Development of Instructional System for Competency Enhancement in Website Programming Skills

T. Yingthawornsuk, S. Suwannakhun, K. Kwansomkid, N. Sarak and S. Rungsawang

Abstract—Nowadays, the internet plays increasingly important role in our daily life. Because the internet can give us access to a lot of information, and a variety of news and social media. It can also facilitate our communication, opinion, and sharing information, instant news, and recent education technology. Most people use social technology for education purpose and doing some research. Since the modern communication technology is very fast in transferring and sharing information. Therefore, people who want to study any new kind knowledge can simply access to online internet. In this work based on the evaluation result from the users' satisfaction, the developed website named "ModShare" was designed, tested, and evaluated for the skill requirement of website developing in learners. From the sample, it can be concluded that the website quality evaluated by experts in Media Technology shows at high level with mean and S.D. values of 3.87 and 0.18 respectively. It can be concluded that the quality of the website based on the experts' opinion is also at high level with mean and S.D. values of 3.99 and 0.57 respectively. The findings form study could be supportive of learning through Internet and website that are designed carefully with knowledge analysis and earning competency for users afterward accessing through the proposedsystem.

Keywords— Internet, Web, Programming and ModShare.

I. INTRODUCTION

Nowadays, information and communication technology play a very important role such as the use of computers network in work, searching for information, or exchanging information or massage via mobile phone to communicate in public or private organizations. Information and communication technology have been used at all levels of the organization. These technologies are beneficial to human life in many ways, namely 1) education, 2) medical and public health, 3) agriculture and industry, 4) banking, 5) security, 6) transportation, and 7) Commerce. These are considered to create opportunities for competitive advantages for organizations. The internet is a technology that is more useful for education as it has become. It is an educational medium of the modern world, which is the reason for the popular use of the internet in teaching activities. According to a survey of educational value of activities on computer networks

T. Yingthawornsuk, S. Suwannakhun, K. Kwansomkid, N. Sarak and S. Rungsawang, Department of Media Technology, King Mongkut's University of Technology Thonburi, Thailand

throughout the United States by Bank Street Teachers College in 1993, it has been found that activities on the computer network helps to open the world to learners. Teaching activities on the network results in learners to be more aware about society, culture, and the world because the educational network on the internet allows learners to be able to communicate quickly with people around the world in an interactive way. The instant interactions such as Chat, Talk or other services such as e-mail, WWW, FTP, etc. allow learners to search for information from all over the world, regardless of whether where the information comes from or how the information has been created.

The MOOC (Massive Open Online Course) has been adopted, which is a form of online teaching and learning that allows students to learn through the website that is designed and created. This MOOC is innovative and new in the world of education, where students can study through online learning activities such as watching videos, reading various Text/Infographic, question and answer session, and quiz examination. It is also possible to link between online courses and various educational technology tools. This is a focus of our study in a website-based learning system. We use JavaScript coding in development of website and online teaching.

Because the programming and designing skills with more experience in developing the websites are considered to have many benefits. They can help to promote the competitiveness in the business sector in marketing sector. It creates a good image, modernity, and credibility to companies and businesses. It acts as a consultant to find the resolution of problem and it always provides some advice on products or services to customers 24 hours a day without waiting for opening hours of store but online service that can trade, access from anywhere and increasing sales on products in effective way.

According to benefits that internet provides, therefore, in this work we have used the internet in conjunction with teaching and learning techniques to develop a learning system that can improve the programing skill in learners. The targeted learners are all students who are now studying in Media Technology Program, King Mongkut's University of Technology Thonburi, Thailand and extending to people in public, who are interested in creating a website. Evaluation of quality and satisfaction toward the website that is developed is

determined for improvement of website by collecting and summarizing the opinions from experts in area of website design and the users' feedback on their satisfaction on website in many aspects.

All sections presented in paper are organized as follows. Related work describes the research reports from the past. Methodology presents the details of techniques that are used in this work. Implementation shows how the study is conducted and the result of study is obtained. Next section is results and discussion, and finally Conclusion of study.

II. RELATED WORK

Phichit W. [1] mentioned from the storyline HTML, the web writing language, HTML is a form of computer language used to create web pages to store the desired information in the form of a hypertext document (Hypertext) that can link web pages from one to others by the structure of HTML. There are diacritics or tags used to control the display of text, images, tables, and other objects through a web browser.

Yuthapong Y. and Chatchawan I. [2] from the web interface design project said that the Link Interfaces use the Menu Page, Pymarid interface and not use more than 3 types of fonts on the same webpage. The suitable font size for general use on the website should be 13.3 points as average size. The appropriate background color should be light colors such as white or light gray. The opposite colors should be chosen to use not more than two colors.

Techatat T. [3] had reported the research result on Mobile phone image recognition analysis. The result of study suggests that the image (ICON), which is the most effect on human visual perception, is a real picture or virtual (Realistic) that contains the most realistic details. There is a clear definition of the picture. An image that can communicate well is a picture that has more than one composition.

Narong M. et al [4] conducted the research on the development of a teaching system for improving the computer programming abilities in the secondary school students. This research group aimed to study the factors that can affect the learning of students and approaches used in programming. Then development of teaching system was made, and the effectiveness of system was evaluated in terms of analysis, design, development, implementation, and samples collected from a group of junior high school students. The result of study has been shown that the following factors, which are personality, academic competence, special qualifications, social factors, and other supporting factors affect the learning on computer programming. Using a special learning style specifically can maximize the learners' abilities and competency. Also, the learning achievement in terms of knowledge, comprehension and computer programming skills was found in learners after learning through the teaching system to be significantly higher than before at 0.05 level.

III. METHODOLOGY

A. Website platform design theory

User Experience (UX) is the expectation of the desired outcome from problem solving. It could be simplicity, luxury or whatever which depends on the context in which happened while encountering a problem. For example, a customer who always buys products with cash has made a purchase with a money transfer application with the QR Code. If we want to make a new application for people who want to use it, we must adjust it to fit the need of people in terms of convenience and easy to use, less steps and processing time to complete the order such as Apple Pay or Google Pay.

User Interface (UI) is the design of various platforms that businesses interact with users, such as websites, applications, games, etc. where the design must be attractive, simple, concrete and looks beautiful and colorful for user to use that application. Moreover, the design should also be outstanding and easily understandable on how to use it.

B. Software

A set of instructions that are written by a programmer so that the computer works on the specific purposes embedded in program. Software can be divided into two types which are Operating System Software and Application Software. In this works we used Visual Studio Code, Adobe Illustrator and MySQL.

C. Website design elements

In designing a website, it must be simple, easy to understand, consistent, structural, and not too complicated confusing. The content must be complete, high quality, and easy to use and has a design stability.

IV. IMPLEMENTATION

A. Operation procedure

First, we collect data and analyze all preliminary data. Second, objectives of study are made and then the scope of study is drawn as a boundary of work. Then, we plan and create the content on website. The website is tested and evaluated with experts and finally improved for the latest modification of system.
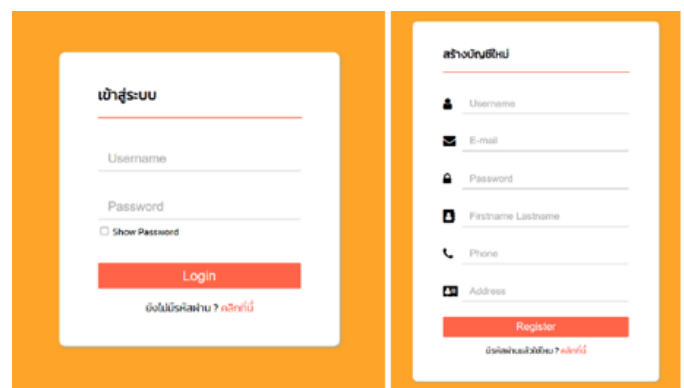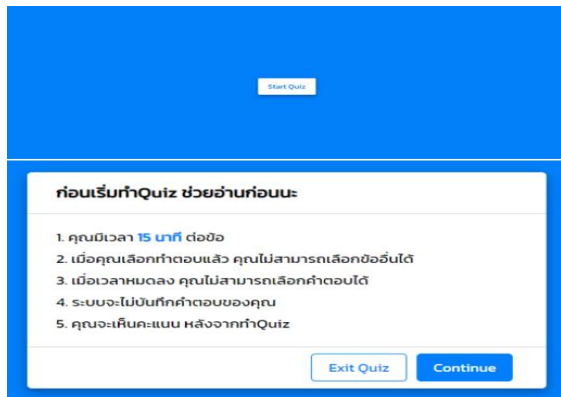

Fig. 1. Webpage of Login and Subscription

Fig. 2. Webpage showing instruction on how to take a quiz after learning
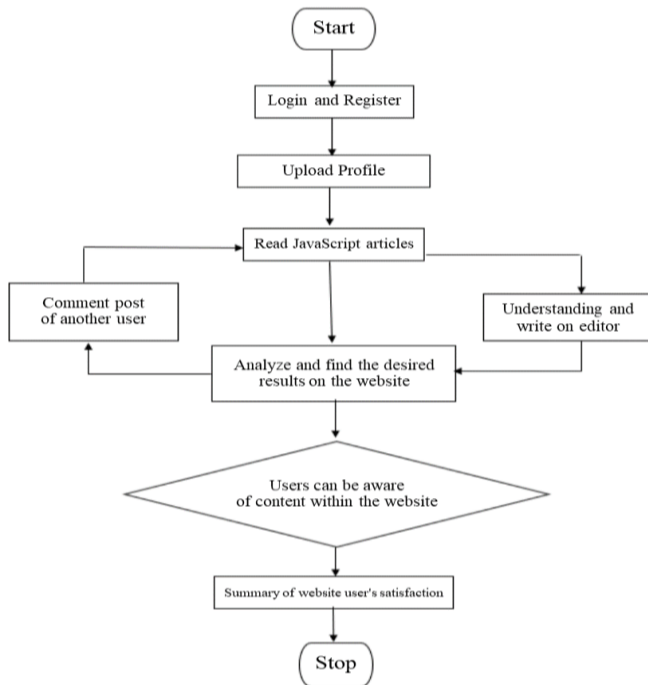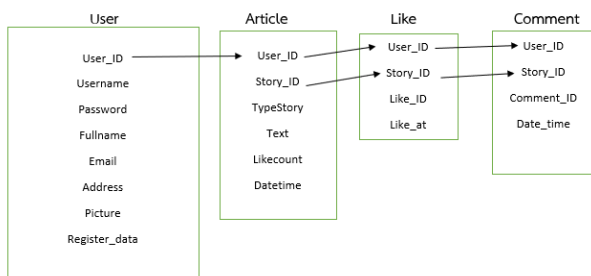

Fig. 3. Flowchart of website development

Fig. 4. Database Model

B. Population and sample

1) Population

The participants, who voluntarily involve in this web-based learning system, are the undergraduate students at King Mongkut's University of Technology Thonburi, studying in a program of Media Technology. Their satisfactory feedback toward the website is collected and evaluated.

2) Sample

Thirty students who are between 18 and 25 years old join the study and fill in their feedback opinion. In data analysis, a random sampling method (Accidental sampling) is used. Data are collected directly from a group of samples through the satisfaction questionnaire.
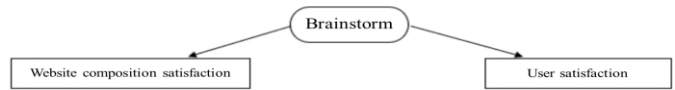

Fig. 5. Satisfactions from brainstorming

C. Evaluation details

1) Interaction

 a) Users can understand the neglect in website.
 b) Users can understand the different systems in website.
 c) Users are satisfied when people read their messages.

2) Application

 a) The website can provide knowledge about Java Script.
 b) The website can work correctly.
 c) The website is easy to use and suitable for users.
 d) The website is useful to users.
 e) Overall satisfaction with website'

3) Design

 a) UX/UI design'
 b) The layout of the website is easy to understand.
 c) Colors and images are suitable.

D. Satisfaction level

- Level 5 means Excellence.
- Level 4 means Good.
- Level 3 means Fair.
- Level 2 means Improvement required.
- Level 1 means Poor.

E. Quality level

- 4.50 - 5.00 means that the website is excellent.
- 3.50 - 4.49 means that the website is good.
- 3.00 - 3.49 means that the website is at fair level.
- 1.50 - 2.49 means that the website needs improvement.
- 0.50 - 1.49 means that the website is poor.

V. RESULTS AND DISCUSSION

As the results of satisfaction made on the components of the website shown, the users' feedback suggested that how to use the subscription and Login windows is easily understandable. The website can be used comfortably and arrangement of all elements within the website in order, convenient, and easy to understand. The character display format is correct as it is written. The layout of the elements on the screen is

appropriate. The font style is appropriate. The button placement and various display messages are appropriate. The font size is appropriate. The font color is appropriate. The satisfactions on attributes mentioned above were found to be at high level with mean values between 3.88 to 4.5. The attractiveness of the website was at a moderate level with mean of 3.55. For the overall satisfaction it shows at a high level with a mean of 3.99.

The users' satisfactions toward the website on the appropriateness of the composition of the website, the suitability of the buttons, the ease of understanding on how to use the website, and the feeling of returning to the website were found mostly at high level with respective mean values of 4.44, 4.02, 3.85. and 3.55. Its overall satisfaction is at high level with a mean value of 3.96, and by the experts' opinion with a mean of 3.99 respectively.

In the satisfactions of users on the following terms: Membership & login window, design of website background, elements of website, display of text, use of color images, font style, size and color, button element layout, and attraction to use, were found to be at high levels with a range of mean values between 2.66 to 4.33. The overall mean value of 3.96 can be found for the users' satisfaction om the components of website. In terms of website development, the following features, which are comprising of text display, order of display on the screen, using to improve the cognitive development, using the Edit window to program on the website, accuracy and suitability of website layout were satisfactorily found for their mean values between 3 to 4. The overall mean value results from the experts' opinion found at 3.87 which is at high level of satisfaction.
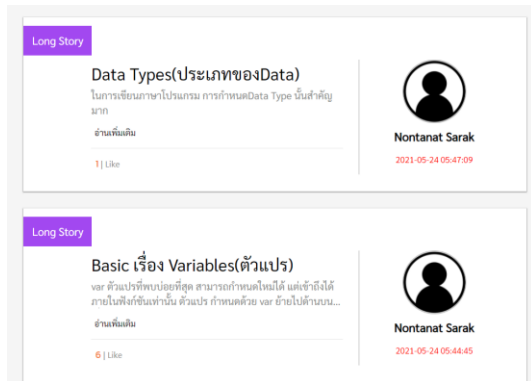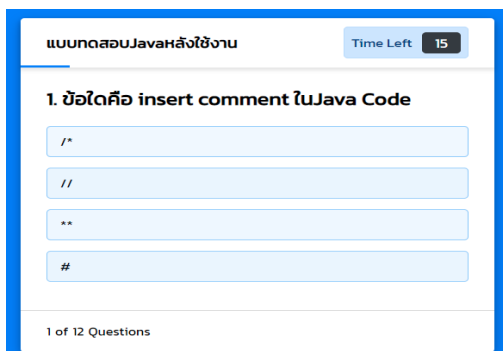

Fig. 6.   User profile

Fig. 7.   JavaScript knowledge on a test question

TABLE I.   QUALITY ASSESSMENT RESULTS

Items	Mean	S.D.	Quality level
Users' satisfaction			
Components of website	*3.99*	*0.577*	*Excellent*
Users' satisfaction	*3.96*	*0.560*	*Excellent*
Experts' satisfaction			
Elements of website	*3.96*	*0.230*	*Excellent*
Development of Website	*3.72*	*0.096*	*Excellent*
Total Average	***3.91***	***0.366***	***Excellent***

Fig. 8.   Post on basic knowledge of JavaScript array

VI. CONCLUSION

The development of website-based teaching system contributes the knowledge and information regarding design and programming of website to users. The practical skills of web programming in users can be improved after learning from the system. To assess the quality of the website that was developed and the satisfaction of the users toward the website, questionnaires survey forms were used to collect sample data and then evaluated from both experts and website users.

As the result of evaluation made on the users' satisfaction toward the website, the "ModShare" website was evaluated for skill of website developing in learners by experts. From the sample collected, the satisfactions on attributes mentioned in results were found to be at high level with mean values between 3.88 to 4.5. For the overall satisfaction It can be concluded that the quality of the website is at a high level with a mean and S.D. values of 3.99 and 0.57 respectively. The quality improvement of the developed website based on evaluation scores that were obtained will be further steps in modification of system.

ACKNOWLEDGMENT

REFERENCES

[1] Phichit Wichitbunrak, Computer Language HTML, Executive Journal Bangkok University, No.3: 1, 2011, Pathum Thani, Bangkok University, Thailand.

[2] Yuthaphong Yanyothin and Chatchawan Inthusamit, "Website Interface Design" Thesis, Faculty of Architecture and Design Graduate School. Rajamangala University of Technology Rattanakosin, 2015, Nakhon Pathom, Thailand.

[3] Techatat Thumnitakit, "Analysis of mobile phone icon perception", Department of Media Arts and Design Graduate School, 2006, Chiang Mai University, Chiang Mai, Thailand.

[4] Narong Manosudhirit and Montree Yamkasikornm, "Teaching System Development for Developing computer programming ability", Ph.D. thesis, 2013, Thailand.

[5] Thai Programmers Association, UI vs. UX: What is the difference between user interface and user experience, 2017, www.1belief.com. https://doi.org/10.22224/gistbok/2017.2.5

[6] Basic web design principles with elements and structure layout, 2017, www.1belief.com.

[7] Manop Chan, "JavaScript Language", 2021, www. marcuscode.com.

[8] Website making company: Roles, functions, benefits and importance of the website, 2019, www.article.co.th

Sarayut Rungsawang graduated for Bachelor's degree in of Media Technology, King Mongkut's University of Technology Thonburi (KMUTT), Bangkok, Thailand in 2020.

haweesak Yingthawornsuk works with department of Media Technology, King Mongkut's University of Technology Thonburi, Thailand. He graduated for Ph.D. degree in Electrical Engineering from Vanderbilt University, TN, USA in 2007.

Sirimonpak Suwannakhun works with Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi, Thailand. She graduated for Ph.D. degree in Program Learning Innovation and Technology, King Mongkut's University of Technology Thonburi (KMUTT), Bangkok, Thailand in 2017.

Kantapat Kwansomkid studies with department of Media Technology, King Mongkut's University of Technology Thonburi, Thailand. He graduated from Bangpakok Wittayakom school, Thailand in 2020. with Science and Mathematics degree.

Nontanat Sarak graduated for Bachelor's degree in of Media Technology, King Mongkut's University of Technology Thonburi (KMUTT), Bangkok, Thailand in 2020.