

Why are medical students 'checking out' of active learning in a new curriculum?

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OBJECTIVES The University of Virginia School of Medicine recently transformed its pre-clerkship medical education programme to emphasise student engagement and active learning in the classroom. As in other medical schools, many students are opting out of attending class and others are inattentive while in class. We sought to understand why, especially with a new student-centred curriculum, so many students were still opting to learn on their own outside of class or to disengage from educational activities while in class.

METHODS Focus groups were conducted with students from two classes who had participated in the new curriculum, which is designed to foster small-group and collaborative learning. The sessions were audio-recorded and then transcribed. The authors read through all of the transcripts and then reviewed them for themes. Quotes were analysed and organised by theme.

RESULTS Interview transcripts revealed candid responses to questions about learning and the learning environment. The semi-structured nature of the interviews enabled the interviewers

to probe unanticipated issues (e.g. reasons for choosing to sit with friends although that diminishes learning and attention). A content analysis of these transcripts ultimately identified three major themes embracing multiple sub-themes: (i) learning studio physical space; (ii) interaction patterns among learners, and (iii) the quality of and engagement in learning in the space.

CONCLUSIONS Students' reluctance to engage in class activities is not surprising if classroom exercises are passive and not consistently well designed or executed as active learning exercises that students perceive as enhancing their learning through collaboration. Students' comments also suggest that their reluctance to participate regularly in class may be because they have not yet achieved the developmental level compatible with adult and active learning, on which the curriculum is based. Challenges include helping students better understand the nature of deep learning and their own developmental progress as learners, and providing robust faculty development to ensure the consistent deployment of higher-order learning activities linked with higher-order assessments.

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INTRODUCTION

Studies of learning are driven primarily by two fundamental questions: how can teaching staff help students achieve objectives for learning most effectively, and how can that learning be sustained over time? At the University of Virginia School of Medicine – as in other institutions around the world – we recently transformed our pre-clerkship curriculum. The *Next Generation (NxGen)* curriculum was designed based on adult-learning principles and is aligned with our primary teaching philosophy, which aims to facilitate more engaging, student-centred learning.

The assumption underlying our efforts was that medical students would embrace an active, student-centred curriculum that increased student interest and engagement in learning, and resulted in better short- and long-term learning outcomes. This assumption was based on the fact that active learning approaches have been practised and researched for decades, and efforts continue in most disciplines to reform passive teaching into active, student-centred strategies.^{1–4} Many studies have reported a high degree of student enthusiasm for this type of curriculum reform^{5,6} and, in fact, Greenberg⁷ more recently offered these specific approaches to learning as a ‘value-added’ solution to the decades-old problem of decreasing attendance in medical school lectures.

Active and adult learning

The new curriculum also acknowledges a growing movement in higher education (referred to as the ‘flipped classroom’) in which students are provided with resources for foundational knowledge (i.e. lower-order knowledge) and concepts to be learned outside the classroom. In the classroom, the information learned is applied to clinically relevant patient cases and problem sets that students work through in groups, in which they can collaborate in advancing both individual and group learning, with the goal of applying their new knowledge to solve clinical problems.^{1,2} The design of these learning activities is based at least in part on constructivist⁸ (Fig. 1) and adult⁹ (Fig. 2) learning principles. Additionally, the curriculum builds on the long espoused benefits of active learning, which include better retention of content, deeper inquiry and understanding, increased motivation to learn, and the development of lifelong skills for learning.^{1–4,10}

Were the assumptions on which we built the new curriculum appropriate?

Following the completion of assignments carried out independently prior to class, students work together in small groups in the classroom on problem sets, team-based learning exercises,¹¹ case studies and other collaborative exercises. The students we spoke to as part of this study indicated that they recognise and appreciate when these interactive

- 1 Intellectual abilities are socially and culturally developed
- 2 Learners construct knowledge and understandings within specific contexts
- 3 New learning is shaped by prior knowledge
- 4 Intelligent thought involves metacognition (self-monitoring of learning and thinking)
- 5 Deep understanding supports transfer of knowledge

Figure 1 Characteristics of constructivist learning principles⁸

- 1 Adults are motivated to learn as they experience needs and interests that learning will satisfy; therefore these are appropriate starting points for adult learning activities
- 2 Adults’ orientation to learning is contextual; appropriate units for adult learning are life situations, not subjects
- 3 Experience is the richest source of adult learning; the core methodology of adult education is the analysis of experience
- 4 Adults have a deep need to be self-directed; therefore it is the role of the teacher to engage them in mutual inquiry rather than to transmit knowledge and then assess learners’ conformity to it
- 5 Adult education should make optimal provision for differences in style, time, place and pace of learning

Figure 2 Characteristics of adult learning principles⁹

sessions work well because their learning is enhanced. However, teaching staff and classroom observers noted dwindling attendance over the course of the pre-clerkship phase and students distracting themselves and others during learning activities. Even those who frequently attended classes occasionally lost their focus on course content, at least in part because of the ease of social interaction during collaborative exercises and easy access to the Internet. As noted by Marzuk,¹² such students are present only 'in body' as they text, tweet and watch videos. A survey of students only confirmed the informal observations of teaching staff: a mere 25% of the class reported regularly attending active learning sessions in the classroom. An additional 50% of the class reported that they approached the active learning exercises in ways unintended by the curriculum designers, by looking over the answers to the problems and cases posed in class rather than working through the questions with teammates.

Medical students skipping class to study and learn alone is not a new phenomenon, and, in a traditional lecture-based curriculum, absence from class may not prevent students from achieving learning objectives, particularly if lectures are captured on audio or video (as is now very common). However, a curriculum designed primarily on active learning principles is based on the notion that students will be present in class and will learn with one another. Although there is extremely limited literature discussing how low class attendance or inattentive students might compromise active classroom activities, this is clearly a common concern among medical educators. There have been multiple lengthy conversations on list serves such as the popular 'DR-ED' about how to engage students in the classroom. Although we felt we had already adopted many of the approaches recommended and discussed, we still needed to consider reasons for these increasingly pervasive absences and behaviours.

Data from our course evaluations indicated that the quality of the active learning sessions was inconsistent, which suggested that improving faculty devel-

opment efforts might help alleviate the problem of poor class attendance. However, student survey comments also suggested a more troubling possibility: some students did not (yet) possess the self-direction, reflective ability and motivation required for sustained engagement in a curriculum designed to incorporate adult learning principles. Moreover, some students did not appreciate the value of collaborative learning or recognise the contributions an individual may make to the learning of others. If students are not developmentally prepared for these educational approaches, teaching staff will struggle with active, student-centred course design, and students will struggle with self-directed and collaborative learning. These issues are not specific to our institution, but are of broad concern to all curriculum designers involved in the reform of a traditional lecture-based curriculum into active learning in a student-centred classroom.

Research focus

Our current inquiry was driven by our concern that we might need to adjust our theoretical assumptions about active learning in the classroom in view of the actual experiences of students in the classroom. We wanted to understand why, with a newly adopted student-centred curriculum, many students were opting to learn on their own, outside the curriculum and learning environment – a classroom with 18 round tables seating up to nine students each – developed by the School of Medicine. Most importantly, we wanted to know how we might better help our students experience the deep and significant learning offered in the classroom that will prepare them more effectively for clerkships and will help them sustain lifelong learning habits in professional practice.

METHODS

We approached this qualitative study through a phenomenological lens, in part based on Van Manen's¹³ contention that phenomenological research comprises six separate activities (Fig. 3).

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| <ol style="list-style-type: none"> 1 Identify a phenomenon of particular serious interest 2 Investigate the experience as lived rather than as conceptualised 3 Reflect on the themes that typify the phenomenon under investigation 4 Describe the phenomenon 5 Define and describe pedagogical foundations or links to the phenomenon 6 Consider the parts that comprise the whole of the phenomenon |
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Figure 3 Steps in conducting phenomenological research¹³

We sought to understand our students' learning experiences from their day-to-day perspectives. Although teaching staff had often discussed their experiences of teaching in half-empty classrooms, these discussions were based on personal observations, random anecdotes from students, and structured evaluations.

Via e-mail, we sent an invitation to all members of the Year 2 class ($n = 156$) asking them to participate in a focus group discussion about classroom learning in the pre-clerkship curriculum. We hoped to recruit 10% of the class. After a few e-mail reminders, we were able to recruit 15 volunteers (9.6%); these were the first students we heard back from; no-one was turned away. The sample was not stratified and comprised approximately equal numbers of men and women (which is representative of the class). The volunteers were divided into two groups, with one author (EB) facilitating a group of eight students and a second author (JM) facilitating the remaining seven. An additional student from the class graduating in 2015 who volunteered but was not available on the scheduled date was later interviewed independently by one of the authors (EB). Lunch was served to the two groups, but not to the individual student who was interviewed later. We used a broad, open-ended, semi-structured protocol (Fig. 4) to guide the discussions. In many instances, the conversations proceeded in directions we had not foreseen, which allowed us to explore additional dimensions with the students.

After the initial round of interviews but before any review of transcripts, we invited a similar sample of medical students from the class graduating in 2014 to participate in the study, using an identical process. We did this in order to determine if there were differences in the experiences of the (only) two classes of students to have attended classes in the new

curriculum (in 2010–2011 and 2011–2012). An invitation identical to that sent to students in the class graduating in 2014 was sent to students in the class graduating in 2015 ($n = 156$). Eight students agreed and were facilitated by one of the authors (JM); a follow-up invitation to the class yielded six additional students, who were also facilitated by JM. The same semi-structured protocol (Fig. 4) was used for all focus groups and all discussions were audio-recorded.

The audio-recordings were sent to an outside company for transcription. The transcribed interviews were then content-analysed individually by two of the authors who had not conducted any of the focus groups (CW, KP), who each independently developed a list of sub-themes that they ultimately merged into the three themes that will be described in the Results section. In a subsequent meeting, the two authors met to discuss what they had found, at which point it emerged that their lists and findings were almost identical. The two authors came to full agreement on minor discrepancies between their two sets of findings, which were then combined into one complete set by a fifth investigator (PR). The two authors who had conducted all of the focus groups (EB, JM) were then asked to review the merged set of themes and sub-themes, and subsequently indicated that the set represented what they had heard in the focus groups.

In this qualitative investigation, credibility was achieved by gathering data from multiple sources (four focus groups representing two different classes) and asking members of the focus groups for feedback on our interpretation of the data (they agreed the comments represented the discussion in the groups). A 'thick description'¹⁴ of our recruitment procedures, our sample and our findings support the transferability of this investigation to other settings.

Nature of learning groups and group formation in the school of medicine

- 1 Introductions, description of the study, disclaimer about how participation will in no way impact on grades or standing in the School of Medicine
- 2 How do you choose which groups to sit with in the learning studio?
- 3 How often do you change groups?
- 4 What are the dynamics within the group(s)?
- 5 Please describe the benefits and positive aspects of group learning
- 6 Please describe the challenges and negative aspects of group learning

Figure 4 Semi-structured interview protocol

RESULTS

Focus group transcripts revealed candid responses to questions about learning and the semi-structured nature of the protocol enabled the facilitators to probe unanticipated issues (e.g. reasons for choosing to sit with friends and how groups are formed). Across the groups (which were representative of two classes familiar with the new curriculum) discussion was remarkably similar, even with the student who was interviewed alone. The authors believed – particularly for the student interviewed alone – that they had already reached saturation and thus they were hearing no new information. There were expectations that the comments of the class graduating in 2014 (their focus groups were scheduled last) would be significantly different because they had been the first cohort in the new space and there were glitches with the new curriculum. There was one lone comment about difficulties with technology very early on in the new classroom; however, the authors ultimately believed that over time the students were able to look back and focus less on problems and more on the experience.

From their initial independent reviews of the transcripts, the reviewers (CW, KP) culled several sub-themes (Fig. 5), which they ultimately combined into the three themes that follow. This process was conducted in part because many of the comments in the original material were represented in multiple sub-themes.

Interactions among learners: sitting with friends and changing tables

Students described in some detail how and why they made decisions on whether or not to sit with

- Learning studio groups (friends versus random)
- Social aspects of groups
- Table personalities/leadership
- Position in learning studio
- Preparedness/attendance
- Concentration in class
- Active learning (quality, value added)
- Learning/teaching styles
- Attendance
- Other/miscellaneous

Figure 5 Original sub-themes identified from the student discussions

friends. Once they had established friendships, many of them chose to sit in small groups with friends they had made early on and with whom they socialised out of class:

At the beginning of the year when you don't know many people [you sit wherever] there's an open seat. When you start to do social things and get a group of friends you typically sit with them.

I definitely started off floating around a bit almost randomly when seats were open – but then I settled into pretty much the same table mainly because of friends.

Once I started forming friendships I [chose my table] based on fun, not "Oh this person knows their stuff and this one doesn't." It was who has a similar personality to mine.

I think a lot of people would start at the table you were assigned to for your TBL [team-based learning]. Then some people would join that table and some would leave, and then inevitably someone at that table started there for TBL and the rest [of the people at that table] were their friends. The table I ended up staying at the whole time was originally my TBL table... but then my friends were there so I just stayed at table two.

Many of the students chose to sit with friends because doing so allowed them to feel less pressure to prepare for each session; they believed they would not be chastised or embarrassed by classmates with whom they were friendly. At the same time, they realised they were more easily distracted when sitting with friends:

You tended to sit with your friends so no tension.

I know that with my social friends I definitely learn less. We get distracted; we talk about stuff, or look at a video during class. It's terrible.

[When we were less prepared] our group was more like social catch-up because you know when you go home you're going to work by yourself, so while you're all together you might as well talk to people.

I think that because I sit with pretty much the same group every day we're really comfortable with each other. I think also we have a sense of when someone doesn't understand it we'll ...

kind of fill each other in a little bit. I feel like it happens to me a lot you know. Maybe that's why I stick to my table because they help me out. No-one is going to judge you, like, "Why don't you know this?" "Why aren't you prepared?"

Randomised groups help. You're more likely to prepare if you don't know them [other members of group]. If it's your friends, you don't care if you look dumb in front of them.

At the same time, a few of the students articulated how not sitting with friends (during randomised assignments for required TBL and other activities) and how preparing for learning activities enhanced their learning:

I think [groups we choose on our own] can be very different from our other TBL required group. I think one thing that works so well about the [randomly assigned] TBL groups is it's not you and five of your really close friends.

When you're prepared it works great.

I think so much of it was really activity-based. And if the activity was solid, and you are prepared for it then having the group was wonderful.

Actually it's really helpful sometimes when I'm the more prepared one because it's really helpful to actually talk it out and explain it to someone.

A few of the students changed tables, some more often than others, for various reasons, including the specific activities and their level of preparedness that day:

I find I like to change it up – partly because I like to check in with different people and partly because I think it's nice to get different perspectives.

Sometimes I'll switch if there's a problem set. I'll sit with people I work on problem sets with, because some people do a lot of prep work and come in ready to do the problem set, which is how I try to do it.

If it's just a lecture or a talk with the residents then it's not essential to me where I sit. But if there's something like a problem set where you

actually have to work through something and think/talk about it, I'll definitely go to people who prepare as little or as much as I do.

There are some people I really like socially but in small groups they might not be the best people to work with, so sometimes I make my decision [whether to switch groups] based on the kind of work we're doing that day.

The learning experience: quality

A few of the students' comments about positive learning experiences in the classroom were based not only on group dynamics, but also on content and methodology:

Some people would get the material really well and be able to explain it to the rest of the group. And at other times they were lost and you'd get somebody to explain it to them. So being in a larger group where you can actually talk it out with different people who got the material made it a little easier.

There were activities they gave us that were done really well. They told us the readings before and we were prepared. So when you're sitting with three or four people and you couldn't quite figure it out, you could talk to them and learn so much more than sitting at home thinking: "I don't know, I guess I'll try and [find the answer] on the Internet."

People are working together – I've never had a sense of competition at all. It's more like, "I don't get this, can someone help?"

[One of the benefits of the groups is] being able to field questions with your peers, because I'm someone who doesn't speak out in class. I would easily ask the people at my table but I would never speak up.

The students spoke candidly about the quality of activities in the new curriculum:

Sometimes a lecture can be great and sometimes not so great – [when that happens] you can mentally check out and you know you're not hurting yourself too much. It's the same thing with group activities. Sometimes they're really useful. Sometimes they're not. And so you can disengage a little bit because you feel like you're wasting your time.

Sometimes instructors gave us group work to do that didn't require group work, on things that don't require as much time as they think we should be spending talking about it. And so then it kind of dissolves into, "What's a good YouTube video?" or whatever.

There's a lot of wasted time. Some [self-selected] groups finish problem sets in 10 minutes and some in 45 minutes. If you finish early you're just sitting there.

There were definitely classes I sat through thinking "Why am I here?"

The learning experience: engagement

The students also spoke about how and why they disengaged from class activities, whether in the classroom or not. Although they did not always state this explicitly, efficiency was a recurrent theme:

If you're sitting with your back to the speaker, he can see your computer screen, so if you intend on not paying attention, you will try to sit facing him.

Most of the lecturers tend to call on people in the front half of the room or else the inner circle of tables, so I like to sit in the back outer circle because I don't want to get called on.

More and more people are less and less prepared, that's why you see a decline in attendance. With the problem sets, if you don't feel prepared and ready to contribute, your time is better spent [at home] doing your own work.

There are some lectures where the resources are so good – I can read the book and understand everything and I don't really gain too much from going to the lecture... But if I have read the material and don't understand it by the time I've done the pre-reading, then I'm going to the lecture.

DISCUSSION

In this study we explored – through their own words – medical students' learning experiences in the pre-clerkship curriculum. We hoped that the focus groups would clarify why we were less successful than we had anticipated in engaging students as active adult learners in classroom experiences

designed to promote deep learning, a key goal of the new curriculum. In the focus groups students revealed an impressive degree of intellectual maturity in articulating how active involvement in collaborative classroom exercises enhanced their learning, particularly when they were prepared for class and challenged by the exercise. However, they also reported that sitting with their friends made the learning environment less demanding and more comfortable for them, and that they intentionally 'hid' to avoid being called on and to avoid being intellectually challenged by teaching staff or by classmates who were more prepared. Students also reported that they frequently did not prepare for class and avoided the possibility of being challenged in class by deliberately choosing to sit with friends (who were often distracting and less prepared), or they skipped collaborative sessions altogether. Tellingly, they used the phrase 'checking out' to refer to being physically present but intellectually disengaged.

Implications for teaching faculty development

Students' reluctance to engage fully in class activities is not surprising if some classroom exercises are not well designed or executed, as some students reported. On these occasions, students felt their time in class was not used well or even wasted (reflecting, again, concern about efficiency issues). Clearly, these comments implicate teaching faculty and inconsistent approaches to designing classroom activities as the source of the problem. Although it is beyond the bounds of the present study to determine exactly what the underlying issues are, we speculate that some teaching staff may not have fully grasped the theoretical basis for active learning or its tangible benefits to students, and therefore have not 'bought into' the curriculum reform. Others may need help in redesigning class activities to promote the goals of an active learning environment, which include encouraging students to learn to think for themselves (instead of waiting for the tutor to tell them what to think), to proceed with increasing autonomy and less guidance from teaching staff and peers, to express their understanding in their own words, and to continuously revisit and revise their own cognitive infrastructures.¹⁵ We firmly believe this approach, when executed consistently, helps students to think more critically and creatively, and to practise and ultimately master cognitive skills that will help them analyse, predict, present theories and engage in meaningful dialogue.

Implications for student development

Students' comments also suggest that their reluctance to participate regularly in class may derive from the fact that they have not yet achieved the developmental level compatible with adult and active learning. Vygotsy¹⁶ described learning and development as primarily social processes in which individuals learn as they grow into the intellectual life represented by those around them. To the extent that students deliberately avoid the challenges of deeply engaging with peers in a collaborative classroom environment, they fail to take advantage of the benefits of having peers who can serve as learning resources in the same way that a lecture, text or teacher can. In fact, Bleakley criticises medical education for not embracing social learning theory; he describes clinical practice's ideology as one that is 'grounded in a tradition of heroic individualism where knowledge is treated as private capital'.¹⁷ Students who opt to study alone instead of attending class may be, as Bleakley¹⁷ describes, intolerant of ambiguity that can arise when groups collaborate in shared cognition.

Our focus groups provided evidence that some of the students did not understand or appreciate the nature of higher-order learning, the benefits of peer teaching and learning, or the reasons why the school chose to move away from a primarily lecture-based curriculum. Many students described resisting engagement in active learning exercises by allowing themselves to be distracted in class or by opting out of certain new curriculum activities altogether, often in order to view pre-digested lectures online (by streaming video) or to study from the answer key to the active learning exercises they skipped. Entwistle and Tait¹⁸ found that students who rely on a surface (superficial) approach to learning prefer 'pre-digested', non-participatory lectures, whereas students who prefer a deep (higher-order) approach prefer teaching staff who challenge and stimulate them. Our hope for our students, and for all medical students, is that they will consistently prepare for, attend and engage in classroom activities because they recognise and value collaborative, higher-order learning.

Next steps

We believe this study has broad implications for understanding the solitary learning in which medical students engage outside the classroom during their pre-clerkship years. Our findings suggest that medical students may need to understand better

the nature of deep learning and their own developmental progress as learners. This issue can be addressed by using classroom time early in the pre-clerkship curriculum to explicitly and then iteratively discuss with students the learning theories that underlie pedagogical and assessment decisions made in the process of developing a new curriculum. This approach would implement Kegan's¹⁹ suggestion that educators 'build a pedagogical bridge' that helps students progress developmentally as learners, while they are simultaneously mastering biomedical knowledge and clinical skills objectives. Ideally, we can help students progress from surface to deep learning habits as they make the transition from solitary learning to collaborative learning.

Another key finding in our study was that although students may intellectually understand the importance of higher-order learning and its influence on their future performance as doctors, behaviourally they opt out of or complain about participating in higher-order classroom activities in order to study and memorise what they know they will be tested on in examinations. Many see efficiency as a top priority, especially as the US Medical Licensing Examination (USMLE) Step 1 examination approaches, and collaborative learning as a barrier to efficiency. We must develop assessments in the pre-clerkship curriculum that truly measure higher-order cognitive skills and on which students will perform well only if they have participated fully in classroom activities.

A final major challenge is to oversee teaching staff and class activities sufficiently to assure consistency in the delivery of the curriculum. This oversight might include requiring teaching staff to undergo development activities that are critical to creating appropriate learning challenges for students and to developing core constructivist expertise and resources that are made available to all teaching faculty. Assigning seating to prevent students from sitting mostly with friends in classroom activities, and requiring attendance at activities that are dependent on peer or collaborative learning are also options, but medical students have said that assigned seating makes them feel they are in 'third grade' and they actively resist attendance taking, especially in large-group activities such as lectures.

In 2012, Kanter²⁰ suggested reframing the attendance problem in terms of the learner-teacher relationship. He believes the formation of the learner-teacher relationship should be the centre

of what adds value to the student experience in medical school, whether inside or outside the classroom. Although it might be difficult to engage the 'casts of thousands' of faculty staff who teach students in the pre-clerkship years, perhaps a model pilot could be developed upon which some feasibility and outcomes-based research could be conducted; additional evidence pertaining to the issue of student attendance would certainly be useful to support steps we want and need to take to assure effective learning on the part of medical students.

CONCLUSIONS

This study draws together and extends previous research linking developmental readiness for self-directed and collaborative learning and the ongoing issue of medical students choosing to learn in isolation, mostly for the sake of efficiency, rather than taking advantage of the higher-order cognitive skills they can learn from their faculty staff and peers. The practice of staying at home or 'checking out' also means these students are not contributing their unique perspectives to classroom learning. In designing our curriculum, we assumed that the value of an active-learning curriculum would be obvious to the students and that they would benefit significantly from learning problem solving and the clinical relevance of basic science concepts, along with peer-to-peer interaction in class. We did not consider the possibility that students might need explicit assistance in appreciating the value of an adult-learning, active, student-centred curriculum or that they might not be developmentally ready for it. We also underestimated the degree to which faculty development would be required to ensure that the students' classroom experiences were consistent in terms of the provision of high-quality active learning exercises. Clearly, designing a curriculum on the foundation of higher-order principles is relatively simple compared with creating a consistent learning environment that engages students in higher-order thinking and fosters their maturation as learners; this is an issue we believe is currently prevalent in medical student education.

Limitations

Although we feel that the sample of students with whom we met was representative of the only two classes to have experienced the new curriculum thus far, it was a convenience sample of those

who responded to our e-mail invitation(s). In addition, although this study was conducted at one medical school, based on conversations with colleagues at other medical schools the authors believe that the problems related to attendance at classroom activities represent a much broader concern (especially where video streaming of classroom activities is available). As there is surprisingly very little in the literature about this, similar studies at other medical schools would validate this belief.

Contributors: CW contributed to the conception and design of the study, the analysis and interpretation of transcribed student interviews, the literature review, and the drafting and revision of the paper. EB contributed to the conception of the study and the literature review, interviewed students for the study, and participated in the drafting and revision of the paper. JM contributed to the conception of the study, interviewed students for the study, and participated in the drafting and revision of the paper. PR contributed to the literature searches, the analysis and interpretation of transcribed student interviews, and the revision of the paper. KP contributed to the analysis and interpretation of transcribed student interviews and the revision of the paper. MY contributed to the conception and design of the study, and the drafting of the paper. MKW contributed to the conception and design of the study, and the drafting and revision of the paper. All authors approved the final manuscript for submission.

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REFERENCES

- 1 Adler MJ. *The Paideia Proposal: An Educational Manifesto*. New York, NY: Macmillan 1982.
- 2 Erickson SC. *The Essence of Good Teaching: Helping Students Learn and Remember What They Learn*. San Francisco, CA: Jossey-Bass 1984.
- 3 McKeachie WJ, Hofer BK. *McKeachie's Teaching Tips: Strategies, Research, and Theory for College and University Teachers*, 11th Edn. Boston, MA: Houghton Mifflin 2002.

- 4 Bonwell CC, Eison JA, George WU. *Active Learning: Creating Excitement in the Classroom*. Washington, DC: ERIC Digest 1991; ED340272.
- 5 Moore GT, Block SD, Style CB, Mitchell R. The influence of the new pathway curriculum on Harvard medical students. *Acad Med* 1994;**69** (12):983–9.
- 6 Schwartz PL, Loten EG. Effects of a revised pre-clinical curriculum on students' perceptions of their cognitive behaviours, attitudes to social issues in medicine, and the learning environment. *Teach Learn Med* 2003;**15** (2):76–83.
- 7 Greenberg L. More about medical students' attendance at lectures. *Acad Med* 2013;**88** (2):149.
- 8 Shepard LA. The role of assessment in a learning culture. *Educ Res* 2000;**29** (7):4–14.
- 9 Lindeman EC. *The Meaning of Adult Education. A Classic North American Statement on Adult Education*. Norman, OK: University of Oklahoma 1926.
- 10 Prince M. Does active learning work? A review of the research. *J Eng Educ* 2004;**93** (3):223–31.
- 11 Parmelee D, Michaelsen LK, Cook S, Hudes PD. Team-based learning: a practical guide: AMEE guide no. 65. *Med Teach* 2012;**34** (5):275–87.
- 12 Marzuk PM. More about medical students' attendance at lectures. *Acad Med* 2013;**88** (2):149.
- 13 Van Manen M. *Researching Lived Experience: Human Science for an Action Sensitive Pedagogy*. London, ON: University of Western Ontario 1990.
- 14 Frambach JM, van der Vleuten CP, Durning SJ. Quality criteria in qualitative and quantitative research. *Acad Med* 2013;**88** (4):552.
- 15 Brooks DC. Space matters: the impact of formal learning environments on student learning. *Br J Educ Technol* 2011;**42** (5):719–26.
- 16 Vygotsky LS. *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press 1978.
- 17 Bleakley A. Blunting Occam's razor: aligning medical education with studies of complexity. *J Eval Clin Pract* 2010;**16** (4):849–55.
- 18 Entwistle NJ, Tait H. Approaches to learning, evaluations of teaching, and preferences for contrasting academic environments. *High Educ* 1990;**19** (2):169–94.
- 19 Kegan R. *In Over our Heads: The Mental Demands of Modern Life*. Cambridge, MA: Harvard University Press 1994.
- 20 Kanter SL. To be there or not to be there: is attendance really the question? *Acad Med* 2012;**87** (6):679.

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