Learning 'B-learning' through 'B-learning': A Practice Model for Teachers' Professional Development

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***Abstract*—Blended learning (B-learning) has been regarded as an effective instructional and learning mode in recent years. It has also been widely recognized that systematic training is urgently needed for in-service teachers to design, develop and deliver effective B-learning courses. As shown in the literature, in-service teacher training is usually carried out in three formats. The first is face-to-face conducted in a concentrated period of time. There are two constraints in this format: the time constraint on the part of the participants due to other commitments, and the resource constraint on the part of the institution for managing large-scale workshops. The second format is a purely online one, often featuring the lack of effective interaction between the instructor and the participants and among participants themselves. The third type is offered in blended mode. However, most programs do not offer ongoing support for participants or follow-up evaluations. Our research developed and evaluated a five-stage blended training model that caters for the needs of in-service teachers in their professional development for B-learning. It is a practice model enabling participants to learn B-learning in B-learning mode and through the design and implementation of a real blended learning course. This study evaluated 10 institutions across China, which adopted this training model with the participation of 952 teachers between October 2016 and January 2017. Our findings confirm the effectiveness of this model and direct our attention to more in-depth studies on teachers' professional development for B-learning in blended mode.**

Keywords—blended learning; blended mode; professional development; training mode; tertiary teacher

I. INTRODUCTION

With the development of educational technology, people are increasingly concerned about the effective ways to "blend" technology into the curriculum in higher education. However, 'blended learning (B-learning)' means different things to different people. (for a review of B-learning literature, see [1]). One view is that any instruction and learning activities that include ICT are a form of B-learning [2]. However, in this paper, we concur with the view that B-learning is the deliberate fusion of the students' on-line (asynchronous and/or synchronous) self-learning and the face-to-face (F2F) contact between teachers and students and/or within students in one course [3].

To be competent to design and delivery a B-learning course, teachers need to go through a professional development process. Teacher training is an effective way to promote the professional development of in-service teachers [3]. Such programs can be summarized in three formats.

The first format is the most widely practised, that is, face to face (F2F) training conducted by a group of experts or instructors in a concentrated period of time. Such training can take place either outside the institution, or at the institution's premise. In the former case, time and resources are the main concern as training is usually conducted in a different city during winter or summer vocations. Due to the constraints of time and resources, the number of trainee teachers is often limited. When training is conducted within the institution during the semester, considerable constraints are placed on teachers, instructors and administrators. Teachers are especially time poor due to concurrent teaching commitments. Although a larger number of teachers can be expected to participate in the training, to instructors and administrators, this also means more complexity in managing resources and providing adequate support.

The second format is a recent development in teachers' professional development, purely online programs. However, they also have inherent problems. The most notable one is the lack of effective interaction between the instructor and the trainee teacher and among trainee teachers. This is because it is hard for the 'remote' experts/instructors to e-moderate during the whole training process [4]. Yet, "e-moderating" is considered as one of the key success factors in teaching and learning online [5] .

More recently, the third training model, the blended learning model, began to gain attention. A good example can be found in "the National Training Plan (2014) for Key Teachers Subject Lesson Training Project, which combined online and face-to-face training [6]. The "Shanghai College Teacher pre-service Training Project" represents another effort in this direction [7]. The Intelligent Teacher Training in Primary and Secondary School Project[8]. Although those projects produced some positive evaluation results, they appeared to be ad-hoc without a long term mechanism to support teachers after training.

The above review of the literature reveals three essential elements that are urgently needed for an effective professional development program for teachers. That is, an effective professional development program should be time and resource effective, facilitate effective interaction at different levels, and support teachers' post-training application of B-learning. The proposed professional development model in this research aims to engender these three elements.

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II. THE PROPOSED BLENDED TRAINING MODEL

This research proposes a five-stage blended training model specifically catering for the professional development needs of teachers for blended learning skills. Fig.1 demonstrates the five stages and the main content covered in each stage. This model traces the whole training process starting from the pre-semester F2F and online training, during-semester application of B-learning to real courses, to the post-semester evaluation stage.

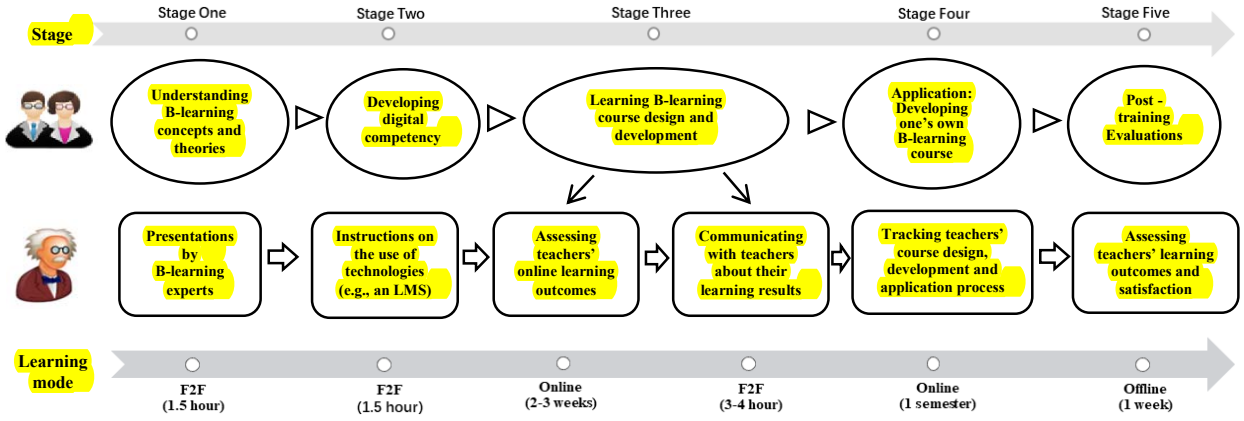

Fig. 1 The five stages and contents of the blended training model

A. *Stage One: Understanding B-learning Concepts and Theories (Pre-semester F2F)*

The first stage is F2F focusing on the understanding of B-learning. Apart from exploring the latest progress in B-learning and B-learning concepts and theories, case studies of B-learning courses are shared to gain a deeper understanding of B-learning design and instruction. The training is offered in the form of workshops and seminars facilitated by instructors/experts in B-learning. Participants in this stage include both classroom teachers and relevant management staff. The attendance of management staff is required so as to raise their awareness of the importance of B-learning and the importance of establishing and improving learning support mechanisms.

B. *Stage Two: Developing Digital Compentency (Pre-semester, F2F)*

Participants are trained to use advanced educational technologies to support blended course design and instruction. These tools can support both synchronous and asynchronous interactions and can be used both online or offline. Training focuses on how to maximize the potential of these technologies (e.g., a Learning Management System (LMS)) for effective learning. Online and blended learning protocols and behaviors should also be a point for discussion in the training.

Fig. 2 The interface of THEOL(Left)

Fig. 3 The course site of the B-learning professional development program (Right)

C. *Stage Three: Learning B-learning Course Design and Development (Pre-semester, Online)*

The core objective in this stage is to learn how to design and develop a B-learning course. This objective can be achieved through the completion of a self-learning online component titled *B-learning* course design *and development*, followed by achievement and experience sharing.

The online component consists of two parts, design and development, as shown in Fig. 4. The design part covers pre-analysis of the existing course, design of the overall B-learning course and individual learning units. The development part includes course information import, overall course construction online and content creation for individual learning units.

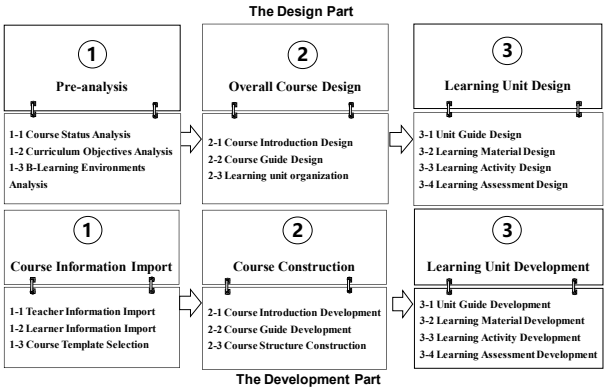

Fig. 4 The contents of the online component titled *B-learning course design and development*

Pre-analysis refers to the analysis of the existing course in F2F mode, including: (1) course status analysis, (2) curriculum objective analysis, and (3) B-learning environment analysis.

In course status analysis, teachers should answer some questions about problems in the existing course. For example, what are the educational objectives of the course that should be met? Does the existing instructional model meet the leaners' needs? If not, why? What problems may exist? Which problems can be solved in B-learning mode if any?

In curriculum objective analysis, teachers need to analyze the characteristics of the students they teach, including the level of knowledge, digital technology literacy and so on.

In B-learning environment analysis, trainee teachers also need to answer questions about the proper environment for B-learning. These questions can be about the fit between available technologies and course objectives, as well as relevant policies to support different phases in B-learning. .

The overall design of the course covers how to design an effective introduction to the course, how to design a course guide outlining the overall course objectives, course structure, schedule, and assessments, and how to organize learning units.

The learning unit design refers to the design of the basic teaching content, such as the unit learning guidelines, the unit learning objectives, learning resources, learning activities, and assessments.

The development part aims to develop teachers' skills to create a course site on a LMS. This involves, as a minimum, learning to use the tools on the LMS for creating unit content and for importing paper-based course materials to the course site.

For the B-learning course design part, teachers need to complete a total of nine learning tasks, and for the development part, they need to complete three tasks.

After the teacher completes the self-learning online component, an B-learning expert group will evaluate the teacher's course design and development, select outstanding work, and organize achievement and experience sharing sessions. The goals are: (1) to provide feedback to teachers on their course design and development as well as their learning experiences, (2) to promote outstanding best practices to other teachers, and (3) to identify and discuss common problems. Teachers are encouraged to form learning communities and learn from one another for further improvement of their learning.

D. Stage Four: Application (During Semester, Online and F2F)

After completing Stage Three, teachers are required to apply what they have learned to the design of their own B-learning course. They need to complete the design and development of at least 2 learning units and integrate the two units in their original F2F course to make it a B-learning course. In this process, teachers are supported by an expert group through online Q&A sessions, and through the evaluation of the teachers' course design, development and implementation.

In terms of course development, the evaluation mainly examines the effective integration of subject matter, content, pedagogy and F2F and online learning environment. The course implementation was evaluated in terms of the effectiveness of the course's online and F2F instruction. Such an evaluation is realized through the examination of the teacher and student online behavior data collected from the LMS. The evaluation includes the number of log-ins, the length of each online time, the degree of involvement in the learning activities and so on. Furthermore, an expert group attends the course in the classroom to assess the integration of online components into classroom learning. This evaluation focuses on four aspects, namely, (1) Whether the teacher can fluently use technologies to teach? (2) To what degrees online and F2F instructions blend? (3) Whether the blend is appropriate? (4) What are the problems if any?

E. Stage Five: Post-training Evaluations (Post Semester)

The learning outcomes of trainee teachers are evaluated through a number of evaluation mechanisms after the whole training is completed. In addition to teachers' own assessment of their achievements and experiences, the expert group also provides an evaluation report for each participating teacher. The evaluation uses the teaching and learning behavior data collected from the LMS, such as the number of access to the LMS, online time distribution, and online learning behaviors. The expert group also assesses the teachers' digital competency using a questionnaire. In addition, teachers can use 'Student Course Satisfaction Questionnaire' to measure students' satisfaction of their blended learning experiences.

III. METHODOLOGY

A. Research Procedure

Using the above discussed B-learning model, professional development programs were offered between October 2016 and January 2017, to teachers in a number of institutions throughout China. In this study, we focused on 10 institutions, with five universities from Beijing, Zhejiang and Jiangsu provinces, and five vocational colleges from Inner Mongolia, Shandong, Chongqing and Zhejiang provinces. A total of 952 teachers participated in the programs using "Tsinghua Education Online (THEOL)" as the LMS. This LMS was developed by the Educational Technology Institute of Tsinghua University. The interface of the LMS is shown in Fig.2, and Fig. 3 is the screenshot of the course site for the B-learning Professional development program.

B. Research Questions

This evaluation seeks to answer the following two research questions:

- What were the trainee teachers' perspectives of their B-learning in blended training mode?
- How effective was the proposed blended training model as shown in the trainee teachers' post training application of B-learning?

C. Data Collection

From a training management perspective, in order to achieve systematic training assessment, we need to assess both the training results and the effectiveness of the training mode. The training result assessment measures the trainees' learning outcomes. The assessment of effectiveness of the training project aims to identify the effectiveness and problems of the training program, which include the assessment of training content, organization, and management [9].

Thus, this research collected data from two surveys. The first survey was conducted at the end of the training program to assess the teachers' satisfaction with the training program. This survey used a 5-point Likert scale ranging from very good, good, average, not good, and bad. The five questions contained in the survey are:

- Q1.Your overall evaluation of this training program.
- Q2.Your evaluation of the organization and learning mode of this training program.
- Q3.Your satisfaction with the training schedule.
- Q4.Your evaluation of the workshops by the experts
- Q5.Your evaluation of the online learning resources. (including 18 sub-questions)

The second survey was done 3-5 months after the completion of the professional development program to evaluate the medium effect of the training, that is, to see if the participants applied B-learning to their teaching practices. We developed a checklist for the survey with two levels of indicators of B-learning application (see Table 2). There are 2 indicators in level 1 and , and 13 in level 2. The survey was sent out to two groups of particpants, the F2F group and the blended training group. The F2F training project lasted for two days covering the same learning content and activities as the professional development program in B-learning mode. Both programs were taught by the same instructor group. 351 completed surveys were collected from the F2F group and 355 from the B-learning group.

IV. Results

A. Results from the First Survey - Teacher Training Satisfaction Questionnaire

We collected a total of 229 questionnaires and 215 of them were valid. The results are presented in Table 1. As shown in Table 1, the great majority of respondents rated their overall experiences as very good and good across the five questions and the sub-questions. Most notably, 96% (Q1, very good + good) were satisfied with the overall training experiences, and 95% rated the training schedule (Q3) as very good and good. These highly positive ratings were closely followed by those for Q2 (91%), Q5 (85%) and Q4 (84%).

TABLE 1. RESULTS FROM THE TEACHER TRAINING SATISFACTION QUESTIONNAIRE

Questions	Very Good	Good	Aver -age	Not good	Bad
Q1: Your overall evaluation of this training project.	59%	37%	4%	0%	0%
Q2: Your evaluation of the organization and learning mode of this training.	46%	45%	9%	0%	0%
Q3: Your satisfaction with the training schedule.	45%	50%	5%	0%	0%
Q4. Your evaluation of the presentations by the experts	30%	54%	15%	1%	0%
Q5:Your evaluation of the online learning components.	30%	54%	15%	1%	0%
SQ5.1 Pre-analysis of exisiting course.	31%	57%	11%	0%	0%
SQ5.2 The design of overall course structure.	29%	58%	12%	1%	0%
SQ5.3 The design of learning guide.	29%	54%	15%	1%	0%
SQ5.4 The design of learning objectives.	30%	55%	13%	1%	0%
SQ5.5 The design of learning resources.	29%	55%	15%	0%	0%
SQ5.6 The design of learning activities.	27%	58%	14%	0%	0%
SQ5.7 The design of Learning Assessment.	28%	53%	18%	1%	0%
SQ5.8 The construction of Course information.	28%	55%	17%	0%	0%
SQ5.9 The development of an overall course structure.	30%	56%	14%	0%	0%
SQ5.10 The development of a learning unit guide.	31%	51%	19%	0%	0%
SQ5.11 The creation of learning resources in a learning unit.	29%	54%	16%	0%	0%
SQ5.12 The inclusion of a discussion forum in a learning unit.	33%	53%	13%	2%	0%
SQ5.13 The inclusion of a questionnaire in a learning unit.	32%	50%	16%	2%	0%
SQ5.14 The development of a micro video in a learning unit.	33%	52%	15%	0%	0%
SQ5.15 The development of a reflection in a learning unit.	29%	58%	12%	1%	0%
SQ5.16 The creation of an online test in a learning unit.	30%	52%	16%	1%	0%
SQ5.17 The creation of an online assignment in a learning unit.	33%	51%	14%	2%	0%
SQ5.18 The creation of an learning evaluation method in learning unit.	30%	53%	14%	2%	0%

B. Results from the Second Survey - Post Training Follow-up Survey regarding the Teachers' Application of B-learning

In order to further explore the effectiveness of the proposed training model, we developed a detailed checklist to assess the B-learning application results. Table 2 explains the two levels of indicators of applications in detail. Table 3 demonstrates the number of teachers who completed all the tasks listed in Table 2. As evident in Table 3, 23.2% more teachers participating in the training in B-learning mode applied B-learning to their teaching, in comparison to the F2F group.

TABLE 2. A CHECKLIST FOR B-LEARNING APPLICATION

Level 1 indicators	Level 2 indicators	Description
	1.1 Basic information of the course	A brief introduction to the course
	1.2 Course learning guide	Instructions about how to complete the all course learning
	1.3 The structure of the learning unit	A complete learning unit structure
	1.4 Assessment criteria	A set of criteria for assessing learning outcomes
	1.5 Learning unit design and development	A complete study unit, including a gudie to the unit, teaching resources, online testing, homework, discussion, online surveys.
	2.1 Teacher login	The teachers' LMS login records, at least 3 times per teaching week
	2.2 Course learning announcements	At least one teaching related announcement was issued.
	2.3 Online homework or tests	At least one piece of online homework or test
	2.4 Teacher-organized online discussion	At least one course related forum discussion
	2.5 Student Login	Student login records
	2.6 Student learning time	a record of time spent by students on watching micro video lectures.
	2.7 Online homework or test submission	A record of homework or test submission by students.
	2.8 Student participation in online discussions	A record of student online forum discussion

TABLE 3. THE NUMBER OF TEACHERS WHO APPLIED B-LEARNING

Training program	Number of teachers who attended training	Number of teachers who applied B-learning	Percentage
F2F	351	142	40.46%
BL	355	226	63.66%

V. DISCUSSION AND CONCLUSION

The data from this research indicate that the blended training program employing the proposed B-learning model received an overwhelmingly positive evaluation from the participants. This finding was further corroborated by the larger number of teachers applying B-learning to their teaching practices after the completion of the training. This forms a distinct contrast to the F2F group. We thus can confirm the effectiveness of the B-learning model proposed by this research.

There are several factors contributing to the effectiveness of this training model. First, as part of the training was done online, less time was needed for traveling on the part of the trainee teachers as well as the instructors, and less resources were need for managing the training, making the training more time and cost-effective. The online components of the training could be done anywhere as long as the teachers had access to the Internet.

Second, the combination of F2F and online training allowed both the trainee teachers and instructors a degree of flexibility in time management. After the basic concepts and theories were dealt with in F2F workshops, the trainee teachers could further develop their B-learning skills and continue to practise online what they had learned, whenever they had the time. In addition, they were more in control of the time they needed for completing the assigned tasks.

Third, the blended instruction also provided the trainee teachers with different levels of interaction with the instructors and with their peers. Both the F2F interaction during the workshops and the online Q&A sessions offered by the instructors during the development of the online learning units proved to be facilitating to the teachers' learning process.

Fourth, the proposed training model engendered a crucial component in the training, the hands-on component, that required the teachers to apply what they had learned in training to real teaching practice, that is, to the redesign of their courses for the blended mode of learning. This was the longest period in the training process, lasting for a semester. More importantly, the teachers were fully supported during this process.

Last but not least, the evaluation mechanism inbuilt in the proposed model enabled the trainee teachers to reflect on their learning process, and such reflection should lead to further improvements in their B-learning implementation.

VI. LIMITATION AND FUTURE WORK

The proposed blended training model for in-service teachers' profession development for B-learning provided the trainee teachers with an iterative cycle of learning, application, reflection and improvements. However, the scope of this paper only allows us to present some preliminary results of this important cycle of development. There are many issues that deserve further investigation but are beyond the scope of this study, such as the learners' perspectives of B-learning and the ongoing support for teachers' professional development in B-learning.

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