Real Time Collaborative Whiteboard Application

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ABSTRACT

E-learning can be used to assemble virtual classrooms, which can be a cost-effective method. Unfortunately, the properties of the learning material are limited, which makes it difficult to converse, making the document's template even more confusing, especially when it comes to fabrics. Visual conversation includes illustrations, sketches, diagrams, and modelling. Accordingly, there is a need for a flexible learning media solution that can be applied in the mix. A fully interactive web-based format is generally recommended in this study. Use a whiteboard application to enhance virtual learning services. The format is created using a cascading program. The Internet has the potential to create a web of collaborative and exciting content to stimulate and support virtual learning, especially distance learning.

I.   INTRODUCTION

ICT solutions have been proven to improve the quality of education and learning services. One of the most widely used ICT solutions today is e-learning or e-learning. Online learning systems provide learners with flexibility in terms of information, learning sequence, learning pace, time, and regular media, allowing them to tailor their experience accordingly. with their individual learning goals. The e-learning model is widely used in educational institutions due to its flexibility and adaptability. Even when educators and learners are in different places, the learning process can take place directly and simultaneously. Distance, time, money and lack of

educational resources are all surmountable challenges with online learning. Nonetheless, there are a number of particular issues to be addressed, one of which being the limitations of the learning media. Realtime visual information transfer is still difficult to achieve in online learning. In contrast, instant messaging is largely used for text communication.Material explanations are more difficult to grasp as a result of this condition, particularly when it comes to images, sketches, and modelling. For example, explaining a drawing or model via online contact via chat is becoming increasingly challenging. As a result, in the virtual classroom, a more flexible and collaborative learning media solution is required.This study proposes the establishment of interactive online web based whiteboard applications to aid in the advancement of electronic learning services in answer to the problem. The innovation of this program is the interactive whiteboard feature, which is added to communication tools such as chat. This feature, comparable to classroom whiteboards, allows teachers to interactively write texts, draw diagrams, sketches, and models that can be shared with all distance learning students. . This approach has the potential to overcome some of the shortcomings of current chat services, especially in terms of spontaneous handwritten interpretation. Increased student engagement in the classroom, enthusiasm and love of learning are all benefits of using interactive whiteboards in the classroom.

II. RELATED WORK

A. In their study, Prasetya and Didik explored the various limitations of e-learning, including the visual depiction of diagrams and their explanations.They proposed a technique to overcome these constraints that links students and teachers to a common goal whiteboard. They've also talked about how they're going to use their money. Distance learning and online learning will benefit from these research collaborations.

B. In their research work, Mâta, L., Lazar, G., and Lazr, I. discuss the impact of interactive whiteboards in science teaching and learning. They investigated the influence of interactive whiteboards in learning sciences, and their findings revealed that the use of interactive whiteboards has favourable benefits on learning and teaching sciences. Marjana Pardanjac, Dijana Karuovic, and Erika Eleven have also examined the possibility of using interactive whiteboards and software in the teaching process in their work.

III. REAL TIME INTERACTIVE WHITEBOARD

In the context of ICT, the term "whiteboard" refers to a computer "whiteboard". allows students in the virtual classroom to view visual presentations (text, sketches, and images) by educators. An electronic board that allows users to interact with it over the Internet is called an online board. Individuals from all over the world can chat and interact with each other through this partnership. In particular, in lessons or classes, interactive whiteboards are used to facilitate interactive communication through writing, drawing and sketching. The combination of interactive whiteboards and Internet services offers great potential to improve teacher and student productivity. The best use of interactive whiteboard technology is to enhance existing services such as discussion forums or chat rooms. In addition to having a positive impact on student learning, research shows that designing classrooms around interactive whiteboards can help teachers streamline preparation, better integrate technology, and increase productivity. . overall capacity.

The following are some of the benefits of using an online interactive whiteboard:

- Students merely need to be linked to the Internet network to use this service, which is widely available.
- They can be utilised in a virtual classroom together.
- Make it possible for students to work together.
- It is software that can be used in a variety of settings and professions. Because learning in this type of education necessitates a technology that facilitates cooperation between instructors and students, online whiteboards are highly beneficial in supporting remote education.
- Interactive whiteboards can support a variety of learning styles and are used in a variety of learning situations, including for students with hearing and visual impairments. Using interactive whiteboards in the classroom can increase student engagement, motivation, and enthusiasm for learning, which can include a number of benefits.

A. System Design

A utility software will be produced as a result of this research. In terms of product characteristics, this research used the waterfall model of software development, which includes steps such as communication, planning, modelling, construction, and deployment. This model was chosen based on well-known needs, a consistent product specification, and well-understood support technology.

B. Research Design

The following are the steps of the waterfall development model:

1) The project's first step is the communication stage, which tries to figure out what the interactive whiteboard product needs are.

2) We've defined all of the system's requirements at this point; the second step of planning includes estimation, scheduling, and tracing product outputs. Here, we also build an interactive whiteboard interface.

3) Things are assessed and designed using modelling. At this stage, an interactive whiteboard application model is created based on the requirements and is linked to the analysis and design outputs.

4) The building stage aims to transfer the results of the modelling stage into product applications as well as product testing results.

5) The deployment stage attempts to widely disseminate goods that the product's target audience can use.

The waterfall paradigm of software development is followed in a logical and ordered fashion. In this paradigm, each stage is interconnected; the next level requires input from the previous stages, and so on until all phases are finished.

C. Product Description

A new software tool is provided as a technique to assist improve the quality of remote education services.

This application was created using web technologies and may be accessed over the Internet. Users can share a display worksheet through the online whiteboard tool. A teacher will write or sketch on an interactive board, and students will be able to see the board's appearance even if it is in another room. The suggested system development architecture is depicted in greater depth in Figure 1.

D. Product Testing

Testing is carried out to guarantee that the developed software complies with the requirements and runs according to the scenario that has been defined. The testing phase's main goal is to uncover errors that haven't been detected yet.

The black-box method of product testing has limitations when it comes to functionality testing. Testing is carried out by examining the software's output in relation to the input provided. To make product testing easier to implement, a description of the test methods and test cases was required.

The testing procedure starts with the unit or module and then moves on to the full software product. The result statement is accepted or refused in test cases written in this way. Engineers undertake product testing as an expert judgement based on their relevant expertise. The testing technique is carried out by monitoring the product and modifying it using the tools available.

IV. RESULTS AND DISCUSSIONS

Analysis and design results are converted into a machine-readable format during execution. The results of the system design development process will also be included in this section.

A. **Research Results**

An interactive whiteboard application is created at this point with React.js, Bootstrap, HTML5, CSS3, JavaScript, and Node.js, with socket-io serving as the communication backbone.

The development of an interactive whiteboard application is divided into two parts:

Whiteboard UI

As an interactive whiteboard, this module represents the application's main functionality.
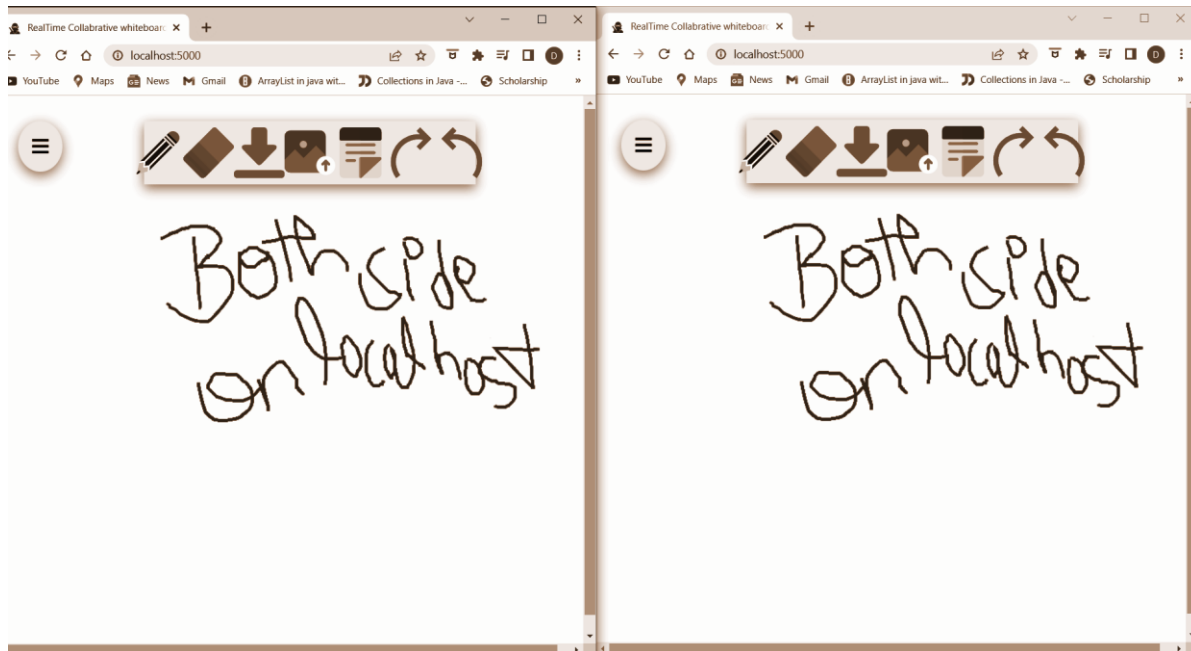
Real time interaction

This module allows two people to interact and collaborate in real time.

This can be used to depict any form of solution or presentation from anywhere in the world in real time.

B. **Discussions**

The results show that interactive whiteboard applications may be made with web technologies like HTML and CSS3, as well as Node.js. The results of creating an interactive web-based whiteboard application point to a way to improve electronic learning opportunities. This ICT application strategy saves money, time, and resources, which is very beneficial for electronic learning. The main shared whiteboard function can be utilised to establish virtual classes where students are not required to physically attend.

The facilities supplied represent the interactivity that characterises the programme. A teacher can use a browser connected to a computer network to engage (write or draw) directly with an interactive whiteboard. This activity is carried out entirely with the mouse. Learners, on the other hand, can use their own browsers to observe educational activities on the whiteboard in real time.

V. CONCLUSION

The development of interactive web-based apps has resulted in, The design of a whiteboard application can be implemented in electronic education. This application's design is capable of organising virtual classes and providing visual accompaniment or explanations, particularly when it comes to text authoring and diagramming dynamic sketches and models that may be shared with all distant learning participants. As a result, Students are more likely to accept learning materials.

Furthermore, the availability of chat services in a virtual classroom, enables employees to communicate with one another.

VI. ACKNOWLEDGMENT

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