Chi-square test.

Results: A majority of medical students (54.8%) still attend live lectures. The attenders were mostly auditory ($p=0.010$) learners. Non-attenders at live lectures perform better in the examination compared to the attenders ($p=0.003$). Those who used online lectures as their aid to studying performed better in the examination ($p=0.026$).

Conclusions: Medical students still attend live lectures regularly. However, high performances at summative examination was associated with non-attendances at live lectures and the use of online learning/online lectures.

Keywords: Lectures; medical students; VARK; ASSIST; examination performance.

1. INTRODUCTION

Poor attendances at live lectures have been an issue for many decades. Academicians believe that the decreasing attendances are due to many factors- generational issue, increasing technological issues, differences in values and etiquette [1]. Kanter also elaborated that the 21st century learners are always on the move, unable to sit still in lectures, they enjoy with the advancement of technology where lectures could be listened to at their convenience and pleasure; and the under-appreciation of the efforts that the lecturers had put in for the live lectures have made them poor attenders at live lectures [1]. Marzuk commented that some faculty members would view the perpetual medical students' absences from lectures as an unacceptable act to the extent of a breach of professionalism, unfit for the call of this profession [2].

Some faculty otherwise had stated that the low attendances at lectures were purely acceptable, not an issue, as long as the students were able to learn and perform in the exams [2]. Some authors believed that attendances at live lectures determine success in the examinations therefore the use of these technologies or "home learning", replacing the live lectures could be destructive to their learning and their performances in the examinations [3]. However, contradictory findings were also reported on this issue [4,5].

McKinlay [6] reported a reduction in live lecture attendances of about 10-33% after the introduction of recorded lectures whilst some others reported no difference in the attendance post introduction of recorded lectures [7-10]. Indeed, a vast collection of data reported on the use of recorded lectures as an aid to students'

learning and limited data were reported on the use of other complementary aids in their learning. It is therefore important that students choose the most effective strategy, most suited to their learning style, in this environment of blended learning in which students have a variety of formats for learning. Students' learning styles, or combinations of styles, are the students' most preferred styles of learning i.e. the Visual (V), Auditory (A), Read/Write (R) and Kinesthetic (K) modes of learning [11]. Learning styles have been shown to be correlated with academic outcomes and Dobson [12] found that students with Kinesthetic (K) learning styles performed worst in the lecture portion of the study compared to other learning styles. Students can take different approaches to learning with some that are more inclined to take a deep approach while others the surface approach. Study approaches have been shown to contribute to students' success in the examination [13]. It was also suggested that a deep approach to studying could be influenced by good teaching, while poor teaching contribute to the surface approach [14,15].

This study therefore aimed to investigate (1) the likelihood of the pre-clinical medical students to attend the live lectures (2) the comparison of the attendances at live lectures with their learning preferences (3) the comparison of the attendances at the live lectures with their performances at the summative examinations.

2. MATERIALS AND METHODS

This comparative study was conducted for four months (April 2015 to July 2015). The sample frame comprised of 776 Year 2 and Year 3 medical students. The Year 2 students'

examination results were obtained from their Year 1 summative examination the Year 3 students' results were obtained from their Year 2 summative examination.

2.1 Study Instrument

The students were given three questionnaires to fill. The students completed (i) the latest version (v7.1) of VARK (Visual/Aural/ReadWrite/Kinesthetic) with Cronbach's Alpha value for VARK with reference of: V(0.85), A(0.82), R(0.84), K(0.77) (Fleming, 2007) (ii) the short version of ASSIST (Approaches and Study Skills Inventory for Students) with Cronbach's Alpha value for ASSIST with reference of: Deep (0.85), Strategic (0.88), Surface (0.81) (Entwistle et al. 2000) and (iii) the third questionnaire where students' demographic data, educational background, their number of attendances to the medical lectures as well as their preferred methods of studying were captured. The purpose of the study was explained to the students and consents were sought before the distribution and the students were given 30 minutes to complete these questionnaires.

The VARK questionnaire consists of 16 questions and the students could choose more than 1 item in each question. The ASSIST is a Likert-scaled questionnaire to measure attitudes which involves the students to rate the extent of their agreement on a five-point scale. The completed VARK questionnaires were evaluated using the scoring instructions given on the website. The ASSIST questionnaires which identifies whether the students adopt either the deep, surface or strategic approach to learning and studying were evaluated by adding the responses across these items which produces a scale score. The students' official examination results were compared to the number of

attendances at medical lectures, their preferred study aids, their ASSIST and VARK scores.

2.2 Ethical Consideration

The study protocol was approved by the Joint Ethics Committee of the university in compliance with the Helsinki Declaration.

2.3 Statistical Analysis

Statistical Package for Social Sciences (SPSS) version 18.0 was used to analyse the data collected. The Pearson's Chi-square Test was applied on the tabulated demographic data and analysed for comparison purposes. In this study, a *p*-value of less than 0.05 was considered as statistically significant.

3. RESULTS AND DISCUSSION

3.1 Baseline Data

Table 1 shows the baseline data of the medical students that participated in this study. A total of 776 medical students participated in this study. A total of 397 Year 2 and 379 Year 3 medical students participated in this study. The examination results for the Year 2 medical students were retrieved from their 1st summative examination at the end of their Year 1. The examination results for the Year 3 students were retrieved from their 1st professional examination at the end of their Year 2. A majority of the students were local students (88.5%). The international students were from countries in Asia, Australasia, Africa and North America. The undergraduate students were those who undertake this medical course as their first degree and the postgraduate students were holders of prior degree(s).

Table 1. Baseline demographic data

Components	Year 2 n (%)	Year 3 n (%)	Total n (%)
No of students	397 (51.2)	379 (48.8)	776 (100)
Local students	344 (86.6)	343 (90.5)	687 (88.5)
International students	53 (13.4)	36 (9.5)	53 (13.4)
Undergraduate	387 (97.5)	371 (97.9)	758 (97.7)
Postgraduate	10 (2.5)	8 (2.1)	18 (2.3)
Male	205 (51.6)	185 (48.8)	390 (50.3)
Female	192 (48.4)	194 (51.2)	386 (49.7)
Age (mean ± SD)	20.55 ± 1.24	21.58 ± 1.140	

3.2 Comparison of Students' Attendances at Live Lectures and Learning Approaches

Table 2 shows the comparison of the students' attendances at the live lectures and their study approaches. A majority of the medical students studied were Deep learners (50.5%) and the least adopted study approach was the Superficial learning approach (19.8%). Non association was found between the students' learning approaches and their attendances at live lectures. However, when the data was analysed based on cohort by cohort basis using the data on more junior medical students (Year 2), it was found that the non-Superficial learners were more likely to attend live lectures ($P=0.010$).

3.3 Comparison of Students' Attendances at Live Lectures and Learning Styles

Table 3 shows the comparison of the students' attendances at the live lectures and their learning

styles. A majority of the students studied are kinaesthetic (K) learners (30.4%) followed with in descending order of popularity; the R (23.7%), Multimodal (18.7%), A (17.7%), and V (9.5%) learning styles. The auditory (A) learners were more likely to attend the live lectures than other types of learners ($P=0.010$). Amongst the auditory (A) learners, a majority of them were female students (54%).

3.4 Comparison of Students' Learning Methods and Learning Outcomes

Table 4 shows the comparison of the students' learning methods and their learning outcomes. Generally, we found that the students' most preferred (52.7%) aid to their studies was their textbooks. More than half of the students in this study (54.8%) still attend the live lectures. The local medical students ($P=0.048$) and those who were female were more likely to attend the live lectures ($P=0.001$). Those who did not attend the live lectures regularly used more of online

Table 2. Comparison of learning approaches and attendances at lectures

	Attendances at lectures				Chi square p-value
	Non-regular N (%)	Regular N (%)	Odds ratio	95% CI	
Year 2					
Superficial					
No	154 (48.6)	163 (51.4)	0.510	0.304-0.855	0.010*
Yes	26 (32.5)	54 (67.5)			
Strategic					
No	119 (43.3)	156 (56.7)	0.763	0.497-1.170	0.214
Yes	61 (50.0)	61 (50.0)			
Deep					
No	87 (43.1)	115 (56.9)	0.830	0.559-1.232	0.355
Yes	93 (47.7)	102 (52.3)			
Year 3					
Superficial					
No	138 (45.2)	167 (54.8)	0.974	0.584-1.623	0.920
Yes	33 (44.6)	41 (55.4)			
Strategic					
No	126 (46.5)	145 (53.5)	1.217	0.775-1.910	0.394
Yes	45 (41.7)	63 (58.3)			
Deep					
No	78 (42.9)	104 (57.1)	0.839	0.559-1.258	0.395
Yes	93 (47.2)	104 (52.8)			
Year 2 & 3					
Superficial					
No	292 (46.9)	330 (53.1)	0.702	0.489-1.007	0.054
Yes	59 (38.3)	95 (61.7)			
Strategic					
No	245 (44.9)	301 (55.1)	0.952	0.699-1.297	0.756
Yes	106 (46.1)	124 (53.9)			
Deep					
No	165 (43.0)	219 (57.0)	0.834	0.629-1.107	0.210
Yes	186 (47.4)	206 (52.6)			

*p-value < 0.05 was considered as statistically significant

lectures ($P=0.001$) and textbooks ($P=0.001$). These non-regular attenders at live lectures were also found to use less discussion ($P=0.001$) and own notes ($P=0.001$) as aids to their studies. The students who did not regularly attend the live lectures were high achievers in their academic performances ($P=0.003$). Those who used online

lectures were also found to be more likely to achieve better results in their examinations than other non-online lecture users ($P=0.026$). The same results were seen replicated only for the Year 3 students when the data was analysed based on cohort analysis.

Table 3. Comparison of learning styles and attendances at lectures

	Attendances at lectures				Chi square p-value
	Non-regular N (%)	Regular N (%)	Odds ratio	95% CI	
Year 2					
Visual (V)					
No	163 (45.4)	196 (54.6)	1.027	0.524-2.012	0.937
Yes	17 (44.7)	21 (55.3)			
Auditory (A)					
No	158 (48.3)	169 (51.7)	2.040	1.178-3.533	0.010*
Yes	22 (31.4)	48 (68.6)			
Read/Write (R)					
No	129 (43.0)	171 (57.0)	0.680	0.430-1.077	0.100
Yes	51 (52.6)	46 (47.4)			
Kinesthetic (K)					
No	120 (44.4)	150 (55.6)	0.893	0.585-1.364	0.601
Yes	60 (47.2)	67 (52.8)			
Multimodal					
No	150 (45.2)	182 (54.8)	0.962	0.564-1.639	0.885
Yes	30 (46.2)	35 (53.8)			
Year 3					
Visual (V)					
No	156 (45.5)	187 (54.5)	1.168	0.582-2.342	0.662
Yes	15 (41.7)	21 (58.3)			
Auditory (A)					
No	137(43.9)	175 (56.1)	0.760	0.448-1.289	0.308
Yes	34 (50.7)	33 (49.3)			
Read/Write (R)					
No	133 (45.5)	159 (54.5)	1.079	0.666- 1.747	0.758
Yes	38 (43.7)	49 (56.3)			
Kinesthetic (K)					
No	124 (45.9)	146 (54.1)	1.120	0.716-1.754	0.619
Yes	47 (43.1)	62 (56.9)			
Multimodal					
No	134 (44.8)	165 (55.2)	0.944	0.575-1.548	0.819
Yes	37 (46.3)	43 (53.8)			
Year 2 & 3					
Visual (V)					
No	319 (45.4)	383 (54.6)	1.093	0.674-1.773	0.718
Yes	32 (43.2)	42 (56.8)			
Auditory (A)					
No	295 (46.2)	344 (53.8)	1.240	0.853-1.804	0.259
Yes	56 (40.9)	81 (59.1)			
Read/Write (R)					
No	262 (44.3)	330 (55.7)	0.847	0.608-1.181	0.328
Yes	89 (48.4)	95 (54.6)			
Kinesthetic (K)					
No	244 (45.2)	296 (54.8)	0.994	0.731-1.351	0.968
Yes	107 (45.3)	129 (54.7)			
Multimodal					
No	284 (45.0)	347 (55.0)	0.953	0.663-1.369	0.794
Yes	67 (46.2)	78 (53.8)			

*p-value < 0.05 was considered as statistically significant

Table 4. Comparison of learning resources and academic outcomes

	Academic outcomes				
	Low achievers N (%)	High achievers N (%)	Odds ratio	95% CI	Chi square p-value
Year 2					
Live lectures					
No	135 (75.0)	45 (25.0)	0.829	0.520-1.323	0.432
Yes	170 (78.3)	47 (21.7)			
Online lectures					
No	161 (77.0)	48 (23.0)	1.025	0.643-1.635	0.918
Yes	144 (76.6)	44 (23.4)			
Books					
No	173 (79.0)	46 (21.0)	1.311	0.821-2.091	0.256
Yes	132 (74.2)	46 (25.8)			
Discussion					
No	146 (74.5)	50 (25.5)	0.771	0.483-1.231	0.276
Yes	159 (79.1)	42 (20.9)			
Own notes					
No	151 (77.8)	43 (22.2)	1.117	0.700-1.782	0.641
Yes	154 (75.9)	49 (24.1)			
Year 3					
Live lectures					
No	100 (58.5)	71 (41.5)	0.482	0.312-0.745	0.001*
Yes	155 (74.5)	53 (25.5)			
Online lectures					
No	125 (74.4)	43 (25.6)	1.811	1.162-2.823	0.008*
Yes	130 (61.6)	81 (38.4)			
Books					
No	129 (67.9)	61 (32.1)	1.057	0.688-1.624	0.799
Yes	126 (66.7)	63 (33.3)			
Discussion					
No	130 (67.7)	62 (32.3)	1.040	0.677-1.597	0.858
Yes	125 (66.8)	62 (33.2)			
Own notes					
No	118 (64.5)	65 (35.5)	0.782	0.509-1.202	0.261
Yes	137 (69.9)	59 (30.1)			
Year 2 & 3					
Live lectures					
No	235 (67.0)	116 (33.0)	0.623	0.455-0.855	0.003*
Yes	325 (76.5)	100 (23.5)			
Online lectures					
No	286 (75.9)	91 (24.1)	1.434	1.044-1.968	0.026*
Yes	274 (68.7)	125 (31.3)			
Books					
No	302 (73.8)	107 (26.2)	1.192	0.871-1.633	0.272
Yes	258 (70.3)	109 (29.7)			
Discussion					
No	276 (71.1)	112 (28.9)	0.902	0.659-1.235	0.522
Yes	284 (73.2)	104 (26.8)			
Own notes					
No	269 (71.4)	108 (28.6)	0.924	0.675-1.265	0.624
Yes	291 (72.9)	108 (27.1)			

*p-value < 0.05 was considered as statistically significant

3.5 Discussion

The debate on the declining attendances at live lectures over the years does not revolve solely on the essence of the breach of the principle of professionalism but also on habituality- a culture of absenteeism which is not encouraged and

condoned yet seemed saliently permissible. Smith commented on the lecture attendances of students in pre-clinical curriculum that as much as medical schools seem to be more optional and therefore medical students would have perceived their future work ethics to be as such- the reality of the medical profession isn't [16].

However, contrary to the debate on this issue, more than 90% of the students studied (both cohorts) stated that they attended lectures regularly. This study therefore confirms that lectures continue to play an important part in students' learning and this study concurred with the latest findings by Gupta and Saks [17] and Gysbers et al. [18] Billings- Gagliardi & Mazor [19] reported that the students do make deliberate decision on their attendances to live lectures and the decisions were based on the perceived effects of the lectures on their learning. Although in this study, there were comments made by the students regarding their disappointments in live lectures, for examples: *"If the lecturer is boring and reads from the slides and not stimulating, I rather choose to self-study"*, *"I don't learn anything from attending the lectures hence I rather conduct self-study to make better use of my time"* and *"Some lectures are difficult to understand due to it being a difficult topic, a long lecture or due to language barrier"*, the overall attendances were still high. Phuong-Mai et al. (2005) commented that students in this part of the world are Confucian learners [20] – rote learners yet high achievers, passive learners, highly concerned about absorbing knowledge and highly dependent on teachers as the "fount of knowledge" [21-23]. Therefore, perhaps having observed such traits, these students would therefore be more inclined to attend live lectures where it was viewed as the platform of attainment of the knowledge although the lectures might not be considered as fully beneficial. However, further emphasis to find the reasons for the high attendances is mandatory owing to the high compliance to this method of learning.

On the contrary, those who did not attend lectures regularly did better in the summative examinations. Bligh reported that there wasn't an increased effectiveness of lectures over independent learning or own reading [4]. In this study, the students were mostly Deep/Strategic learners and their high performances in the examinations regardless of their attendances at the live lectures therefore would have been indebted to this attribute. Many studies in the past have shown that the learner himself played a central important role in the teaching/learning interaction therefore the learner's input rather than the teachers' is far more important for student learning. These findings therefore supported the notion of teaching as the facilitation of student learning [14,24-26].

When addressing the differences in study aids used to compliment lectures, the students regularly used textbooks more compared to other modalities (online lectures, discussion groups, own notes). These younger medical students (Year 1- Year 3), who had more to learn as they were in transition from the school based curriculum into the university education would have utilised textbooks more compared to their more senior counterparts. The more senior students would have chosen to use more of their own notes because in order to consolidate learning in a more complex manner they needed to derive knowledge from other sources to supplement their learning. Those who used online lectures did better in their academic performances than those who didn't. The online lectures which are pre-recorded lectures could be reminded, fast forwarded, paused or played multiple times by the students. The students could follow a lesson at their own speed according to their learning pace. This allows the students more time to reflect upon what was said by the lecturers. Franklin et al. (2011) and Gupta & Saks (2013) reported that although students utilised equal amount of online lectures, the objectives of the junior and more senior students in their utilisation of this study aid differ from each other [17,27]. The more junior students considered this as a supplement to their learning whereas the more senior students viewed this as a replacement for live lectures. In this study, we did not investigate the reasons for the utility of online lectures although we found that majority of students used this method as a complement to their learning.

Kharb et al. [28] reported that most of their female students prefer live lectures. In this study, we found that the female students also had a higher frequency of attendances compared to the male students. It was explained by Kharb et al. [28] that females were more likely to attend lectures as they are more likely to be Auditory (A) and Visual (V) learners compared to the male students. We concur with Kharb et al. that we also found most of our female students were auditory (A) learners although the difference was not statistically significantly between the genders. We report a similar results to the study by Neider et al. [29,30] where they reported that the male students used more recorded lectures than live lectures compared the female students. The same was also seen in a study by Gupta and Saks [17]. The same was seen in a study by Gupta and Saks [17]. Male students were more inclined to use online lectures at home. The

reasons for these findings on gender differences were not clear and needed further explorations and investigations.

The students learning styles in this study were mostly Kinesthetic (K) in nature. Rohrer and Pashler reported that there were very little evidences to show the benefit to tailor the educational instructions according to the students learning styles [31]. On the contrary, Knight & Woods [32] and Beichner and Saul [33] reported a higher student gain and better problem solving skills when placed in the interactive environment compared to the traditional lecture based environment. The ongoing contradictory findings on this issue warrant further investigations to achieve the best provision of learning environment for the students to better boost the students' performances. Therefore, the recognition of the students' need and addressing these needs are important future missions.

Lectures should be revamped from the old-fashioned didactic lectures to one that is more effective at content delivery to better benefit the students, especially in this region where compliances to attend the live lectures are high. George et al. explored on the use of social technologies to contribute to the more active learning environments during the live lectures by integrating the Google Docs and Survey Monkey where the students could respond anonymously to the discussion on the posted questions as well as to respond to the survey questions during the lectures [34]. Lutze-Mann and Kumar adopted the formative assessment lectures where students were asked to answer questions posted followed by a series of mini-lectures to discuss the options given which therefore provide a non-threatening feedback on their performances [35]. The adaptation of the more scientific lecture-based PowerPoint slides with multimedia design principles carefully developed and improved to cater for the needs of learning and deliver the most effective PowerPoint presentation of which students could retain more knowledge than the previous traditionally derived slides [36]. The flipped classroom, the most experimented area in the past few years, with students watching the online lectures at home and to lectures are reserved for concept reinforcement and activity work could better engage a wider variety of types of student learners [37].

This study has a limitation where the students' number of attendances to the live lectures were recorded by themselves. Lectures are not a

mandatory teaching learning sessions for students to attend therefore we did not have a mean to take the students' attendances before each lectures. This might have contributed to some biases as students may have entered that they attended lectures more regularly that they actually did. We suggest that for future studies, actual attendances at the live lectures are to be taken for better analysis.

4. CONCLUSION

This study concluded that a majority of medical students still faithfully attend live lectures regularly. Most attenders at live lectures were auditory learners. High performances at summative examination was associated with non-attendances at live lectures and the use of online learning/online lectures.

Should we do away with live lectures or should we improve on it? Despite its ineffectiveness, this study has shown that unlike the norm of the decreasing lecture attendances, we see a surprising persistence in the popularity of this teaching and learning method. This mandate the surge to act upon the urgency to improve its delivery to the medical students and to pragmatically engage them in more active learning on a background of a supposedly passive information delivery environment. If there is a need to continue with live lectures, there is a need for further study to look at the outcomes of the newly improved student-centred live lectures. Otherwise, the technology driven, cost and outcome effective online lectures should be the revised major learning aid for the students. Further studies should be attempted to collect evidences in order to judge the importance and feasibility of these online lectures. These future scientifically proven studies would help the education industry to boldly decide on whether there is a need to have a paradigm shift to ditch the prided, old fashioned, non-effective live lectures which are detrimental to students' learning and to welcome the new era of technology driven learning for these 21st century learners.

No more live lectures - Quixotism or Realism? *Only time will tell.* Will higher education be brave enough to ditch this method of knowledge delivery, the backbone to their existence? The increasing trend in the use of a lot of videos and audios for knowledge gain and the use of various Moodle (discussion forums, database) and External Services (Google docs, Twitter) for students' engagement practically serve the role

of an institutionalised knowledge delivery system. The paradigm shift to a more student-centered approach, Information Technology (IT) supported aide to learning which will yield the equivalent or better assessment results/outcomes will be the future of learning.

CONSENT

It is not applicable.

ETHICAL APPROVAL

The study protocol was approved by the Joint Ethics Committee of the International Medical University in compliance with the Helsinki Declaration.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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