Creating Dynamic Webpage for GeoGebra Quiz Applet

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Abstract

This paper introduces the use of internet skills to facilitate e-learning to improve the pedagogical skills of learners' to use of software tools in their teaching-learning process. This research emphasises to create mathematics quizzes using geogebra dynamic applets for mathematics scholars using internal geogebrascript commands and external JavaScript commands and integrate these applets into webpage. These webpages can be integrated into our e-learning tools or college website. There create random mathematics quizzes, Students can solve mathematics quizzes and their responses can be stored into database of our software tools for further evaluation which can be accessed and evaluated by administrator. We show that teachers with no expertize in programming skills can make attractive applets of mathematics quiz using some basic knowledge of geogebra script commands.

Keywords: GeoGebra, GeoGebra Script, External JavaScript.

1. Introduction

The use of computer technologies in education is becoming more and more important. Every day we develop different variety of tools like web pages, wikis, (simple or advanced) math applications, different ways of interaction with students or with other colleagues, etc. The development of these tools is having a great impact on teaching and also on research. Modern mathematics instruction is also feel need of computer and educational software usage. GeoGebra is a software that combines Algebra and

Dynamic Geometry System features which enables us to create Dynamic and Interactive Mathematics Learning Environments. That is why it is ideal to carry out plane analytic geometry in a computer aided instruction. Geogebra has attractive features, simple usage and availability, teachers and students are enthusiastic to use GeoGebra in analytic geometry instruction.

2. Research Methodology

Geogebra is dynamic learning software for teaching mathematics. We make various types of activities using geogebra. We have presented to develop mathematics quizzes using basic programming in geogebra applets. Since geogebra provides dynamic learning environment, hence we can create dynamic mathematics quizzes. Geogebra facilitates two types of scripting. First, internal Geogebra Script and second, external JavaScript. In internal Geogebra Script, geogebra has its own internal commands. These are very simple commands. We can find these commands on geogebra.org. We can script into geogebra applet. We can make a button using button command and script into button. Whenever we click on button, a new quiz will be generated according to scripting in buttons. Teachers who have some basic programming skill can develop attractive mathematics quiz using geogebra applets. We can make webpage of geogebra applet. To make webpage goto file menu, then click on export, then select Dynamic worksheet as webpage(html), now select Export as webpage, fill the input boxes and click on Export button, the webpage will be create. For external javascript, right click on webpage and goto page source. Open the source page in any editor and the JavaScript command into page source code. There is javascript command on geogebra.org. We can make a button using JavaScript and control over the applet.

3. Guidelines to Construct Geogebra Quiz Applet

The basic guidelines to construct Geogebra applet is given below. To create a geogebra quiz, first we construct geometric structure of the quiz by usual construction technique. We can select various geometrical tools and make geometric structure. Now we select buttons and write scripts in it. Basic steps are followed.

- Provide a button to create a **New Problem**.
- In the GeoGebra Script tab of the **New Problem** button, implement the logic to change the applet display with new parameters, write the line *newproblem=true* in the end. This signals to the GeoGebra that a new problem has been created.
- Provide a button to **Check** the user input. If the applet accepts any user input then that has to be saved in a variable named *user_responses* in the format *user_responses="resp_var1=value1;resp2_var2=value2;resp_var3=value3."* This allows GeoGebra to know what the user has entered. If the applet does not require any user input then you do not need to set *user_responses* variable.

- Provide a text box to input User's logic for given answer. For this, take an input box and then take a textbox by name 'user_logic'. click on object property of inputbox and goto definition and insert 'user_logic' into inputbox[]. //InputBox[user_logic]

- To indicate whether the user has answered correctly or not, assign a value 'true/false' to a variable named ***iscorrect***. Note that assignment to **iscorrect** variable should be done preferably at the end of the checking logic in the GeoGebra script of the **Check button**. Whenever an assignment is made to **iscorrect** variable GeoGebra saves the display of the applet at that time. Hence it is mostly preferred to set **iscorrect** at the end; you can set it at other places also if you want to save applet display at some other point, figure 1.

Let's take a simple examples to show, how to make an applets

3.1 Applet: Check Exterior angle

Take a point 'A', take another point 'B' using new point tool. Now join 'A' and 'B' using line tool. Take another point C and simply right click on point, goto object properties and define as 'point[a]' in definition of object properties. Take another point 'D' and define 'Rotate[B, α, C]' in definition of object properties.

We can see the construction of the applet, click on 'construction protocol' of View menu, figure 2.
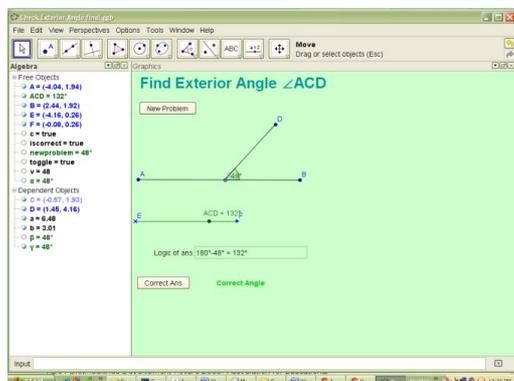
Figure 1: Construction of Geogebra Applet
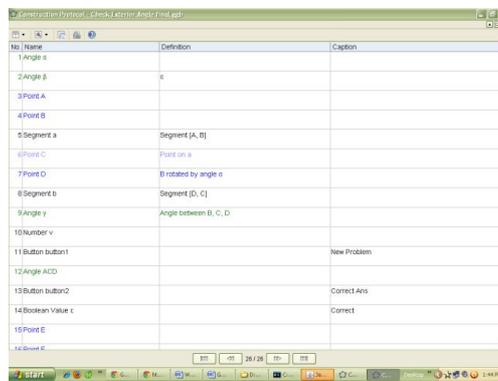
Figure 2: Construction Protocol of Geogebra Applet

There are two buttons in this applet.
    i)-new problem
    ii)- Correct Ans

Scripting in new problem button-
    Take a variable v and assign a value randombetween[1,179]
    //SetValue[v,RandomBetween[1,179]]

Take a variable α and assign the value of v in α.
//SetValue[α,v°]
Take a variable 'newproblem' and assign value of α into it. This will be accessed by moodle.
//SetValue[newproblem,α], Go on figure 3.
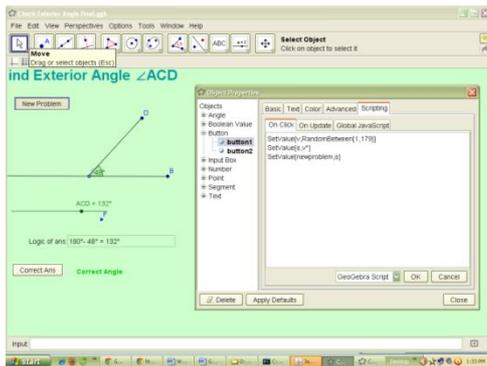
| **Figure 3**: Scripting in 'New Problem' Button. | **Figure 4**: Scripting in 'Correct Ans' button. |
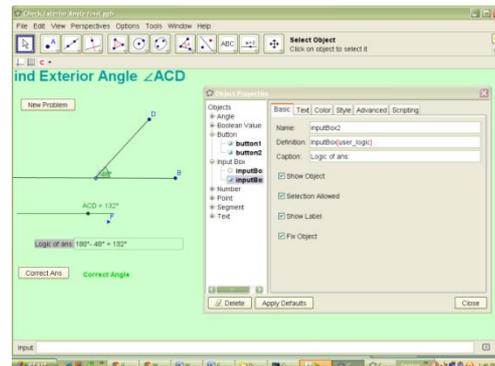
Scripting in Correct Ans button-
Take a true/false type variable **c** and assign value true if *(180°-α)=ACD* otherwise false.
. // SetValue[c,If[(180°-α)+""==ACD+"",true,false]]
Take a variable 'iscorrect' and assign the value of **c** into this.
//SetValue[iscorrect, c]
If true it display text 'Correct angle' otherwise display 'Incorrect angle'.

To create an Input Box-
Take an input box to insert the value of user's logic for answer. Insert a textbox by name 'user_logic'. click on object property of inputbox and goto Definition and insert 'user_logic' into inputbox[].
//InputBox[user_logic] Go on figure 4.

3.2 Geogebra JavaScript Communication
We can control Geogebra applet using JavaScript. For this, open the applet on web page. Now open the source code of the applet page using right click and select 'view page source.' And Modify the source code. To edit source code, open the page with any text editor. If we want to call a javascript function then first type 'document.ggbapplet'and add the desired function with 'dot(.)'.For example, document.ggbApplet.getValue('text1');
Here function 'getValue()' function is called to print the value of parameter 'text1'.

Example 1: the following HTML code fragment adds a "Reset" button to an HTML page that lets the user reset the construction shown in the GeoGebraApplet to its initial state:

```
<form>
<input type="button" value="Reset" onclick="document.applets[0].reset();">
</form>
```

Example 2: this adds two buttons "Hide A" and "Show A" change the visibility state of an object named "A" in the construction

```
<form>
<input type="button" value="Hide A" onclick="document.applets[0].setVisible('A', false);">
<input type="button" value="Show A" onclick="document.applets[0].setVisible('A', true);">
</form>
```

3.3 Javascript Code Explanation

The Javascript code connects the Form inputs and GeoGebra. It tells the GeoGebra to execute the command on a particular event (a click on a commmand button). It tells GeoGebra to graph the equation in the text box once the button is clicked.

1. Script is also a tag just like <HTML> and <form>. We begin our javascript tag with the line <script type = "text/javascript"> and end it with the </script> tag.
2. The var applet = document.ggbApplet command instructs your browser that the current applet used is the GeoGebra applet.
3. The var f = "f(x) = " + document.InputFromUser.FunctionEquationText.value command assigns the text input from the FunctionEquationText value (the text in the text box) from the form InputFromUserForm. Notice that the name used are also the names inside the <form></form> tags.
4. The applet.evalcommand(f) tells GeoGebra to graph the function stored in f.
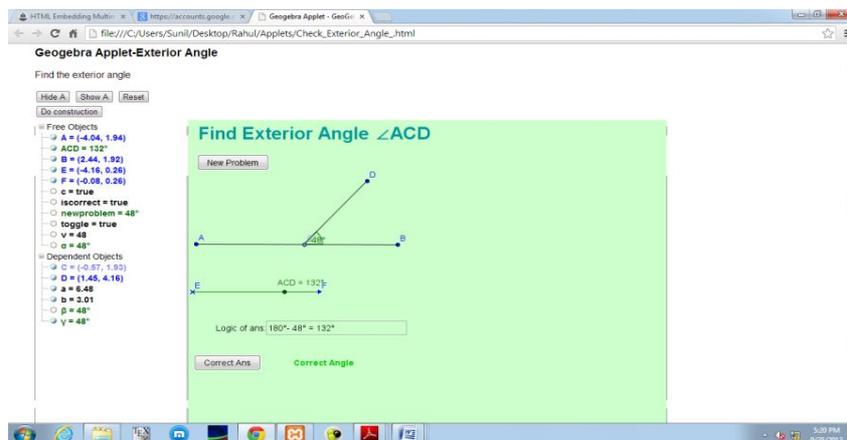
Figure 5: Geogebra quiz dynamic webpage.

4. Conclusion

In this research work we have shown the basic steps to make a mathematics quiz using geogebra applet. Here provided some basic instruction of scripting in geogebra applet. Moreover, the use of free software tools provides important advantages, among which we can highlight universal access at no cost to the software as well as to documentation. We can develop an E- Learning tools and upload the geogebra applet where student can solve the quiz. To store the students' response we have to develop a database according to the variable used in the applet. Server can communicate through these variable and students' response may be stored into database which can be accessed by administrator.

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