

Promoting Interaction Between Primary School Teachers and Students Using A Better Interface About “Whiteboard” Application

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ABSTRACT

This paper aims to find a better interface of “whiteboard” for primary school teachers and students to interact with each other. The design and study are based upon the existing model and according from that, we design a newly useful model to evaluate some existing applications related to our topic. After that, a better prototype about the “whiteboard” application is designed and analyzed to better assist teachers in class and students to review after class. Eventually, the new prototype could satisfy more requirements from teachers and students in real life scenarios.

Keywords

Interaction, Interface, Whiteboard, Teachers, Students

1. INTRODUCTION

In recent years, both tablet application and education are an inseparable topic between computer science specialists as well as professors in the field of education research. Harvey Mellar analyzes the educational software design by reporting a case study, and A.Jones talks about the educational software by implying the contexts for evaluating them. Many applications not only involve new technologies but also offer opportunities for teaching and learning in new ways. For example, various forms of e-learning applications facilitate the development of learning communities and share learning outcomes. Given the importance of determining the

effectiveness of the use of information and communication technologies for learning, the need for evaluation becomes crucial.

Furthermore, for example, some “whiteboard” applications exist in the market for teachers and students to use in class. Here, we will design a prototype according to the evaluation model we build in this paper. Before that, we will talk about the existing evaluation model—Jigsaw evaluation model and compare some software by our model.

In the whole process, the main target users are primary school students and teachers. As a result, a better interface and interaction way for them is designed for enhancing E-learning both in class and after class.

2. MATERIALS AND METHOD

As mentioned before, we adopted 2 evaluation models here: one is an existing one: the Jigsaw evaluation model and the other is a new one that we create in this paper according to what teachers and students really need from the application- straightforward interaction in class and review after class.

2.1 Jigsaw Evaluation Model

“The Jigsaw evaluation model proposed by Squires and Preece is designed to increase teachers’ awareness of the integration of learning and usability issues. In this model, the learning task consists of the specific task concepts needed for the topic and the general domain concepts. It was found that after using the Jigsaw model, teachers showed more awareness of integration.”

“Squires and Preece discuss the possibility of applying their model to ‘interpretive evaluations’ i.e. evaluating the users use of the software, but their focus is on the predictive evaluation.” We suggest that one reason for the gap in approaches, therefore, is that the goals are quite

different: in the context Squires and Preece describe, the goal is selecting educational software and in ours, evaluating the usefulness and successful interaction of particular application.

2.2 Our Model—Double Interaction Model

I adopt the concept taught in class COMP7505 by Professor Bebo White: “The human-computer interaction is the human’s ability to use machine including their learnability”. I call our evaluation model the “Double Interaction Model”. The reason why I call it this is because there is a straightforward interaction between teachers and students in class using the application and also an interaction between the application and students or teachers. In other words, the application offers a platform for them to interact with each other. The students not only need to learn to use the application by our user interface, but also get through the knowledge by the interface.

So the model aims to exam how efficient teachers and students interact with each other through the application. Here we assume one background and design 2 scenarios according to our previous point:

2.2.1 Background

The target users of our interface are primary and secondary school students and teachers. The main course is mathematics related to some simple calculation, algebra and geometry.

2.2.2 Scenarios

First of all, the application “whiteboard” acts like a blackboard in class, and with the help of projector, teachers show their teaching content straightforward in class, but with “save function”, teachers could decide whether to save it or not—in this case, the teacher acting as a controller of the whole system, have the privilege to decide the atmosphere in class.

Secondly, there will be a controlling system of all iPad devices in class and a practical server “Moodle” may be used together with the application. It means that the application will interact with the “Moodle” by the action of teachers and students using the application. In this case, a certain account and password will be assigned to users. Teachers use the application to teach, students use the application to answer, to share. Also, they could use “submit” button to submit assignment to “Moodle” and to teachers, and teachers could share the content with all other students as well.

2.3 Evaluating existing applications

According to what we have set in the last part-our evaluation model, and reviewing the background and two scenarios, we have casted about some existing applications in the market and they will be explained and sorted in this paper.

The figure 1 shows the applications we found:

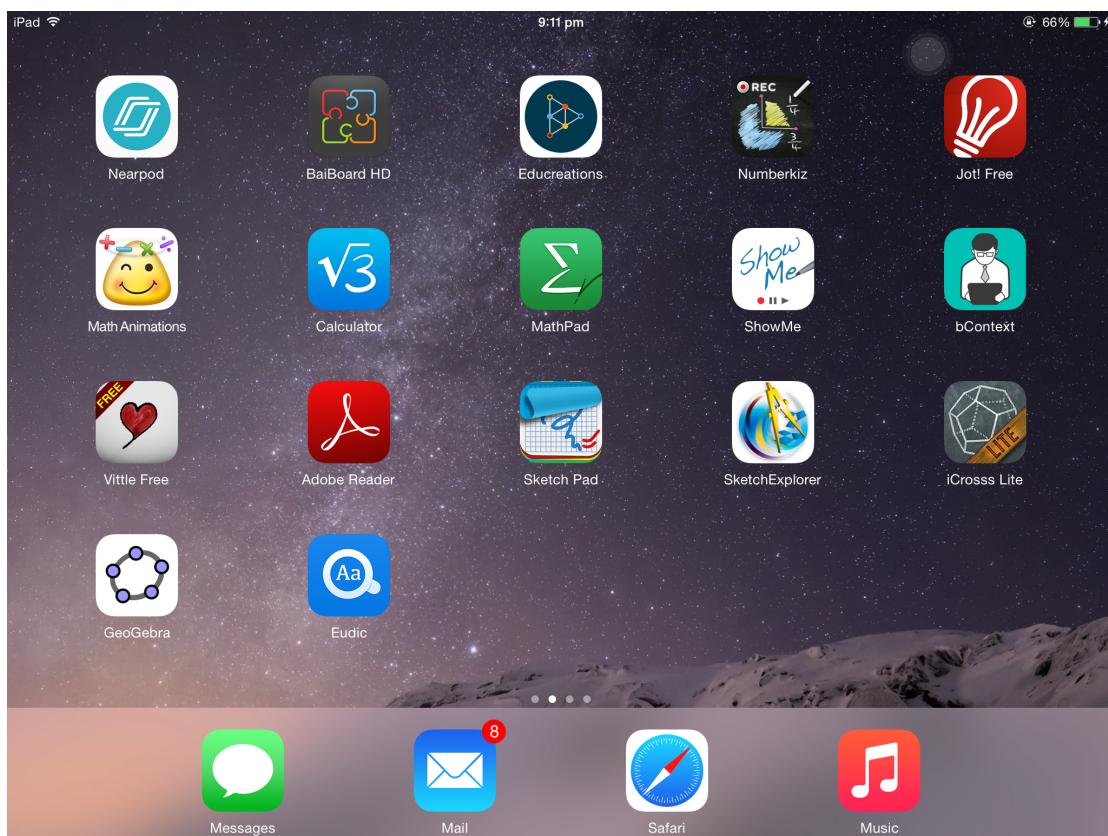


Figure 1. Applications we found

2.3.1 “Whiteboard” with recording

“Jot! Free”, “bContext”, “Vittle Free” and “Sketch Pad” are only “whiteboard” functions to be implemented. They could only carry out the very basic function like drawing with different colors, erasing with the “eraser”, deleting whole content on the board and etc.

One thing they have in common is that they all have the button for recording, but this is not the action we need because: 1) Recording of the class will weaken the performance of students in class; 2) According to the study of primary and secondary school students, they would not prefer to review the whole class again at home; 3) Recording of all class will also make students be lack of vital points of knowledge. In conclusion, these 3 applications, though implementing some of the basic functions, we will not say or adopt any of the features included.

2.3.2 “Whiteboard” with social network

“Nearpod”, “Baiboard HD”, “Educreations”, “Numberkiz”, “ShowMe” are the “whiteboard” applications with social network. Since they are based on the network to share the materials through the applications, different applications have different functions and user interface.

1) Nearpod

This application has very clear interface, but functions behind the buttons are all based on the server, both students and teachers need to use the server to do the work, which brings much more trouble and inconvenience in class. But the useful thing is that it has different switching mode between teachers and students.

2) BaiBoard

This application is a little bit bald and professional for primary school students. The color of the user interface is either white or gray, and buttons are not clearly described what functions they have.

3) Educreations

Without clear “save” button, we do not say it a good user interface for users to use; without “back” button, we do not admit it a wonderful user interface because both Gulf execution and evaluation time will be expanded due to unclear indication on the interface.

4) Numberkiz, Showme

Though it has the social network to share, view and show, but we are not pursuing this kind of interaction through our interface. Review the previous scenarios again, we hope the teacher could be the nominator, who needs to control, choose, and receive documents submitted by the students.

2.3.3 Recognition by application

Calculator and MathPad are not really “whiteboard” here but what we would like to adopt is its strong recognition ability that the application could recognize what you are writing on the interface and calculate the results for you. As for primary school students to learn math, this recognition is very useful for them to take advantage of.

2.3.4 Adobe Reader

The reason we mention it here is to show one of the basic function we would take on. That is the import function: we could import any format or the file like PDF, docx, images to show on the interface.

2.3.5 “Whiteboard” with in-app content

“Math Animations”, “iCrosss Lite” and “Geogebra” are applications that have already have some fundamental elements of math in it like algebra, geometry, coordinate system and etc. You could do some changes or whatever you need on it. I do think it is very convenient for both teachers and students to use in the future.

2.4 Low-Fidelity Prototype Design

According to the previous study and analyses of Jigsaw evaluation model and our evaluation model. It is concluded that a good interaction interface about “whiteboard” should have the following characteristics that several key buttons are needed to meet the requirements of interaction between teachers and students not only in class but also after class.

Since our target is: 1) teaching in the classroom and 2) self-directed learning at home. The teachers could use the pen to draw on “whiteboard” first and then the image can be projected for illustration. Therefor, it will assist teachers in some scenarios. It will also help students if they want to draw something complicated.

Back to our main target users: primary school students and teachers (mainly primary and secondary students) and main courses are English and mathematics, we need a boundless whiteboard with very specific functions implemented by various buttons to satisfy users' requirements.

As a result, a whiteboard is needed to be very clear and easy for students to use, and use their imagination to write whatever they want to exchange and learn from each other. Besides, it is convenient for teachers to explain the usage of whiteboard and use it efficiently to convey information and interact with “Moodle”.

For further development, we are expected to design a prototype that includes the dynamic visualization of knowledge and automatic recognition of inputting signals in the application.

2.4.1 Main Page of User Interface

The main components of user interface are showed in the sketch below:

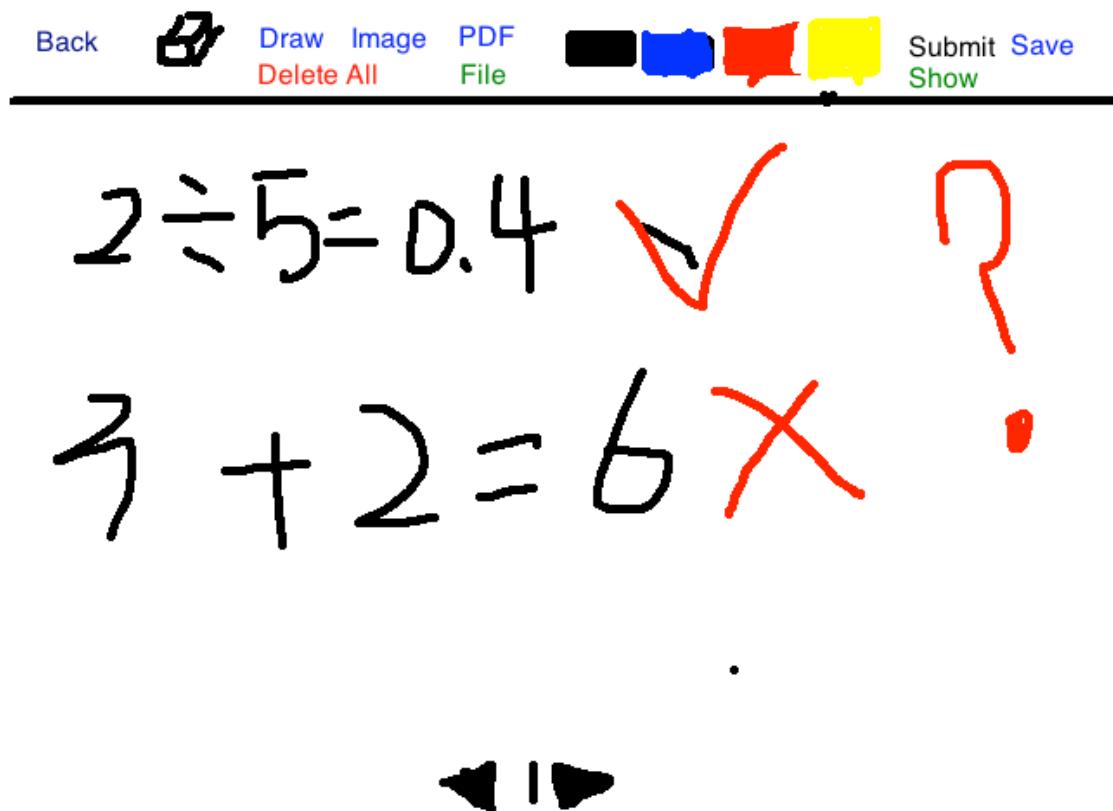


Figure 2. Main Page of Whiteboard

2.4.2 Main Functions of Whiteboard

Tools bar is on the very top of the main page of whiteboard to illustrate the vital functions of this user interface: Drawing function, remove function, save function and showing function.

1) Drawing function

The drawing part by default includes the color of paintbrush to choose, the eraser to scrub, and the “delete all” button to remove all the content of this page.

We use a “pen” to show the drawing function and also there is a drop-down menu when clicking the “pen” button for you to choose

color for better visualized content.

2) Remove function

We use an “eraser” to show the function or real eraser to remove the extra mistakes you make on the board. It is just like a real life eraser. Also we have a button “Delete All” to remove all the content on this page.

3) Save function

We use both “save” button and “submit” button to implement the save function of the whiteboard. If it is teachers’ mode, then the save button will be enabled while the “submit” button is unable, vice versa. What’s more, drop down menu are showed here to choose whether to save this page or all the pages you build during the process.

4) Show function

The show function is very usable for teachers to review what he/she has taught in class and to choose which one to keep for students to review or modify one of the pages of the content.

Besides, there are 2 extra functions here:

The back button: the button is used to go back to the personal main page (whether as teacher or student mode).

The adding pages button is to add page or choose to go which page you choose.

2.4.3 Comparison between our design and existing apps in this paper
Looking at the existing apps and our design, we conclude some advantages of our prototype:

1) No “recording” function

As I mentioned before, a “recording” function is not necessary for primary school students to use. In contrast, it may distract students’ attention from class and reduce the attendance rate in class. Besides, we should notice that our design purpose is to enhance interaction between teachers and students, but with “recording” function added, the application will be like a parclose warding off students from teachers.

2) Integration with “Moodle”

According to the previous analyze of the applications with “social network”, as the application is used in class and we pay the strong attention to the “Moodle” part of the application. But the application will not rely on any server side application, and “Moodle” just provides a platform for teachers to save file and students to submit assignments. Besides, as there will be 2 versions of the application, the teacher could control the students in his/her class.

3) Automatic recognition and visualize dynamically

This is the special point we added in the application and very distinctive feature that does not exist in the applications in this paper.

We hope the system itself could recognize the inputting signatures on the whiteboard and give some feedbacks according to the content. Besides, the primary school students are sensitive to mind-map, so in order to satisfy their psychology issue and make use of it to enhance e-learning, we are expected to design a prototype of visualization of knowledge dynamically.

3. LOOKING FORWARD TO THE FUTURE

3.1 Recognition

As mentioned before, I would like the application could position a tool for “personalized learning” as it is not just content-teaching, not

just supporting learning in maths or a single subject, and not just thinking, and knowledge visualization. I would like to add checkpoints inside the app to monitor the learning progress of the learner and giving feedbacks to the learner in realtime.

3.2 Visualization

To visualize the information and corresponding knowledge dynamically on the interface needs special data structure, hence, a better technology is expected to support this function. Maybe not traditional file or tree data structure, maybe files saved as SVG format will be needed.

4. RESULTS

Reviewing the whole process of studying Jigsaw model, building our own evaluation model, comparing 2 main existing interaction applications using whiteboard and designing a more useful prototype, we came to the conclusion that to promote interaction between teachers and students in class and after class, we needed more concise buttons to satisfy various requirements needed by both of their roles (Fig.1). According to the study and our design, different modes are also needed to design and implement for teachers and students.

What's more, as most primary and secondary students are familiar with mind maps and concept maps. A better application should support visualization of information "dynamically". In others words, it requires the support of special design in data structure.

However, this prototype design and design may not meet some requirements when used in classroom practically. We hope to design more wholesome and functional interface for teachers and students.

5. DISCUSSION

According to our analyses, the prototype could better promote the interaction between teachers and students.

The existing application using whiteboard is whether needed server or signed up for certain purpose or lack of core functions used in class. We combine the elements of application used in class and the server “Moodle” together for a better interaction. Also, a better visualization technology is needed to design for linking the useful information for students to review.

We are looking forward to the next stage on our prototype about special data structure and dynamic visualization.

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