Not yet a dinosaur: the chalk talk

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Abstract

This article discusses the chalk talk’s potential as an active learning method. Although chalk talks are a form of interactive lecture, they have received little attention in the medical education literature compared with other active learning methods such as team-based learning and simulation. One of the authors (C. K. L. Phoon) has used chalk talks to teach congenital heart defects to first- and third-year NYU medical students for many years. His chalk talks have consistently earned among the highest teaching scores, and students have noted their strengths of being more interesting, clear, and tangible than didactic lectures. Using the teacher and student perspectives, we examine the chalk talk’s strengths and weaknesses compared with common passive and active learning methods. Chalk talks create a real-time, shared space that facilitates the active learning goals of helping students build, test, and revise mental models (conceptual frameworks). The limited amount of information that can be presented and the ability to solicit and arrange students’ ideas on the board lead to the cocreation of valuable conceptual frameworks. Chalk talks require less restructuring of teaching sessions than other active learning methods and are best suited to topics that hinge on understanding of concepts. We advocate for the chalk talk to be reexamined as a promising educational tool given its strengths and the successes that other active learning methods have shown. Furthermore, we provide guidance to help educators deliver chalk talks and discuss future studies that would advance understanding of this powerful teaching tool.

INTRODUCTION

Medical school curricula have undergone significant changes in the face of advances in learning theory. Traditional didactic lectures have been widely critiqued for transmitting information without promoting understanding, and a variety of active learning approaches have emerged in response. These approaches enable students to apply knowledge as it is learned, through methods such as problem-based learning, team-based learning, and simulation (1–3). Numerous studies have shown that replacing didactic methods with active methods leads to improvements in attention span, exam performance, and teaching evaluations (1). Some studies have also shown preliminary evidence of improved understanding and patient care (4), the ultimate end points of medical education.

Like many of the aforementioned active learning methods, the chalk talk is also a form of interactive lecture. However, it has received little attention in the medical education literature, and there is little evidence for or against its effectiveness, especially in the United States (5, 6). Instead, it seems that the chalk talk is viewed as a “dinosaur” in the age of digital media and is largely overlooked in conversations about medical education.

One of the authors [C. K. L. Phoon (CKLP)] has spent years honing the chalk talk as an active learning tool to teach congenital heart defects. He has consistently earned among the highest evaluation scores from the first- and third-year New York University (NYU) medical students whom he teaches. These students have pointed out that the chalk talk is more interesting, clear, and tangible than the didactic lectures that make up the bulk of their curriculum (Table 1). Various components such as responses elicited from the audience and drawings done in real time position the chalk talk as a powerful retro tool for active learning.

Using both the teacher and student perspectives, we identify the components of the chalk talk and show that it shares many of the strengths of other active learning methods while avoiding some of the weaknesses of didactic lectures. To put the chalk talk in context, we first examine common teaching methods in the medical education literature, such as PowerPoint presentations, small-group discussions, and team-based learning. After analyzing the chalk talk’s strengths and weaknesses compared with these methods, we advocate for it to be reexamined as a promising active learning approach. Finally, we provide guidance for lecturers interested in delivering their own chalk talks.

active learning; basic science education; chalk talk; clinical education; teaching method
AN OVERVIEW OF MEDICAL EDUCATION METHODS

Traditional PowerPoint Lectures

Although the chalk talk was once the traditional form of lecture in medical education, PowerPoint lectures have become the primary approach in recent decades (3). Pre-prepared slides lend themselves well to highlighting and summarizing important points, structuring well-organized lectures, clearly displaying new terms, and accurately presenting complex figures (7–9). However, PowerPoint presentations often run the risks of covering too many slides in a short amount of time and reformatting textbook information without adding additional value (8, 9).

Active Learning Methods

Active learning methods, such as team-based learning and case-based learning, shift the educational approach from being teacher centered to being student centered. Medical students have demonstrated a strong preference for active learning (3, 4, 10–14), and this preference is stable across countries (10–12), disciplines (13), and education levels (3, 12, 15, 16). In addition to being generally preferred by students, active learning methods often achieve improved learning outcomes and increased engagement compared with didactic lectures (11, 15, 17).

Rather than merely presenting information, teachers using active learning methods engage students in 1) building mental models (conceptual frameworks) of the material being learned, 2) consciously and deliberately testing those mental models to determine whether they work, and 3) repairing models that seem to be faulty (18, 19). This cycle promotes understanding rather than memorization (19), and is outlined in Fig. 1.

Small-group discussions are an active learning method that allows students to process information into useful mental models through interaction with their peers and instructor. These models are tested and revised as students answer questions and receive feedback. A study comparing the use of small-group discussion and lectures to teach OB-GYN clerkship students showed that small-group discussion was preferred by both students and faculty (12). Although this preference did not translate to improved exam scores, other studies have suggested that students need to attend multiple discussions to achieve better scores (11, 20) and that the benefits of discussions may be more apparent in tests of practical skills than in multiple-choice exams (4).

Team-based learning is another active learning strategy that helps learners create, test, and revise mental models (Fig. 1). This strategy directs learners to 1) complete preclass preparation to reduce the amount of content discussed in class, 2) take a readiness assurance test individually and then as a team, and 3) work in teams to apply their knowledge to solve problems (17). All teams simultaneously reveal their answers, and the instructor facilitates a discussion of these answers to arrive at a consensus.

Preclinical students have been shown to perform better on exam questions testing material taught with team-based learning than questions testing material taught with didactic lectures (17). Team-based learning is efficient in that it allows a single instructor to provide a small-group experience without modifying the time, space, and faculty facilitators required during a typical large-group session (2). For students, this method also offers the added benefit of helping to build teamwork skills (2, 17).

Other active learning alternatives to the didactic lecture include problem-based learning (e.g., case-based learning in small groups), laboratories (e.g., anatomy and histology
exercises), and simulation, in which students practice clinical decision making and/or skills (2, 3). Although these methods and the methods above can result in improved learning, there are notable limitations. In particular, active learning methods often require educators to completely restructure their teaching session, depend on students to complete preclass assignments, and cover less material in class than didactic lectures (14, 15).

Active Learning Techniques in the Context of Didactic Lectures

For educators hoping to circumvent some of the aforementioned pitfalls, there are several active learning techniques that can be employed in the context of traditional didactic lectures. Asking questions, either verbally or with audience response systems (21), is an easy way to make didactic lectures less passive. In addition to facilitating active learning goals (Fig. 1), asking students to predict information before revealing it more effectively cements their understanding and retention of information (15, 22, 23).

Additional active learning techniques include the One-Minute Paper, which asks learners to take a minute to write down their answers to a question or summarize the material that was just covered (2); Think-Pair-Share, which asks students to consider their responses to a question before discussing with a partner and eventually with the class (2); and the Muddiest Point, which directs learners to identify and share areas of confusion (2). These techniques can be effective ways to make didactic lectures more interactive, and they have yielded better learning outcomes and student ratings in many classrooms (2, 15, 24).

Chalk Talks

The chalk talk is an often-overlooked alternative to the didactic PowerPoint lecture. In this method, the teacher uses a whiteboard and marker (formerly a blackboard and chalk) to deliver a lecture in real time. Chalk talks are closer to traditional lectures than some of the newer active learning methods, thus avoiding the requirement for educators to completely restructure their teaching session.

When done well, the chalk talk is a versatile tool that incorporates and builds upon the components of active learning (Fig. 1). The real-time, shared space between teacher and learner helps learners construct and revise mental models. Soliciting audience participation to cocreate visuals and embracing the limited amount of information that can be written by hand helps teachers identify and interact with the mental models that students create.

The verdict on whether chalk talks or PowerPoints are preferred in medical education is unclear, and the majority of studies examining this topic are done in India. Of these studies, some favor PowerPoint (8, 25), some favor chalk talks (7, 26), and others favor a combination of both (9).

THE CHALK TALK AS AN ACTIVE LEARNING TECHNIQUE

Strengths

Unlike PowerPoint lectures, chalk talks are often interactive, encouraging discussions of critical concepts in a nonthreatening environment. One of the authors (CKLP) has given chalk talks on congenital heart defects to NYU first- and third-year medical students for many years, receiving among the highest lecture ratings. These students have consistently pointed out the chalk talk’s strengths of encouraging engagement, leveraging real-time visuals to improve understanding, promoting interest, and clearly explaining a manageable amount of content (Table 1). It is important to note that this study qualified as a quality improvement project with our Institutional Review Board, and data were collected without identifiers, so the requirement for consents was waived.

Multiple studies of chalk talks in Indian medical schools have reported these same strengths. For example, medical students have reported chalk talks to have better teacher-student interaction than PowerPoint lectures in several studies (7, 8, 25). This is likely because chalk talks are not limited by predefined lecture slides and can be shaped by audience participation. Soliciting and writing down audience ideas can help students feel engaged and can help educators better understand their audience’s knowledge level. Tailoring lectures accordingly can lead to more targeted and effective learning (5).

Indeed, the chalk talk lends itself well to the Socratic method of teaching, in which a teacher asks a series of questions to help students come to the desired answers. When done respectfully, asking the audience questions and choosing which ideas to include on the board helps educators provide students with useful feedback and correct misconceptions (15). Feedback about whether ideas are correct has been shown to help students retain information better and engage more with the lecture (15, 22, 23).

Moreover, arranging ideas on the board spatially helps students synthesize these ideas logically (5). The ability to solicit and organize students’ ideas before their eyes is likely why medical students have reported chalk talks to have better flow of thoughts, continuity, and clarity than PowerPoint presentations (7, 9). Furthermore, students have found that leaving information on the board helps them make connections and better understand material (9).

The limited amount of information that it is possible to write on the board means that chalk talks tend to deliver a more manageable amount of content than PowerPoint presentations. This makes it easier to construct a conceptual framework that augments textbook information rather than repeating it, as noted by medical students (9, 15).

In addition to the major strengths above, chalk talks have several other advantages. For teachers, chalk talks avoid power failure and audio-visual issues, require less restructuring of teaching sessions than other active learning methods, and allow instructors to walk around and engage the audience rather than being limited to the podium. For students, chalk talks do not depend on completing preclass assignments like many other active learning methods and make it easier to take down notes and diagrams (7, 8, 25), which can improve focus and enhance engagement. These strengths can enable chalk talks to achieve better self-reported understanding of the material (7, 9) and better test scores (26) compared with PowerPoint lectures.

Limitations

The chalk talk is a useful tool for facilitating interactive lectures, but it must be noted that drawings work best with
dynamic concepts such as those found in congenital heart disease, acid-base balance, and digestion. Subjects that introduce a lot of terminology, are more memorization based, and/or have complex figures (e.g., anatomy and infectious diseases) may be better suited to PowerPoint presentations. This subject dependence is supported by a study showing that 91% of medical students preferred PowerPoint presentations to chalk talks for anatomy instruction (25). These students noted that PowerPoints were more interesting and clearer with respect to new terminology, spelling, diagrams, and visibility (25).

A legible chalk talk can partially mitigate these issues, but PowerPoint is inherently better at presenting complex graphics or large amounts of information. Although the majority of comments about CKLP’s chalk talks complimented the manageable amount of content, one clerkship student mentioned that it “should cover more, rather than focusing on a few things.”

The Chalk Talk’s Place in Medical Education

Given the chalk talk’s strengths as an active learning method, it should be used more often in medical education. In preclinical education, it can be an effective tool to help students build conceptual frameworks within which to organize information. In clinical education, the chalk talk can be an effective tool for drawing out generalizable takeaways behind a patient’s presentation. Indeed, Pitt and Orlander (6) have advocated for chunking learning into mini-chalk talks at the bedside rather than delivering daily didactic lectures.

In both the preclinical and clinical settings, chalk talks are best suited to topics that hinge on understanding of concepts (e.g., congenital heart defects) rather than topics that rely on complex diagrams or large amounts of information (e.g., anatomy). For topics that exist in a gray area, PowerPoint can be used to project complex diagrams on the board and these diagrams can be annotated as part of the chalk talk. This method leverages the advantages of both chalk talks and PowerPoints (27), and the majority of medical students in an Indian study felt that both platforms should be used simultaneously in all classes (9).

GUIDANCE FOR PREPARING CHALK TALKS

Mixed results among studies comparing chalk talks and PowerPoint lectures (7–9, 25, 26) reflect the reality that lecture quality ultimately depends more on the teacher than on the teaching tool. However, the chalk talk has formidable strengths when used well, and the guidance that follows will help lecturers leverage these strengths.

Formulate a Plan

The first step in creating a good chalk talk is identifying the goal and key topics. For example, in CKLP’s chalk talk for first-year students, the goal is to introduce students to representative congenital heart defects that allow insights into heart development and embryology. Key topics include congenital heart defects, cardiac embryology, ventricular septal defect (VSD), tetralogy of Fallot (ToF), and coarctation of the aorta (CoA). It is useful to select key topics that demonstrate generalizable concepts. In the case of CKLP’s chalk talk, discussing VSDs in detail can help students develop a general understanding of other left-to-right shunts that are not discussed (e.g., atrial septal defect, patent ductus arteriosus).

After key topics have been selected, educators should define a conceptual framework that students can use to understand them. For example, CKLP’s chalk talk begins with a simple box diagram of the heart displaying its four chambers and major blood vessels. Pressures and oxygen saturations are explained to help students construct a mental model of the heart. Throughout the presentation, the box diagram is modified as questions are posed about how pressures and oxygen saturations change in different diseases (VSD, ToF, CoA). Students use their mental model to answer these questions, and they revise their understanding of the heart as CKLP gives them feedback on whether their answers are correct (Fig. 1).

Once the general plan for the talk is finalized, the outline can be filled in. Educators should now consider the specific details to be discussed during each section of the talk, jotting down notes, compiling relevant diagrams, and noting specific questions that can help students test and revise their mental models. As an example, when teaching students about VSDs, CKLP aims to define the defect, explain its clinical consequences and why they arise, and discuss treatments. Therefore, he plans to transition between these subtopics by asking students the following questions: What is a VSD? Why would a hole in the heart be an issue? Where does the blood now course, and how are the lungs and specific cardiac chambers affected? What would happen in the case of a large versus small hole, in terms of the degree of pressure and volume transmitted across the defect? Which clinical symptoms are observed in patients with VSDs? For the budding surgeons, how would you approach this repair?

Opportunities to correct common misconceptions should also be considered when devising questions. For example, one common misconception about VSDs is that they cause symptoms due to less blood entering the systemic circulation. Asking students why a hole in the heart is problematic is an opportunity to acknowledge this misconception and explain that the cardiac output is slightly decreased but not enough to make patients symptomatic. Another common misconception about VSDs is that they are still left-to-right shunts when they are large because of pressure differences in the pulmonary versus systemic circulation. CKLP asks students why the blood would still shunt from left to right in a large VSD to solicit this answer and subsequently explains that this shunting is actually due to differences in vascular resistance.

Educators may consider writing an outline or set of key information on the board beforehand, as this can provide a framework to guide students’ thinking during the lecture. If there are diagrams or groups of text that are especially complex, educators should consider projecting these in a PowerPoint slide or drawing them on the board before the lecture begins. Although CKLP does not currently use any smartboard technology, new technologies such as smartboards could potentially make the integration of digital media smoother.

Finally, it is worth considering the recent shift in many medical school curricula that allows students to choose
between attending live lectures or viewing recordings of these lectures. Educators can address this potential issue by working with school administrators to make their chalk talk mandatory or informing students that they will get more out of the chalk talk if they engage in real time. In cases where it is not possible to make the lecture mandatory or achieve full attendance, it is especially important to repeat questions from the audience so that students listening to the lecture recording can hear each interaction.

Set the Stage

Before the talk begins, educators should draw or project any diagrams or key information that they have prepared onto the board. After greeting students and introducing oneself, lecture expectations should be set. Outlining lecture objectives and encouraging students to engage by answering questions sets the stage nicely. If the educator will be lecturing students without evaluating them, it is helpful to mention this, to take away student pressure to perform. Setting expectations of a volunteer-based system of answering questions can also put the room at ease.

Engage with Students

As an educator delivers their chalk talk, it is important to maintain flexibility. The questions and content of the talk can be tailored to be more or less complex based on the understanding that students demonstrate. Keeping the training level of the audience in mind when making these adjustments helps educators stay on track.

For example, CKLP gives a similar congenital heart defects talk to both first- and third-year medical students, but he emphasizes more of the clinical concepts when addressing the latter audience. For the first-year students, he will introduce only a few clinical concepts, including tachycardia, respiratory distress, and peripheral edema, but the focus remains on the effects of altered hemodynamics on the heart, lungs, and general whole body health. For the third-year clinical clerks, CKLP will set different goals at the start of the lecture, which include a concise review of the physiology and hemodynamics, but now the emphasis is placed on the clinical disease process (and any disease process): how the congenital heart defect comes to attention and is diagnosed, what happens if you do nothing about it, what you can or should do for it, and how patients do after treatment. He then elaborates for each congenital heart defect the clinical aspects as linked to the physiology: 1) the presenting history and why the physiology leads to the clinical symptoms; 2) physical examination findings and how the physiology leads to these clinical features; 3) the natural history of the condition—what the physiology does to the body in the long term; 4) medical and surgical treatments and how these fix or mitigate the abnormal physiology; and 5) the “unnatural” history, including what new abnormal physiology the treatments themselves create.

In both the first- and third-year chalk talks, CKLP has found that it is important to organize audience contributions on the board logically. Writing down audience answers to questions without filtering or reorganizing can result in too much information to be useful. Instead, giving verbal feedback and incorporating only correct and relevant ideas onto the board is preferable. Furthermore, although students may offer ideas in a nonstructured manner, placing them in a logical order (e.g., most to least likely in a differential diagnosis) creates a visual representation of important connections between concepts.

Additional Tips to Keep in Mind

Emphasizing material and concepts not necessarily found in students’ reading promotes interest and engagement with the lecture. Humor, history, and pointing out the range of specialties that the talk applies to often stimulate additional discussion. In the case of the congenital heart diseases chalk talk, CKLP points out that knowledge and understanding of congenital heart disease is important not only to pediatric cardiologists and other cardiologists but also to cardiac surgeons, cardiac (and noncardiac) radiologists, cardiac anesthesiologists, pathologists, and obstetricians, among other specialists. Finally, providing opportunities for shadowing can further encourage student interest.

Tips for Delivering an Online Chalk Talk

In light of the COVID-19 pandemic, it is important to consider how different teaching methods can be adapted to online platforms. Many chalk talks can be conducted by using virtual whiteboards that are built into video conferencing platforms (e.g., Zoom). Chalk talks that require PowerPoint slides for annotation can be delivered by screen-sharing and using PowerPoint’s annotation capabilities in real time. Student interaction can be facilitated through students unmuting when they would like to speak, using the raise hand feature of the video conferencing platform, or typing questions and answers into the chat box. To avoid a cacophony of voices in a large-group setting and to minimize friction required for students to participate, instructing students to type their questions and answers into the chat box of the video conference generally works best.

CONCLUSIONS

Chalk talks provide a real-time, shared space between teacher and learners. The limited amount of information that chalk talks can cover and the ability to organize ideas spatially helps participants cocreate valuable conceptual frameworks. Asking questions, giving students feedback on their answers, and incorporating correct and relevant ideas onto the board helps students achieve the active learning goals of building, testing, and revising mental models. Given the success of other active learning methods and the strengths that chalk talks offer, chalk talks should be reconsidered as a promising medical education tool.

Chalk talks are best suited to topics that hinge on fundamental understanding of concepts, though using chalk talks together with projected PowerPoint slides can be a good way to address topics that are conceptual in nature but include some complex diagrams or text. In either case, chalk talks require a less dramatic restructuring of teaching sessions than other active learning methods, and the guidance above should help interested educators experiment with this format. Educators who find success with this format can help
colleagues experiment with chalk talks and give them feedback to enhance their teaching skills. Furthermore, circulating papers about chalk talks in faculty e-mail lists (5, 6) and giving presentations at teaching conferences or within individual institutions can help reach large numbers of other educators.

Several studies in India and our personal experiences at NYU suggest that chalk talks are very well received by medical students, but there is variation in student ratings depending on parameters such as the subject covered (7–9, 25, 26). In the future, studies exploring which subjects are best suited to chalk talks and comparing chalk talks to other teaching methods will help us better understand how to effectively deploy this powerful teaching tool. The chalk talk is by no means a “dinosaur,” and when leveraged to its full potential, it has more utility as a teaching method than ever before.

DISCLOSURES

No conflicts of interest, financial or otherwise, are declared by the authors.

AUTHOR CONTRIBUTIONS

C.K.L.P. conceived and designed research; N.S. analyzed data; N.S. prepared figures; N.S. and C.K.L.P. drafted manuscript; N.S. and C.K.L.P. edited and revised manuscript; N.S. and C.K.L.P. approved final version of manuscript.

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