International Journal of Business and Management Invention
ISSN (Online): 2319 – 8028, ISSN (Print): 2319 – 801X
www.ijbmi.org || Volume 6 Issue 10 || October. 2017 || PP—97-102

The influences of MOOCs teaching and accounting literacy on learning effectiveness: Quasi-experimental design method

Yu-Je Lee
Takming University of Science and Technology, Taipei City
E-mail of corresponding author: pyj@takming.edu.tw

ABSTRACT: *This study aims to explore the impact of MOOCs teaching of teachers and accounting literacy of students on learning effectiveness in accounting classes in a college in Taiwan. In this study, we use Purposive Sampling method to sample the population. The main subjects were college students who had taken (or were taking) Principles of Accounting and teachers who had taught accounting courses in a college in Taiwan. Moreover, data was statistically analyzed by "Covariate Analysis of Two-Factor Single Covariate" (i.e., two independent variables, one dependent variable and one covariate) of quasi-experimental design method. The results show that (1) MOOCs teaching has negative but insignificant impact on post-test learning effectiveness, compared with pilot-test learning effectiveness; (2) accounting literacy has positive and significant impact on post-test learning effectiveness, compared with pilot-test learning effectiveness; and (3) MOOCs teaching and accounting literacy have negatively but insignificantly interactive impact on post-test learning effectiveness, compared with pilot-test learning effectiveness. These results can be provided as references to the teachers teaching accounting in technological and vocational schools and decision-making authorities in education field for teaching and formulation of education policies, respectively.*

Keywords -*MOOCs Teaching, Accounting Literacy, Learning Effectiveness, Quasi-Experimental Design Method*

Date of Submission: 09-10-2017 Date of acceptance: 31-10-2017

I. INTRODUCTION

More than a decade ago, Massachusetts Institute of Technology began a controversial program called Open Course Ware, which provided all course information on the web free of charge. However, the vast majority of the information is limited to text, such as class notes. Many colleges and universities also had provided free courses in the same way. Nevertheless, no homework had been provided and no one had tracked students' learning conditions and ensured the students' understanding of the concepts expressed in the courses. MOOCs program included these elements【1】. Furthermore, because of the prevalence of e-teaching, especially the implementation of massive open online courses (MOOCs), it has become the new trend in digital learning【2】.The focus of modern talent cultivation emphasizes forward-looking, innovative, diverse and international characters. MOOCs and experimental teaching strategies are required to connect the industry and academia to achieve the above objectives.

With the advent of knowledge-based economy era of information internet technology, Bergmann & Sams【3】adopted inverted instruction, which requires students to preview curricula, and blended learning, which mixes internet teaching and traditional classroom teaching, to help students achieve higher level of learning objectives. In this process, the students must be responsible for their own learning. They can also receive personalized learning assistance at the same time.

In addition, according to the literature, many professors were concerned about the participation in MOOCs mainly because they were unfamiliar with the new type of teaching model. The institutions also worried that the courses developed under the new teaching mode will cost too much of their funding, time and human resources. Therefore, it would be helpful to have an in-depth understanding of the course of participation of the university teachers who have participated in the MOOCs and the technological requirements and other relevant problems they have faced in the course of teaching material design and preparation, as well as organizational management in classrooms and the support they need. Such information can be provided to other university teachers, schools or institutions as an important consideration for their development of MOOCs【4】.

Moreover, over the years, colleges of management of Taiwan's technological and vocational colleges have treated accounting as a compulsory course according to the standard curriculum guidelines of the Ministry of Education because accounting is one of the basic courses that enable the students to acquire advanced

financial knowledge. It is worthwhile to explore whether the interest in reading and ability to read Principles of Accounting-related materials nurtured in high schools and vocational schools and the degree of literacy of Principles of Accounting (including bookkeeping) affect the learning effectiveness of the students in advanced accounting courses offered by the technological and vocational colleges.

Therefore, based on the above motivations, this study adopted the Covariate Analysis of Two-Factor Single Covariate of quasi-experimental design method, and sampled the population consisting of students who had taken (or were taking) Principles of Accounting and teachers teaching accounting courses in a college in Taiwan. The main objectives are summarized as follows:

(1) To understand that whether MOOCs teaching has negative and significant impact on post-test learning effectiveness;
(2) To understand that whether accounting literacy has positive and significant impact on post-test learning effectiveness; and
(3) To understand that whether MOOCs teaching and accounting literacy have negatively and significantly interactive impact on pilot-test learning effectiveness.

II. LITERATURE REVIEW

Definition and Constructs

Definition of MOOCs teaching and accounting literacy and their related literature

The conceptual definition of Massive Open Online Courses (MOOCs) in this study is defined as "large-scale open online courses made available to a large number of online users through the Internet so that the users can participate in the learning course." Such definition is summarized from the following literature.

MOOCs were proposed by Canadian scholars Bryan Alexander and Dave Cormier in 2008. Teachers and students were connected through a topic, and the students had to preview the content of the course through a website before class, actively participate in discussion and exchange during class, and interact with other students through various social network tools after class. This mode is called cMOOC. Another mode, called xMOOC, has been developed since 2011. The teachers used short videos to teach, and supplement their teaching with tests and homework as well as learning interaction. Through the leaning platform, the teachers can understand the effectiveness of learning.

Tu【4】pointed out that MOOCs can increase the communication between teachers and students, making it a two-way interaction, which is close to traditional classroom learning. MOOCs can be divided into two types. One is cMOOCs in which the teaching principles are based on connectionism. The other is xMOOCs, which requires large investment and complete course and schedules, including tests, assessment and pass criteria, and offers certificates.

McAuley, Stewart, Siemens, & Cormier【5】argued that MOOCs is an aggregation phenomenon started in 2008. MOOCs converged and integrated various social networks and experts approved by various academic fields. It also accumulated free and easily accessible internet resources as teaching and learning materials, forming a large-scale learning network. The curricula were also formed from the interaction and exchange among the participants.

Ho【6】pointed out that MOOCs are a teaching platform designed to give everyone an opportunity to receive higher education. The teachers can provide learning experience in experimental classrooms through quizzes, homework, midterm/final examines and off-line learning groups.

The conceptual definition of accounting literacy of the study is defined as the understanding of the entire accounting cycle and the basic ability of bookkeeping, as well as the interest and ability to read the materials related to Principles of Accounting.

Definition of learning effectiveness and related literature

In this study, the conceptual definition of learning effectiveness is "the impact on and achievement of the learners after learning. The measurement indicator is academic record." The above definition is summarized from the following literature.

Wang【7】believed that learning effectiveness is the impact and outcome that a learner acquires through learning, which includes instructor's teaching, learning environment, course curriculum and learning outcomes.

Huang【8】pointed out that learning effectiveness is the accumulated ability and accomplishment a learner acquires after the course is completed, through active participation in the experience of the teaching process.

Chen【9】argued that the learning effectiveness refers to "a student's demonstrated ability after various possible forms of assessment tests are conducted on the student at the end of the learning activity."

Huang【10】believed that learning effectiveness is the indicator for measuring a learner's learning outcomes. For students, learning effectiveness is the outcome that can only be recognized after students have experienced a long period of school education.

Literature Review on Pairwise Correlations of the Constructs of this Study

Literature regarding the impact of MOOCs teaching on learning effectiveness

The literature regarding the relevance of MOOCs teaching and learning effectiveness is summarized as follows:

Ho【6】pointed out that although MOOCs provide interaction function for teachers and students, the teachers and students on the platform are not in an actual teacher-student relationship. It was delayed interaction. On the contrary, in a physical classroom, the teachers and students can have real-time interaction. Moreover, he also cited JosonKanov's view that although MOOCs teaching provides students with an online course option, he was not optimistic about a complete change to online courses because face-to-face communication and interaction can increase the value of university and expand the students' experience in college life. In the complete absence of face-to-face interaction, it is difficult to imagine that things can function normally in whole or in part【11】.

Lu【12】pointed out that the courses offered by mature MOOCs platforms show that MOOCs cannot be completed by teachers alone in the traditional way.

Tsou【13】pointed out that online learning seems to be the current trend of leaning, but MOOCs are not suitable for all topics. For example, "Reducing Natural Disasters" is a general course that is general, related to surrounding environment and people and easily acceptable by the public. In addition to students, this type of courses also attracts the public for life-long learning. However, for special or professional courses, such as accounting, traditional teaching mode is more effective. The MOOCs cannot fully replace the courses that require face-to-face teaching.

To sum, this study proposed the following hypothesis:

Hypothesis 1 (H_1): MOOCs teaching has negative and significant impact on post-test learning effectiveness, compared with pilot-test learning effectiveness.

Literature regarding the impact of accounting literacy on learning effectiveness

We have not found any literature on the relevance between accounting literacy and learning effectiveness. However, in this study, we subjectively believed that accounting literacy is relevant to learning effectiveness. Therefore, this exploratory study proposed the following hypothesis:

Hypothesis 2 (H_2): accounting literacy has positive and significant impact on post-test learning effectiveness, compared with pilot-test learning effectiveness.

Literature regarding MOOCs teaching and accounting literacy

We have not found any literature on the relevance between MOOCs teaching and accounting literacy on learning effectiveness. However, in this study, we subjectively believed that MOOCs teaching and accounting literacy are relevant to learning effectiveness. Therefore, this exploratory study proposed the following hypothesis:

Hypothesis 3 (H_3): MOOCs teaching and accounting literacy have negatively and significantly interactive impact on post-test learning effectiveness, compared with pilot-test learning effectiveness.

III. RESEARCH METHOD

Based on the above research motives, purpose and literature review, this study deducted research hypotheses, and constructed a conceptual research framework, as shown in Figure 1.

Research Framework

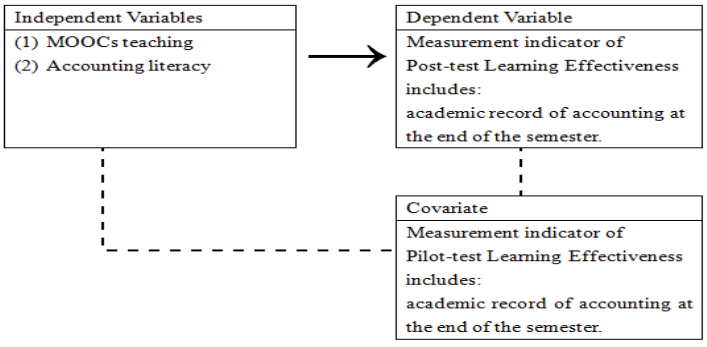

Figure 1 Research Framework

Sampling Method and Questionnaire Design

This study applied Purposive Sampling method on the research population, and targeted students who had taken (or were taking) Principles of Accounting and teachers teaching accounting courses in a college in Taiwan for a questionnaire survey. This study issued 40 copies of questionnaire to experts as a Pilot-test. After revising the questionnaire according to experts' feedback for improvement, a Post-test was conducted. The Convenience Sampling method was used to formally distribute 480 copies of questionnaire. There were 395 copies of valid returned samples, a valid returned rate of 82.29%.

The five-point Likert scale is used to measure the questionnaire, where various degrees of agreement are given scores from five to one, with 5 being strongly agree and 1 being strongly disagree. The higher the level of agreement, the higher the score; conversely, the lower the score.

The four-question questionnaire regarding MOOCs teaching was designed based on the questionnaire from Tu【4】.

Secondly, the four-question questionnaire regarding accounting literacy was designed by the author of this article.

Additionally, the six-question questionnaire relating to learning effectiveness was designed based on the questionnaires from Wang【7】and Huang【10】.

Quasi-Experimental Design Method

This study adopted the Covariate Analysis of Two-Factor Single Covariate (two independent variables, one dependent variable, and one covariate) of the Quasi-experimental design method as the statistical analysis method. The two independent variables were the MOOCs teaching adopted by teachers teaching accounting courses and the accounting literacy of students who had taken (or were taking) Principles of Accounting in a college in Taiwan. The dependent variable was post-test learning effectiveness, and the covariate of this study was pilot-test learning effectiveness. It is worth mentioning here that the measurement indicator of learning effectiveness of this study was academic record. These data were obtained from the questionnaires of this study.

Tools for Statistical Analysis

(1) The reliability analysis of the questionnaire is measured by Cronbach α coefficient; while validity analysis relies on Expert Validity (or Content Validity).

(2) Statistical Analysis

The statistical analysis method adopted in this study was the Covariate Analysis of Two-Factor Single Covariate (i.e., two independent variables, one dependent variable and one covariate). The two factors were two independent variables: MOOCs teaching and accounting literacy (a and b), and the covariate (c) is pilot-test learning effectiveness. The dependent variable (y) is the post-learning effectiveness. The purposes were to explore: (1) whether MOOCs teaching has positive and significant impact on post-test learning effectiveness, compared with pilot-test learning effectiveness; (2) whether accounting literacy has positive and significant impact on post-test learning effectiveness, compared with pilot-test learning effectiveness; and (3) whether MOOCs teaching and accounting literacy have positively and significantly interactive impact on post-test learning effectiveness, compared with pilot-test learning effectiveness.

Second, Bryman& Cramer【14】argued that intra-group regression coefficient homogeneity test should be conducted before the analysis of covariate (ANCOVA) to determine whether the Covariate Analysis of Two - Factor Single Covariate (i.e., two independent variables, one dependent variable and one covariate) is applicable to a study. Furthermore, if the F value of covariate is significant, then post hoc analysis is conducted, using "adjusted means" as the standard for comparison to find the pair that presents significant differences. Lastly, three factors were taken into consideration when selecting covariates in this study, that is: (1) it has to relate to the dependent variable, rather than an experimental treatment; (2) if the correlation between two covariates is above .80, then only one of them is selected as the covariate for the study; and (3) when there are fewer test subjects, less covariates should be selected. It is easier to control extraneous variables when there are more covariates, thus rendering a more accurate statistical test in an experimental treatment【15】.

IV. RESEARCH ANALYSIS AND RESULTS

With regard to the reliability analysis of the MOOCs teaching and accounting literacy questionnaires, Cronbach α coefficient was higher than 0.8, which indicated good reliability of the questionnaires, as shown in Table 1.

Table 1 Reliability Analysis on the MOOCs Teaching, Accounting Literacy, and Learning Effectiveness Questionnaire

Reliability Analysis	Dimension	Cronbach α coefficient
MOOCs teaching, Accounting literacy, and Learning Effectiveness Questionnaire Survey	MOOCs teaching	0.723
	Accounting literacy	0.714
	Learning Effectiveness	0.724
Overall Scale		0.720

As for the validity, the questionnaire of this study adopted expert questionnaire, which in itself has sufficient content validity. In addition, after compiling and analyzing the following computer reports, the findings show:

Table 2 A Summary Table of the Simple Main Effect Analysis of MOOCs Teaching, and Accounting Literacy in Post-Test Learning Effectiveness

Sources of Variation	SS	DF	MS	F	Post Hoc
Factor (MOOCs teaching, accounting literacy)					
in a1 (MOOCs teaching)	-136.31	2	-68.16	-2.41	Learning Effectiveness (Pilot-test) > Learning Effectiveness (Post-Test)
in a2 (accounting teaching)	221.24	2	110.62	3.91**	Learning Effectiveness (Post-Test) > Learning Effectiveness (Pilot-test)
Error	84.93		28.31		

*P<0.05 **P<0.01 ***P<0.001

According to Table 2,

(1) MOOCs teaching has negative but insignificant impact on post-test learning effectiveness, compared with the pilot-test learning effectiveness. Therefore, Hypothesis 1 (H1) is not tenable.

(2) Accounting literacy has positive and significant impact on post-test learning effectiveness, compared with the pilot-test learning effectiveness. Therefore, Hypothesis 2 (H2) is supported. (Tenable)

As shown in Table 3, MOOCs teaching and accounting literacy have negatively but insignificantly interactive impact on post-test learning effectiveness, compared with pilot-test learning effectiveness. Therefore, Hypothesis 3 (H3) is barely tenable.

Table 3 A Summary Table of Covariate Analysis of MOOCs Teaching, and Accounting Literacy, and Post-test Learning Effectiveness

Source	Type I&II Sum of Squares	df	Mean Square	F	Eta Squared	Observed Power(a)
MOOCs Teaching (a1)	-127.23	2	-63.62	-1.50	-.23	.47
Accounting Literacy (a2)	282.13	2	141.07	3.32**	.64	.48
The Interactive Effects of Post-Test Learning Effectiveness (a1*a2)	-88.31	2	-44.16	-1.04	-.41	.85

*P<0.05 **P<0.01 ***P<0.001

V. CONCLUSIONS AND RECOMMENDATIONS

According to the above analysis and results, the conclusions and contributions of this study are given below followed by the limitation of the study and recommendation for follow-up studies.

Conclusions

(1) Hypothesis 1 (H_1) is not fully tenable, i.e., the MOOCs teaching has negative but insignificant impact on post-test learning effectiveness, compared with the pilot-test learning effectiveness.

(2) Hypothesis 2 (H_2) is tenable, i.e., accounting literacy has positive and significant impact on post-test learning effectiveness, compared with the pilot-test learning effectiveness.

(3) Hypothesis 3 (H_3) is not fully tenable, i.e., MOOCs teaching and accounting literacy have negatively but insignificantly interactive impact on post-test learning effectiveness, compared with the pilot-test learning effectiveness.

According to the above, MOOCs teaching is one of the ways that supplement normal face-to-face teaching in the technological and vocational colleges in the field of accounting. MOOCs offer a variety of courses for on-the-job training and life-long learning, but they cannot completely replace the traditional face-to-face teaching.

Research contributions

The results of this study can be provided as a reference to teachers teaching accounting in technological and vocational colleges in Taiwan for teaching purpose and to the decision-making authorities in education field

for formulating educational policies.

Research Limitation

Despite the limited resources, this study was conducted in a rigorous manner at every phase of the research. However, the following research limitations still exist:

(1) Because of limitation on research resources, this study was based only on students who had taken (or were taking) Principles of Accounting and teachers teaching accounting courses in a college in Taiwan. The scope of this study did not cover all college students and teachers teaching accounting courses in Taiwan.

(2) This study sampled the population by means of purposive sampling, which is one type of non-probability sampling. Although it has higher recovery rate of valid samples, such method may cause sampling bias and thus affects the results.

Recommendation for Future Studies

(1) Because the main subjects of this study were limited to students who had taken (or were taking) accounting and teachers teaching accounting courses in a college in Taiwan. For extensive data, the follow-up researchers can try to expand the scope of this study for further analysis.

(2) The follow-up studies can adopt simple random sampling or stratified random sampling when sampling the population.

REFERENCES

[1] Cheng Shiu University, (2014). http://li.csu.edu.tw/wSite/ct?xItem=98478&ctNode=14428&mp=moocs&idPath=null

[2] C. C.Kuo& J. K. Ho, Flipping the Teaching,*Taiwan Education Review, 686*, 2014, 9-15.

[3] J.Bergmann &A. Sams, *Flip your classroom: reach every student in every class every day.* Alexandria, VA: ASCD and ISTE,2012.

[4] Y. C. Tu, *A Study of the Technical Needs and Problems of University Faculties' Participation in MOOCs. Taiwan: Master's degree thesis*, National Taiwan Normal University, 2014.

[5] A.McAuley, B.Stewart, G.Siemens &D. Cormier, The MOOC model for digital practiceonline learning experience,*Education Technology Research and Development, 51(3)*, 2010, 94-102.

[6] J. K. Ho, From CAI to MOOC-the Review and Forward Looking of Taiwan's Digital Learning,*T&D Fashion, 180*, 2013, 1-28.

[7] G. C.Wang, *A Study on The Teaching Methods, The Learning Attitudes and The Learning Effect in the Cram Schools in Kaohsiung Area*, Taiwan: Master's degree thesis, National Kaohsiung Normal University, 2010.

[8] S. L.Huang, Learning Effectiveness-oriented Curricula Design, 2012.http://www.excellent.pu.edu.tw/uploaded/bj/1011/1010426.pdf, surfing date: 2016/06/23

[9] H. F.Chen, *The Learning Effectiveness and Learning Retention Involved in Elementary Mathematics Studies by Using E-Textbook*, Taiwan: Master's degree thesis, Department of Business Management, Kao Yuan University, 2015.

[10] W. T.Huang, *The Effects of Family Resources, Multiple Entrance Channels, and Learning Attitudes on Learning Performance: The Case of a University,*Taiwan: Master's degree thesis, Department of Accounting, Tunghai University, 2016.

[11] Central News Agency, MOOCs Might Harm Colleges, 2013 (2013-11-02).

[12] K. W.Lu, Talking about MOOCs from Khan Academy. MOOCs Digital Learning Seminar in the New Era of Higher Education, 2013 (2013-10-11) (http://taiwanmooc.org/)

[13] H. C.Tsou, *A Research on the Learning Behavior of Massive Open Online Courses (MOOCs)-"Reducing Natural Disasters" Course as an Example*, Taiwan: Master's degree thesis, Department of Civil Engineering, National Kaohsiung University of Applied Science, 2015.

[14] A.Bryman, &D. Cramer, *Quantitative Data Analysis with SPSS for Windows: A guide for social scientists.* London: Routledge, 1997.

[15] M. L. Wu, *SPSS Operation and Application The Practice of Quantitative Analysis of Questionnaire Data, 2nd Edition*, Taipei: Wu-Nan Book Inc, 2014.

Yu-Je Lee. "The influences of MOOCs teaching and accounting literacy on learning effectiveness: Quasi-Experimental design method." International Journal of Business and Management Invention (IJBMI), vol. 6, no. 10, 2017, pp. 97–102.