The Effect of Adopting an Innovative Teaching Paradigm-SPOC on Students' Learning Performance

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ABSTRACT

Massive online open courses (MOOCs) are growing in popularity around the world. However, many scholars have pointed out that MOOCs adopt a rather monotonous way of teaching. According to Bloom's taxonomy of objectives in the cognitive domain, given the MOOCs, what teachers can achieve in cultivating students' abilities is only the development of "knowledge" and "comprehension", which are at the lower level. This study was designed to explore the effect of applying a new teaching paradigm in hospitality accounting courses to promote students' learning performance. Students in two classes of a 4-year hospitality management programme participated. One class was assigned to an experimental group which used the SPOC teaching method; and the control group taught with the general lecturing approach. Using a quasi-experimental research approach, it is showed that accounting competencies and learning attitudes of the experimental group were significantly better than those of the control group, and there was also a significant correlation between "collaborative learning status" and "students' learning performance".

Keywords: Moocs, spocs, accounting competency, learning attitude, collaborative learning

INTRODUCTION

The favorable evidence challenges the lecturing teaching method that has long dominated higher education (Willuam and Susan, 2013). Willuam and Susan (2013) further stated that "online education" is a potential revolution heading toward an essentially different system of higher education. Massive online open courses, called MOOCs, are key to the emerging educational world (Coughlan, 2013; Willuam and Susan, 2013). However, many scholars have pointed out that MOOCs adopt a rather monotonous way of teaching (Haggard, 2013; Daniel et al., 2015; Lidoria, 2015). It makes learners to present low participation, and as a result, the learning performance of MOOC learners might be limited, with their learning objectives staying at the lower levels (Liu, 2014). According to Bloom's taxonomy of objectives in the cognitive domain, given the MOOCs, what teachers can achieve in cultivating students' abilities is only the development of "knowledge" and "comprehension", which are at the lower level (Liu, 2013; Liu, 2014). As to mid-level "application" and "analysis" or even the higher-level "evaluation" or "creation", teachers are often unable to guide the development of these abilities in students due to limited interactions and time (Huang and Chan, 2014).

EDUCAUSE (2012) defined that "the flipped classroom is a pedagogical model in which the typical lecture and homework elements of a course are reversed". Bishop and Verleger (2013) pointed that "interactive group learning activities inside the classroom" and "direct computer-based individual instruction outside the classroom" are included in the flipped classroom. Fulton (2012) stated there are several advantages in the flipped classroom: (1) students learn at their own pace; (2) teachers can better insight into student difficulties and learning styles; (3) teachers can more easily customize the curriculum and provide it to students; (4) classroom time can be used more creatively; and (5) teachers can adopt the method to increase levels of student achievement, interest, and engagement…etc. Many researchers pointed out that in the flipped teaching model classroom time originally used for lectures is now focused on activities that cultivate students' higher-level thinking through active knowledge application (Betihavas et al., 2016; Akçayır and Akçayır, 2018; Lin and Hwang, 2019). It is further proved that student-centered learning involving constructive learning is realized in flipped classrooms (Koh, 2019). That is, in the flipped teaching model, students can do "knowledge" and "comprehension" through self-directed online learning at home, and the classroom time can then be reversed for development of "application",

"analysis", "evaluation", and "creation" abilities through teachers' guidance or collaboration with peer students in the classroom (Anderson and Krathwohl, 2001; Liu, 2013; Akçayır and Akçayır, 2018; Lin and Hwang, 2019). In other words, through flipped teaching, students have more opportunities to develop higher level abilities such as "evaluation" and "creation" (Cheng, 2019).In this background, a new teaching model called Small Private Online Courses (SPOCs) was emerged (Bernard, 2013; Liu, 2014; Lidoria, 2015).

SPOC is a blended learning model that integrates online courses into classroom instructions and supports both online and offline learning (Bernard, 2013; Lidoria, 2015; Cheng, 2019). This method is derived from MOOC (Coughlan, 2013). It refers to online courses that are smaller and available to a limited number of students (Bernard, 2013; Liu, 2014; Lidoria, 2015). It brings the advantages of MOOC to classroom instruction and utilizes information technology to support learning (Liu, 2014; Garlock, 2015). In other words, SPOC incorporates MOOC and flipped teaching into classroom instruction (Oremus, 2013; Bhaskar, 2013; Garlock, 2015; Cheng, 2019). The aim of this study is to develop a SPOC method into classroom instruction of an accounting course, analyze the students' performance of this model, and provide an innovative paradigm of applying SPOC in an accounting course. Kuo & Ho (2014) suggested that the effectiveness of flipped teaching should be examined using more scrupulous approaches. Bishop and Verleger (2013) further pointed out that a one-group design may yield not objective results, and using a true-experimental design or a quasi-experimental design is a minimum requirement. Following the related suggestions above, a quasi-experimental design was adopted in this study.

METHOD

This study used a quasi-experimental design and "teaching method" was used as an independent variable. In order to compare the effects of two teaching methods –SPOC and general lecturing method – the participants of two classes were divided into an experimental groups and a control group.

The participants were 95 students from two classes in the second year of a 4-year hospitality management program at a university in Taiwan. One class with 46 students (11 male and 35 female) was assigned to experimental group, and the other one with 49 students (7 male and 42 female) to control group. For experimental group, "SPOC method" was adopted, which integrated MOOC and flipped teaching into classroom instruction. The course content provided for this

group were generally the same as the textbooks commonly adopted in general hospitality accounting courses, and the only difference lay in the construction of multiple online and offline teaching activities under the SPOC teaching process. In order to achieve the goal of student-centred learning in SPOC where the teacher use classroom time to support individual learning needs (Akçayır and Akçayır, 2018; Brewer & Movahedazarhouligh, 2018), this study designed multiple teaching activities to support learning personalisation through flexible learning environments. In addition, Betihavas et al. (2016) referred that collaboration through group work is a way to organize learning activities in flipped classrooms, heterogeneous grouping was thus adopted based on the participants' learning achievement of "Management Science". 46 students in the experimental group were divided into high-level, mid-level, and low-level groups, respectively taking 25%, 50%, and 25%. Based on the sorting result, 7 groups were formed, with 4 groups consisting 7 and 3 groups consisting of 6 students.14 units of experimental teaching activities were designed, and each of these units detailed the schedule, content, required teaching aid, and notes of the preparation activities, developing activities, and general activities. The experimental period spanned 16 weeks. In addition, the assessment items, teaching activities, accompanying teaching objectives in each dimension, and related grading percentage for each activity in the experimental group are as shown in Table 1. As for the control group, "general lecturing method" was adopted. The teaching materials used were the same as the experimental group but students in this group were not engaged in SPOC learning process, but with individual learning.

Table 1. The assessment items, teaching activities and grading percentage

Assessment Item	Teaching Activity	Teaching Objective	Grading Percentage
Overall learning performance	Class discussion	Application Evaluation Creation	5%
	Issue discussion (9 times)	Evaluation Creation	18%
	Group assignment (4 times)	Application Analysis Evaluation	16%
	Online test (8 times)	Knowledge Comprehension	16%
	Unit quiz (4 times)	Application Analysis	10%
	Duration of online learning	Knowledge Comprehension	15%
Midterm and final exams	Midterm exam (1 time)	Knowledge Comprehension	10%
	Final exam (1 time)	Application Analysis	10%
Semester grades			100%

RESEARCH INSTRUMENTS
Student's learning portfolio interface

The education administration system database of the university will import the data of the experimental course, including course name, syllabus, and enrolled students into the database of the Virtual University Platform. The platform would keep track of each student's learning progress and create a learning portfolio for each student. After the experimental instruction, each student's learning portfolio was also quantified to evaluate their overall learning performance in this course. The relationship among the education administration system database, Virtual University Platform, and student's learning portfolio interface is as illustrated in Figure 1. Through this interface, the total number of logins, total usage time, the usage time in each login, number of posts and replies in the discussion forum, number of attendances and posts in the real-time chat room, number of downloads of reference materials, number of uploads of assignment, and many other data of each student could be checked.

The Self-evaluation Scales

There are three major research instruments developed in this study to verify if significant differences existed in accounting competency, learning attitude, and collaborative learning status between the experimental and control group. Based on results obtained from document analysis and content analysis, draft questionnaires

consisting of the "Self-evaluation Scale in Accounting Competency", the "Self-evaluation Scale of Learning Attitude", and the "Self-evaluation Scale of Collaborative Learning" were developed using a five-point Likert type scale ranging from 1(strongly disagree) to 5 (strongly agree). The participants had to evaluate how much they agreed with each item on a five-point Likert scale. After the draft was completed, four accounting experts and two e-learning experts were invited to review the questionnaire and propose amendments to the draft. Their suggestions were used to modify the draft and create a pilot-test questionnaire with expert validity. The pilot test was intended to check the feasibility of the questionnaire. A total of 109 copies of this questionnaire were collected, and the pilot test result indicated an overall reliability coefficient that was above the commonly accepted limit of 0.70 (Cortina, 1993).

The Self-evaluation Scale in Accounting Competency

To examine if there were significant differences in self-evaluation in accounting competency between the two groups of participants, a "Self-evaluation Scale in Accounting Competency" was designed based on the 25 required skills for accounting professionals as suggested by Albrecht & Sack (2000). This scale was intended to help the participants self-evaluate their improvements in each accounting skill. The collected data were first analyzed using Kaiser-Meyer-Olkin (KMO) and Bartlett tests. KMO=.931 and Bartlett's test Chi-sq=3398.436 (Sig=.000) were obtained, indicating that the data were good for factor analysis. Later, principal component analysis (PCA) was performed to extract items with an eigenvalue greater than 1 and a factor loading greater than .5. Two dimensions were extracted, including "Interaction and Collaboration Skills" and "Knowledge and Learning Ability". The cumulative explanation of variance reached 77.442%, suggesting the construct validity of the scale was established. Finally, the reliability test of this scale was carried out. The Cronbach's α coefficients for the subscales ranged between .972 and .974, and that for the entire scale was .984, suggesting high reliability of the scale.

The Self-evaluation Scale of Learning Attitude

To examine if the two groups of participants had significant differences in self-evaluation of learning attitude towards accounting, the "Self-evaluation Scale of Learning Attitude" was designed based on Chen (2015). This scale consisting of 20 items allowed the participants to self-evaluate their learning attitude in various aspects. The collected data were also analyzed using KMO and Bartlett tests. KMO=.894 and Barlett's test Chi-sq=1443.013 (Sig=.000) were obtained, suggesting the data were good for factor analysis. Later, PCA was applied to extract items with an eigenvalue greater than 1 and a factor loading greater than .5. Item No. 16 "I have smooth interactions with the teacher" and item No. 17 "My accounting competency has improved" were thus deleted. Four dimensions were extracted, including "Learning Interest", "Learning Assessment", "Peer Interaction", and "Communication and Expression". The cumulative explanation of variance reached 73.904%, so the construct validity of the scale was assured. Finally, the reliability test of this scale was carried out. The Cronbach's α coefficients for the subscales ranged between .869 and .898, and that for the entire scale was .937, suggesting high reliability of the scale.

The Self-evaluation Scale of Collaborative Learning

To examine if "collaborative learning status" and "overall learning performance" were related among participants in the experimental group, the "Self-evaluation Scale of Collaborative Learning" was designed as suggested by Huang (2016). This scale consisting of 20 items allowed students in the experimental group to self-evaluate their status of collaborative learning in different aspects. The collected responses were analyzed using KMO and Bartlett tests, and KMO=.535 and Bartlett's test Chi-sq=1783.065 (Sig=.000) were obtained, indicating the data were good for factor analysis. Later, PCA was performed to extract items with an eigenvalue greater than 1 and a factor loading greater than .5. Two dimensions were extracted, including "Collaboration and Sharing" and "Peer support". The cumulative explanation of variance reached 82.675%, indicating the construct validity of the scale was established. Finally, the reliability test of this scale was carried out. The Cronbach's α coefficients for the subscales ranged between 0.872 and 0.985, and that for the entire scale was 0.981, suggesting high reliability of the scale.

RESULT
The effects of different teaching methods in accounting competency

To examine if the two groups of students had significant differences in accounting competence, the "Self-evaluation Scale in Accounting Competency" was administered to both groups after the experiment. Their evaluation results were analyzed using independent-sample t-test. The results as Table 2 indicated that the experimental group gave significantly higher

scores to their improvements in both dimensions of accounting competency and the related accounting abilities, especially in "Team Spirit", "Collaborative Learning Skills", and "Communication Skills", as compared with the control group. This suggested that, through appropriate arrangements of teaching activities, the SPOC teaching method proposed created an environment that could facilitate learners' accounting competencies. In addition, the experimental group reported a greater effect of the SPOC teaching method in improving "Interaction and Collaboration Skills" than in improving "Knowledge and Learning Ability".

Table 2. The effects of different teaching methods in accounting competency

Dimension	Mean		S.D.		t-test
	EG	CG	EG	CG	t
Interaction and collaboration skills (IC)	4.16	3.62	.747	.728	-3.750
Knowledge and learning ability (KL)	4.20	3.72	.723	.657	-3.390
Overall competency	4.19	3.67	.718	.667	-3.672

Note: EG: Experimental Group; CG: Control Group; ** p < .01 ;*** p < .001

The effects of different teaching methods on learning attitude

To examine if the two groups of students had significant differences in learning attitude towards accounting after the experiment, the "Self-evaluation Scale of Learning Attitude" was administered. Their responses were analyzed using independent-sample t-test. The results as Table 3 showed that the experimental group scored significantly higher than the control group in "Learning Interest", "Learning Assessment", and "Communication and Expression". Especially for the items including "I have good learning effectiveness", "I am interested in the course", "I enjoy participating in the learning activities of the course", "I will utilize digital resources for learning", "I usually feel support or encouragement from classmates", "I have smooth communications with classmates", and "I will apply multiple methods in learning", the experimental group gave a significantly higher rating than the control group. Therefore, SPOC teaching method indeed has the significant influence on promoting learning interest, peer support, and motivating leaners to use multiple learning tools.

Table 3. The effects of different teaching methods on learning attitude

Dimension	Mean		S.D.		t-test
	EG	CG	EG	CG	t
Learning interest (LI)	3.60	3.29	.719	.521	-2.330	.0
Learning assessment (LA)	4.28	3.99	.638	.545	-2.410	.0
Peer interaction (PI)	4.25	4.06	.628	.524	-1.609	.1
Communication and expression (CE)	4.04	3.73	.729	.549	-2.380	.0
Overall competency	4.03	3.76	.576	.436	-2.579	.0

Note: EG: Experimental Group; CG: Control Group; * p< .05, ** p< .01

The correlation between self-evaluation score for collaborative learning and overall learning performance

In this experimental course where the SPOC teaching method was adopted, in addition to the traditional midterm exam and final exam scores, the quantified qualitative data in learner portfolios of each student was considered as their overall learning performance, one part of semester grades. To evaluate the collaborative learning status of each student in the experimental group, the "Self-evaluation Scale of Collaborative Learning" was administered to the experimental group. After collecting their responses, the correlation between "self-evaluation score for collaborative learning" and "overall learning performance" was analyzed. The results suggested that the two variables were correlated (Pearson's correlation coefficient=.323, Sig=.029). Using the experimental group's learning achievements before the SPOC teaching method (pretest results) as the control variable, an analysis of partial correlation between "self-evaluation score for collaborative learning" and "overall learning performance" was further carried out. A partial correlation coefficient of .343 (Sig=.021), conforming that there was a significant correlation between the two variables, was also obtained. The above results suggested that, through use of an appropriate collaborative learning design and arrangements of teaching activities, qualitative learning behavior in students can be motivated in learning activities.

DISCUSSION AND CONCLUTION

It is found that the process of learning in SPOC consists of three phases, including "Basic Learning", "Advanced Learning", and "Application and Creation". In the "Basic Learning" phase, students watch online videos on the platform first and try to comprehend the knowledge covered in this course by themselves; in the "Advanced Learning" phase, students learn

from the issues and examples in the given scenarios through both online and offline channels, discuss the key ideas regarding the lesson, and construct their core concepts under the teacher's assistance; in the final "Application and Creation" phase, students manage to synthesize and organize the knowledge they have acquired under classroom instructions, apply it in complicated and real scenarios, and then adjust their core concepts depending on the environment. The above three phases do not proceed at the same time but are in an interactive relationship. Through comparison of knowledge acquired and feedbacks from online and offline learning, students can achieve higher learning performance.

In addition, it is also found that classroom instruction remains the main channel for students to acquire and internalize knowledge, and SPOC allows teachers to dynamically adjust their teaching design and activities based on students' e-learning portfolios. Hence, SPOC model can not only increase students' learning performance but also manifest teachers' value. As a blended learning model that combines online and offline learning, SPOC allows teachers to assign specific students to perform self-directed online learning first and then implement face-to-face teaching activities that involve clarification or discussion of students' questions in the classroom later. Results of this study show that integration of online and offline learning in SPOC can contribute to an improvement of students' competencies and attitudes. Moreover, SPOC can also provide better learning experiences and assist them to attain higher-level learning objectives as application and creation. McCollum et al. (2017) pointed out there is generally a dearth of collaborative frameworks used in flipped classrooms, and learning interactions are needed to be enhanced by structured group processes. In this study, the concept of collaborative learning is imported to the SPOC teaching method adopted in the experimental group. Therefore, there are significantly more interactions among learners in the SPOC, and the depth of the interactions also increased at the same time. The results also suggest that collaborative learning status and students' overall learning performance were significantly related. In other words, collaborative learning enhances students' learning effectiveness. This finding is consistent with the conclusions in Anderson et al. (2017).

In summary, in comparison with MOOC, where learning takes place 100% online, SPOC allows teachers to agilely utilize the video resources and aids of the platform to support their classroom instructions, and more flexibly design their teaching activities. Moreover, in terms of learner evaluation, SPOC allows teachers to perform a more comprehensive assessment of students based on their performances in assignments, issue discussions, online tests, and other forms. This meets the modern trend of multi-dimension learner assessment and exceed traditional paper-and-pencil tests. Through an application of the SPOC model in teaching, this study confirms the positive effect of SPOC on learning performance and also investigates learners' learning process in this model. It is hoped that the results could contribute to teaching practice.
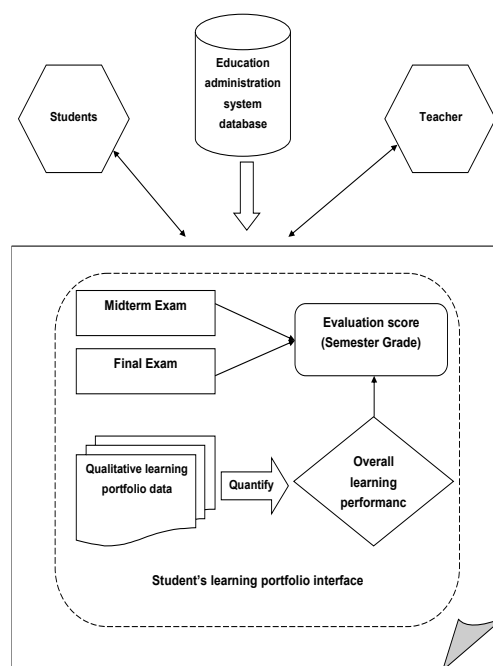

Figure 1. The relationship among the education administration system database, Virtual University Platform, and student's learning portfolio interface

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