"The EUrASEANs: journal on global socio-economic dynamics"
Volume 1 (20); January - February, Year 2020;
ISSN 2539 – 5645 (Print)

on-line access: https://www.euraseans.com/1(20)

SMART CLASSROOM IMPROVEMENT USING WEB APPLICATIONS

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This paper presents the development of web applications to support smart classroom. This research describes the web application which teachers and students can use on their mobile devices such as smartphones, tablets or laptops. The core idea behind this study is that web application motivates students to study in the classroom. The population of our research is

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50 Computer Engineering students. The survey shows that the ease of using the application scores 4.40. The functions of the application score 4.44. The run time performance scores 4.32. Finally, user experience scores 4.48. and User Interface scores 4.44.

Keywords: smartphone; tablet; smart classroom; web application

Introduction

Education in Thailand remains to be very much traditional. Smart classroom is still an innovation in Thai education as it gradually integrates advanced technologies into classroom learning process. Both directly and indirectly, it improves the education performance.

Despite the supporting function of smart classroom, there are several limitations in its use in class. First and foremost, teachers need to understand tools and equipment to be used in a smart classroom before they actually start using. One of the most popular examples in this regard is smart board which is smart classroom equipment similar to touchscreen monitor in its principles of work. It can be operated by a hand or a smart marker. Moreover, it has a computer connected to it to process data and show the output on the smart board. The students can interact with the large area of this board. However, students still need to study inside the smart classroom, and this is the major limitation in the use of this equipment. On the other hand, tablets and smartphones are much more portable devices, they can be easily moved between the classroom, are more publicly available and require significantly less skills in use.

This research aims to study web applications' use inside the smart classroom environment. Such applications are, in particular, used to improve the performance in the course of learning at Suan Sunandha Rajabhat University (Bangkok, Thailand).

There is a range of previous works regarding smart classrooms and the related web applications. In 2001, Xie W. et al. developed a smart classroom concept for the so-called teleeducation. Now teachers can write on a wall-size media-board just by their hands, or use speeches and gestures to conduct in-class discussions involving even long-distance students in them. In 2008, Suo, Y. et al. developed a real-time interactive virtual classroom, also for teleeducation, which involves using mobile devices of students. It got the name of Open Smart Classroom. In 2010, Sevindik presented the so-called Future's learning environment, designed specifically for healthcare education.

The positive effects of such smart classrooms on the academic achievements of the students in the involved healthcare college quickly proved the effectiveness of the smart classroom concept for the education of future nurses. Those and some other results showed that smart classroom applications are effective environments that can be used as an alternative and a supplement to a traditional face-to-face educational environment. In 2011, Williams and Pence used smartphones in the learning environment of a chemistry classroom.

They applied augmented reality and QR codes to improve interaction in their class. Finally, in our recent work, we presented the packaging label scanner application (Rattanatranurak, 2019) which has been developed on the Android operating system to help students increase their in-classroom performance. Our students were very satisfied with using this application.

Research Methodology

In this research, we would like to present a web application for smart classrooms, developed in and for Suan Sunandha Rajabhat University (Bangkok, Thailand). User interface has been designed taking into account user experience. The programme has been initially designed for 3 types of users: teachers, students and administrators. The first page of the application is shown in Figure 1. Types of users are predetermined automatically. To sign into our application, the users should type in their username and password. Then, pass the captcha for security purposes and click on Sign In.

Experiments and results

In this work, the survey results have been gathered from 50 users, all affiliated to the Department of Computer Engineering, Faculty of Industrial Technology, Suan Sunandha Rajabhat University. The final sample consists of 24% of the first-year students, same 24% of the second-year students, 22% of the third-year students, and 30% of the fourth-year students, see Tab. 1.

The survey questions cover such issues as the ease of using the application, the functioning of the application overall, the run time performance, user experience, and user interface scores. The results are presented graphically below, see Fig. 7 to 11.

Table 1 - Survey sample
(made by co-authors)

	number of students	percentage
1st year	12	24
2nd year	12	24
3rd year	11	22
4th year	15	30

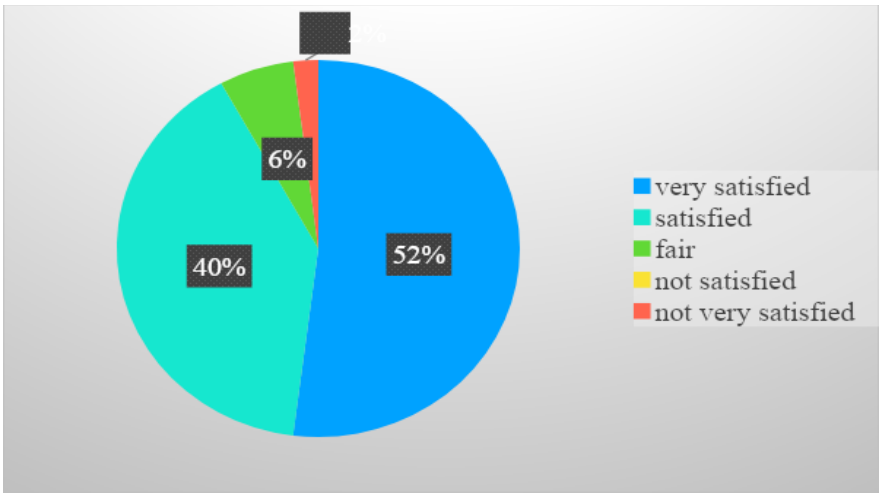

Figure 7 - Students' satisfaction with the ease of using the application
(made by co-authors)

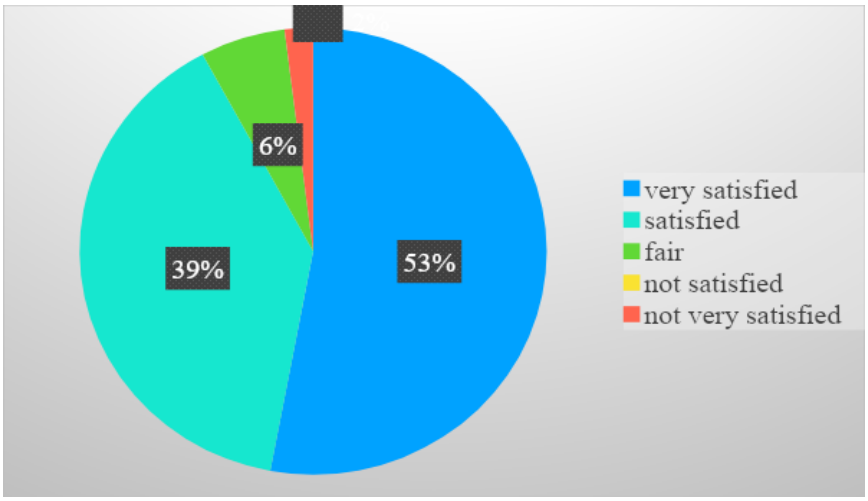

Figure 8- Students' satisfaction with the overall functionality of the application
(made by co-authors)

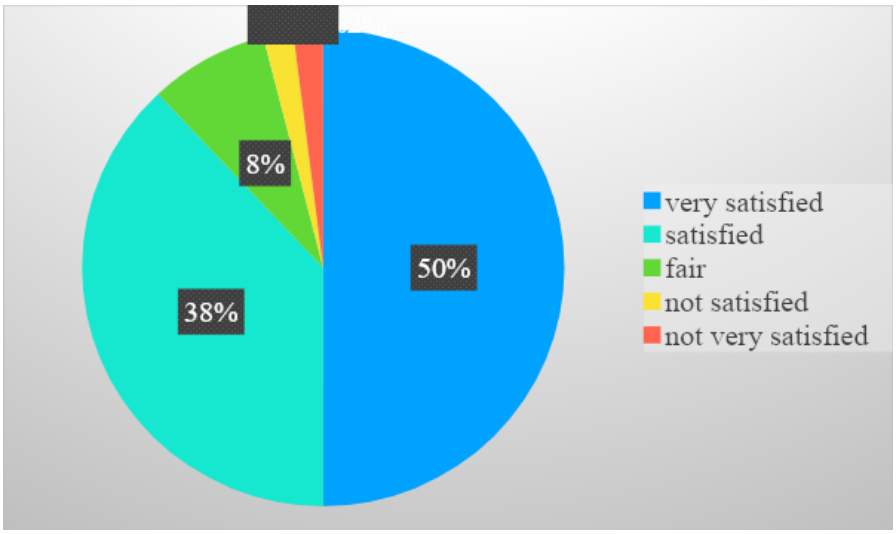

Figure 9 - Students' satisfaction with the run time performance
(made by co-authors)

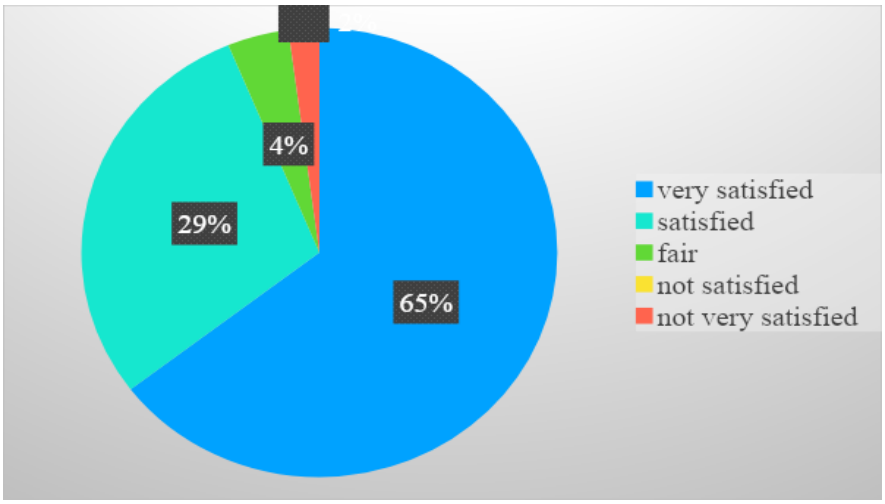

Figure 10 - Students' satisfaction with their user experience
(made by co-authors)

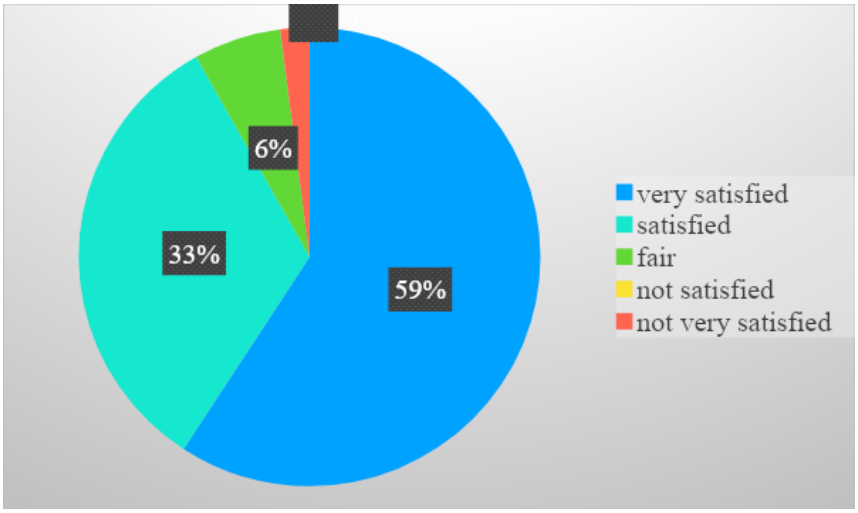

Figure 11 - Students' satisfaction with user interface
(made by co-authors)

Conclusion

In this work, we have briefly presented the locally developed web application. The application in question can be run on all smart devices, including smartphones, tablets, and desktop computers. The application has been developed for both Safari on iOS and Google Chrome on Android operating system.

Our survey shows that students' satisfaction with the application in question is fluctuating mostly between Satisfied and Very Satisfied. This result is applicable to all the parameters we were interested in. Such impressive results can be, at least partially, explained by the fact that the application indeed interacted with the users at a very fast rate of work.

The survey results also demonstrate that the ease of use score is 4.40 in total. The functionality of the application got the score of 4.44. The run time performance scored 4.32. User experience score is 4.48. Finally, user interface score is 4.44.

Considering that this smart classroom application is among the first one developed locally in Thailand, we find these high satisfaction scores to be a good starting point for further developments in the same direction.

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Paper submitted *02 November 2019*
Paper accepted for publishing *11 January 2020*
Paper published online *05 February 2020*