Rethinking large group lectures – how far in this format?

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ABSTRACT

Objective: The aim of this study is to determine the perceptions, attitudes, and behaviour of medical students and lecturers regarding the lectures and their effects on students' learning behaviour.
Materials and Methods: This was a qualitative study including multi-methods. Researchers observed lecture ambiance and activities in two courses. Lectures were observed and slide-presentations were evaluated. Additionally, in-depth and focus group interviews were conducted.
Results: Two researchers attended and observed 75 lectures. The average number of attendees was 51.21. Eighty percent of lecturers did not introduce any activities to attract attention and prepare students for the lecture. Only 12% of lectures were taught interactively. Of the evaluated 43 (69.80%) slide-presentations, sufficient association or integration was not made between clinical and basic sciences.
Conclusion: This study revealed that the lectures created negative feelings and thoughts in students and lecturers, and led to undesirable attitudes and behaviour. It is essential to focus on giving interactive lectures which aim at developing reasoning, decision-making, and evaluation competencies. The most significant factors determining students' attendance and appraisal of the lectures were related to the preparation of the lecturers, the intensity of the content, integration between basic science and clinical science, and the presentation skills.
Keywords: Integration, Lectures, Medical education, Undergraduate, Teaching methods

1. INTRODUCTION

Lectures conducted with large groups are still one of the mainstays of teaching methods in higher education. One of the reasons for its widespread use is that it offers lecturers the opportunity to transfer a wide range of contents simultaneously to large numbers of students. Being cost-effective and requiring less preparation compared to interactive learning methods are among the other reasons [1]. It is widely believed that learning is a constructive process requiring the active involvement of learners. So, learners construct knowledge through learning experiences and by reflection on the experiences and learning environment around them [2]. However, teacher-centred instruction is a controversial method, which has been discussed in the literature. Regarding lectures in large groups, studies highlight significant problems such as the inability of students to stay focused for a long time, the lack of in-depth

learning opportunities, and the effect of attendance on student performance [3,4-6].

As mentioned above, although much has been written about medical students' learning and attendance in sessions, there is a paucity of literature revealing the lecture-related beliefs, attitudes, and behaviour patterns of students and lecturers. So far, no studies were performed where lectures were evaluated in a holistic and multi-faceted manner, including the stages before, during and after the lecture. Thus, research in these areas, revealing how students experience lectures and how these experiences affect their attitudes and behaviours, would provide novel evidence to revise and change the current situation regarding the still-heavily used large audience lectures.

The aim of this study is to reveal the perceptions, attitudes, behaviours, and the effects on learning of medical students

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and lecturers regarding the lectures. In this context, research problems were determined as follows:

(a) How do medical students and lecturers experience pre-, during and post-lecture sessions? (b) What is the level of interaction experienced during the sessions among learners, between learners and lecturers, and how does the depth of this interaction affect learners' attitudes and learning behaviours?

2. MATERIALS and METHODS

This was a qualitative study, which included 4 different methods and techniques: observation during the lecture, analysis of the presentation materials, interviews with students and lecturers.

The type, population, and sample of the research

The study including pre-, during and post-lecture evaluations was carried out with lecturers and the 3rd-year undergraduate students of the Marmara University, School of Medicine (MUSM). Medical education at MUSM consists of 6 years. The 3rd year curriculum is composed of five subject committees. Researchers selected two of the five subject committees, 'Nervous System and Associated Diseases' (NSAD) and 'Growth-Development, Mental Health, and Related Disorders' (GDMR) consisting of a total of 88 lectures (116 hours in total) for the study. Within the NSAD course, a total of 38 lectures (12 basic medical science, 25 clinical sciences, and 1 public health) and within the GDMR course a total of 50 lectures (6 basic medical science, 39 clinical science and 5 public health) were selected for evaluation. Researchers chose these lectures for evaluation taking into consideration the diversity of disciplines such as physiology, pharmacology, public health, family medicine, etc.

Research methods and techniques

In-class observation and analysis of the lecture materials:

With the permission of the lecturers, 75 lectures in the two courses were observed and evaluated by two researchers (SA and MS) using the "Lecture Observation Checklist" in terms of attendance, interaction, interest, presentation of the content, and the use of interactive techniques (supplement 1). Of those 75 lectures, the presentation materials of 43 lectures were randomly selected and analysed independently by three researchers (CE, BCY, MAG) in terms of various criteria by using the "Evaluation Form for Presentation Material" (supplement 2). Checklist and evaluation form were created by researchers.

Interviews: Participants were selected by convenience sampling method for interviews. Out of the 56 lecturers of the 75 lectures, in-depth interviews were conducted with 10 lecturers, who agreed to participate in face-to-face interviews, while 4 lecturers were interviewed using online interview tools. The interviews lasted between 15-25 min. They were audio-recorded and

terminated when data saturation was reached by answering all the interview questions.

For the focus interviews with the students who accepted to participate in the study and gave their written consent, 3 focus groups, composed of 12 students each, were formed by systematic randomization method. Focus group interviews, between 45 and 70 min, were also audio-recorded (supplement 3).

Statistical Analysis

The process of qualitative analysis is shown in Figure 1. The contents obtained from the qualitative interviews were transcribed, and content analysis was made by two researchers (SA and MS). Descriptive statistics were used in the analysis of quantitative data.
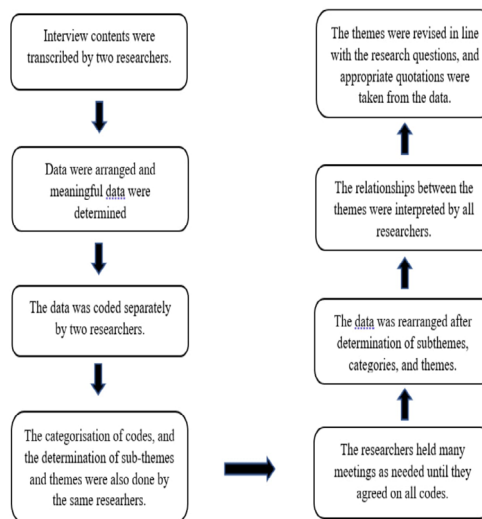

Figure 1. *The processes of qualitative analysis.*

3. RESULTS

Observation of lectures and analysis of lecture materials

Within the 218 registered students, the average number of students attending the observed lectures was 51.21 (median: 50.0, min.=12, max.=107). Eighty percent of the lecturers did not apply any warm-up activity in the beginning to prepare the students for the lecture and attract their attention. 88% straightforwardly conveyed the information. In only 12% of the lectures, the content was supported by interactive techniques (case, video, etc.). It was observed that students were distracted mostly after 10 and 20 min of a 50-min lecture. The ratio of the lecturers making a general summary about the content of the lecture at the end of the lecture was 8.0% (6 lectures). Other details regarding the data revealed in the observations of the lectures are given in Table I.

Table I. The data gathered from observation of lectures

The number of students at the beginning of lectures (first 10 minutes)		Median=50 Min.=12, max.=107
The activities/behaviours of the lecturer in order to prepare, motivate and engage the students at the beginning of the lecture	Ratio (%) of all lectures	20% (n: 15)
	Duration	Mean: 2.4 min, SD=1.18
The number of students attended the class during lecture (based on 10 minutes time period)	Time period	Mean/SD (min. - max.)
	10-20 min.	1.04/2.17 (0 - 13)
	20-30 min.	0.34/0.62 (min.:0, max.: 3)
	30-40 min.	0.10/0.45 (min.:0, max.: 3)
	40-50 min.	0.04/0.19 (min.:0, max.: 1)
The number of students left the lecture before the end of the lecture (based on 10 minutes time period)	Time period	Mean/SD (min. - max.)
	10-20 min. (mean/SD)	0.02/0.16 (0 - 1)
	20-30 min. (mean/SD)	0.05/0.22 (0 - 1)
	30-40 min. (mean/SD)	0.13/0.55 (0 - 4)
	40-50 min. (mean/SD)	0.25/1.02 (0 - 8)
The number of students who did not attend the lectures (S) and The number of reasons for not attending the lectures (R) (napping, yawning, dealing with something else, talking to each other)	Time period	Mean/median/SD
	0-10 min.	S: 3.00/2.00/1.90 R: 3.00/3.00/2.27
	10-20 min.	S: 3.38/2.74 R: 2.96/2.00/2.44
	20-30 min.	S: 3.20/2.00/3.03 R: 2.53/2.00/2.21
	30-40 min.	S: 2.81/2.00/3.04 R: 2.44/2.00/2.64
	40-50 min.	S: 1.09/0.00/2.12 R: 0.85/0.00/1.57
The students attending/asking questions during lecture.		Mean/SD (min. - max.)
	Number of students	1.96/2.39 (0 - 10)
	Time of first question (minute)	14.38/14.48 (0 - 47)
	Number of questions	2.00/2.65 (0 - 10)
The questions asked by the lecturer	Number of questions	Mean/SD (min. - max.) 5.13/4.89 (0 - 20)
	To whom the question was asked (ratio)	Anonymously: 95% Directly to a student: 5%
The applications /interactive activities used during lecture (which engage the student in the teaching process actively)	The ratio	12.0% of all lectures (n=9)
	The duration (minutes) of activities (mean/SD)	7.11/2.82 (min.: 1, max.: 14)
The activities/behaviours performed by the lecturer in order to gather and stimulate the distracted attention of the class during the lecture.	The ratio	44.0% of all lectures (n=33)
	The duration of activities/behaviours per lecture	Mean/SD (min. - max.) 1.78/1.13 (1 - 4)
The activities carried out by the lecturer for summarizing the topic occasionally during the lecture	The ratio	26.6% of all lectures (n=20)
	The duration of activities for summarizing per lecture	Mean/SD (min. - max.) 1.75/0.89 (1 - 3)
The activities/behaviours of the lecturer regarding the summarization of the lecture at the end of the presentation	The ratio (%)	32.0% of all lectures (n=24)
	The duration of activities for summarizing (mean/SD)	3.71/2.17 (min: 1, max: 10)
The activities/behaviours performed by the lecturer to reveal the relationship of the subject with the professional lives of the students during and/or end of the lecture	The ratio	32.0% of all lectures (n=24)
	The number of activities/behaviours per lecture	Mean/SD (min. - max.) 3.00/1.64 (1 - 6)
What was the seating composition of the students in class?	In front: 72% (n:54) Homogeneous: 25.3% (n:19) Messy: 2.7% (n:2)	
The attention of the lecturer during the lecture	All attention is on the slide: 26.7% (n:20) Mostly towards the slide: 20% (n:15) All attention is towards the class: 53.3% (n:40)	

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The presentation materials of the total 43 lectures (79.1% clinical, 20.9% basic science lectures) were analysed, and the

details regarding the data revealed in the observations of the lectures are given in Table II.

Table II. The analysis results of the presentation materials of lectures

		% (n)
Department of lecturers	Basic science	20.90 % (9)
	Clinical Science	79.10 % (34)
Declaration of learning outcomes with students	Yes	39.50 % (17)
	No	60.50 % (26)
The structure of slides (sentences, paragraphs, number of lines, font size *(>20)/size of material, title, color selection, using of slide area in balance, using of image approppriately)*	Should be improved	27.90% (12)
	Acceptable	37.20% (16)
	Well structured	34.90% (15)
The content of presentations *(interdisciplinary integration, congruence of level of students, treatment/diagnosis details, etc.)*	Should be improved	27.90% (12)
	Good	41.90% (18)
	Very good	30.20% (13)
The supplementary documents/tools such as case, audio visual aids, photos, links, etc. within the presentations of lecturers	Yes	37.20% (16)
	No	62.80% (27)
The integrity and flow of the presentation	Yes	11.60% (5)
	No	88.40% (38)
Slides used to prepare students for lecture at the beginning of the presentation *(interesting/ motivating slides, etc.)*	Yes (slides are enough)	69.80% (30)
	No	30.20% (13)
	More than needed	-
Slides used to recap the lecture during presentation	Yes	93.00% (40)
	No	7.00% (3)
Slides used to summarize presentation at the end of lecture	Yes	16.30% (7)
	No	83.70% (36)
Making references between the clinical and the basic sciences within presentation	Yes	30.20 (13)
	No	69.80 (30)
Slide number		Mean/SD (min. – max.) 51.69/18.27 (25 - 97)
The characteristics of content based on visual/audio and written components in presentation of lecturers		Mean/SD/% of slide number
	Only written	32.97/16.06/66.79%
	Only visual/audio	8.93/8.69/18.10%
	Both	7.46/8.75/15.11%

Analysis of interviews with lecturers

As a result of theme analyses of the in-depth interviews with the lecturers, a total of 3 main themes emerged: "planning the lecture and evaluating student achievements", "experience and effects of the lectures", and "post-lecture review and reorganization".

The details of data for themes, categories, and subthemes are presented in Figure 2 and Figure 3.

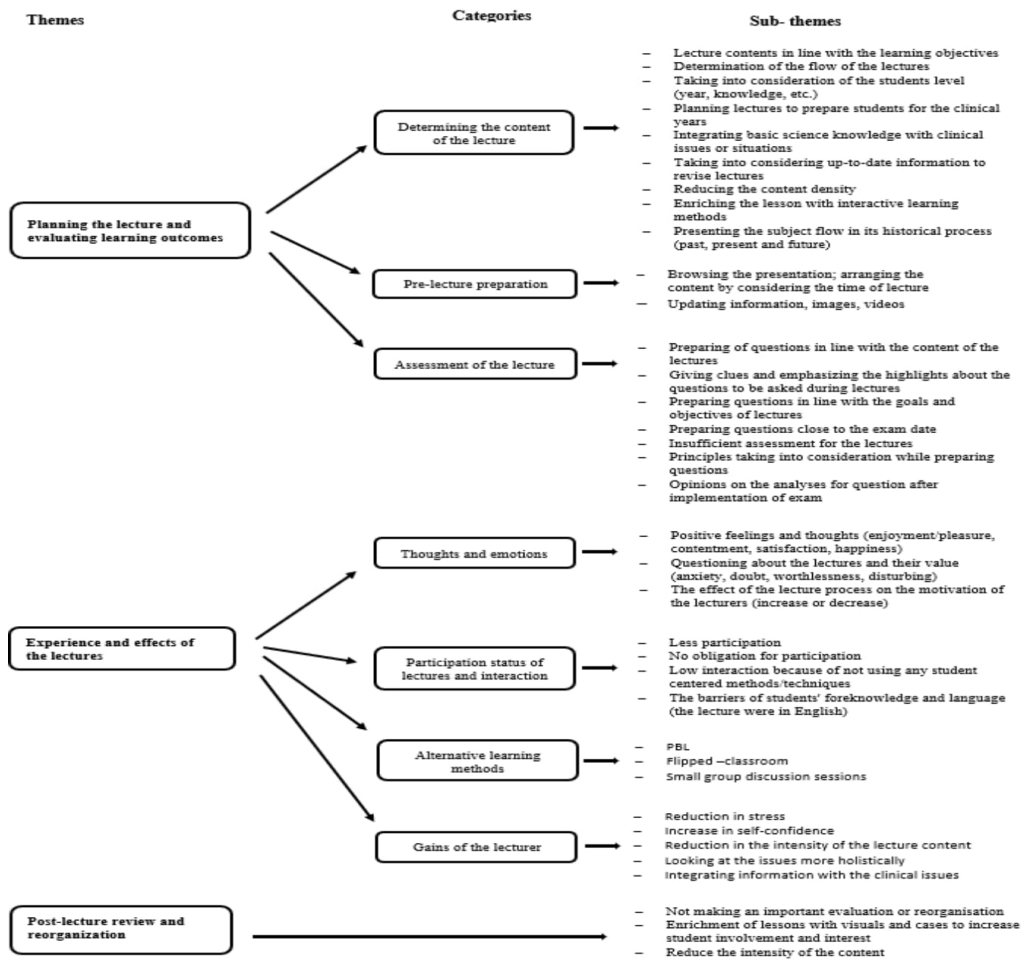The selected quotations related with the main themes are as follows.

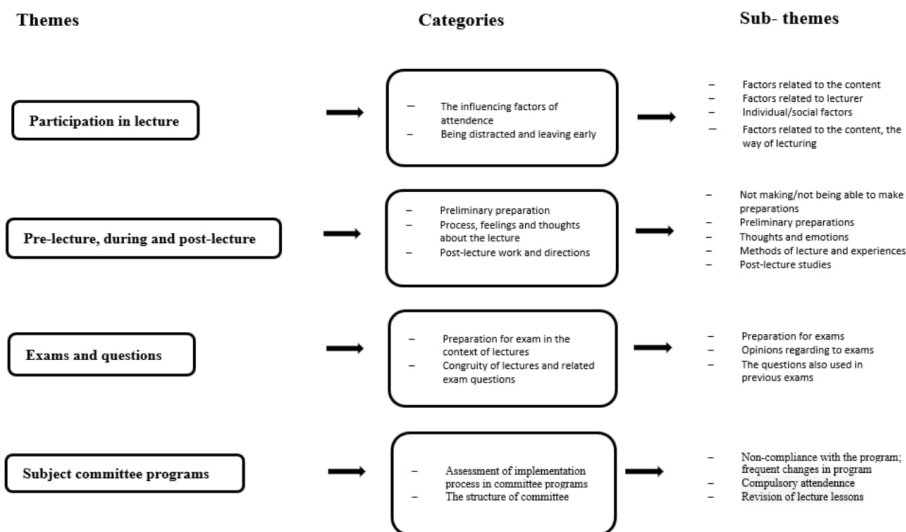*Figure 2. Themes and sub-themes obtained from in-depth interviews with the lecturers.*

Figure 3. Themes, categories, and sub-themes revealed from the focus group interviews with the students.

The first theme: "planning the lecture and evaluating student achievements"

"I try to ensure that students get basic information about the clinical situations I commonly deal with by including basic science knowledge, and I intend to provide them with basic information such as what kind of symptoms the patient will have if there is damage in various localizations… I often try to be interactive and involve the students in the lectures…"

"I prepare exam questions in line with my goals and objectives. The questions are usually at a level which those who attend the lectures can understand. … I would like the questions to distinguish between those who attend and who do not."

The second theme: "experience and effects of the lectures"

"Less attendance in lectures than in previous years reduces my motivation. I do not think it is worth our effort. We are doing something wrong, but I do not know what."

"Students' interest and participation make the lecture better. However, today it is possible to access most of the materials on the internet, and there are also very good online lectures. Therefore, sometimes I think about whether it is better to give the lectures as "flipped classroom" instead of straight classroom lecture method."

The third theme: "post-lecture review and reorganization"

"Actually, I do not go through an intense evaluation process…"

"After the lecture, I always review the content and try to correct any missing points. … I reinforce the points where I feel the student's interest is diminished or remove them if not necessary. During the lecture, I make my observation on this."

Analysis of focus interviews with students

As a result of the analysis of the focus group interviews, 9 categories and 16 sub-themes emerged under 4 themes (Figure 3).

Selected quotations related with the main themes were as follows:

"Participation in lecture"

"I think the way the teacher teaches is the most important aspect. S/he does not teach the lecture directly using slides; besides, it is not very intense and boring, s/he sometimes asks questions, and an atmosphere of interaction occurs, and s/he gives examples from her/his professional life, I like these kinds of lectures more."

"The reason why I come to those classes is just to see friends, spend time, and not to stay away from the classroom."

"Pre-lecture, during and post-lecture"

"Clinical lecturers explain the contents more simply, so you feel content when you leave the class? I mean the comfort of understanding the topic when I leave the class. … A feeling of content to attend the lecture and understand it, so you think that your time is not wasted, and it relaxes you."

"I have this feeling (uneasiness) not only in this committee but also in others because the content of the lecture is very intense."

"Exams and questions"

"Most of the questions can be answered by studying slides, so I can say that this seems to be possible even if the lectures are not given at all. Anyway, it is possible to find different presentations and videos on different websites on the internet, and we can also study by using them."

"Subject committee programs"

"Students determine the lecture they will attend depending on the lecturer, if they think it is worth attending, they do."

"I think the target of our education should be clinically focused, basic science lectures make me feel bored."

4. DISCUSSION

In our study, the most significant factors determining students' attendance, leaving the class before end of the lecture, positive and negative experiences and feelings towards the lectures were also those factors related to the preparation of the lecture, the intensity of the content, integration between basic sciences and clinical sciences, and the presentation skills. In the literature, lectures are criticized for many reasons such as differences in the lecturer's presentation skills, content intensity, inadequate interaction, inability to integrate information, etc. [7,8]. Despite severe criticism, one of the reasons why lectures continue to choose a predominantly used method in education is the insufficient research on this subject [9]. Qualitative research based on the experiences of students and lecturers is limited. This qualitative study is the only study in which the experiences of students and lecturers related to the lectures are evaluated in all aspects using four different methods, not only with the experiences during lecture but also with the experiences before and after. In practice, the experiences during the lecture halls vary a lot within themselves. For example, the presentation skills of the lecturer are very different, and the students are expected to adapt to each lecturer. In addition, students' current knowledge levels play a role in the process [10]. It is observed that the students defined the lectures they mostly benefited from and enjoyed as "interactive, interesting, and practical". The two themes that were associated mostly with positively experienced lectures were "sustaining attention" and "practicality". It is known that the attention span of students in direct instruction is generally limited to 20 min [8]. Students associated "sustained attention" during the lecture mainly with the "interactive" nature of the lecture. One aspect of the interaction is related to in-class student participation. In this context, one way to ensure interaction with students in large lecture halls is to enrich their presentations with interactive learning methods. Today, with the advances in educational technologies, using student response systems, question-answer and similar methods have become easier [11]. The second aspect of interaction is the association of the theoretical content presented in the lecture with daily life and professional life. At this point, the second theme that also

appears to be related with sustaining attention is "practicality". Students report that such lectures motivate them more when the content of the lectures is more meaningful, useful, and applicable via integrating the content with professional life [12]. In our study, it was revealed that students are more eager to participate in and benefit more from interactive lectures. It was also observed that the experiences of lecturers who had interactive presentations, were more positive. However, the findings emphasized that positive experiences are limited, and pointed to insufficient interaction. Since, the content of the lecture was regarded as too intense for in-class interaction and forced the lecturers to apply straight lectures, the content was not deepened and reinforced with interactive techniques such as question-answer, discussion, or case use. Basic and clinical science knowledge were not integrated enough or associated enough with day to day clinical life. The feelings, attitudes and thoughts of both the students and teachers were adversely affected towards the lectures. As a result, the students chose not to attend the classes. The rate of attendance in lectures was found to be limited to one-fourth of the class size. It was observed that students' feelings about the lectures were dominated by negative emotions like "meaninglessness", "reluctance", "worthlessness", "regret", "waste of time", "anger", "boredom" and "unable to breathe" rather than "positive energy", "comfort", "relaxation and satisfaction". Lack of attendance in lectures and limited interaction cause a decrease in motivation and lead to negative thoughts and feelings in lecturers. Many lecturers reported that methods such as problem-based learning and "flipped classroom" instead of lectures could be put into practice. There are many studies in the literature regarding the positive effects of attendance in lectures on learning [13,14]. However, in recent years there has been a noticeable decrease in attendance in lectures [15]. In our study, the average attendance rate was found to be 25%. Many factors were identified regarding the non-attendance of medical students, such as prioritizing other academic activities and some personal or physical problems. For example, the transportation problem due to the distance between the campus and the place of residence was identified as an important factor affecting the attendance of the class for 70% of the students [13]. It was revealed that the morning traffic in Istanbul negatively affects their decision to attend lectures in the early hours in our study as well. Among other reasons, two factors were found to be particularly significant: the way the lecturers deliver the lectures, and having the opportunity to watch online lectures for topics covered through various online platforms. It was observed that intensive content and not using interactive techniques during lectures negatively affected attendance. On the other hand, the motivation of the lecturer and the enrichment of the presentations with visuals, relevant cases, and professional experiences/narratives positively affected the attendance. Moreover, it was observed that when participating in classes where intensive content presentation was not found meaningful, the use of different online lecture alternatives reduced participation even more. Literature supports these findings related to the lecturer factor. Studies have shown that interesting lectures, the communication of the lecturer, and the lecturers' mastery of the subject positively affect

student attendance [9, 16, 17]. Another ongoing discussion regarding attendance is whether it should be compulsory or not. In a study, medical lecturers stated that compulsory attendance greatly affected student's attendance. Besides, some faculty members advise students to attend lectures to avoid problems with presentation materials shared in lecture halls and to avoid a poor performance in exams/assignments [18]. However, another relevant study did not reveal a significant relationship between medical students' attendance in lectures and their academic achievements [19]. In our study, the lecturers expressed their opinions on the necessity for compulsory attendance, but the students stated that it would not affect the efficiency of the lecture positively; on the contrary, it could negatively affect the students who really want to participate and benefit from the lectures.

In-class observation and analysis of the lecture materials revealed that the methods for increasing interaction were used in only 12.0% of the observed lectures. The number of slides for a 45-min lecture was very high, with an average of 51.7 (median:50), and the number of question-answer activities per lecture was also low. The lecture materials were content-intensive and the integration between basic and clinical sciences was not sufficient. After all these considerations, the solution lies in the improvement of the content of the lectures and the transformation of direct lecturing into interactive lectures using interactive techniques rather than making attendance compulsory. A more likely scenario would be that enhanced presentation contents and increased student interactions positively might affect participation.

Another significant factor regarding attendance in lectures is the rapid change in education and information technologies in recent years and the outcomes of this change. For example, the recording of the lectures and the opportunity for students to watch these recordings anytime decreases attendance [18,20]. Parallel to the development of video and audio recording technologies, students prefer to watch recorded content (podcasts or recorded lectures) than participate in lecture halls [19]. While, lecturers are more cautious about accepting and adapting to technological developments and the consequences of these developments, students are much more open and adapt quickly. Medical students state that following the lectures in this way is more efficient, useful, and has a better effect on their education than live lectures [18,19]. Our study results are consistent with this literature. The students in our study preferred to follow the lectures on online platforms instead of lectures that are not interactive, meaningful/useful, and involve a significant proportion of content presentation. However, in our study, some of the lecturers stated that thanks to technological developments, students can now access the course contents online and switching to student-centred interactive learning methods (problem-based learning (PBL), flipped classroom) instead of teaching in lecture halls should be considered. The transformation that has been taking place in medical education in the world for a long time is to reduce lectures and carry out education mainly by using student-centered learning techniques such as; proble-based (PBL), team-based learning (TBL),

case-based collaborative learning (CBCL), flipped classrooms and technology-based education [21].

It is obvious that the lecturer-centred educational approach and practices based on content transfer will not be sufficient on their own for the attainment of twenty-first-century physician competencies [22]. At this point, it is essential to focus on interactive lectures that aim at the development of causation, decision-making, and evaluation competencies, rather than a straight narrative lecture that targets lower-level cognitive acquisitions and result in superficial learning. Reducing the intensity of the lectures in the curriculum and reorganizing the programs with student and interaction-centred learning activities will make learning more in-depth, integrated, and meaningful [23]. Besides, distance education provides flexibility in the existing programs [24].

According to many medical lecturers, after the pandemic there will be no return to the old system in medical education and permanent changes related to distance education will be implemented in education. It is also reported that in the future, changes in medical education will need to be closely monitored and put into practice by accreditation institutions [25]. In this context, the COVID-19 pandemic can be seen as an important opportunity to reconsider lectures. Moreover, the COVID-19 pandemic has made lecturers around the world a little keener on the use of educational technologies and online education. Lecturers are more convinced of the efficiency of online education training tools. In this process, medical education institutions have experienced the online presentation of some of the curriculum content [26,27]. The COVID-19 pandemic has been an opportunity for many faculties to implement innovative online education methods that they previously had not dared or found the opportunity to put into use [28].

This study revealed that the lectures are experienced negatively by both students and lecturers. It has been observed that these negative experiences create negative feelings and thoughts in students and lecturers, and thus lead to the development of undesired attitudes and behaviours towards lectures. Experiences related to the lectures should be handled and comprehended from all aspects, like current beliefs, acceptance, attitudes and behaviour patterns, habits, emotional, sociocultural, technical, and functional learning. Gaining a deeper insight into this issue will make the changes made in this direction more applicable. In addition, lecturer-oriented presentations should also become more effective, meaningful, and useful by the use of interactive techniques, affirmative and supportive classroom environments. However, such a transformation can only start when educational institutions ask themselves the following question and take necessary initiatives in this direction: "How far can we go with lectures?"

The main identified limitation regarding findings and conclusions that can be drawn in this study is as follow: the results obtained from this qualitative study conducted in a medical school are limited only to the culture and educational experiences of that country and the medical school. Therefore, it is pivotal to diversify such studies in different cultures and

medical schools employing different qualitative research designs, methods, and tools. The outcomes and effects of the experiences related to the lectures should be revealed in a deep and holistic manner through further qualitative studies based on different research questions. It is to be expected that when based on studies which attempt to interpret and understand current experiences in different cultures around the world, the process of change and transformation in this direction will be realized more effectively.

Compliance with the Ethical Standards

REFERENCES

[1] Jones SE. Reflections on the Lecture: Outmoded Medium or Instrument of Inspiration?. J Furth High Educ 2007;31: 397-406. doi: 10.1080/030.987.70701656816.

[2] Narayan R, Rodriguez C, Araujo J. Constructivism – constructive learning theory. In: Beverly J Irby, ed. The Handbook of Educational Theories. 1st ed. US: Information Age Publishing, 2013:169,183.

[3] Long A, Lock B. Lectures and large group. In: Swancwick T, ed. Understanding Medical Education; Evidence, Theory and Practice. 2nd ed. UK:Wiley Blackwell, 2014:137,148.

[4] Asad MR, Amir K, Tadvi NA, et al. Perception of medical undergraduate students about interactive lectures in an outcome-based integrated curriculum: a cross-sectional study. J Educ Health Promot 2017;6:100. doi: 10.4103/jehp.jehp_38_17

[5] Massingham P, Herrington T. Does Attendance Matter? An Examination of Student Attitudes, Participation, Performance and Attendance. J Univ Teach Learn Pract 2006;3:83-103. doi: 10.53761/1.3.2.3.

[6] Bates M, Curtis S, Dismore H. Learning approaches and lecture attendance of medical students. J Furth High Educ 2018;42:248-58. doi: 10.1080/0309877X.2016.126.1089.

[7] Flexner A. Medical education in the United States and Canada: a report to the Carnegie Foundation for the

Advancement of Teaching. Bulletin No. 4, 1910. http://archive. carnegiefoundation.org/publications/pdfs/elibrary/Carnegie_ Flexner_Report.pdf (Accessed on November 11, 2021).

[8] Mustafa T, Farooq Z, Asad Z, et al. Lectures in medical educaton: what students think?. J Ayub Med Coll Abbottabad 2014;26:21-5.

[9] Manzoor I, Mumtaz A, Habib M, Tariq S, Elahee M, Javaid I. Lectures in medical education: students' views. J Ayub Med Coll Abbottabad 2011;23:118-21.

[10] Webb EM, Naeger DM, Fulton TB, Straus CM. Learning objectives in radiology education: why you need them and how to write them. Acad Radiol 2013;20:358-63. doi: 10.1016/j.acra.2012.10.003.

[11] Moss K, Crowley M. Effective learning in science: the use of personal response systems with a wide range of audiences. Comput Educ 2011;56:36-43. doi: 10.1016/j. compedu.2010.03.021.

[12] Jen A, Webb EM, Ahearn B, Naeger DM. Lecture evaluations by medical students: concepts that correlate with scores. J Am Coll Radiol 2016;13:72-6. doi: 10.1016/j.jacr.2015.06.025.

[13] Dhaliwal U. Absenteeism and under achievement in final year medical students. Natil Med J India 2003;16:34-7.

[14] Massingham P, Herrington T. Does attendance matter? An examination of students' attitudes, participation, performance and attendance? J Uni Teach Learn Pract 2006;3:83-103. doi: 10.53761/1.3.2.3.

[15] Charlton BG. Lectures are an effective teaching method because they exploit human evolved 'human nature' to improve learning. Med Hypotheses 2006;67:1261-65. doi: 10.1016/j.mehy.2006.08.001.

[16] Chaudhry R, Dullo P, Gupta U. Attitude of 1st year MBBS medical students about two different visual aids in Physiology lectures. Pak J Physiol 2009;5:16-9.

[17] Bollemier SG, Wenger PJ, Fornaish AB. Impact of online lecture-capture on student outcomes in a therapeutic course. Am J Pharma Educ 2010;74:1-5. doi: 10.5688/aj7407127.

[18] Campbell AM, Ikonne US, Whelihan KE, Lewis JH. Faculty perspectives on student attendance in undergraduate medical education. Adv Med Educ Pract 2019;10: 759-68. doi: 10.2147/ AMEP.S208960.

[19] Ikonne U, Campbell AM, Whelihan KE, Bay RC, Lewis JH. Exodus from the classroom: student perceptions, lecture capture technology, and the inception of on-demand preclinical medical education. J Am Osteopath Assoc 2018;118:813-23. doi: 10.7556/jaoa.2018.174.

[20] Zazulia AR, Goldhoff P. Faculty and medical student attitudes about preclinical classroom attendance. Teach Learn Med 2014;26:327-34. doi: 10.1080/10401.334.2014.945028.

[21] Chen F, Lui AM, Martinelli SM. A systematic review of the effectiveness of flipped classrooms in medical education. Med Educ 2017;51:585-97. doi: 10.1111/medu.13272.

[22] Stevens CD. Repeal and replace? A note of caution for medical school curriculum reformers. Acad Med. 2018;93:1425-27. doi: 10.1097/ACM.000.000.0000002219.

[23] Buja LM. Medical education today: all that glitters is not gold. BMC Med Educ 2019;19:110. doi: 10.1186/s12909.019.1535-9.

[24] Shahrvini B, Baxter SL, Coffey CS, MacDonald BV, Lander L. Pre-clinical remote undergraduate medical education during the COVID-19 pandemic: a survey study. Res Sq 2021;21:13. doi: 10.1186/s12909.020.02445-2.

[25] Wayne DB, Green M, Neilson EG. Medical education in the time of COVID-19. Sci Adv 2020;6:eabc7110. doi:10.1126/ sciadv.abc7110.

[26] Liang ZC, Ooi SBS, Wang W. Pandemics and their impact on medical training: lessons from Singapore. Acad Med 2020 Sep;95:1359-61. doi: 10.1097/ACM.000.000.0000003441.

[27] Sandhu P, de Wolf M. The impact of COVID-19 on the undergraduate medical curriculum. Med Educ Online 2020;25:1764740. doi: 10.1080/10872.981.2020.1764740.

[28] Woolliscroft JO. Innovation in response to the COVID-19 pandemic crisis. Acad Med 2020;95:1140-42. doi: 10.1097/ ACM.000.000.0000003402.

***Supplementary material 1.** Checklist for observation of lecture*

The number of students at the beginning of lectures (first 10 minutes)?		
The activities/behaviours of the lecturer in order to prepare, motivate and engage the students at the beginning of the lecture	Number	
	Duration	min.
The number of students attended the class during lecture (based on 10 minutes time period)?	10-20 min.	
	20-30 min.	
	30-40 min.	
	40-50 min.	
	50-60 min.	
	60-70 min.	
The number of students left the lecture before the end of the lecture (based on 10 minutes time period)?	10-20 min.	
	20-30 min.	
	30-40 min.	
	40-50 min.	
	50-60 min.	
	60-70 min.	
The number of students who did not attend the lectures (S) and the number of reasons for not attending the lectures (R) (napping, yawning, dealing with something else, talking to each other)	0-10 min.	S:….. R:……
	10-20 min.	S:….. R:……
	20-30 min.	S:….. R:……
	30-40 min.	S:….. R:……
	40-50 min.	S:….. R:……
	50-60 min.	S:….. R:……
	60-70 min.	S:….. R:……
Area used by the lecturer during the lecture	⌒ Narrow ⌒ Medium ⌒ Wide	
The students attending/asking questions during lecture	Number of students	
	Time of first question	… min.
	Number of questions	
The questions asked by the lecturer (A: Anonymously, D: Directly to a student)	Number of questions	
	To whom the question was asked	A: ….. S:……..
	What was the feedback to the answer?	
The applications /interactive activities used in the lesson (which engage the student in the teaching process actively).	The number of	
	The ratio to the total time	…min.
The activities/behaviours performed by the lecturer in order to gather and stimulate the distracted attention of the class during the lecture.	The number of	…min.
	The ratio to the total time	…min.
The activities carried out by the lecturer for summarizing the topic occasionally during the lecture.	The number of	…min.
	The ratio to the total time	…min.
The activities/behaviours of the lecturer regarding the summarization of the lecture at the end of the presentation.	The number of	
	The ratio to the total time	…min.
The activities/behaviours performed by the lecturer to reveal the relationship of the subject with the professional lives of the students during and/or end of the course.	The number of	
	The ratio to the total time	…min.
What was the seating composition of the students in class?	⌒ In front ⌒ In back ⌒ Homogeneous ⌒ Messy	
The attention of the lecturer during the lecture	⌒ All attention is on the slide	
	⌒ Mostly towards the slide	
	⌒ All attention is on the class	
	⌒ Mostly towards the class	

Supplementary materials 2. Evaluation Form for lecture presentation material

Department of Lecturers	⊂ Basic science ⊂ Clinical Science
Declaration of learning outcomes with students	⊂ Yes ⊂ No
Slide number	
The characteristics of content based on visual/audio and written components in presentation of lecturers	⊂ Only written ⊂ Only visual ⊂ Both
The structure of slides (sentences, paragraphs, number of lines, font size (>20)/size of material, title, color selection, using of slide area in balance, using of image approppriately)	⊂ Be developed ⊂ Acceptable ⊂ Adequate
The content of presentations (interdisciplinary integration, congruence of level of students, treatment/diagnosis details, etc.)	⊂ Be developed ⊂ Good ⊂ Very good
The supplementary documents/tools such as case, audio visual aids, photos, links, etc. within presentations of lecturers	⊂ Include ⊂ No
The integrity and flow of the presentation	⊂ Include ⊂ No
Slides used to prepare students for lecture at the beginning of the presentation (interesting/ motivating slides, etc.)	⊂ Include ⊂ No ⊂ More than needed
Slides used to recap the lecture during presentation	⊂ Include ⊂ No
Slides used to summarize presentation at the end of lecture	⊂ Include ⊂ No
Making references between the clinical and the basic sciences within presentation	⊂ Include ⊂ No

Supplementary materials 3. Questions for in-depth interview

Questions of in-depth interview with lecturers:

1. How did you prepare your lecture content? Did you review your lecture/ presentation material before the lecture? What is your main framework and what parameters do you take into account for your lectures preparation?

2. What are your feelings and thoughts about the lectures you teach? What kind of educational experience do you think you had in this committee? How has this experience affected your motivation for teaching and your thoughts on lectures?

3. Have you needed to revise your lecture(s) after implementation? Could you please give more details?

4. When did you prepare the exam questions? What did you consider while preparing those questions?

5. How would you evaluate the analyses of exams you gave, and the performance of the students in these exams?

Questions for group interview with students:

1. How did your experience with lectures affect your learning/ study motivation?

2. Were you given an assignment after the lectures? Did you make a plan and study for additional learning/completion of your aim? Which factors to affect or do not affect your plans for studying?

3. How did you prepare for the committee exam?

4. When you think about the scope of the lectures, how would you evaluate the questions in the committee exam? How did these questions affect your motivation and depth of learning?