Exploring the Three-Stage Blended Learning Model and Its Effectiveness in Teacher Training Programs

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Abstract. Teacher training programs assume a foundational and indispensable role in the professional development of all teachers, especially new teachers. Teacher training courses can facilitate teachers' pedagogical development. However, in contrast to the importance of teacher training program, new teachers often face time difficulty and challenges in the learning of the training courses. This paper proposes the three-stage blended learning model which promotes the program trainers, professionals and teachers to continuously interact through both online and offline ways beyond in-class training time. This model is not only a perfect solution to balance teachers' working time and the program training time, also it is an effective way to address the issues of monotony and singularity in learning educational courses. This paper provides a detailed presentation and analysis of the design philosophy and applications of this model. A teaching experiment was conducted in a Shanghai normal institute to confirm its effectiveness. Two groups from the teacher training program were selected since teachers in these two groups displayed the same score level in the pretest. The control group used the traditional offline face to face training model, while the experiment group employed the three-stage blended learning model. At the end of the training program, a final test was conducted and teachers' learning outcome of these two groups showed significant difference. Results shows that teachers who employ the three-stage blended learning method achieved significantly higher learning outcome than teachers who adopt the conventional way. Also from the satisfactory test results, teachers from the three-stage blended learning model display higher level of satisfaction during the whole teacher training program.

Keywords: blended learning; Bloom's Taxonomy; cognitive skills; training program.

1 Introduction

Teacher training programs constitute an important component in teachers' professional development. It is specifically designed to investigate salient educational phenomena and pedagogical challenges germane to education, with the overarching objective of elucidating universal and elemental principles of education within this context.

Learning in a teacher training program confers a threefold advantage upon teachers, especially for the new teachers. Firstly, it engenders a comprehensive grasp of educational systems. By immersing themselves in this subject matter, teachers gain panoramic insights into the structural intricacies, historical evolution, and socio-functional dynamics inherent to educational systems. This holistic comprehension serves as a cornerstone in their broader understanding of education's role in society. Secondly, learning those classic educational cases imparts invaluable insights into the realm of effective teaching, which is crucial for their teaching career. Teachers emerge from this experience armed with pedagogical acumen and a repertoire of teaching techniques, equipping them to adeptly facilitate learning and address the diverse needs of their students. Thirdly, teacher training program nurtures teachers' art of curriculum development. Armed with foundational knowledge in educational principles, teachers are better prepared to craft curricula that align seamlessly with the objectives and standards.

In the context of teacher training programs, learning educational courses has its pivotal place in the pedagogical development, and it is especially important for new teachers. However, in contrast to the importance of teacher training courses, teachers often are overwhelmed with their work load and have less time and energy to engage in the training program. In addition, teachers also face high difficulty and challenges in learning educational courses. The theoretical content inherently exhibits a profound level of fundamentality and abstraction, attributes that imbue the learning process with heightened challenges and intricacies.

2   Challenges in Teacher Training Courses

2.1   Bias of 'Poor Practicality' toward Knowledge Learning

Different from the teaching practice, teacher training courses constitute the learning of educational knowledge which has more emphasis on curriculum design and critical thinking. Some teachers may easily develop a false and misleading impression that educational knowledge learning does not need to be linked to educational practice.

The core focus of educational knowledge learning courses lies in promoting teachers' systematic and comprehensive awareness before their teaching practice. However, this over-emphasis on knowledge often promotes the dialectical relationship between theory and practice. Knowledge learning becomes disconnected from real-life experiences. When new teachers encounter practical educational challenges in their work, they often do not apply their educational knowledge to seek solutions, resulting in a failure to bridge the gap between theory and application. Consequently, teachers lose the essence of learning theory for practical purposes, which result in a high dropout rate in educational knowledge training courses.

2.2   Lack of Learning Initiative and Interest

The conventional pedagogical approach, most frequently employed in teacher training courses, consists of traditional lectures. However, it is imperative to acknowledge that

employing the conventional lecture method for the dissemination of educational theories is accompanied by a panoply of distinct disadvantages.

From the vantage point of program trainers, the act of lecturing on theoretical constructs often fosters a climate of passive learning. In this paradigm, trainees assume a predominantly receptive role, wherein they are subjected to the presentation of educational principles and strategies without being actively engaged in the contextual intricacies of education. This mode of instructional delivery frequently results in rote memorization of knowledge devoid of substantive understanding, thereby diminishing its practical applicability within the real-world educational milieu. Furthermore, this can lead to compounded difficulties when navigating the complexities inherent to more advanced educational knowledge and mind thinking.

Viewed through the lens of the trainees, traditional lectures are synonymous with a suboptimal learning experience. They provide trainees with limited opportunities for meaningful engagement, both with the trainers and with their peers. The dearth of interactive discourse within the confines of a traditional lecture hampers the free exchange of ideas and the fostering of critical discussions essential for comprehensive comprehension. The protracted duration of lectures can further exacerbate this issue, resulting in diminished attention spans and commensurately diminished educational outcomes.

2.3   Shackles of Habitual Thinking

The past teaching experience of teachers has developed a mode of habitual thinking, where they perceive educational knowledge as infallible. New teachers' cognitive inertia manifests in their preference for pre-packaged knowledge. They may be familiar to applying certain knowledge to a specific scenario. When there is a slightly different variation in real life context, they may fail to apply the existing solution and unwilling to engage in thinking one more step, only waiting for the answer instead. Such mindset not only hinders the development of teachers' critical thinking and innovative thinking but also impedes the enhancement of their overall abilities such as problem solving, independent thinking, collaborative working, and self-directed learning abilities.

In teacher training program, nurturing teachers' critical thinking abilities and encouraging them to reflect on their teaching practice are equally important to promote teachers' professional development. The emphasis of reforming teachers' learning mode should lie in aiding teachers in breaking free from these habitual cognitive patterns, and fostering the flexibility of applying knowledge to practice, ultimately forming a comprehensive ability to solving educational problems innovatively in their work.

In summary, the conventional lecture model employed for the dissemination of educational knowledge grapples with two pivotal challenges: the stifling of teachers' initiative in the learning process and the engendering of a lackluster classroom atmosphere bereft of meaningful engagement. These issues underscore the imperative of exploring alternative pedagogical approaches to imparting educational knowledge in order to enhance the overall effectiveness of teacher training program.

3   Innovative Blended Learning Model

With the fast development of technology, there is an emerging need for integrating technology into face-to-face classroom in higher education, especially in teacher professional training program [1]. Research shows that the implementation of blended learning has a positive effect on reducing college students' dropout rates and in increasing their exam pass rates [2]. The applications of blended learning in higher education is widely supported [3]. Blended learning has several advantages for both teachers and students. Teachers can facilitate students' independent learning [4], and they can also foster students' critical thinking in solving real world problems [5] Blended learning can also enhance students' engagement in the classroom through lively interactions [6,7]. In higher education, blended learning model not only improve students' knowledge and skills acquisition, but also saving educational cost[8,9]. Other researches focus on the study of improving students' social-emotion development and visual learning through technology[10,11,12].But some of the research show the opposite result. In medical education, blended learning did not improve students' performance [13]. How to form an effective strategy to implement the blended learning method in higher education practice still requires scholarly research[14]. This paper explores the application of innovative blended learning model in the teacher training program and its effectiveness.

3.1   Three-Stage Blended Learning Cycle

Using Bloom's Taxonomy of learning domains as the theoretical framework, this innovative blended learning model provides students a well-rounded and effective theory learning experience. Bloom developed the taxonomy of educational objectives for the purpose of evaluating learners' learning outcome [15]. Anderson and Krathworthl reevaluated the original taxonomy and created a revised version [16]. Bloom's Taxonomy of learning domains is a framework that categorizes educational objectives and cognitive skills into three domains: cognitive domain, affective domain and psychomotor domain.

Cognitive domain deals with intellectual activities, such as thinking, understanding, and problem-solving. It includes six levels of learning: remembering, understanding, applying, analyzing, evaluating, and creating [17]. Affective domain relates to emotions, attitudes, and values. It encompasses five levels, from receiving, responding, to valuing, organizing and characterizing. Psychomotor Domain focuses on the development of physical skills and motor abilities. This domain encompasses a range of activities that involve physical movements, coordination, and skill development.

Employing the six hierarchical levels of Bloom's cognitive domain, the teacher training courses are redesigned according to teachers' practical learning needs and their different levels of cognitive activities. The new blended learning model divides teachers' professional training into three stages: theoretical learning, case-based practices and innovative thinking (Fig. 1). These three stages are a continuous process from the basic cognitive skills to the high-order thinking strategy. They are connected end to end, ultimately forming a closed loop, thus creating a virtuous learning cycle. This

learning cycle will encourage teachers to engage in a continuous process of learning not only in-class but also off-class. By repeating the learning cycle, teachers are able to reflect and refine their understanding of the knowledge and allow them to repractice in their worksite, leading them to a firm mastery of the teacher training.
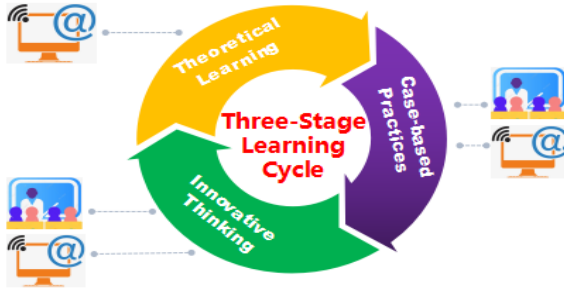

Fig. 1. Three-Stage Blended Learning Cycle.

3.2   Theoretical Learning Stage

Unlike the conventional educational knowledge learning which organize all knowledge according to the time line, innovative blended learning model follows teachers' cognitive learning process. In the theoretical learning stage, all educational knowledge courses are tailored to teachers' learning pattern, following a sequence from easy to difficult, from low-order thinking skills to high-order thinking skills. Thus teachers' educational knowledge is reorganized and restructured. The program training content is not limited to the textbook's chapter order but is adjusted according to the needs and learning characteristics of teachers. This approach allows teachers, especially the new teachers, to start learning with simple and commonly used knowledge in their daily work to those highly specialized and complex abstract knowledge.

In theoretical learning stage, in addition to the rearranged learning sequence of educational knowledge courses, ways of learning are extended from offline learning to online learning. Lower-order cognitive skills such as remembering and understanding can be achieved through teachers' online learning. Research has shown that the use of software provides students with additional opportunities to enhance learning [17]. Program trainers could assign independent online learning task for teachers before class. Through online platforms program trainers can provide resources like video lectures, interactive e-books and educational cases to help teachers remember and understand key concepts. Also program trainers could employ an online self-test for teachers to assess their self-learning outcome. The test results not only allows teachers to discover and revisit the difficult knowledge point, but also provides program trainers with trainees' learning feedbacks which helps them to target their in-class teaching at trainees' weak points of knowledge comprehension.

Online learning set teachers free from the time and place limits of the training program. They could use their spare time to involve in a step-by-step training course in a speed which they feel comfortable with. This online learning model also stimulates teachers' learning interest before offline training courses. (Fig. 2).

3.3   Case-based Practice Stage

In case-based practice stage, higher-order thinking skills are employed mainly in offline learning settings. Program trainers could use teachers' working cases as a vehicle to involve teachers in analyzing educational problems. With the guidance of Bloom's taxonomy, teachers' higher-order thinking skills are improved in their learning [18].

Offline learning of teacher training program takes various forms, including learning Q&A, teachers' group discussions, case analysis, debates, problem-solving projects and presentations. Teachers are more willing to engage in the classroom activities and positively interacts with the program trainers, which is consistent with Athanassiou's research findings [18]. In offline learning, instructors don't cover all knowledge in the textbook exhaustively. Instead, the focus is on deepening teachers' understanding of educational knowledge and the application. During this face-to-face teaching, teachers are encouraged to engage in discussions, debates and collaborative learning with small groups. Case-based practice allows teachers to reflect their past teacher experience, strengthen and promote their abilities to solve their teaching problems in practice.

Online learning can assist teachers' in-class case study in two main ways. Firstly, introducing remote guest speakers. For instance, new teachers usually have very limited experience and opportunities to interact with expert teachers. Online learning can facilitate the inclusion of remote guest speakers, professors and expert teachers who can provide insights and perspectives related to teacher experience. With the involvement of guest speakers, teacher training courses become more comprehensive and in-depth, and the feasibility of solutions to educational problems is significantly enhanced.

Secondly, employing real-time polling. Before and during the offline training session, program trainers could use online tools to organize a real-time polling. Teachers may provide a series of analysis and solutions to educational cases. They are stimulated to comparing their own analysis with other groups' outcome, which encourage them to reflect and gauge their understanding of the theory and to prompt further discussions related to the optimal analysis and solutions.
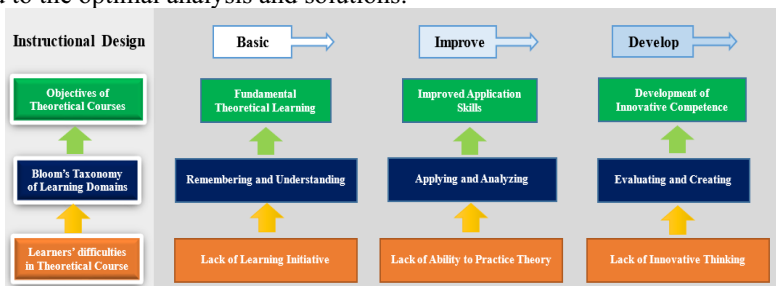

Fig. 2. Educational Design of the Three-stage Blended Learning Mordel.

3.4   Innovative Thinking and Collaborative Stage

Innovative thinking and collaborative learning is promoted and developed in the third stage mainly through teachers' work. Teachers are assigned with different project-based tasks. By applying the training content to their worksite situations, teachers are

able to solve practical educational problems, which make their efforts in program training more meaningful and their learning objectives clearer. Project-based tasks, serving as a driving force, not only can enhance teachers' practical and collaborative learning abilities, but also stimulates deep thinking in educational problems, develops critical thinking and fosters the development of innovation skills.

Project-based tasks can compensate for the lack of practicing higher order thinking skills in solving educational problems. In offline learning setting, project-based tasks offer teachers a channel of independent inquiry and a platform of collaborative learning. Teachers need to analyze each educational situation and discover the core problems. Some of the problems may need program trainers' guidance which promotes the trainer-trainee interaction in both online and offline learning.

For example, in the learning of preschool environment creation, the design of preschool classroom environment is a project which can give teachers an opportunity to reflect their own work. These projects may require teachers to spend their spare time visiting different preschool classrooms for on-site observations and collecting relevant pictures and video materials for analysis. After analyzing the pros and cons of each environmental design, teachers can propose their own classroom environment design. This experience of solving their worksite problems allows teachers to gain a critical and innovative thinking skill towards their teaching issues.

Online learning could facilitate teachers' project-based task in every step of the collaborative and innovative work. Program trainers could use online platform to track teachers' ongoing projects and to provide timely assistance. Moreover, trainers could provide extra reading materials and hold online discussions to help teachers to foster higher-order thinking skills. With the course instructors' online guidance, teachers can evaluate the effectiveness of their educational plan, make prompt modification and thus create their innovative solution.

Online learning platform allows teachers of online technology, group members could share the results of their exploration and application, and they could work together to combine each individual's work into one project easily. Creativity and innovation are not only shown in the process of collaborative projects but also are displayed in teachers' unique and creative ways of project presentation.

In the third stage of teachers' learning, a challenging project assignment can inspire critical and creative thinking, and it can provide ample opportunities for collaborative learning among teachers. During collaborative learning, interactions between program trainers and teachers, as well as discussions among peers, can guide teachers to break free from their habitual cognitive thinking patterns. This gradual process cultivates teachers' ability for innovative thinking. Ultimately, teachers acquire the comprehensive skills to identify, analyze, and innovatively solve problems.

4   Results and Discussion

The application of the three-stage blended learning method in teacher training program began in 2020. Initially, it simply introduced online training resources without fundamental changes to teaching methods and learning approaches. Over the following two

years, with the development of complementary online courses, curriculum design philosophies and methods were continuously optimized, and the application of the three-stage blended learning method in classrooms gradually matured. In 2023, the formal proposal of the three-stage blended teaching model for teacher training courses was made.

4.1 Improved Learning Outcomes

In order to test the learning effectiveness of the three-stage blended learning model, a confirmatory teaching experiment was conducted. Specific procedures included conducting satisfaction tests for teacher training courses among new teachers in a preschool teacher training program. Two groups of new teachers with similar satisfaction scores were selected to participate in the experiment. From March to July 2023, two groups of new teachers need to study the same course which serves as an invaluable repository of fundamental theoretical knowledge, offering a comprehensive exploration of the discipline of early childhood education. The experimental group utilized the three-stage blended learning method, while the control group used the traditional offline lecture-style learning method. The same learning materials were used during the experiment, and the same program trainer conducted the instruction for both groups, eliminating the potential influence of individual teaching styles on trainees' performance. After the course concluded, new teachers from both groups underwent assessments of teacher training content knowledge and a program training satisfaction test. From the two groups' satisfaction results, teachers who use the three-stage blended learning model display higher level of satisfaction and they report more engagement and interest in the learning process.

Table 1. Mean Score of Theoretical Knowledge Assessment

Group	*N*	*M*	*SD*	*SEM*
Control group	35	77.7429	3.62461	.61267
Experimental group	35	80.4286	3.75958	.63549

Table 1 shows that the mean score of control group in the final teacher training knowledge assessment is 77.74 which is lower than the experimental group (M=80.43). According to results of the independent sample t-test (Table II), F= .230 with a p value higher than 0.05, which indicates that equal variances is assumed. Then t=-3.043, p<0.05 indicates that new teachers who employ the three-stage blended learning method achieved significantly higher learning outcome than teachers who adopt the conventional way.

Table 2. Independent Sample Test

	Levene's Test for Equality of Variances		T-test for Equality of Means		
	F	*Sig*	*t*	*df*	*Sig*
Equal variances assumed	.230	.633	-3.043	68	.003
Equal variances not assumed			-3.043	67.909	.003

4.2   Increased Proactive Engagement

Under this model, different stages of learning correspond to different learning strategies. Before the class, problem-driven learning methods are applied to stimulate teachers' interest and motivation for self-directed pre-class learning. Diverse online teaching resources are used to assist teachers in understanding and memorizing foundational knowledge.

In the training process, educational cases serve as the basis, and a variety of learning methods, both online and offline, are integrated. These methods include flipped teaching, case-based teaching, inquiry-based teaching, and collaborative discussions. They aim to deepen teachers' understanding and mastery of training knowledge and promote their ability of application.

After class, project-based teaching methods are employed, using real education cases to drive teachers' self-directed and collaborative learning. Program trainer can provide guidance and assessment through both online and offline methods, allowing teachers to deepen the understanding of learning's practical significance as they apply their learning to solve problems. By completing projects, teachers develop and experience a sense of achievement, which encourages them to reengage in the next learning cycle.

4.3   Enhanced Practicality of Learning and Higher-order Thinking Skills

One of the key features of this model is the integration of real-life and challenging educational cases into teachers' learning process, aiming to help them build a bridge between training content and practice. This assists teachers in clearly recognizing that knowledge can guide practice, and practice can validate theory. Applying real educational cases to learning process, on one hand, fosters teachers' higher-order cognitive skills. In addition to remember and understand teacher training, they need to learn how to apply their learning in practice, analyze the coming educational problems, evaluate their teaching plan and finally create a feasible problem-solving solution. This process aids them in internalizing knowledge into concrete guidance, thereby enhancing their higher-order thinking and practical application skills.

On the other hand, new teachers often face more challenges in their work. The feature emphasized in this model, which involves learning knowledge through educational cases, can simulate the transition from new teachers to proficient teachers. This learning

model effectively transforms knowledge learning into teachers' professional competence. In teacher training programs, this learning model also effectively reduces new teachers' sense of disconnection between knowledge and practice.

5   Conclusion

Adopting a blended learning approach in a three-stage learning model of teacher training program is an effective way to address the issues of monotony and singularity in a traditional training style. The three-stage blended learning approach divides teachers' learning into three stages: basic knowledge learning, case-based practical training, and project-based problem solving. It fosters a sense of teamwork and an environment of creative thinking, through which teachers deepen their understanding of knowledge and improve their application skills. Ultimately, this model enhances new teachers' ability to solve working problems.

The three-stage blended learning model continuously optimizes and diversifies the learning methods, aiming to enhance teachers' interest in training courses, promote proactive engagement, nurture innovative thinking, and develop comprehensive practical skills. This model is an effective way to provide teachers with a scaffolded learning experience from simple to complex, from abstract to concrete, ultimately fostering a conscientious cycle of self-directed learning. Future research should focus on the training of more program trainers applying blended learning model effectively, since program trainers assume a key role in advancing trainees' continuous learning through both online and offline ways. Also using this model requires program trainers' more time and more resources to prepare each training and trainers' excellent teaching skills is a prerequisite for the success of this model. Therefore, how to promote the application of this model and still guarantee high quality of program training is worthy of more future study.

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