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Cloud-based learning to promote higher education learning skills: Study on Suan Sunandha Rajabhat University

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Abstract

This research examined the effectiveness of cloud-based learning designs in promoting higher education learning skills by 1) reviewing the students' cloud learning academic achievements and 2) examining the online lesson evaluation results. Specifically, 30 sophomore Information Science students enrolled in a cloud technology course to promote user design learning skills were recruited as the sample group. The research tools were pre-test, post-test, online lesson evaluations, Google Classroom, and Google Forms. The data were statistically analyzed to determine the means, Standard Deviation: S.D., Median, Interquartile Range: IR, and Quartile Deviation: QD and t-tests were conducted. After cloud-based learning, the student academic skills were significantly higher than before the cloud learning at a .05 significance level, improving on average from 25.57 points to 55.93 points. The cloud-based online lesson evaluation analysis revealed that the lessons designed to promote learning skills in the user experience design course were the most appropriate ($\overline{X}$ = 4.71, S.D. = 0.45, IR<=1, and QD<=0.0)

Keywords: Learning Design, Cloud-Based Learning, Academic Achievement, Higher Education

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Introduction

The policy of digital technology is applied in endorsing education, improving students to get a standard of 21st century skills. The 21st century skills also include Communications Information. The skills have been promoted a new digital technology innovation in classroom for lifelong learning. The content and supplementary material can be applied in instruction. (The national plan of digital economy and society 2561-2580 B.E.).

The information and communication technologies (ICT) industry has become increasingly important to Thailand' s economy as it allows its people to gain higher income and have a better quality of life (Office of the National Digital Economy and Society; Ministry of Digital Economy and Society 2019). ICT is also playing an important role in developing an environmentally friendly economy and society. The government is well aware of the current state of digital development in Thailand (Office of the National Digital Economy and Society. Ministry of Digital Economy and Society 2019) and its economic and social challenges in adjusting the country' s. Therefore, to enable its socio-economic development, Office of the National Digital Economy and Society has placed significant importance on developing and using ICT by developing its ICT infrastructure. In particular, Office of the National Digital Economy and Society has focused on building an extensive broadband internet network to ensure its citizens have access to information and develop the information intelligence abilities to use the information wisely, which in turn has led to a dramatic transformation of the learning and teaching landscape.

Learning methods and models are needed that align with the goals of the Thai national education plan to promote lifelong self-directed learning and develop strong, resilient, creative, versatile, analytical, and practical citizens that have strong problem-solving abilities (Chuangprakhon, Santaveesuk, & Nilsook, 2018). Therefore, Thailand's education sector has been actively developing innovative learning models to improve teaching efficiency, meet course objectives, and enhance students' cognitive, affective, and psychomotor capabilities. Courses and learning models have improved to meet the updated Thailand Qualifications Framework requirements for five identified desirable graduate characteristics. They consist of morality and ethics, knowledge, intellectual skills, interpersonal skills and responsibilities, numerical analysis skills as well as communication and use of IT. As a result, it has become important that instructors and academic staff receive sufficient knowledge to manage these different learning and teaching methods (Porncharoen, 2019). Student knowledge, skills, abilities, and overall academic achievements are generally assessed using test scores, instructor evaluations, or both. Academic achievement tests are used before and after the

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learning activities to measure the knowledge gained and evaluate student progress (Thaiposri, 2016).

Cloud technology has become more valued in modern education systems (Nookhong & Wannapiroon, 2015; Wannapiroon, Kaewrattanapat, & Premsmith, 2019). As information can be retrieved quickly and conveniently from the internet, learners no longer need to sit in a classroom because they can now learn anywhere and at any time. However, learner-instructor communication is still an important factor. Learners can also use social media to easily exchange ideas, brainstorm with other learners, and communicate with their instructors on their assignments and due dates (Matchacheep, Chukaew, & Nilsook, 2019). Cloud learning uses cloud computing technology and the internet to integrate learning resources with web technology and migrate from private servers to cloud computing systems (Plisorn and Phiriyasurawong, 2019). Therefore, cloud technology has become essential knowledge management and learning tool for developing 21st-century skills (Montre, Chukaew, & Nilsook, 2019).

The instruction in a new era must switch the learners from passive learners to active learners. Moreover, there are no boundaries in learning. The learners can choose their own pace. They can study anywhere and anytime.

The researchers are interested in Cloud-based learning to promote higher education learning skills: Study on Suan Sunandha Rajabhat University. It corresponds with national strategy and national education plan. It is under the framework of urging the 21st century instruction for Thailand 4.0.

Objective

1. To study the academic achievement of cloud learning
2. To study the evaluation result of online lessons

Literature Review

The researcher conducted a synthesis of documented data and research related to cloud-based learning to promote higher education learning skills. The main themes can be summarized as follows.

1. Applications of cloud technology to education

Classroom, a Google Application, allows teachers to create, assign, and collect their students' assignments. The teacher develops a course (class) and can then assign individual and/or group work. The associated files are uploaded from a computer to Classroom or added from Google Drive or YouTube, with links to any website. The Classroom also integrates Google Docs, Google Drive, and Gmail. The teacher can view

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the students' work, give advice and comments, and evaluate the students' work and progress. The students can join a classroom, do assignments, and communicate with the teacher and other students. Students can do their assignments directly on Google Docs, upload files from their computers to Google Drive, add links to the files on the website, and create documents, spreadsheets, and slides (Kiryakova, 2017).

Wang (2017) concluded that using cloud computing technology for online interactive services allowed users to easily in the form software as Software as a Service (SaaS) and provided efficient educational tools that allowed teachers to assign group activities to students. Therefore, this study focused on using Google Docs, the most widely-used cloud application for higher education.

2. Google applications for educational cloud computing

The Google App for Education, which is free, allows instructors, researchers, and students to access and use web applications, exchange ideas, and complete tasks using the communication and sharing tools. The Google App for Education also allows technical administrators to send messages to instructors, students, and staff for free using web-based services such as Google Mail, Google Talk, Google Sites, Google Video, and Google Calendar, and also provides productivity and collaboration tools such as the Google Docs package (Kumar, Kommareddy & Rani, 2013). The seven main aspects of the Google App for Education can be summarized as follows.

Online tools and services that enable secure communication and collaboration in schools and educational institutions and allow teachers, researchers, and students to select suitable solutions to meet their needs; Google Calendar, which is a publishable, sharable, and accessible calendar, to schedule, manage, and organize course events; Google Sites, which allows instructors, researchers, and students to create and publish content using Google tools; Google Video, which allows instructors, researchers, and students to share information using a secure and private video tool; Google Talk, which is an instant messaging service that allows colleagues to communicate over long distances; Google Mail, which has a label and filter features to help students, instructors, and researchers manage incoming and outgoing emails from other accounts; and Google Docs, which is the main course tool used to collaborate on the same document.

3. Cloud computing in e-learning

Cloud computing can be used to develop scalable platforms. Thus, schools and individuals must access the cloud to access affordable and convenient information and technology services. Therefore, the main benefits of moving to cloud services are easy access to applications, low cloud storage costs, and the scalability and flexibility of e-learning platforms (Almajalid, 2017). E-learning benefits students as it provides

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online lessons, tests, and an ability to submit comments, projects, and homework, and benefits instructors as they can manage content, conduct tests, assign projects, give comments and have forum discussions with the students (Alghali, Najwa & Roesnita, 2014).

Scope of Research

The population is a second-year undergraduate student enrolled in the User Experience Design Course at Suan Sunandha Rajabhat University.

The sample group Was 30 students in second-year undergraduate students enrolled in the User Experience Design Course at Suan Sunandha Rajabhat University.

Research Methodology

The process of analyzing the teaching context consists of

1 . Learner analysis: Learners at this level are undergraduate students who need to promote higher education learning skills such that students can apply their knowledge to their studies and work to suit the characteristics of digital learners.

2. Content analysis and objectives: The course content is a user experience design course for students in the field of information science The course content consists of the theory that students can learn online. It takes one semester to complete the course.

The research tools used in this study were:

2.1 Data Analysis of student satisfaction with cloud learning online lesson assessments user experience design course. An online lesson evaluation form for the user experience design course comprising questions on the objectives, content, lesson interactions, interface design, and learning designs, which were evaluated using a 5-point Likert scale.

2.2 Google Classroom was used to store the course code, course name, course objectives, course description, course materials, handouts, videos, pre-tests, post-tests, and exercise document files and course material, all of which were created and uploaded by the instructor for the students.

2.3 Google Forms was used to create and collect the students' pre-tests, post-tests, and exercises. the scores which were released instantly to the instructor after submission. The students' overall and question-by-question responses were displayed in charts, which allowed the instructor to analyze the answers, evaluate their difficulty, and recommend improvements for the subsequent semester. Google Forms was also used to develop the evaluation survey, with the results also displayed in charts.

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2.4 To compare the differences between the students' learning achievements before and after the experiment. t-test and dependent t-test will be used. Pre-post-tests Consist of 80 questions; 20 questions per chapter from chapters 5–8 from a user experience design course.

3. Statistics used in data analysis

1. T-test for independent samples is commonly used for comparing the academic achievement of studying with Cloud learning

2. The online evaluation from 30 students with means, Standard Deviation: S.D., Median, Interquartile Range: IR, and Quartile Deviation: QD

Research Results

The results of the comparison of academic achievement of undergraduate students of second-year information science program, 30 people before and after studying with cloud learning shown in Table 1.

Table 1. Comparison of the cloud learning student academic achievements

Test score	n	Full score	$\bar{X}$	S.D.	t-test	Sig.
Before cloud learning	30	0	25.57	8.16	12.81	.05
After cloud learning	30	0	55.93	11.89		

****p< .05**

Table 1 shows the students' cloud learning achievements were significant at a 0.05 level. The students' learning skills increased by 25.57 points on average out of a total score of 55.93 points. Therefore, the cloud learning user experience design class increases learners' learning rate, compared to traditional lectures. The results of the study show the importance of implementing cloud learning in higher education institutions to improve student achievement in higher education.

Table 2. Means and standard deviations for the cloud-based user experience design course evaluation

Evaluation Items	$\bar{X}$	S.D.	Quartiles			Interquartile Range	Quartiles Deviation
			Q1	Median	Q3		
1. Objective							
The objectives were clear and aligned with the course.	4.83	0.38	5	5	5	0	0.0
2. Content							
The content covered the specified	4.73	0.45	4	5	5	1	0.4

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Evaluation Items	$\overline{X}$	S.D.	Quartiles			Interquartile Range	Quartiles Deviation
			Q1	Median	Q3		
objectives.							
The content was accurate.	4.70	0.47	4	5	5	1	0.5
The content was divided into units.	4.73	0.45	4	5	5	1	0.4
The content was arranged in order.	4.73	0.45	4	5	5	1	0.4
3. Lesson interaction							
The resources on the website were used efficiently.	4.70	0.47	4	5	5	1	0.5
The lesson was connected to up-to-date external links.	4.67	0.48	4	5	5	1	0.5
The connected links were related to the content.	4.63	0.49	4	5	5	1	0.5
4. Interface design							
The layout was proportional and user-friendly.	4.73	0.45	4	5	5	1	0.4
The fonts, sizes, and colors of the text were easy-to-read, clear, and appropriate.	4.67	0.48	4	5	5	1	0.5
The colors used were appropriate and harmonious.	4.77	0.43	5	5	5	0	0.0
The conveyed meaning was in line with the content.	4.67	0.48	4	5	5	1	0.5
The buttons, symbols, images, and texts communicated with users appropriately.	4.67	0.48	4	5	5	1	0.5
5. Class design							
There was an interaction between the students and the lessons, the students and the instructor, and the students and students.	4.80	0.41	5	5	5	0	0.0
There were practices or exercises that covered the course objectives.	4.63	0.49	4	5	5	1	0.5
Feedback was given to provide appropriate reinforcement to students.	4.67	0.48	4	5	5	1	0.5
Students were encouraged to think analytically.	4.73	0.45	4	5	5	1	0.4
An appropriate and clear user manual was provided.	4.70	0.47	4	5	5	1	0.5
Summary	4.71	0.45	4	5	5	1	0.0

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Table 2 shows that the cloud-based online user experience design course lessons taken by Information Science undergraduate students were evaluated at the highest level ($\overline{X}$ = 4.71, S.D. = 0.45, IR<=1, and QD<=0.0) The user experience design course cloud-based academic achievements by the Information Science students were as follows.

Conclusion and Discussion

This paper analyzed the Google Classroom online learning management system to offer a cloud learning course for a user experience design course for Information Science students. The system included the course code, course name, course objectives, course materials, handouts, videos, pre-test, post-test, and course exercises, which allowed students to study the content and complete assignments on their own at any time and from anywhere had internet access. The technology effectively supported the learning and increased the students' learning efficiencies. The pre-test and post-test score means were compared using t-tests to assess the student respondents' academic achievements. An online lesson evaluation form was developed to collect the student evaluations further and improve the Google Classroom course. Consistent with the research of Alghali, Najwa, & Roesnita (2014) and Okai et al. (2014). It was found that teaching activities using prevalent learning environments and cloud-based learning technologies enable learners to learn anytime and anywhere. Online collaborative learning is most suitable for all learners considering that convenient, flexible resources are available anytime and anywhere (Nookhong & Wannapiroon, 2015; Wannapiroon, Kaewrattanapat, & Premsmith, 2019; Awan, Afshan, & Memon, 2021). The results have concluded as follows:

1. The students had an average increase of 25.56 points out of a total score of 55.93 points which was significant at the .05 level. A result is to Boontham and Cookhampaeng (2020), the average achievement scores after studying the computer-assisted lessons were higher than before. Similarly, the academic achievement comparison before and after the learning (Bangpoophamorn and Wiriyanon 2019) revealed that the students' test scores in the four-way multiple-choice questions were significantly higher than before at a .05 significance level The students' average academic achievement scores after learning were higher than before the learning, similar to the findings in Palasonthi, Phiriyasurawong, & Chatwattana (2019).

2. The online evaluation rated the learning experience at the highest level ($\overline{X}$ = 4.71, S.D. = 0.45, IR<=1 and QD<=0.0). As in Songsom, Nilsook, & Wannapiroon (2019) the student relationship management system Internet of Things evaluations was at the highest level possible because the online lessons were able to be accessed and

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studied anytime and anywhere on portable devices (Sarnok, Wannapiroon, & Nilsook, 2019). The lesson content was evaluated as meeting the objectives of each unit, and the lessons were well-designed; therefore, the overall system appeared to work seamlessly (Pengsuk, Karanyathikul, & Gerdtham, 2016).

Moreover, it caters to everyone's needs and promotes learning skills for students in higher education, particularly in the rapidly changing digital age. Therefore, it is necessary to adapt e-learning that offers a method for producing quick and easy content. such as designing and developing micro-learning content in an e-learning system with more content that supports HTML5 and H5P (Redondo et al., 2021).

Recommendation

The researcher makes the following recommendations:

Usability Research

1. Cloud base instruction can be applied in a proper way of contents both in theory and practice.

2. The online study behavior should be followed in all dimensions.

Recommendation for next steps

1. The cloud based instruction should be merged with project based instruction. The integration of online learning sources should be studied.

2. The study of micro-learning content and HTML5 and H5P should be employed with Plugin in e-learning with Cloud base learning.

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