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Leveraging an Existing Learning Management System for Alternative Learning

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Abstract: Alternative learning is a practical option for interested learners that have not attended or finished formal basic education. In the Philippines, the Department of Education offers many alternative learning and non-formal programs for every kind of Filipino. While there have been initiatives to integrate information and communication technologies (ICT) in these programs, the use of modern ICT has not been fully realized. This study investigated the effectiveness of introducing an existing learning management system (LMS) as a supplement to the Accreditation and Equivalency Alternative Learning System (ALS) program of the Department of Education. The LMS was intended to aid learning and improve performance by enabling online access to learning materials, delivery of real-time feedback through self-checking interactive quizzes, and self-monitoring of learning progress. A dynamic quiz generation plugin was developed and integrated with Moodle to create interactive quizzes from existing static learning materials. LMS use was monitored in an eight-week implementation in two learning centers where learning gains, usability, access, response, and overall experience were assessed. Based on the analysis of gain scores between the experimental and control groups, the users of the LMS performed better in the posttest. Evaluation of the LMS yielded favorable ratings in usability, and access and response as an online learning environment. Overall, the student and teacher respondents viewed the LMS as a helpful learning tool and encouraged its use in other learning centers and in the future. Feedback and suggestions were also gathered from the respondents during evaluation which can be used to improve the LMS.

Keywords: Applied computing, learning management systems, human factors, Department of Education of the Philippines, Alternative Learning System, Moodle, system deployment

1. Introduction

The Accreditation and Equivalency ALS program of the Department of Education of the Philippines is a non-formal education program that provides opportunities for out-of-school youth and adults to complete their basic education. Steps have been taken to introduce ICT to ALS and one is the Radio-Based Instruction program, a variety of distance learning that uses radio broadcasts to air learning modules in very remote areas. (Acido, Muega, and Oyzon, 2013) Another ICT initiative was Project MIND which explored how using SMS can reduce dropout rates and improve performance (Ramos, Librero, Triñona, and Ranga, 2007). A blended-type e-learning program was also launched in 2007 called the eSkwela project to promote ICT use. (UNESCO Bangkok, 2009).

The ALS programs have started using ICT but most if not all of these initiatives have ceased operation. Most ALS programs also use non-interactive learning materials such as booklets and handouts in teaching. There is an opportunity to capitalize on the interactive capabilities of modern ICTs and reintroduce e-learning. The goal of this study is to adapt the current static learning materials of the ALS programs and convert them into interactive learning tools that can be integrated into a modern LMS. The LMS is expected to improve student performance by enabling wider and more convenient access to online self-assessment learning materials at the students' own pace, location, and time. The LMS will provide structure, content, and monitoring and assessment capabilities in the ALS programs that will help establish a rich learning experience for the students.

2. Research Questions

This study intends to answer the question "*How should an existing learning management system be used to be an effective supplement to ALS sessions?"* through the following questions: (1) What is an appropriate online learning environment for the ALS materials? (2) What functionalities of the chosen learning management system will be used and developed? (3) How will the student progress be monitored? (4) What measures will be used to determine the effectiveness of the learning management system? Based on these measures, how effective is the learning management system? (5) How will the learning management system be evaluated? (6) What is the overall students' experience in using the learning management system? (7) How will the learning management system be sustained after its deployment?

3. Results

What is an appropriate online learning environment for the ALS materials? Moodle is an LMS that uses shared libraries, abstraction, and Cascading Style Sheets, and was developed with a focus on the elements of the students' learning environment (Dougiamas and Taylor, 2003). Moodle was chosen in this study because it is: (1) Free - publicly available with no licensing fees; (2) Open source - highly portable, extensible, and adaptable; (3) Scalable - easily upgradable therefore regular maintenance is not needed; (4) Stable - has a 14 year history, assuring up-to-date documentation and support; (5) Intuitive - largely intuitive and can be mastered quickly; and has a (6) Community - that develops and improves features.

What functionalities of the chosen learning management system will be used and developed? The standard distribution of Moodle was used with an additional checklist plugin. The Moodle Mobile application was also utilized. A dynamic quiz generator was developed based on open source programs: pdf2htmlEX and SCORM API wrapper. Pdf2htmlEX is a PDF to HTML converter and publishing tool that allows the content to be displayed and uploaded in the web browser as originally formatted and styled (Wang and Liu, 2013). Using pdf2htmlEX, ALS PDF files were converted into identical HTML files. The files were then adapted into interactive quiz sections through the SCORM API wrapper, an open source API that enables conversion of HTML files to SCORM packages that can connect to any SCORM-compatible LMS (Hutchison, 2008). The converted quiz SCORM packages enabled saving of the quiz scores in the Moodle gradebook.

How will the student progress be monitored? Student progress was recorded for eight weeks through four one-hour sessions in the learning centers and the LMS logs. A total of 50 students and 2 teachers from two ALS learning centers participated in the study from varying age groups (15-66 years old). Student participants were randomly divided into experimental and control groups.

What measures will be used to determine the effectiveness of the learning management system? Based on these measures, how effective is the learning management system? LMS effectiveness was determined by comparing the learning gains of the experimental and control groups in written tests before and after LMS use. For the experimental group, frequency of use and logins, number of quiz attempts, and quiz and module completion rate were also used. Based on learning gains, the experimental group (M=4.2 SD=17.75 N=25) performed better than the control group (M=2 SD=13.92 N=25), $t(47)=1.95$, one-tailed $p<=0.03$. High performing students (M=25237 SD=117574523 N=13) were shown to have used the LMS more than low performing students (M=15520 SD=76135636 N=12) $t(23)=2.48$, two-tailed $p<=0.02$. No one was able to complete all uploaded modules but it was found that high performing students (M=4.46 SD=2.6 N=3) completed more quizzes than the low performing students (M=2.42 SD=0.99 N=12) $t(20)=3.84$, two-tailed $p<=0.001$. On average, a student was willing to answer the same quiz twice. High performing students (M=2.42 SD=1.16 N=13) also made more quiz attempts than low performing students (M=0.77 SD=0.17 N=12) $t(16)=5.11$, two-tailed $p<=0.0001$. Based on these data, there is significant evidence that the LMS use in ALS can aid learning and performance.

How will the learning management system be evaluated? Two evaluation tools were used: the System Usability Scale (Brooke, 1986) and the Web based Learning Environment Instrument

(WEBLEI) (Chang, 1999). Students rated the LMS a 75.5 in the SUS which is a Good rating according to SUS grade rankings. However, this score is only a C which indicates that LMS usability can be improved. On the modified WEBLEI questionnaire, students had a self-report measure of 3.95 on Access. This indicates that the LMS provided above average access of learning materials. On Response, students measured 4.35 which shows that the LMS promoted and enhanced learning. These evaluation scores are indicative of how effective the LMS is to the ALS programs.

What is the overall users' experience in using the learning management system? Overall LMS experience was gathered through a self-report and opinion questionnaire. Students reported to have a positive experience based on their answers in the questionnaires. Users also provided suggestions that can be used for LMS improvement. Overall, the students and teachers positively viewed the introduction of the LMS and were generally hopeful of future LMS versions.

How will the learning management system be sustained after its deployment? Technical, personnel, administrative, and operational aspects of the LMS were discussed. Moving forward, LMS operation will continue with support from the partner learning centers in this project.

4. Conclusion

In this study, the effectiveness of introducing Moodle to the ALS programs in the Philippines was explored in an eight-week implementation in two learning centers. In general, the LMS was positively received by the students and teachers based on evaluation and feedback. There were also substantial learning gains from the students' LMS use. As part of future work, the use of Filipino materials in the LMS and their effect on student performance are worth exploring. LMS use in this study was only implemented in two centers; therefore, deployment in a much wider scale will further determine the actual effectiveness of the LMS for alternative learning in the Philippines.

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