

The Effectiveness of Using Cloud Adoption in A Non-Formal Learning Implementation

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Abstract—The cloud technology has given impact to various aspects including education. With the advance implementation of cloud in a non-formal environment, the effectiveness needs to be investigated. However, with the current adoption of cloud in a non-formal learning implementation, the effectiveness use of the services in a real implementation has not been discovered in details. Therefore, this paper will observe the effectiveness of cloud usage in the non-formal learning using the proposed Non-Formal Learning Platform (NFLP) and investigate the effectiveness base on the learners' outcome. The findings show that there is a positive significant learners' outcome in using the NFLP. This paper introduces the use of cloud technology in learning that can give impact to the learning process as learning with technology will deploy more challenges and innovation that need to be discovered in the future.

Keywords—cloud technology; non-formal learning platform; effectiveness

I. INTRODUCTION

The cloud services nowadays provide services in various sectors include the education. The capabilities of cloud services give more benefits to the practitioners and learners to implement the formal and non-formal learning with their own arrangements that align with the learning objectives provided. Nowadays, in education perspectives, the use of electronic learning (e-learning) has contributed new perspective in learning practices. The e-learning contents can be accessed anywhere and anytime by the learners with various cloud and mobile education application provided to the learners. The Massive Online Open Course, Google Docs, Learning Management System (LMS), Microsoft 365 are the examples of online education platform can be used by the learners to support their learning practices for both formal or non-formal way.

In the 21st century, the advanced use of technologies provide more options and demand to investigate more on research studies based on the future prediction and impact of having new technologies in learning [1]. Previous work effort on cloud adoption in education had discovered the benefits of having cloud in education environment. The overview and challenges of cloud adoption had showed the positive impact to the education institutions and to the learning

implementation [2], [3], [4]. Despite of the challenges and benefits provided by the cloud adopted in education, the implementation of adopted technology has not progress well [5], [6]. However recently, many education institutions started to recognize the usefulness and importance of cloud technology adoption and use it in the various aspects of education. This is a good indicator that the cloud technology will spread very fast in future [6], [7].

To improve the cloud adoption in education in the beginning and adoption stage, efforts on proposing the roadmap and cloud adoption model has been introduced [2], [5], [6]. The proposed models will benefit the education institutions to start planning the migration process of using cloud technology in the education implementation. However, there is lack of work in the deployment scenario whereby the cloud technology has already been used in the real setting of any learning implementation from the viewpoint of learning stakeholders [8]. Therefore, this paper will observe the effectiveness of using cloud services in the real setting of non-formal learning implementation by investigating the effectiveness from the learners' outcomes. Therefore, the contribution of this paper is to promote the proposed platform to be used in the non-formal learning environment and the findings will encourage the practitioners to improve the learning strategies to be added on as a new approach in teaching practices and learning implementation. This paper is organized in the following order; in section 2, the concept of NFLP with cloud services is given. In section 3, the methodology used in this research will be presented. The result and findings will be discussed in section 4. Finally, we will summarize our work in the last section.

II. THE NON-FORMAL LEARNING PLATFORM (NFLP) WITH CLOUD

For this study, we introduced the cloud non-formal learning platform as shown in Figure 1. This platform consists of learners, the cloud NFLP and smart devices used by the learners to access the cloud NFLP. The platform can be accessed by using any wireless network connections available including Wi-Fi, 3G and 4G connections that's available in the campus area. The platform can also be accessed by the learners at an anytime and everywhere basis. In the platform,

the Massive Open Online Course (MOOC) was used as shown in Figure 2, which is place in the cloud NFLP. MOOC is an online course that focuses on the unlimited participation and open access via the web. MOOC is currently been widely used in various learning implementation such as distance and open learning.

For this study, the Computer Organization course to be placed in the MOOC has been selected as in the cloud NFLP. The electronics resources of the course will be placed in the MOOC by referring to the chapters provided. Most of our learning resources available for the course are in a various way such as online slides, URL links and videos on YouTube. Other than that, the MOOC provides forum and chat session for the learners to have a discussion and exchanging ideas and information regarding the chapters and course. In addition, the noticeboard are also provided in the MOOC that will benefits the learners for any latest information provided by the practitioners.

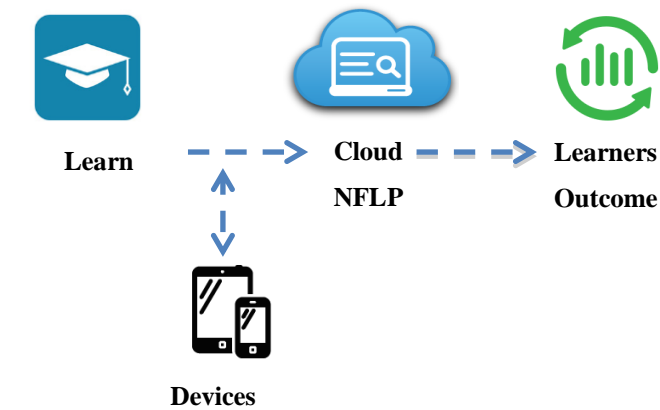


Fig. 1. Cloud Non-Formal Learning Platform (NFLP)

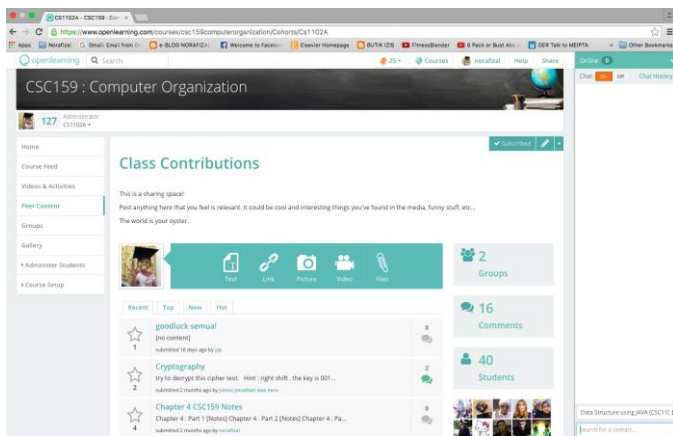


Fig. 2. The Massive Open Online Course platform

III. METHODOLOGIES

For this research, we have selected one course to be used in the NFLP. The class consists of two groups and the selected

students are from semester two, Diploma in Computer Science at UiTM Cawangan Pahang Kampus Raub, Malaysia. The class will consists of control group and the experiment group which the experiment group will use the NFLP in their non-formal learning implementation. The experiment group has been guided to use the NFLP during the first week of the class. Each topic in the course has been included in the NFLP and it consists of seven chapters which most of the media use in the platform represent each chapter by using various learning media such as text, web link, Youtube and others. For every learning session, the students will have to log their attendance in the forum provided by the practitioners. After the registration, students can start their non-formal learning in one hour provided to them to learn the chapter by using any media provided for each chapter. The continuous assessments, which include test, quizzes, assignments, lab tutorial will be provided for the specific weeks and the final exam will take place at the end of the semester.

IV. RESULTS AND DISCUSSIONS

The NFLP will cater the participations for every learning materials accessed by the users during every session of the non-formal learning by the learners. Table I shows the percentage of the learners' participation based on the course materials available in the MOOC.

TABLE I. LEARNERS' PARTICIPATION IN THE NFLP BASED ON COURSE MATERIALS

Course Materials	Coverage (%)	Total Views	Average Time spent (min)
CSC159	100	840	34.20
Course Feed	92.68	1063	28.22
Slide: Chapter 1	90.24	139	23.18
Slide: Chapter 2	78.05	51	17.54
Video	17.07	12	15.34

The learners' outcome based on the continuous and final assessment for both controlled and experimental group is shown in Table II.

TABLE II. MEDIAN AND AVERAGE FOR LEARNERS' CONTINUOUS OUTCOME BASE ON CONTROL AND EXPERIMENTAL GROUP

Continuous Assessments	Median		Average	
	CG*	EG**	CG	EG
Test 1	23.5	23.5	24.87	24.65
Test 2	24.5	23	24.41	25.14
Lab Test	10	12	10.1	11.21
Ongoing Assessment	32.33	33.03	32.61	33.28

CG – Control Group, ** EG – Experimental Group

TABLE III. MINIMUM AND MAXIMUM MARK FOR LEARNERS' CONTINUOUS OUTCOME BASE ON CONTROL AND EXPERIMENTAL GROUP

Continuous Assessments	Min Mark		Max Mark	
	CG	EG	CG	EG
Test 1	15	12.5	39.5	39.5
Test 2	12	15.5	43.5	39.5
Lab Test	3.5	3	20	19
Ongoing Assessment	25.33	27.68	40.73	44.08

CG – Control Group, ** EG – Experimental Group

For the continuous assessment marks on average as shown in Table II, there is a difference for each group indicating that there is significance on using the introduced NFLP platform for the experiment group that will guide and help learners' to learn in their non-formal learning environment. There is also a positive improvement on the marks given by the experimental group for the minimum, maximum and for the total ongoing assessment marks. It had shown that the experimental group led the controlled group in the overall assessments by using the proposed NFLP with the MOOC (Table III). This is because the availability of the introduced learning platform also may encourage the learners to learn by themselves and also penetrated the use of the platform in their group studies that may enhance their learning initiatives provided for them to learn.

TABLE IV. MEDIAN AND AVERAGE FOR LEARNERS' OUTCOMES BASE ON FINAL EXAM ASSESSMENT BASED ON CONTROL AND EXPERIMENTAL GROUP

(Part A: Objectives)	Median		Average		
	CG*	EG**	CG	EG	
	13	12	12.7	12.8	
(Part B: Structure)	Median		Average		
	CG*	EG**	CG	EG	
	Question 1	2	2	1.82	1.53
	Question 2	4	5	4.02	4.17
	Question 3	6	6	5.95	5.95
	Question 4	6	7	5.98	6.84
	Question 5	1.5	1	1.31	1.16
	Question 6	2.5	2.5	2.41	2.39
	Question 7	1	1	0.91	1.16
	Question 8	3	3	3.28	3.71
(Part C: Case Study)	Median		Average		
	CG*	EG**	CG	EG	
	Question 1	2.5	2.5	2.76	3.26
	Question 2	4	3	3.66	3.41
Question 3	6	7	5.65	6.11	

CG – Control Group, ** EG – Experimental Group

TABLE V. MINIMUM AND MAXIMUM MARK FOR LEARNERS' OUTCOMES BASE ON FINAL EXAM ASSESSMENT BASED ON CONTROL AND EXPERIMENTAL GROUP

(Part A: Objectives)	Min Mark		Max Mark		
	CG	EG	CG	EG	
	6	6	6	6	
(Part B: Structure)	Min Mark		Max Mark		
	CG	EG	CG	EG	
	Question 1	0	0	0	
	Question 2	1	1.51	1	1.51
	Question 3	2	1	2	1
	Question 4	0	0.5	0	0.5
	Question 5	0	0	0	0
	Question 6	0	0	0	0
	Question 7	0	0	0	0
	Question 8	0	0.5	0	0.5
(Part C: Case Study)	Min Mark		Max Mark		
	CG	EG	CG	EG	
	Question 1	0	0	0	
	Question 2	0	1	0	1
Question 3	1	1	1	1	

CG – Control Group, ** EG – Experimental Group

For the final exam outcome shown in Table IV and V, the average outcome for each question for the experimental group had shown that out of twelve questions provided in the final examination, seven questions lead on average by the experimental group and the remaining questions lead on average by the control group. Meanwhile in the minimum and maximum marks allocation, the experiment group had shown better performance for certain questions type. The group had scored maximum in part A questions while in part B, the group dominated three questions and equal with the controlled group for the remaining questions. However, in part C type of questions, which is more towards problem solution type of questions, the experimental group lead in two questions for both the maximum and the minimum marks. From the findings we can conclude that, there are benefits of the NFLP as an alternative platform for the learners to use in conducting their non-formal learning implementation. This will also motivate the learners to learn as the technology of using cloud in learning has shown a positive significance to the learners and the outcome of their achievements in learning.

V. CONCLUSION

In this study, we have introduced the development of NFLP as a new platform in implementing learning in the non-formal way. Therefore, to evaluate the effectiveness of the NFLP, we have proposed the use of cloud based online learning, MOOC to be included in our proposed NFLP. From our own practiced and implementation of the NFLP and MOOC into our non-formal learning implementation, we had

seen the effectiveness of having the proposed platform to be adopted into the non-formal learning implementation. With a positive significance on the learners' outcome which based on the ongoing and final assessments, it has shown that there are benefits in the adoption of cloud into the learning implementation. With the advanced cloud availability and impact, it will give benefits the learners in various aspects and also penetrated the positive outcome for the learners to motivate them to learn independently [3], [8]. Therefore, further exploration on a bigger sampling size and enhanced usage of the NFLP development may give another opportunities and challenges that need to be discovered in the future as the cloud has promising wide opportunities in making learning process better and easier for the learners.

REFERENCES

- [1] R. Ali and V. Irvine, "Current m-learning research: A review of key literature", In T. Bastiaens et.al (Eds.), In *Proceedings of the World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2009*. pp. 2353–2359.
- [2] A. Alharthi, F. Yahya, R. J. Walters, and G. B. Wills, "An overview of cloud services adoption challenges in higher education institutions", In *Workshop on Emerging Software as a Service and Analytics - ESaaS 2015, Lisbon, PT, 20 - 22 May 2015*. pp, 102-109.
- [3] R. Alsufyani, F. Safdari, and V. Chang, "Migration of Cloud Services and Deliveries to higher Education," In *Emerging Software as a Service and Analytics 2015 Workshop (ESaaS 2015)*, in conjunction with CLOSER 2015, Lisbon, PT, 20 - 22 May 2015.
- [4] N. Sultan, "Cloud Computing for education: A new dawn", *International Journal of Information Management*, 30, 2010, pp.109-116
- [5] S. Okai, M. Uddin, A. Arshad, R. Alsaqour and A. Shah, "Cloud computing adoption model for universities to increase ICT proficiency", *SAGE Open*, 4(3), 2014. 2158244014546461.
- [6] S. A. Mokhtar, S. H. Shaikh Ali, A. Al-Sharafi, and A. Aborujilah, "Cloud computing in academic institutions", In *Proceedings of the 7th International Conference on Ubiquitous Information Management and Communication (ICUIMC '13)*. ACM, New York, NY, USA, 2013
- [7] D. G. Chandra and M. Borah, "Role of cloud computing in education", In *Proceedings of the International Conference on Computing, Electronics and Electrical Technologies (ICCEET) 2012*. pp. 832-836
- [8] J. A. González-Martínez, M. L. Bote-Lorenzo, E. Gómez-Sánchez, R. Cano-Parra, "Cloud computing and education: A state-of-the-art survey", *Computer & Education*, 80(1), 2015, pp.132-151.