IM-Vative Sandbox: Fun Learning in Mastering Hypertext Markup Language (HTML)

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Abstract— **Hypertext Markup Language (HTML) is one of the most popular languages for website development. Since its inception, many academic institutions have integrated the knowledge of HTML within their syllabus. However, previous research shows that many students are having difficulties to be proficient in HTML language. Several problems are identified; (1) lack of effective online content, (2) lack of supporting tool to code HTML, (3) portability issue of authoring software. Therefore, IM-Vative Sandbox was developed based on PHP Programming Language (PHP), MySQL Database, and jQuery. The sandbox provides real-time generation of HTML source codes; compared to the conventional method of using Notepad, Sublime, or any other authoring tools. In terms of commercialization, the application can be accessed through mobile and desktop and suitable for beginners who want to learn the basics of HTML.**

Keywords— basic web design, contents management, sandbox, learning styles.

I. INTRODUCTION

Nowadays, teaching and learning activities do not only rely on face-to-face classroom learning but, with today's technology, learning is also more flexible and open. This ultimately affects teaching techniques, where technology enables new learning concepts to be viewed from multiple angles and perspectives [1]. Information technology is now progressively involved in various teaching and learning activities, whereby educators may use the new technologies according to educational needs [2]. During this 21st century, the information of higher education has also progressively increased, whereby using information technology and digital resources become common routine, as well as utilizing information platform of education to improve the conventional teaching and learning approaches.

In the process of curriculum development, blended learning emerged as a new type of teaching concept and indicated several potentials [3]. Thus' the "e-learning" term has become a common and important platform for knowledge transfer. The rising popularity of e-learning is attributed to its ability to allow learners to learn without time and location constraints, as well as decreasing training costs for some organizations. Thus, the implementation of e-learning is one of the solutions for learners to be aware of new technology and while attracting them to improve their knowledge [4].

E-Learning applications are now getting recognized by learners as another learning opportunity apart from face to face learning. A project developed by [5] suggested that learners prefer online education as compared to traditional classroom coaching. Likewise, a study by [4] indicated that e-learning can affect self-efficacy especially in upgrading

knowledge and skills of learners and suggested that the educational institutions' management should maintain the technology facilities to ensure e-learning could be useful.

Furthermore, by focusing on teaching and learning of programming language, learning how to write codes using various languages to develop a website or a system has become part of the curriculum offered by many educational institutions. As a result, a lot of concerns become apparent related to what to teach (the contents) and how to teach it (teaching approaches) to build skills and competencies of the learners [6].

Knowing developing websites, mobile applications and information systems are one of the most important knowledge of today. In a world without boundaries, we can meet anyone in the cyber world using web-based software. Graduates who have expertise in developing a website can be considered having value-added and ought to high market demand in the world of employment. Realizing the importance of this knowledge, many academic institutions have integrated the knowledge on Hypertext Markup Language (HTML) within their syllabus as one of the basic and popular languages for website development. However, it is not an easy task for instructors to produce technology-savvy students. It is said that one of the greatest challenges in teaching technology is pacing, as some students may understand the concepts quickly, while others need repetition and may struggle to keep up [7].

Moreover, there were studies conducted to identify problems occurred in learning programming languages. A research by [8] identified four main problems, including (i) the lack of skills in analyzing problems, (ii) ineffective use of problem representation techniques for problem solving, (iii) ineffective use of teaching strategies for problem solving and coding, and (iv) the difficulty in mastering programming syntaxes and functions. Besides, another study indicated that many students are having difficulties to be proficient in HTML language. Several problems are identified, which are lack of effective online content, lack of supporting tool to code HTML and issues on portability of authoring software [9].

Thus, a recent study suggested that a visual programming language (VPL) learning environment may reduce the difficulties and it is appropriate for many levels of learners, including those who are not computer science majors. VPL has vast potential for programming courses in the general education of universities [10]. It offers learners to learn through practice, apply the concepts acquired in the classroom learning into realistic outcomes and view the results.

Therefore, by taking into considerations that ineffective teaching strategies and lack of supporting tools are among the problems that have been identified by previous studies, a tool to support programming language learning is developed, known as IMVative Sandbox. The objectives of this project are; to provide a fun learning application for users in mastering Hypertext Markup Language (HTML), to facilitate the learners to access a 24/7 open platform by giving freedom and independence in learning, as well as to increase learners' proficiency in learning coding languages with technological tool assistance.

II. MATERIALS

IM-Vative Sandbox was developed based on PHP Hypertext Preprocessor (PHP) programming language, MySQL Database, and jQuery. This project can be viewed and accessed from a personal desktop computer, and also made available in the mobile application version.

III. METHODS

The project was developed by following the System Development Life Cycle (SDLC). The stages of system development consist of planning, analysis, design, implementation, and maintenance.

A. Planning

This stage involves a thorough review of the literature to identify previous studies and projects of teaching and learning for programming languages. A needs assessment was also conducted by analyzing students achievements (students' grades) before the project are developed and implemented, of which it was found that some changes are required to help in increasing the achievements. Also, a total of five (5) respondents were selected from the Faculty of Information Management, UiTM Kelantan. These students were chosen because of the researcher's easy access to the sampling frame and they are enrolled in the web development subject. The development team had interviewed to gain information regarding their problems with the programming languages and existing teaching approaches.

B. Analysis

Problems identified from the achievement analysis and interview sessions were then grouped into specific categories. These categories facilitated in identifying specific criteria to be included in the project while ensuring academic requirements can be tailored with and fulfilled.

C. Design

A working model (prototype) of the system was developed based on Joint Application Development (JAD) and CASE tools. Users were consulted to provide input and feedback of the PHP Sandbox. The system was improved according to the feedback received.
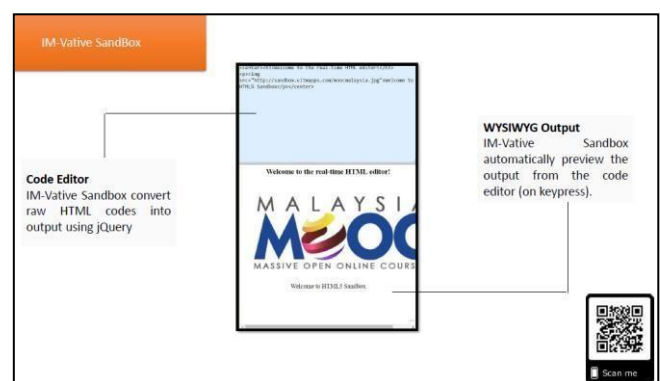

Fig. 1. *Sample of IM-Vative Sandbox operation (real-time coding and output)*

D. Implementation

The application was developed based on PHP, JQuery, CSS, and HTML5 (coding and programming languages) together with MySQL database. Users were still allowed to

provide feedback, especially on the interface design. At the end of this stage, a user acceptance test (UAT) was conducted to ensure requirements are fulfilled. Five respondents involved in the acceptance test and few corrections were made to the system based on the test.

E. Maintenance

Scheduled maintenance (backup) was defined to ensure data are securely kept and protected. Adaptive maintenance was also conducted from time to time to ensure interface and requirements are constantly updated in-line with academic requirements.

IV. RESULTS AND FINDINGS

Establishment of IM-Vative Sandbox has produced few results as follows;

A. Solve academic issues

This tool can be used as a diagnostic tool for the continuous improvement of students' performance. It may help educators to monitor learners' progress and make any recommendations as needed.

B. Fulfill academic requirements

This tool may also facilitate educators to improve teaching delivery by focusing on specific criteria which suit with academic requirements (a course or subject requirements). As a result, effective learning experience among learners can be achieved.

C. Improve productivity

Besides, the application can also be used by many levels of learners, including students, working individuals, and the community. This will contribute to enhancing the skills of digital citizens.

D. Save cost and generate income

IM-Vative Sandbox promotes various commercial values and potentials in terms of its usability, consultation and training, convenience and easy learning kit. There is a potential in writing a publication of book and e-book as users' handbook to introduce the Hypertext Markup Language (HTML) and opportunities to conduct web design and development consultancy. Furthermore, income can be generated by utilization of AdMob, Adsense, and introduction of the application via Google Play and App Store. Utilization of online platform serves the needs in saving the cost of printed materials while supporting green technology.

E. Increase students' interest in learning web development course

This web-based application allows learners to view real-time results of their coding, of which this condition may ease learners to practically involved in the learning process. Besides, it also allows its administrators to provide consultancy and training to all learners as it can be accessed through any electronic device, anywhere and anytime. As it supports learning, the application could be commercialized

to other academic institutions and public/private sectors in giving web development training for the new workers.

V. CONCLUSIONS

The introduction of this new IM-Vative Sandbox educational tool is intended to improve students' understanding and performance in using HTML language for website development. It provides a fun and interesting way of learning and can also be used as a diagnostic tool for continuous improvement of users' web programming skills since the educators can monitor users' progress and suggest any recommendations needed through the online channel. This tool is not only considered as supporting the green initiatives, but also rather as a speedy medium of teaching and learning process.

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