

# Whiteboard Use in Teaching

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***Abstract* – Whiteboards, and their many predecessors and successors, are powerful educational tools, but making good use of them is much more complicated than merely writing on them. Instructors must learn their strengths and weaknesses before they can expect to see a tangible return.**

Index Terms – education, teaching, whiteboard, dry-erase board, blackboard, chalkboard

## INTRODUCTION

One of the most fundamental aspects of a classroom is a writing surface that can be used by both the instructor and students. The modern form of this, which can be seen in nearly every classroom that has been built or renovated in the past 20 years, is the whiteboard. Dry-erase markers are used to write on it, and it can generally be wiped clean without any special cleaning solution.

Despite its seemingly simple nature, using the whiteboard as a teaching tool can take years to master. Because it has so little inherent structure to what it can be used for, it generally reflects on the talent and experience of the instructor using it.

## HISTORY OF WHITEBOARDS

While whiteboards are now a staple in nearly all classrooms, they were not used widely until the past two decades. However, several tools that are functionally very similar have existed for far longer. Writing slates have been used in education for centuries. The blackboard became popular in schools in the 1800s. Flip charts grew popular after their invention in the early 1900s.

The whiteboard itself was not invented until the 1960s, and because it was prohibitively expensive initially, it was rarely used outside of businesses. After the introduction of dry-erase markers in the 1970s, the whiteboard began to see more use, and after less expensive methods of producing the writing surfaces for them were developed, it finally saw widespread adoption in the mid 1990s.

## ADVANTAGES TO WHITEBOARDS

Whiteboards, at their core, are a free-form medium. The way in which an instructor uses them is limited mostly by creativity. This inherent versatility means the whiteboard can be used to address a variety of learning styles, by mixing text with figures and graphics, and then explaining what is written or drawn on them. Information written on a whiteboard is also generally left there for long enough time for students to copy it into their class notes. Furthermore, whiteboards can be used in conjunction with other ways of presenting course content, such as handouts or worksheets, slideshows or videos shown on a projector, or lab activities.

Whiteboards can also be a participatory medium. The instructor does not need to be the only one writing on it; particularly in smaller classes, students can perform activities on the whiteboard, which has the advantage of the

entire class being able to view each student's solution. Additionally, students can work on activities collaboratively, to produce solutions they might not be capable of coming up with individually, and the relatively large size of the whiteboard aids in collaboration.

Unlike printed media, prerecorded content, or other prepared classroom materials, whiteboards are a non-static medium. What this means in practice is the instructor can change or adapt the material being presented on them during the actual presentation. If a group of students is having difficulty with a particular topic, the instructor can easily modify the lesson to accommodate that need. If the instructor finds that prepared materials are insufficient to convey the topic at hand, the whiteboard can be employed to flesh out the presentation.

Compared to its predecessor, the blackboard, whiteboards have a number of notable advantages. Chalk dust from blackboards is known to be an irritant to the respiratory tract, which was problematic for anyone with asthma or similar respiratory conditions. Whiteboards are easy to clean, requiring only a dry cloth for quickly erasing them, and isopropyl alcohol to get rid of leftover markings. Although they can dry out quickly, dry-erase markers are more ergonomic and easier to write with than a small stick of chalk.

### **DISADVANTAGES TO WHITEBOARDS**

As mentioned previously, whiteboards are typically reflective of the instructor using them. Those who have not been trained to use the board properly will likely not be able to present material on it effectively. This learning curve is not strictly tied to experience level, as some instructors misuse whiteboards even if they are otherwise very skilled, while some newer instructors find using the whiteboard easy with relatively little training.

There are a number of practical concerns when using a whiteboard for teaching. First and foremost, legibility of an instructor's handwriting determines much of its efficacy. If students cannot read what has been written on the board, the instructor would be better off using printed handouts or a slide presentation. Similarly, for graphs and figures, one must be reasonably competent at drawing to make use of a whiteboard for conveying this information worthwhile. The time it takes to write or draw material is also a concern, and an instructor may want to arrive to class early to write some of it on the board in advance.

Information written on a whiteboard can quickly become disorganized and confusing if an instructor makes no effort to structure where and how they write. Dividing the board into rectangular sections, using multiple marker colors, and using at least some prewritten notes for the lecture can alleviate this problem, but special care must be taken whenever one decides to add unscripted material into a live lecture. Instructors must also develop the skill of speaking while writing, and not simply saying exactly what they have written, to avoid spending too much time writing during the lesson.

As compared to paper handouts, or a digital presentation that can be distributed online, teaching with a whiteboard can place more responsibility on students to take high quality notes. This is not strictly a negative aspect, as it may help some students to write while listening. However, students who are visually impaired may have a greater difficulty with this, and students who are absent from class will need to catch up on their own unless the entire lecture is being recorded. For highly technical fields, copying down material can be a chore, and students may make errors in copying equations or code, which makes prewritten materials superior in these cases.

### **MODERN REIMAGINING OF WHITEBOARDS**

Integrating whiteboards with more technologically advanced classroom tools is one of the most recent trends in education. "Interactive whiteboards," which combine a whiteboard with a projector, desktop or laptop computer, and a touch-sensitive surface, are becoming common. As many as 15% of all classrooms are now equipped with some type of interactive whiteboard. Despite the allure of these systems, they are very costly, and their effectiveness has not been studied extensively in peer-reviewed research. As such, an instructor should only include use of them in lessons after familiarizing him or herself with their operation and finding worthwhile activities to perform on them. Shoehorning interactive whiteboards into more traditionally structured lessons will likely produce undesirable

results, and the board itself will be more of an impediment than an aid.

Several systems exist that are closer in their functionality to traditional whiteboards. Combined projectors and whiteboards offer all of the expected features of a regular whiteboard, with the addition of being able to annotate what is projected onto it. Classrooms equipped with cameras to record lectures reduce the burden on students to take detailed notes on everything written on the whiteboard, as they can simply review the recording afterwards.

There are a number of internet-based group chat systems that feature collaborative drawing spaces. Students can make use of these in much the same way they would when collaborating on an actual whiteboard, but they do not need to be physically present in the same room. For distance learning classes, MOOCs, and other non-traditional course formats, this can be enormously beneficial.

It is relatively simple to screencast to a projector using a tablet computer, on which an instructor can write and draw figures. This has a number of advantages as compared to a physical whiteboard. It makes integration of prepared content much simpler, minimizing the amount of time an instructor must spend writing or drawing during a lesson. The content can be saved in a variety of file formats, and then distributed online to students after the lesson.

While there may never be a single, all-encompassing system for teaching, there is a clear convergence of technologies in modern classrooms. However it may take quite some time before these systems are seamless enough that they will replace more traditional teaching methods, and do so without placing a greater burden on the instructor and students.

### CONCLUSION

Much like any other tool, whiteboards are only as useful as the person who uses them. Their deceptive simplicity means they can even be counterproductive if a particularly inept instructor attempts to make use of one. In the right hands, however, a whiteboard is an enormous utility. Writing surfaces in classrooms have been a consistent presence for centuries specifically because of the way they can be used to quickly and effectively convey material and facilitate learning for a wide range of students.

Recent attempts to reimagine the whiteboard may seem a bit like reinventing the wheel. Its utility is largely rooted in its straightforwardness, and introducing such a great degree of technological complexity thus goes against all logic. One must consider, though, that these systems are merely a transitional phase, in which their various deficiencies are ironed out through feedback and iteration. Whatever direction this new technology takes, it is clear that the whiteboard, in some form, will stay an essential piece of classrooms for many years to come.

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