# Interactive Whiteboards for Teacher Training

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**Abstract:** The use of interactive whiteboards (IWBs) grew dramatically over the past two decades, especially within educational settings. This action research project attempted to determine how IWBs affected engagement, interaction, and learning when used for teacher training. Survey results indicated positive teacher attitudes towards IWBs prior to training, and that these impressions intensified as a result of the demonstration of the IWB's capabilities. High posttest scores also suggested that IWBs may be effective as a potential tool for delivering content knowledge. Exposing teachers to IWB use during training also appeared to improve their dispositions towards using IWBs for their own classrooms.

## Introduction

It is forecasted that in the next five years, more than seven million interactive whiteboards (IWB) will have been installed, the equivalent of one in every five classrooms worldwide (EFY News Network, 2009). With such great financial resources invested in this new technology, educators are experimenting to determine how best to implement and use IWBs effectively.

In addition to students, teachers themselves may also benefit from professional development or training conducted using IWBs. This action research study attempts to determine the impact of IWB technology on learner engagement, interaction, and attainment when used in teacher professional development. In this particular research study, the professional development training will focus on how to create a VoiceThread presentation.

## Background

### *Teachers as learners*

When teachers become the students in a professional development scenario, considerations must be made for these adult learners. Knowles indicated that as learners mature, several transitions occur: they become more self-directed learners, their life experiences become valuable resources, their readiness to learn is more dependent upon their social roles or tasks, they focus on solving immediate problems, and their

motivation is internalized (as cited in Yoshimoto, Inenaga, & Yamada, 2007).

Technology training for teachers is typically provided on a large scale to accommodate all teachers, resulting in little emphasis on content or grade level. This often results in teachers returning to the classroom too confused to get started with the new technology (Plair, 2008). These short training sessions that rely on teachers working in isolation tend to yield few positive results (Slepkov, 2008). In order for teachers to successfully implement technology, ongoing support is critical.

Ongoing support and continuous training may not always be feasible, however, due to time or budgetary constraints. Teachers identified time is the most common barrier to implementing new technology (Plair, 2008). Administrators also face the challenge of arranging professional development to accommodate class schedules (Slepkov, 2008). The question remains as to what can be done to make the limited training opportunities that are available as productive and effective as possible.

Ward recommends that professional development for adults meet the following five criteria: relate the content to the needs of the participants, cater to participants' learning styles, foster learner self-esteem, provide a stimulating and supportive environment, and establish clear expectations (as cited in Williams, 2008). While not a stand-alone solution, interactive whiteboard technologies can be used to address many of these criteria. The multimodal nature of IWBs appeals to a range of learning styles, and with the use of an integrated learner response system can provide immediate anonymous feedback that fosters learner self-esteem in an interactive, engaging, and stimulating learning environment.

*The basics of IWBs*

According to Hall and Higgins (2005), IWBs represent "a conglomeration of all previous educational technologies," replacing traditional chalk or whiteboards, televisions, videos, overhead projectors, and personal computers (p. 106). Due to this integration of previous technologies, interactive whiteboards have become characterized by their multimedia capabilities including: visual displays, audio, and touch sensitivity (Hall & Higgins, 2005).

Hall and Higgins (2005) provided some suggestions regarding the potential use of IWBs in the classroom including: display of web-based resources or video clips to explain a concept, modeling software use, presentation of student work, digital lesson and flip chart creation, text manipulation, handwriting practice, saving of notes, and editing (Hall & Higgins, 2005). While many of these applications are not unique to IWBs and can be done simply using a computer and projector, the annotation and physical manipulation features inherent in IWBs are an often remarked upon use by teachers (Clyde, 2004; Gatlin, 2004; Jewitt, Moss, & Cardini, 2007; Starkman, 2007).

*A review of the literature*

Though interactive whiteboards are well into their second decade of use in educational settings, it has only been recently that more comprehensive, large-scale studies have been produced to evaluate the impact of IWBs on teaching and learning. Most of this empirical research was conducted in the United Kingdom to analyze the impact of a £10 million investment in the Primary Schools Whiteboard Expansion program (Haldane, 2007).

Marzano and Haystead (2009) conducted the first large-scale study on IWBs in the United States. This quasi-experimental evaluation study sought to determine the effect of Promethean's ActivClassroom system on student achievement. The findings indicate that large percentile gains in student achievement were found when the teacher was experienced, had used the IWB system for an extended period of time, used the system significantly in the classroom but not more than 80% of the time, and has high self-confidence in regards to the use of the system (Marzano & Haystead, 2009).

Literature reviews support the positive effect of IWBs on student motivation and engagement, but remain inconclusive regarding the impact on student learning (Higgins, Beauchamp, & Miller, 2007; Smith, Higgins, Wall, & Miller, 2005). Furthermore, most of the existing research centers on the K-12 environment and does not address the impact of IWBs on adult learners. Market penetration in higher education is lower and may be due to large class sizes and the limited opportunities for interaction within such large group settings (TechLearn, 2003).

Though the literature remains inconclusive regarding student learning gains, the picture becomes much clearer with regards to the benefits for teachers (Kelley, Underwood, Potter, Hunter, & Beveridge, 2007). The similarity of IWBs to conventional whiteboards means that even reluctant teachers can easily adapt to this technology to present information (TechLearn, 2003), since they fit into the spatial and pedagogical status quo with the teacher at the board in front of the room (Jewitt et al., 2007). Through use of IWBs, teachers have found that they are able to more quickly prepare lessons in advance using a greater range of resources that better meet students' needs, execute those lessons more efficiently during class, and better gauge and adapt to student feedback.

*The need for further research*

Continued research on IWBs is needed to confirm the positive impact on student motivation, interaction, and learning. Since the existing research centers on students in the K-12 and university settings, studies should also be conducted to determine if the positive effects on learner motivation, engagement, and achievement are true for adult audiences as well. This recognizes the fact that though much of the existing research involving younger participants can be applied to adult learners, differences still exist and adult learning needs and motivations must be addressed. Because IWBs have been installed in many school environments, teachers who participate in onsite professional development become an ideal audience to analyze.

## Methodology

This action research study sought to determine the impact of delivering instruction using IWB technology on participant engagement, interaction, and learning. This was done through IWB use during a professional development training session for K-12 teachers that focused on how to create and share a VoiceThread presentation.

### *Instructional strategies*

The multimodal nature of IWBs lends itself to a variety of instructional strategies. For this training, key features of the IWB capitalized upon include: annotation of content, linking to web resources, multimedia (video/audio) capabilities, manual manipulation of objects, and gathering feedback through a learner response system.

### *Technologies*

The instruction consisted of a flipchart lesson designed using Promethean's ActivInspire software with embedded learner activities, graphics and internet links. The live implementation required the additional use of Promethean hardware including an ActivBoard, ActivPen, and ActivExpression devices. Additionally, all learners in attendance had school-issued laptops that had wireless internet access to allow them to follow along and practice during the training.

### *Site*

The research was conducted at St. Andrew's Priory School in Honolulu, Hawaii. St. Andrew's Priory is a private, all-girls, Episcopalian, K-12 environment that has a one-to-one laptop program at the fifth and higher grade levels. Permission was granted by the administration to conduct this research training on their premises. Training was conducted in a standard elementary classroom that had an IWB system permanently mounted. This training was part of a series of technology-related professional development opportunities offered over the course of the year to the faculty at this institution. The primary investigator was a former teacher at the school, though has no current affiliation.

### *Population*

The sample population consisted of 13 faculty and staff at St. Andrew's Priory School. Ten of the participants were K-5 classroom teachers. Additionally, the school's technology director, lower school librarian, and head of lower school also participated in the training. Their administrator mandated the training for the lower-school teachers, though the participation in the research study and data collection aspects remained voluntary. The sample population was assumed to have basic computer skills and a moderate level of comfort with technology as demonstrated by their requirement to

communicate regularly through internet messaging and email, maintain an updated class website, and record grades online.

A pre-training survey revealed that the participants were a highly experienced group of teachers, with the majority having had more than 12 years of teaching experience. Most were moderately comfortable with technology, but only three had previously attended a training that was conducted using an IWB. Those who had attended a prior training that used the IWB indicated that the IWB proved moderately helpful to the training. Initial impressions for all participants indicated favorable views for IWB use, such that most of participants expected IWBs to either moderately or greatly increase student engagement, interaction, and learning. Only one teacher reported negative preconceptions regarding the IWB with expectations of no impact on or moderation to student engagement, interaction, and learning and lack of usefulness to her teaching.

*Instruments*

Quantitative data was collected using pre and posttests to determine the level of participant learning. Qualitative data regarding learner attitudes and perceptions towards IWBs was collected using pre and post-training surveys.

The pre and post-training surveys were conducted online using Google Forms. The pre-training survey was anonymous, and collected general demographic data through the use of categorical (multiple option) questions. The survey also collected experiential and attitudinal data regarding technology and IWBs through Likert-scale questions. The post-training survey was also administered online and contained a combination of multiple-option, Likert-scale, and open-response questions. These questions gauged learner response to the use of IWB technology.

All content-knowledge tests (pre and post) were administered through a learner response system (ActivExpression devices). Each test consisted of five multiple-choice questions about creating VoiceThread presentations. The questions were displayed using an ActivBoard and ActivInspire software. The learners used their devices to respond to the questions. The summarized results for the class were shown immediately to the audience and captured through the ActivInspire software for later data analysis.

To maintain participant privacy, pre and post training surveys collected only generic learner characteristics and did not request personally identifying information. The ActivExpression devices used in the learner response system were coded with an alias to prevent identification of individual teachers.

***Results***

Post-training survey results indicate that the positive initial impressions intensified, especially in the areas of student interaction and learning. This is illustrated in Figures one through three that show a shift of the data to the right, indicating stronger positive responses. With regards to their own experience, participants felt that the use of the IWB either moderately or strongly improved their engagement, interaction, and learning.

*Engagement*

Participants were impressed with many features of the IWB system. The "cool" interactive pen, ability to use the board as a "HUGE mousepad", polling feature, speed of switching between applications and screens, learner response devices, and ability to write on the board were all mentioned as motivating factors in the post-training survey. One participant indicated surprise that all fellow participants were focused on the training rather than looking at other things on their laptops.

*Interaction*

Most responses with regards to interaction dealt with the use of the learner response system. Open-ended responses to the post-training survey indicated that the handheld devices would be a "huge hit", allowing students to offer input and actively participate, meanwhile maintaining possible anonymity in a "game-like" atmosphere. The ability to get instant feedback on whether or not they were on track was also a popular feature of the learner response system. The ability for participants to write on the board was also mentioned as a way to interact. Finally, one participant mentioned the trainer's ability to troubleshoot problems with the learning devices as another mode of classroom interaction.

*Learning*

Pre and posttests on the basics of creating a VoiceThread presentation were administered using a learner response system. The average pretest score was 11%; the average posttest score was 88%. This represented a 77% improvement in student learning attributed to the training using the IWB. This data suggests that IWBs can be used effectively for training purposes to convey information and teach new concepts to adult learners, especially with regards to professional development for teachers.

In the post-training survey when participants were asked to describe the features of the IWB that supported their learning and understanding, most responses centered around the ability to more easily follow instruction by having the large display match what was on their computer screens. Having the teacher up at the board instead of at the computer enabled participants to see and hear instruction simultaneously and facilitated interaction with the instructor. Additional responses mentioned specific tools like the ActivPen, annotation tools, and the learner response system's ability to display peer responses.

Overall, the participants were inspired by how “simple and engaging the whiteboard really is.” The ability to see and follow the teacher using the large display, collect instant feedback and address misunderstandings, and foster student interaction were all key points repeatedly mentioned by the learners.

All participants reported a high level of satisfaction with the training (at least 4 on a 5 point scale). Sixty-nine percent of teachers felt that the IWB was critical to the success of the training. When asked how useful an interactive whiteboard would be to their teaching, 84% responded with either 4 or 5 on a scale from "not useful at all" (1) to "very useful" (5). This represents an improvement over initial pre-survey results, as reflected in Figure 5.

Teachers indicated positive attitudes at the prospect of having to use an IWB in their classrooms, with 84% indicating they would use it at least weekly, and 46% anticipating daily use. The teachers reported that the most common barriers to their use would likely be insufficient training, the lack of time required to plan and create materials, and the fact that other teaching technologies would be equally effective and easier to use. Despite these barriers, one teacher indicated, “I’m not afraid to use it now. There are a whole host of possibilities running through my head.”

When asked how they would use an IWB if they were offered one for their classroom, teacher responses included daily announcements, math, reading, vocabulary, spelling, interactive lessons on editing, presentation of daily materials, use of web-based tutorials, practice with penmanship, introduction of new projects, correction of homework, teaching of technology, presentation tool, extra-credit opportunities, student presentations, and as a “forum for fantastic collaboration”. The one administrator participant indicated she would hold faculty meetings using the IWB.

**Discussion**

While the initial results of this action research study are encouraging, more extensive research is necessary before these findings can be generalized. This research study would benefit from being repeated with a larger and more diverse sample population. This small sample population consisted of a highly experienced elementary faculty and staff. The question remains whether other K-12 or higher education teachers would react similarly. The encouraging news is that though the most experienced teachers tend to be the most resistant to change, these findings suggest that even they can see the benefit of and are receptive to using an IWB in the classroom when shown its capabilities.

Despite having the 13 participants physically participate in the live training at the same location, a discrepancy was found between the number of pre and post training surveys submitted. Only 11 pre-training surveys were received, compared to 13 post-training surveys. The findings listed in this study were based on the aggregated results of all surveys submitted. This problem could be avoided in the future by the inclusion of a tracking number to align the pre and post survey results.

Another problematic area of this study concerned the confusion teachers had with regards to the nature of the research study. While all questions in the surveys addressed IWB use, some of the responses to the open-ended questions suggested that teachers were basing their responses on the content of the training as well. For example, when asked to describe features that they found motivating, some teachers listed the available resources and lesson plans that were mentioned as features of VoiceThread, not the IWB. While this problem was not pervasive, it indicates that greater clarification was needed with regards to the focus of the research study and of the questionnaires in particular.

While the findings of this study with regards to engagement support the extensive body of previous research, this study breaks new ground by also targeting the impact of IWBs on learning and interaction, especially among an adult population. The findings suggest that IWBs can potentially be used effectively for training and can possibly foster greater interaction through the use of a learner response system.

Perhaps the most significant finding, however, is the fact that by using an IWB to conduct teacher training, teachers became more receptive to the idea of using an IWB in their own classroom. One of the most frequently cited problems with IWB use is the lack of pedagogical training required to effectively incorporate the IWB into everyday instruction. By using the IWB for training purposes, the trainer modeled effective instructional strategies and techniques that teachers could adapt for their classroom. As a result, using IWBs for teacher training could have greater dividends than just reaching the intended learning outcomes. By demonstrating the simplicity and fun of the IWB, the training becomes an informal mechanism to train teachers on how to better use the technology in their classrooms, meanwhile conveying sound pedagogical practices.

**Conclusion**

This research study suggests that instruction using IWB technology can appeal to adult learners and possibly improve engagement, learning, and interaction. This technology that already exists in most schools ought to be capitalized upon to enliven teacher training and professional development with no additional expense. Secondary benefits may include teachers becoming more comfortable with the IWB technology, being more exposed to effective pedagogical practices and teaching strategies, and becoming more motivated and capable of implementing IWB technology in their own classrooms. By empowering teachers to use IWB technology, we can dramatically impact student engagement, learning, and interaction.

Smith et al. (2005) raised the question of whether the growth in the use of interactive whiteboards represented a boon for education or just another instance of educators getting on the latest bandwagon of technology. While this study has shown training with IWBs has the potential to be a boon for education by positively impacting engagement learning, and interaction, its greatest benefit may be its ability to not only encourage teachers to get on the technology bandwagon, but give them the confidence to take the reigns and implement IWBs in their own classrooms.

## Appendix

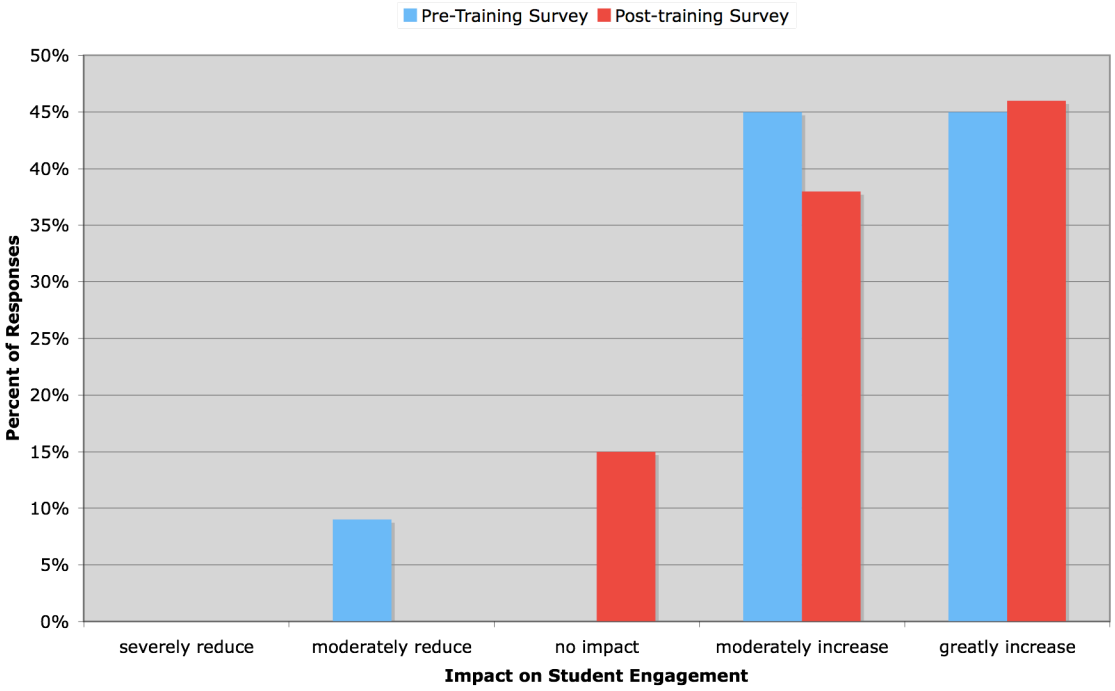


*Figure 1. Perceived impact of IWB use on student engagement*

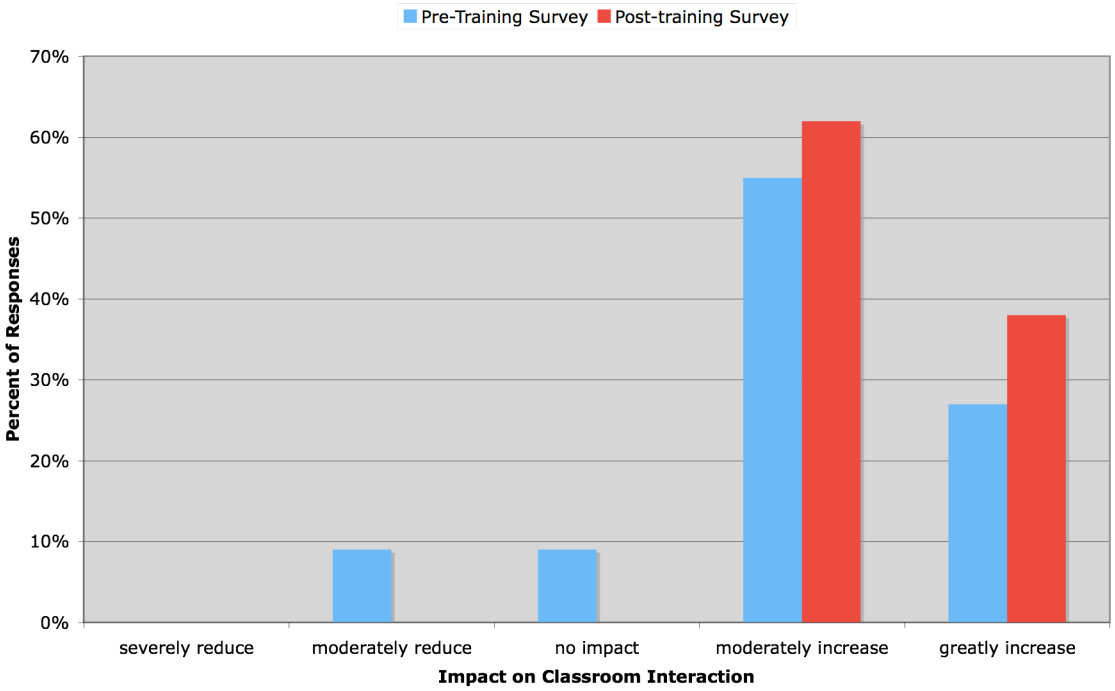


*Figure 2. Perceived impact of IWB use on classroom interaction*

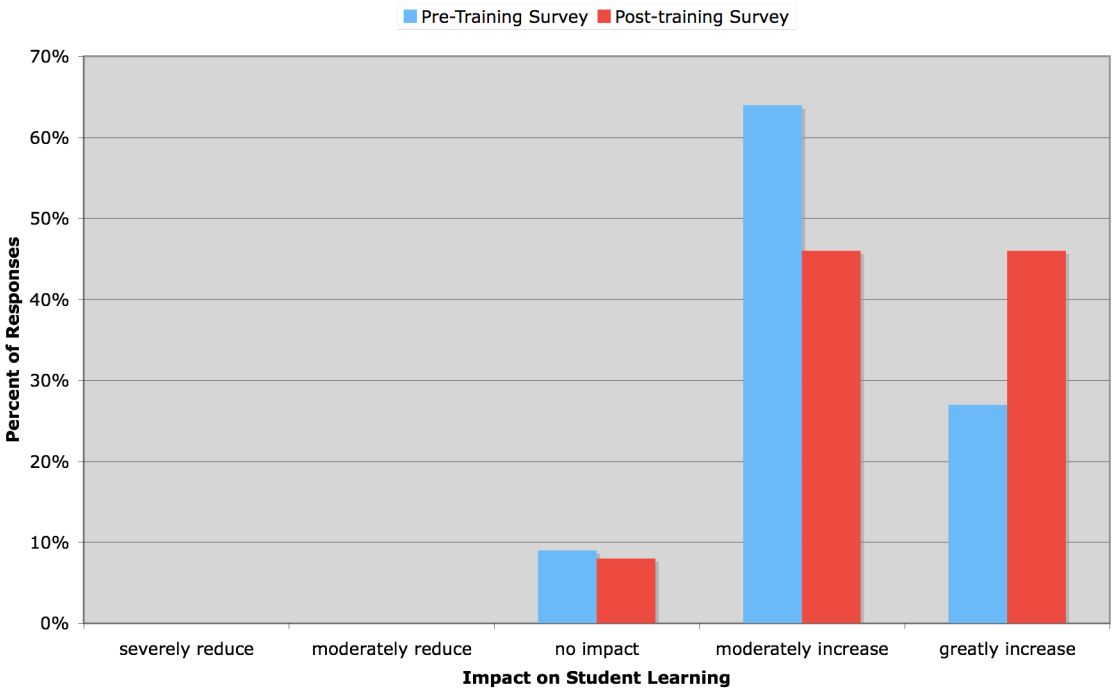


*Figure 3. Perceived impact of IWB use on student learning*

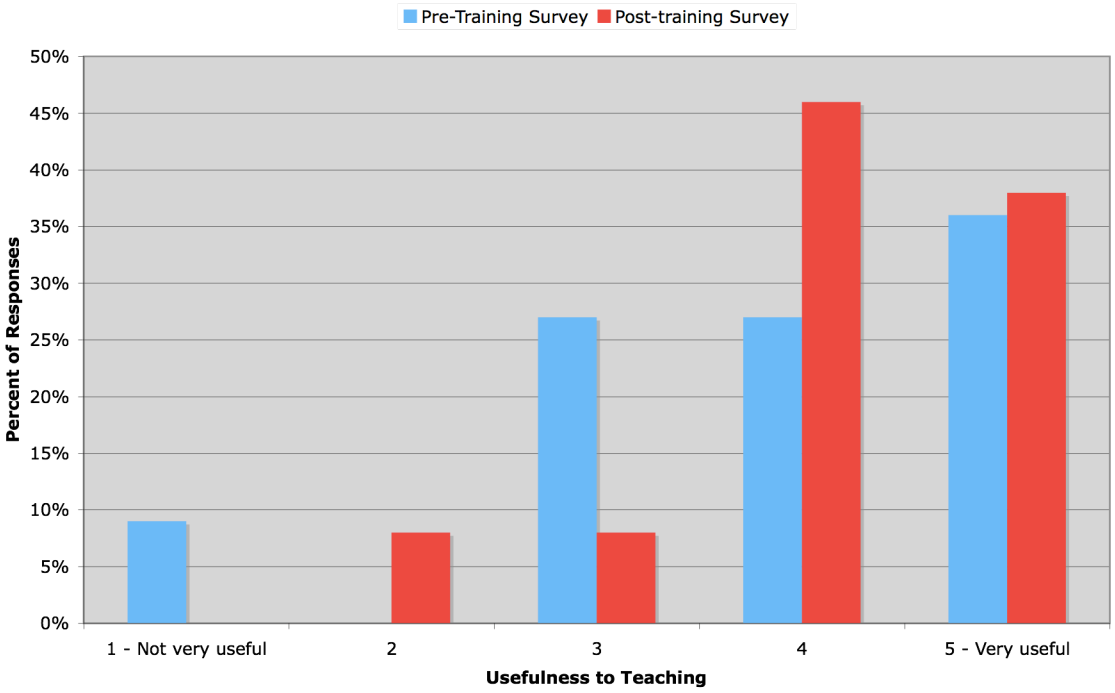


*Figure 4. Perceived usefulness of IWB to teaching*

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