

"Unboxing the Sandbox": A New Method of Learning PHP Advanced Web Programming

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Abstract: The growth of the Internet marks the necessities of a better web application. In Malaysia, the Internet penetration stands at 77.6% of the total population (Malaysian Communications and Multimedia Commission, 2017). Thus, the demand for information system programmer and web programmer has significantly increased over the years. One of the popular programming languages is PHP: Hypertext Preprocessor (Verma, 2017). However, many students especially those newbies are having a problem to effectively mastering and proficient in this language. Therefore, this study is intended to improve students' performance and understanding towards PHP programming language. In doing so, we introduce a new educational tool called "MyPHP SandBox". The sandbox was developed in two (2) phases. First, an empirical study was conducted. A total of five (5) respondents selected from the Faculty of Information Management, Universiti Teknologi MARA Kelantan. Then, based on the empirical findings, the information and content of the sandbox are tailored to the needs of the learners. In term of usefulness, the sandbox can be used as a diagnostic tool for continuous improvement of student performance. The system helps educators to monitor learners progress and make any recommendation as needed. From an empirical viewpoint, findings may help educators to improve their teaching delivery by focusing on specific criteria that contribute to effective learning experience among learners. Furthermore, the product can be commercialized as an eBook, App, Print Publication and Paid Online Learning Content

Keywords: advanced web-design, sandbox, PHP, programming language, server-side scripting, and client-side scripting.

1. Introduction

Information is a collection of data; process into something meaningful to those receiving it. The concept of information management has evolved from manual record keeping into an electronic record. Electronic records are a record in electronic forms and usually need a device or reader in order to read those records. Electronic records are susceptible to many threats, as the information is available online. These records contributed to the outstanding amount of information, data, and instruction available on the Internet, contributed toward information overload and information explosion. However, the lack of effective web content management (WCM) is still a major barrier to information retrieval on the web. Content management track and manage information so that a site can be easily located, modified, and reused (Morgan, 2000). It transforms unstructured data into more structured, meaningful information.

There is a lot of investment and research undertaken to produce the perfect harmony between content management and information retrieval but despite all that the current indexing technique can only produce an average of 30 percent reliable hits. The remaining balance of 70 percent was never returned to the audience thus it hinders the effectiveness of the web content management system (WCMS). Therefore, the current scenarios stress for the need of a good system programmer.

Programming is a subject that requires critical thinking and understanding of specific logic. PHP: Hypertext Pre-Processor is one of the popular programming languages especially for online system development (Verma, 2017). However, due to insufficient training, lack of user-friendly development tools, and lack of user interest contributed to the lack of proficiency of the PHP programming language (Palumbo, 1990). Stroustrup (2006) argue that most early programmers did not have the necessary skills to understand the correct algorithm, the structure of the data, or maintainability of those data. In principle, these programmers did not have the ability to read the code; therefore lead into lack of understanding towards the programming languages. Therefore, this study was conducted to identify the cause of the problem and provides appropriate solutions to improve learners' proficiency in the use of PHP programming languages.

2. Problem statement

The competent and multi-skill programmer is a necessity because many organizations are facing a situation whereby the demand for dynamic access and online delivery of information is rapidly growing (Holly, 2005). The total number of websites and information systems have grown tremendously from 1,000 pages in the early 90's into over two billion pages in 2001 (Ektron, 2001). As websites grow in both size and complexity, static websites are no longer capable to manage the content created over the Internet. These instil the need for a system that capable to handle information with least work especially technical work such as coding. With the new approach, content contributors are no longer a one-man job. There are many levels and degree of authors to assist webmaster and accelerate the development process of a website.

Moreover, the rise of IT professions was also caused by Internet penetration in Malaysia. The penetration rate in Malaysia is currently held at 77.6 percent. This shows that the websites and information systems are currently available to more than half of Malaysia population. From the survey conducted by MCMC, 88.3 percent of users prefer to use the Internet for information while the tendency for accessing or using government services is 38.4 percent. The websites have become among the main communication medium between the government of Malaysia and the citizens.

However, based on previous literature it shows that many learners especially newbies are having a problem to properly attain a specific proficiency level of the programming languages; PHP, Java, JavaScript, JQuery, etc. Therefore, this study attempted to answer the following problems:

- RQ1: Lack of understanding towards PHP programming languages due to lack of resources.*
- RQ2: Lack the understanding of PHP programming languages due to restriction, complexity, and portability of authoring software.*

3. Objective of the study

The followings are the objectives of the study:

- a. Help learners to understand the basic concept of web programming using PHP.
- b. Improve learner's skills and proficiency in using PHP programming languages.
- c. Develop a tool to improve learner proficiency in a programming language.

4. Methodology

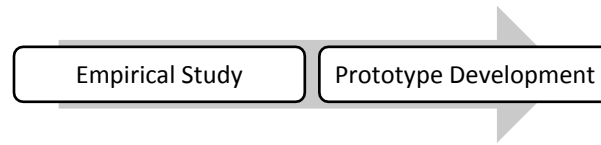


Figure 1: Summary of research methodology

The development of the application follows the two steps methodology: empirical study and prototype development. During the preliminary analysis, an empirical study was conducted to investigate the problem of under-utilisation and lack of proficiency of PHP programming language among undergraduates' students who register for the subject of IMS607: Advanced Web Design and Content Management. 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. These students also enrolled in the subject of IMS607. A thorough review of the literature was also conducted to identify variables leading to successful implementation of an information system.

Henceforth, the resulted empirical evidence was conducted into proper prototype development. Based on the empirical findings, the information and content of the applications are tailored to the needs of the learners. The development of the prototype took 7 months using open learning application and open source programming. MyPHP SandBox was developed using an open source PHP, HTML5, jQuery, CSS3, and MySQL database, while the online content was developed using an OpenLearning online application. The development process followed the Rapid Application Development (RAD) approach.

4.1 Rapid Application Development

In order to speed up the development process, Rapid Application Development (RAD) methodology was adopted based on Martin (2011). The methodology divided the processes into four phases:

a. Requirement planning phase

In this phase the development team interviewing the respondents in order to gain information regarding their problem with the programming languages. Common problems were grouped into specific categories; then the specific system requirements were generated based on the interview sessions.

b. User design phase

A working model of the system was developed based on Joint Application Development (JAD) and CASE tools. Users were consult to give their input and feedback of the MyPHP Sandbox. Based on the feedback from the respondents, the system was improved; and eventually a working model that meet client's need was developed.

c. Construction phase

The coding and programming of the sandbox was developed based on PHP, JQuery, CSS, and HTML5. At this stages the respondents can still make suggestion and provides feedback to the system development process; especially the design of the interface. A complete system testing was conducted based on Nilesen (1995) heuristic usability test.

d. Cutover phase

In this stage user acceptance test were conducted. Five respondents involves in the acceptance test process. Correction was made to the system based on the acceptance test, and finally a working system was distributed to the public through a public domain and accessible from the URL <http://sandbox.uitmapps.com>.

5. Features and novelties

Countless interesting how-to-do-it videos, interactive PowerPoint, virtual assistant, PHP sandbox, games, and flexible learning are the features provided to capture interest among students in mastering the PHP language.

5.1 Interactive learning materials

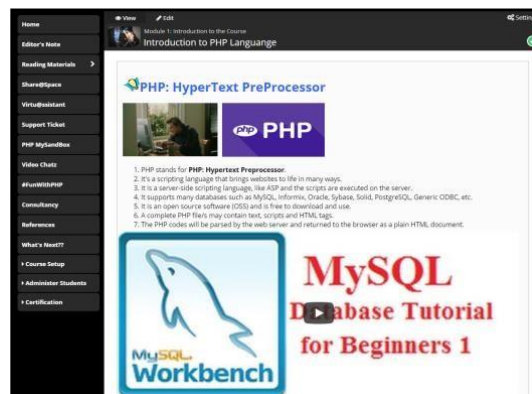


Figure 2: OpenLearning Platform

Interactive and user-controlled reading materials equipped with countless tutorial videos allowed students to explore and learn the theoretical and technical content of PHP.

5.2 Virtua@ssistant

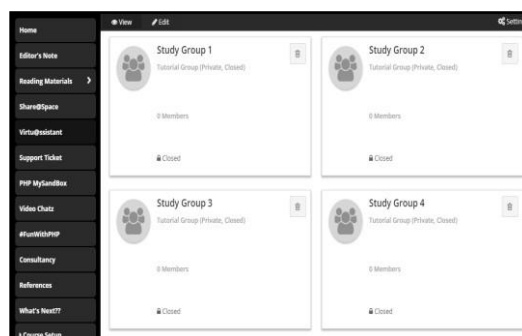


Figure 3: Virtua@ssistant

Virtual assistant enables tutor and student to create a private/specific group to enhance student understanding while conducting interesting activities together.

5.3 MyPHP Sandbox

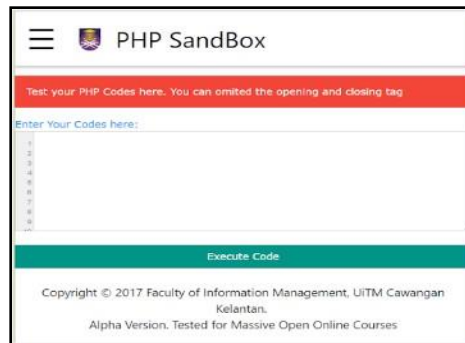


Figure 4: MyPHP Sandbox

PHP SandBox is available to download for free to greatly facilitate learning PHP. Learners can test/execute PHP codes without downloading/installing web server!

5.4 Performance monitoring

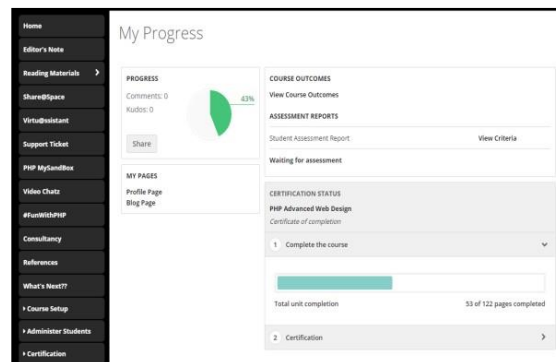


Figure 5: Performance monitoring

Learning by managing own progress to meet the deadline given by the instructor gives a more flexible learning session for a student.

6. Commercialization Potential

Commercialization is the process of moving a technology or innovative concept from the idea stage to the marketplace. In other words, technology commercialization commonly defines as the process of creating a product that is suitable for a particular market at an affordable price that fulfils the demand of the market (Bandarian,2007). There are some potential commercialization's available on this project. E.g. revenue generation, new product innovation and consultancy on new system development.

Revenue generating opportunities are one of the commercialization potentials in the success of this project as it encourages the publication of books and electronic books industry in related fields. For example, Introduction to PHP: A Beginner's Handbook, Web Theory, Introduction to JAVA

Programming and others. Besides that, the project makes it easy for users to create multimedia products and advertise on revenue generating channels like AdMob, AdSense, App and so on.

Apart from revenue generation, this project can also generate new innovations that benefit many users. Previous system developers and applications need to use very complex software and take a long time to complete a project. With this project, MyPHP Sandbox, it simplifies the creation of the system quickly especially in the construction that uses PHP and HTML.

The project will also provide opportunities for system consultancy services such as web design consultancy, information system development consultancy which will smooth out the work and save time in advising and developing the system.

7. Discussion

The motivation of the study relies on two main problems; lack of understanding towards PHP languages due to lack of resources, and problems with the authoring software (restriction, complexity, and portability). In order to solve the underlying problem, a solution was provided in term of online resources (massive open online course) and learning tool (MyPHP sandbox). Interview from the respondents shows that the proposed solution is capable to improve the learning resources, as well as providing an authoring tool that more user-friendly, portable, and ease for use. For example, one respondent quote that *"..the use of MOOC helps me access varieties of online resources, while the sandbox helps me to do programming using my mobile phone at my own convenience"*. Another respondent quoted that *"..the sandbox, compare to any other commercial software, provides faster access to the results, easy to execute, no software restriction, no installation needed, and helps me to learn whenever I want"*.

Therefore, based on respondent's responses it is believed that the development of the sandbox, as well as the MOOC helps to improve access to learning resources, as well as improve the utilization of the authoring software; thus meeting the objective of the study. However, some limitations should be considered. First, the study only considers a small number of respondents. Engaging more respondents may produce a different result. Second, the study utilizes qualitative interviewing method on the development of online resources and the authoring tool. To further validate the result, a quantitative study such as survey questionnaire should be conducted.

8. Conclusion

PHP is one of the most popular programming languages. It is currently being used by a large number of individuals for creating numerous types of applications. It is primarily used as a server-side scripting language for websites. Many students especially those newbies are having a problem to effectively mastering and proficient in PHP programming language. The introduction of a new educational tool called "MyPHP SandBox" is intended to improve students' performance and understanding towards PHP programming language. It also can be used as a diagnostic tool for the continuous improvement of student performance. The system helps educators to monitor learner's progress and make any recommendation as needed. Furthermore, the product can be commercialized as an eBook, App, Print Publication and Paid Online Learning Content. However, it would be a mistake to believe that any solution or approach to be perfect. Likewise, for PHP programming, there are indeed inherent limitations of using it such as complex project demands a certain level of experience, not everything in PHP is easy to do, the code is available in plain sight and other. But in near future hopefully, all kinds of these limitations can be overcome with more stable, flexible, and secure.

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