Design and Implementation of a Word Match Generator

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ABSTRACT

A word matching is a Web-based exercise that enables students to drag and drop key terms to match their descriptions. It is a very popular and effective educational tool for students to learn words and their meanings or to learn key terms and their definitions. We created a tool that enables instructors to enter key terms and their definitions and automatically generates a Web-based exercise for students to practice word matching. In this paper, we present the use, design, and implementation of this tool.

CCS CONCEPTS

• **Computer Science Education → Word matching**.

KEYWORDS

Java, JSP, Spring Boot, HTML, CSS, JavaScript, Web Applications

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1 INTRODUCTION

Given a set of key terms and their definitions, a word matching exercise is to match each key term with its definition. A word matching exercise can also be used in learning vocabulary. The effectiveness of word matching exercises were presented in [1], [4], [8], [9], [10].

We developed many word matching exercises in our computer science courses to enable students to match the key terms with their descriptions. Figure 1 shows an example of a word matching exercise, which can be viewed from https://liveexample.pearsoncmg.com/wordmatch/Section1_2.html.

Figure 2 shows the result after the user drags the key terms to match their descriptions. A Congratulations dialog (see Figure 3) is displayed when all key terms are matched to their descriptions.

We have developed more than 60 word matching exercises. Each word matching exercise is an interactive. The interactives are embedded in the interactive ebooks [6], [7], [5]. The interactives in the eBooks received good reviews [3], [2]. They help students learn and grasp key terms. Each of the word matching interactives is programmed manually. It requires programming skill and takes a lot of time and effort to create a word matching exercise. To enable instructors to create word matching exercises, we create a Word Match Generator. The Word Match Generator enables the instructors to enter key terms and their descriptions and automatically generates the HTML code for a word matching exercise.

In this paper, we will present the use, design, and implementation of the Word Match Generator, discuss the lessons learned from the project, and conclude with the ideas for future work.

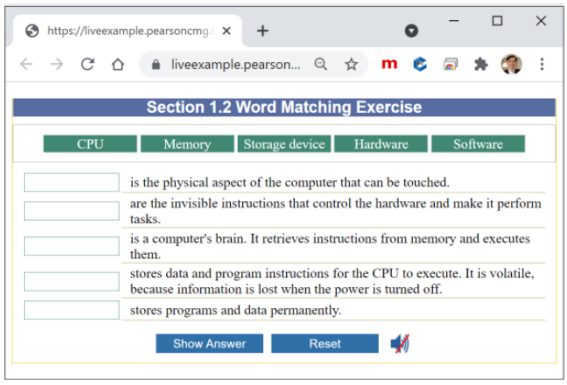

Figure 1: Word Match Generator Before Dragging Boxes

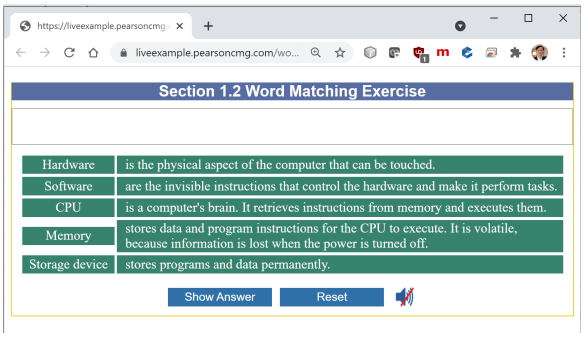

Figure 2: Word Match After Dragging Boxes

Figure 3: Congratulations Dialog Box

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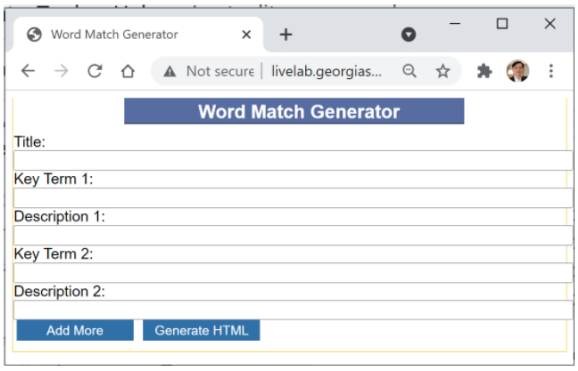

Figure 4: Initial Screen for Word Match Generator

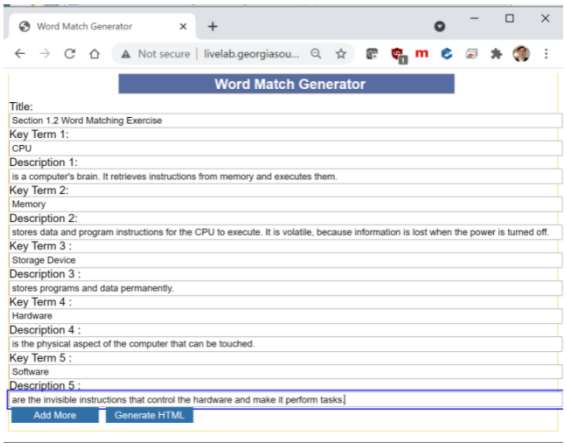

Figure 5: Key Terms and Description Inputs

2 THE USE OF WORD MATCH GENERATOR

To use the word match generator, go to http://livelab.georgiasouthern.edu/wordmatchgenerator, as shown in Figure 4.

Now enter a title, Key Term 1, Description for Key Term 1, Key Term 2, and Description for Key Term 2. You can click the Add More button to create more entries for key terms and their descriptions. For example, to create the word matching exercise in Figure 1, you can enter the following entries in Figure 5.

Now click the Generate HTML button to display the generated HTML code for this word matching exercise. The HTML code is generated as shown in Figure 6. Click the Post button to post the word match exercise to the server.

Note that the descriptions are randomly ordered. The Post button saves the generated HTML file for the exercise on the server and creates a URL for the generated exercise. After the generated HTML file is posted, a View button is displayed, as shown in Figure 7. Clicking the View button displays the exercise using the URL, as shown in Figure 8. The instructor can give the URL for this exercise to the student.

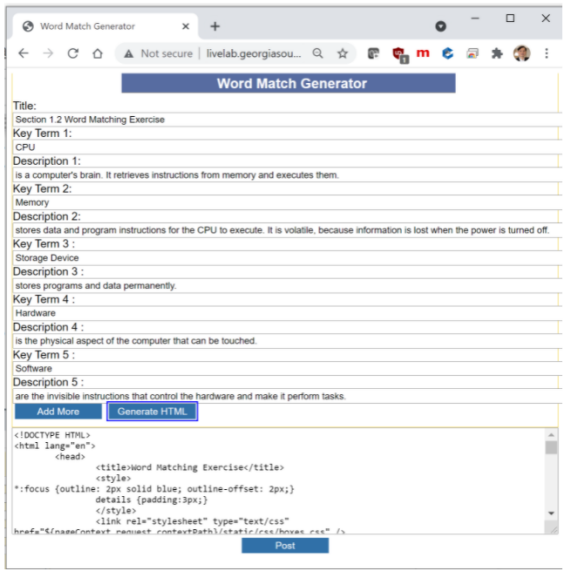

Figure 6: Generated HTML Code

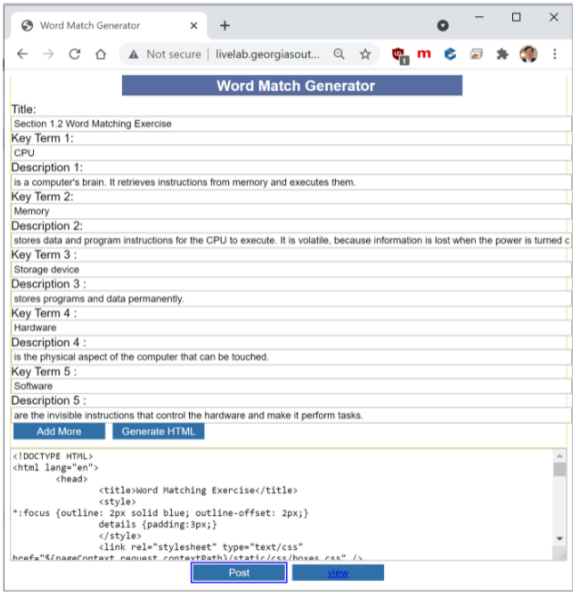

Figure 7: Clicking Post Button

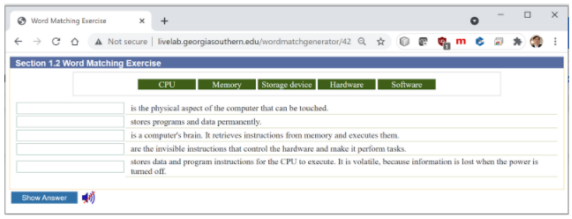

Figure 8: Rendered HTML Code

3 DESIGN AND IMPLEMENTATION

The implementation of the Word Match Generator stems from the static HTML/JavaScript code we have manually created for our word matching exercises.

We designed a simple and intuitive user interface for the instructor to enter the key terms and their descriptions. By default, two entries for key terms and their descriptions are displayed in the Word Match Generator. The user can click the Add More button to display more entries for creating additional key terms and descriptions.

The first step in creating the Word Match Generator was to design a way for us to generate the static HTML/JavaScript code. The generating function is a JavaScript method that obtains the inputs from the key term and description entries, concates the keys and their descriptions into an HTML string, then displays the generated HTML string in a text area. The instructor can directly copy HTML code and then post it on an external Web server for students to access the word matching exercises. The generating function also randomly shuffles the descriptions. When the HTML page for the exercise is displayed, the descriptions appear in a random order.

The next phase of developing Word Match Generator was to save the generated code to the internal server by clicking the Post button. The Word Match Generator creates an HTML file to store the generated HTML code for the exercises and then displays a View button.

The View button serves two purposes. First, it renders the HTML code for the exercise. Second, it shows the URL for the exercise on the server. The instructor can give this URL to the student.

Our Word Match Generator is a Web-based system. It is developed using HTML, CSS, JavaScript, and JavaServer Pages with Spring Boot framework.

4 LESSONS LEARNED

We created many word matching exercises manually. It was time consuming to create each exercise and maintain it. Now we have this tool. It is a simple process to create a word matching exercise without writing any code. In retrospect, we should have created this tool earlier to save hundreds of hours of writing word matching exercises manually.

When we first design the tool, we generate the HTML code and display the code in a text area. We expect the instructor to copy and paste the code. We found this limited the adoption of this tool. So we added the Post button to save the generated HTML code to a server and create a URL for the instructor to access it directly without any extra work.

5 FUTURE WORK

At present the generated exercises are not associated with a user. We plan to let instructors create accounts. Instructors can create and store exercises in a database. An instructor can view all exercises created by the instructor and delete exercises. With a user account, the keys and their descriptions for each exercise can be saved in the database and regenerated. The instructor does not need to re-enter the keys and descriptions if new functionality or new user interface is added to the generated HTML file.

Another direction of the future work is to create multiple word matching exercises once. This idea was proposed by an instructor. The instructor wishes to create an XML file that stores information for multiple exercises. For each exercise, it specifies the title, key terms, and their descriptions. The Word Match Generator takes the information from the XML file and automatically generates an HTML file for each exercise specified in the XML file.

6 CONCLUSIONS

This paper presented a Web-based tool for automatically generating a word matching exercise. Instructors can enter the terms and their descriptions to generate a HTML page and share the URL with students. The tool is freely available from http://livelab.georgiasouthern.edu/wordmatchgenerator.

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