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A context-adaptive teacher training model in a ubiquitous learning environment

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ABSTRACT

In view of the discrepancies in teacher training and teaching practice, this paper put forward a context-adaptive teacher training model in a ubiquitous learning (u-learning) environment. The innovative model provides teachers of different subjects with adaptive and personalized learning content in a u-learning environment, implements intra- and inter-group collaboration to facilitate knowledge construction and in-depth study, and promotes reflection with the help of the supervising teacher's review and summarization. To test the effect, the model was applied to a general teacher training. Participants were then given questionnaires and interviews were conducted to assess the effectiveness of the model and attitude. Results showed that the model promoted teachers' learning effectively, achieved the combination of teacher training and teaching practice. Moreover, teachers held positive attitude toward the model.

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Introduction

With rapid developments in technology and educational theory, adequate teacher training is critical for maintaining a high quality of education in China. However, face-to-face teacher training in China commonly adopts a centralized teaching concept, presented in a limited amount of time, to a large number of trainees from multidisciplinary backgrounds. The focus is on general theory and technology, but the training content cannot meet the varied needs of specific teaching practices from all teachers. This is especially true with respect to training in terms of the skills required to effectively integrate the general technology, tools, equipment and methods that teachers from different subjects encounter. Thus, the issue that training content is separated from practice is prominent.

Liu and Hwang (2012) investigated and summarized the status of teacher training in China, and identified certain key problem areas. The first is that training content does not match with teachers' methodological needs, which fails to stimulate or motivate teacher interest in learning. Training ignores the practical application of theory and technology, and thus, teachers spend considerable time participating in training but cannot translate knowledge into practice. Appropriate training based on each teacher's personalized ability level is not provided, thus some teachers acquire substantial information while others do not.

The discrepancy between teacher training and practice may cause some professionals to experience failure as teachers (Guthrie, 1990; Westbrook et al., 2009). It is difficult for such training to effectively improve teacher's professional ability, thus reducing teacher participation motivation (Guskey,

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2000; Yan, 2008), which ultimately impacts the effect of the training – resulting in a vicious downward spiral. Therefore, strengthening the connection between learning content and teaching practice in training has become an urgent issue that must be incorporated in the teacher training model.

Luckily, recent developments of mobile technology, wireless networks and context-aware technology, as well as the advancement of u-learning, have provided the possibility for context-adaptive learning content that meets the needs of multidisciplinary professionals.

Aiming to solve the detachment of training content with teaching practice, this study focused on the status of face-to-face teacher training in China and proposed a context-adaptive teacher training model in a u-learning environment. The model integrates u-learning and collaborative learning to help teachers obtain personalized learning content, bridge the theory and practice, enhance learning ability. The model was applied into a training practice to investigate its effect based on the following two research questions:

(1) What is the effect of the model on teachers' learning?
(2) What is teachers' attitude toward the training model?

Literature review

With the development of ubiquitous computing, u-learning has become an important trend in the evolution of electronic learning (e-learning) (Hwang, Wu, Tseng, & Huang, 2011; Liu & Hwang, 2010). As a newly proposed concept, different researchers have different definitions of u-learning (Ogata & Yano, 2004; Zhang, Jin, & Shih, 2005). Hwang, Tsai, and Yang (2008) defined u-learning a in general and a narrow sense. In general, u-learning allows for learning to occur at any time and in any location. More narrowly, u-learning is considered a context-aware type of learning that is supported by context awareness technology, ubiquitous computing technology and wireless network technology. For the purpose of this study, u-learning refers to the posterior explanation. Context-awareness is an important characteristic of u-learning, which implies that learner can obtain adaptive and personalized resources and services in u-learning.

At present, increasing numbers of researchers are conducting studies of the u-learning environment and creating u-learning environment prototypes (Feeney, Ahlgren, & Westerlund, 2001; Hwang, Yang, Tsai, & Yang, 2009; Kindberg & Fox, 2002; Shih, Chu, Hwang, & Kinshuk, 2011). In these u-learning environments, learners can obtain the suitable learning resources conforming to their context information of geographical positioning, environmental situation, learning interest, knowledge level, learning state, and so on. However, the learning content learners get in the u-learning environments is static and cannot be changed according to different contexts.

Many researchers have studied the learning effects in u-learning environment, confirming that u-learning with proper learning design was beneficial to improve learning attitudes, learning motivation, learning achievements and questioning ability (Chen, Hwang, & Tsai, 2014; Chu, 2014; Hung et al., 2014; Hwang, Hung, Chen, & Liu, 2014; Liu, 2009; Liu, Chu, Tan, & Chang, 2007; Shih et al., 2011; Shin, Kuo, & Liu, 2012; Wong, Hsu, Sun, & Boticki, 2013). However, these studies mainly concentrate on student learning and seldom focus on teacher training. Only a small portion of researchers who study on teacher learning believe that ubiquitous mobile devices and timely access to information are beneficial to teacher learning (Aubusson, Schuck, & Burden, 2009). Besides, these researchers who focus on teacher training models are only using mobile devices to acquire and transfer static information in a timely manner, ignoring the content that is required by the teacher. (Seppälä & Alamäki, 2003; Wishart, 2009). However, the main motivation of teachers in training is to apply knowledge to their teaching, so they need the learning content related to their subject teaching. Above acquiring content in a timely manner, a focus on teacher demand for subject-specific content is essential to meet the multi-subject needs of the teachers who participate in the training.

In summary, a learner can obtain personalized resources and services related to his situation in a context-aware u-learning environment. The supervising teacher in the training can utilize the feature to identify teachers' needs and provide resources meeting their contextual needs. This resolves the current training problem because teacher practice is personalized, not linked with training content. Accordingly, this study integrated u-learning into teacher training to provide the learning content combined with practical scenarios by identifying teachers' contexts in a u-learning environment. At the same time, considering that the current u-learning environment cannot provide context-adaptive learning content according to various contexts, this study also designs and develops a new u-learning environment that can dynamically adapt the present learning resources according to the teachers' individual contexts.

Methodology

Model

A context-aware u-learning environment can be used to provide adaptive learning content combined with teaching practice by identifying teacher's context. The constructivism emphasizes that learning is a process of active construction instead of passive acceptance. Therefore, collaborative knowledge construction activities are conducive to promoting teachers' meaningful learning and deepening their knowledge comprehension and application (Guo & Huo, 2014; Tsui, Wu, & Sengupta, 1996). In order to bridge training content and practice, and strengthen the application of knowledge, this study proposed a context-adaptive teacher training model in u-learning environment. The features of this model are founded on providing teachers with personalized and adaptive learning content related to teachers' subject closely in a u-learning environment. The model also provides practical activities of intra-group collaboration and inter-group communication to promote collaborative knowledge building and application of knowledge, and facilitates teachers to refine and reflect the knowledge by supervising teacher's comments and summaries. Referencing the network collaborative lesson preparation model (Chen, Zhang, Wang, & Yu, 2013), this study divided the training model into four phases: u-learning, intra-group collaboration, inter-group communication, comment and summary, as shown in Figure 1.

The first stage of the model is u-learning. Teachers can quickly access learning content in a context-aware u-learning environment. The content is presented to the teachers according to their subject adaptively and dynamically. This stage primarily focuses on individual active knowledge construction, and successfully leads to knowledge externalization.

The second stage is intra-group collaboration. In the stage, teachers must complete a task with group members. Everyone can discuss his/her understanding of knowledge and respond to other members' queries. Consensus within the group is achieved and incorporated into teaching practice. This stage achieves intra-group collaborative knowledge construction through group negotiations and discussions. The primary goal of this stage is to achieve knowledge transference.

The third stage is inter-group sharing and communication. Each group shares its achievements, listens to other groups' comments, and responds to other's questions. Ultimately, the groups achieve consensus among groups. The main focus of this stage is inter-group collaborative knowledge construction by communicating and discussing.

The fourth stage is comment and summarization. The supervising teacher comments on and summarizes every group's performance, thus prompting the teachers to reflect on, digest and refine their knowledge, helping them to achieve knowledge internalization.

To verify the effect of the model, this study applied the model in a workshop. The workshop was suitable for teachers from different subjects. The goal of workshop is to make teachers learn and apply some instructional cognitive tools into their subject teaching. So, the learning content for subject teachers should be different. The study tried to use the training model in the workshop to help the subject teachers obtain adaptive and personalized learning content, and to promote the application of knowledge in practice.

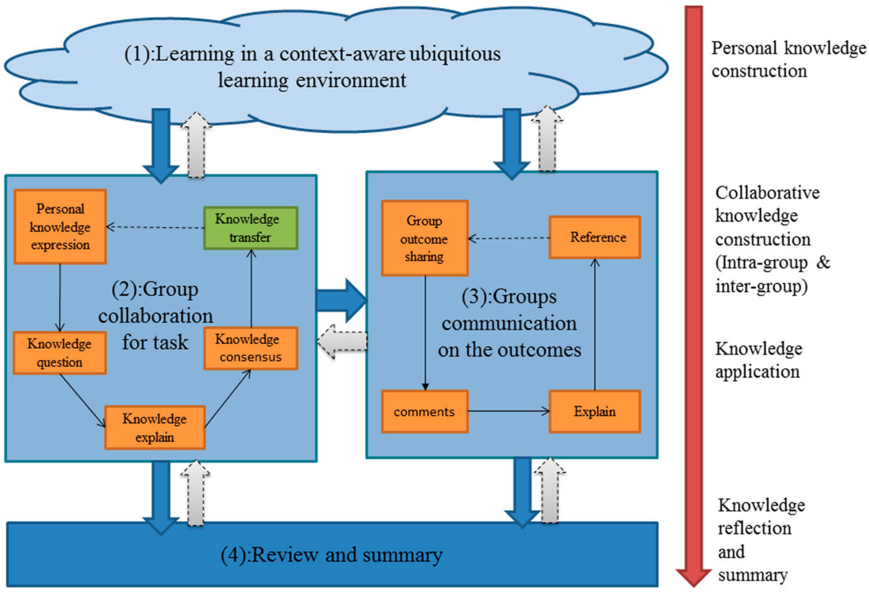

Figure 1. A context-adaptive teacher training model in u-learning environment.

Participants

There were 28 participants in the training, including 6 assistants, which resulted in the submission of 22 valid teacher questionnaires. Of teacher respondents, 8 were male and 14 female, 20 were from urban schools and 2 from rural-area schools. Age ranged from 20 to 50 years. Teachers taught one of the following four subjects: Chinese, mathematics, English or information technology.

The reason teachers' gender and region (urban, rural) are not balanced is that the training was conducted with several other workshops occurring simultaneously. Thus, attendees randomly and freely chose the workshops they wanted rather than being solicited in advance.

Development of the context-aware u-learning environment

The ideal u-learning environment allows a learner to access resources anywhere, anytime, identifies the learner's context and provides context-adaptive learning resources. In the process of training, time is limited, but teachers' subjects are varied, and the demands to strengthen the connection of learning content and implementation are urgent. Therefore, providing more targeted and personalized learning content to teachers is necessary. This research developed a context-aware u-learning environment for subject teachers to provide adaptive and personalized learning content dynamically.

The u-learning environment is composed of three parts: physical resources attached to QR fiducial codes, a wireless network and a learning system called Learning Cell Knowledge Community (LCKC, http://lcell.bnu.edu.cn). The QR code is used to support context awareness, the wireless network is used for the transmission of information, and the LCKC is responsible for providing personalized learning content. The LCKC was developed based on the concept of learning cell (LC) (Yu, Yang, Cheng, & Wang, 2015). A LC is the smallest resource unit in the LCKC, the content structure of which is dynamic as shown in Figure 2.

The researchers added the context-aware and content aggregation modules to the LCKC. The context-aware module is used to gather teachers' context information and the aggregation module is used to adjust and aggregate the content fragments of a LC according to this context information. Researchers previously created a LC for every tool. Each LC contains several sections of

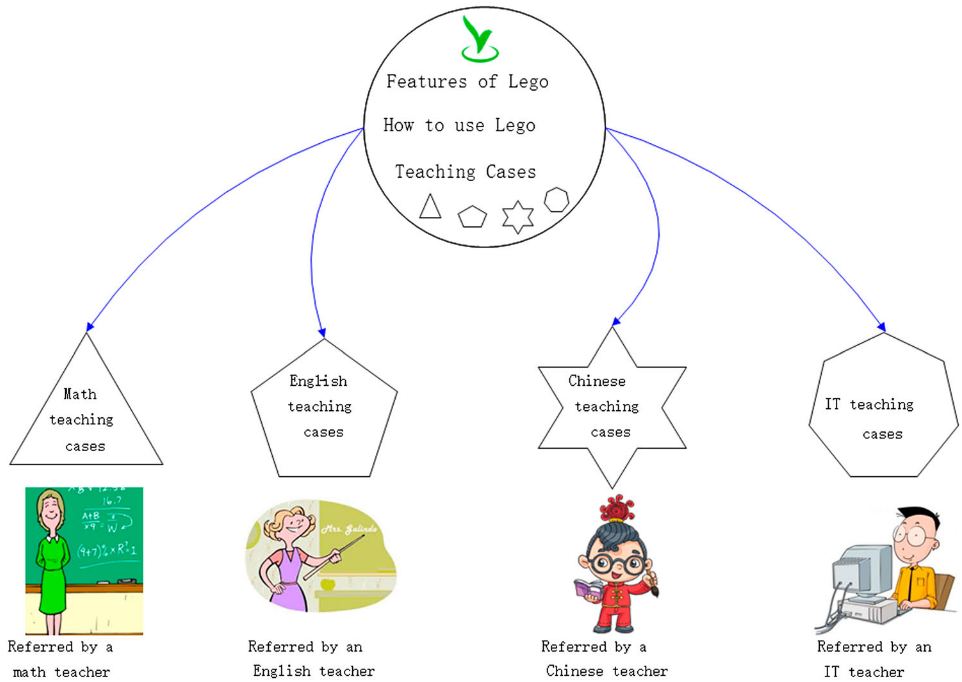

Figure 2. Context-adaptive dynamic content structure of LC.

content, and each section of content is tagged with several keywords that indicate the section's characteristics. When a teacher uses his/her mobile device to login to the LCKC and scan a QR code, the context-aware module will retrieve the teacher's subject and learning need. The most relevant content sections are selected in the LC according to the teacher's subject, which are then made available to the teacher. For example, as shown in Figure 3, an English teacher and a Chinese teacher scan the QR code of the same tool and access the LC, but the content of the LC is not the same. The contents of the LC present an introduction and related websites to both teachers, but the English teacher accesses English teaching cases, while the Chinese teacher accesses Chinese teaching cases.

Learning content design

The training in this study tends to help teachers learn some instructional cognitive tools and apply the tools in their subject teaching to enhance their teaching abilities. Consistent with this goal, the supervising teacher provided trainees with 11 instructional cognitive tools, including Scratch, LEGO, NB (NoBook) simulation physics laboratory, NB (NoBook) simulation chemical laboratory, Bio-digital human, PhET, mind mapping, Google Earth, GeoGebra, intelligent teaching aids and collaborative lesson assessment tool. Most of these instructional cognitive tools can be used in subject areas. The supervising teacher provided relevant content for each of these tools that included an introduction, instructions, subject application cases, reference information. The researchers created 11 LCs in the LCKC, used some feature keywords to mark each section of the content in each LC, and created a QR code for each LC.

Training process

Prior to training, researchers built a QR-code wall. Along the wall were instructional posters, each of which corresponded with a cognitive tool and included the tool's unique QR-code. Some of the

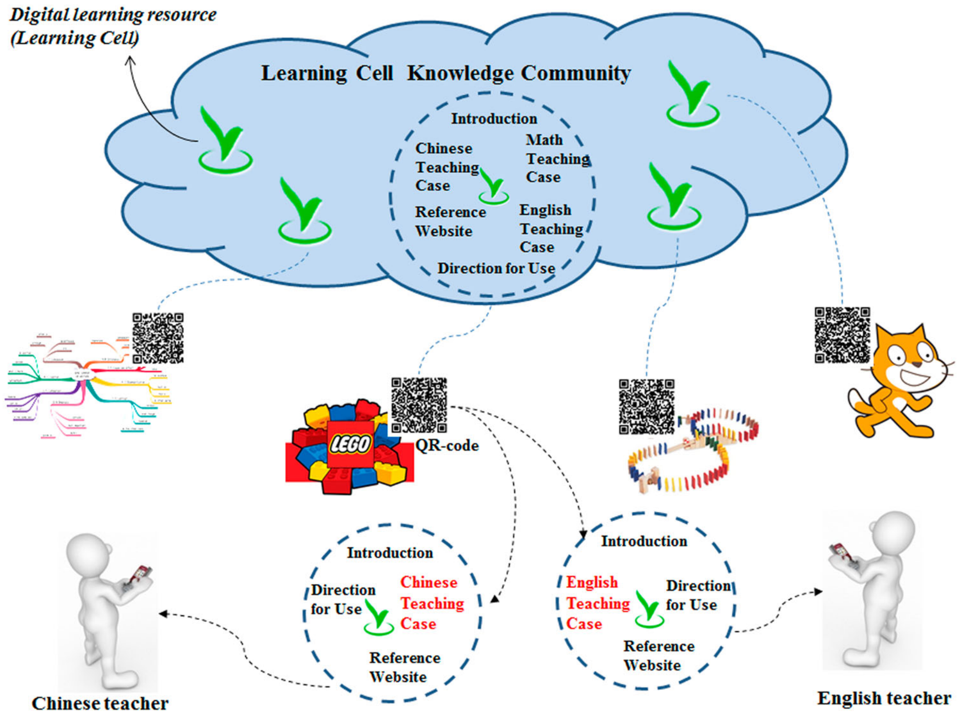

Figure 3. The context-aware u-learning environment.

entities of some tools with their QR code also were displayed near the wall. A unified QR code scanning software was installed onto a number of tablets, along with the u-learning software. The six assistants first experimented with the tablets in the u-learning environment, simulating the training process before the start of the formal training. This allowed the supervising teacher to make further improvement on the u-learning environment and training activities based on the problems identified in the simulated training. The actual training process lasted 180 minutes. The formal training process was as follows.

First, teachers were divided into six groups based on discipline, with four to six teachers per group. Group members introduced themselves, and each group was assigned a teaching assistant. Second, the supervising teacher introduced the purpose, method and design of the training and explained the popularized concepts of u-learning and the u-learning environment. Third, the supervising teacher taught the teachers about how to use the tablets and the QR code scanning software. Finally, the supervising teacher conducted the training activities according to the training model. The training activities were divided into four phases: u-learning, intra-group collaboration, inter-group communication, and summary and reflection. During the activities, the supervising teacher and teaching assistants answered questions and helped teachers to solve problems.

In the u-learning phase, each teacher used a tablet to engage in self-learning in the u-learning environment. Figure 4 shows the real scene of u-learning. There were one Chinese teacher and two English teachers learning a kind of tool named intelligent teaching aid by their tablets. After scanning the same QR code of the tool, the Chinese teacher obtained the learning content about the use and application of the tools in Chinese teaching on their tablets while the English teachers gained the learning content about the use and application of the tools in English teaching.

In the inter-group collaboration phase, teachers communicated with each other to develop a one-lesson-teaching unit collaboratively. Figure 5 shows that the teachers of a mathematics group were

Figure 4. Learning in the u-learning environment.

collaboratively designing a one-lesson-teaching by discussing which tools they learned were suitable to be used and how to apply the tools to make teaching better.

During the inter-group communication phase, each group selected a representative to introduce the teaching design to other groups. As shown in Figure 6, a teacher representative was introducing the teaching design of her group while other teachers were learning from her and encouraged in comments and questions. In the end, all the teachers scored the teaching designs. The one with the highest score was selected as the best design.

The summary and reflection phase was the final phase of the process. The supervising teacher summarized the training and commented on the teachers' learning performances, including their ability of understanding, application and integration of the tools.

Research tools

To understand the effect of the training model on learning and teachers' attitude, researchers administered a questionnaire and conducted group interviews after training.

Figure 5. Collaborating in the development of the teaching unit.

Figure 6. Stating their groups' teaching design.

Questionnaire design

The questionnaire was divided into three parts. The first part gathered basic information, including gender, age, discipline and area (urban or rural).

The second part was the main investigation content of the questionnaire, which was used to investigate the effect of the model on teachers' learning and attitude. There were 19 items in 5 dimensions: u-learning (4 items), learning content (3 items), collaborative knowledge building (5 items), teaching design ability (3 items) and attitude toward the training (4 items). Each question was answered using a five-point Likert scale. The dimension of the attitude toward the training was used to investigate teachers' attitude toward the model, and the dimension of teaching design ability was used to investigate teacher's learning achievement after training. The other three dimensions were used to make further investigation into the effect of u-learning, personalized content and collaborative activity on teachers' learning, respectively, which were the key features of the model.

The items in the dimensions of u-learning and collaborative knowledge construction were designed based on the questionnaires proposed by Chu, Hwang, Tsai, and Tseng (2010) and Hwang and Chang (2011), respectively. Other items were designed by the supervising teacher and researchers. After testing the consistency of each dimension, researchers found that the Cronbach's α values for the consistencies of the dimensions of u-learning, learning content, collaborative knowledge building, teaching design ability and attitude toward the training were 0.92, 0.72, 0.91, 0.87 and 0.94, respectively.

The third section of the questionnaire consisted of two open-ended questions, which were used to understand the effect of the training on teachers' learning further. And the suggestions and feedback to the training were also asked.

Interview design

To understand the opinions and suggestions of the teachers further, each teaching assistant conducted a group interview after training. There were two questions in each interview:

(1) What do you feel about the training model?
(2) What is your suggestion for the training model?

Results

Questionnaire results

Based on the results of the questionnaire, as shown in Table 1, the average scores of the five dimensions of u-learning, learning content, collaborative knowledge building, teaching design ability and attitude toward activity were 4.44, 4.0, 4.27, 4.18 and 4.11, respectively. The highest score was u-learning while the lowest was learning content. However, the scores for all dimensions were 4 or more, indicating that the teachers were satisfied with the personalized learning content, accepted the u-learning pattern fully and exhibited a high sense of identity toward the collaborative construction of teaching design. Furthermore, the teachers considered that their teaching design abilities had been improved.

With respect to the u-learning dimension, most teachers thought that the u-learning was much more interesting compared with the traditional way (4.50), which could enhance their enthusiasm for learning (4.55), promote their new ways of thinking (4.36), and they liked u-learning (4.36).

With respect to the dimension of learning content, the majority of teachers thought that they could quickly access the learning resources related to the instructional cognitive tools and they were interested in u-learning activities (4.14) and the content of these resources was closely related to their subjects (4.09), and the redundant content was less and the content provided better met their needs (3.77).

Regarding the dimension of collaborative knowledge building, most of the teachers agreed that developing teaching design collaboratively was much more meaningful than individually (4.23), as it helped them more quickly to learn how to apply the cognitive tools (4.36) in their teaching (4.27). Moreover, the collaborative knowledge building facilitated new way of thinking as they developed teaching designs (4.36). Therefore, they wanted to adopt the way of collaborative knowledge building for instructional design (4.14).

Regarding teaching design ability, the majority of the teachers believed that their abilities with respect to teaching design had been improved as a result of this training (4.14) and that their abilities to integrate the curriculum with the tools were enhanced (4.09). Moreover, after the training, they felt that their teaching would be more creative in the future (4.32).

With respect to teachers' general attitudes toward the activities, most of the teachers considered that the training model was novel and interesting (4.14), and their enthusiasm to participate in the training was improved (4.14). Furthermore, they indicated that the activities deepened their understanding about the application of the tools (4.09). All of the above would account for the large gains they demonstrated in the training (4.09).

Due to the small sample and varied demographics of participants in this study, a non-parametric independent sample Kruskal–Wallis test was used to further analyze data, and to determine whether the results of the study were affected by age and disciplinary background. Considering that a majority of the teachers were female and from urban schools, the influence of gender and region was not analyzed.

As presented in Table 2, age had no significant effect on the five dimensions, nor did the teacher's subject background as shown in Table 3. Accordingly, the results of the questionnaire were not affected by either of the two factors. Therefore, the training model proposed in this study can be applied to different teachers from different subjects and ages.

The results of the open-ended questions indicated that the teachers thought that the training made them know more instructional cognitive tools, improved their ability to integrate the tools

Table 1. Descriptive statistics of the five dimensions.

Dimensions	*N*	Mean	Std. deviation
U-learning	22	4.44	.58
Content	22	4.00	.63
Collaboration	22	4.27	.59
Instruction design	22	4.18	.56
Activity	22	4.11	.61

Table 2. The Kruskal–Wallis test result of the questionnaire (age).

	Age	*N*	Mean	Chi-squared	df	Sig.
U-learning	20–30	5	11.20	0.13	2	0.94
	31–40	12	11.25			
	41–50	5	12.40			
Learning content	20–30	5	9.90	0.83	2	0.66
	31–40	12	11.33			
	41–50	5	13.50			
Collaborative knowledge building	20–30	5	11.80	0.15	2	0.99
	31–40	12	11.42			
	41–50	5	13.40			
Instruction design	20–30	5	9.10	0.94	2	0.62
	31–40	12	12.25			
	41–50	5	12.10			
Attitude	20–30	5	11.20	0.46	2	0.98
	31–40	12	11.42			
	41–50	5	12.00			

Notes: Asymptotic significances are displayed.
The significance level is .05.

with their curriculum, enhanced their awareness of the importance of collaboration, improved their knowledge of teaching concepts and teaching methodologies, and promoted their creativity with respect to teaching innovation.

The teachers also suggested that more teaching cases should be provided and cognitive tools be presented in a more in-depth and comprehensive manner. They thought that the novel training model should be offered more often and be the part of a complete training program, which could be promoted to local teaching and research departments.

Interview results

Based on the grounded theory, the researchers coded the interview material and analyzed the interview results in a systematic way. Due to limited space, the researchers only explained the coding process and results.

Table 3. The Kruskal–Wallis test result of the questionnaire (subject).

	Subject	*N*	Mean	Chi-squared	df	Sig.
U-learning	Math	12	10.29	1.77	3	0.62
	Chinese	4	14.38			
	English	4	10.75			
	Science	22	14.50			
Learning content	Math	12	11.17	1.59	3	0.66
	Chinese	4	9.00			
	English	4	13.5			
	Science	22	15.00			
Collaborative knowledge building	Math	12	11.88	1.05	3	0.79
	Chinese	4	13.25			
	English	4	8.88			
	Science	22	11.00			
Instruction design	Math	12	10.50	1.21	3	0.75
	Chinese	4	14.50			
	English	4	11.50			
	Science	22	11.50			
Attitude	Math	12	11.75	1.11	3	0.77
	Chinese	4	10.50			
	English	4	9.88			
	Science	22	15.25			

Notes: Asymptotic significances are displayed.
The significance level is .05.

By preliminary analysis of the interview material, the researchers got 18 open encodings: usage of tool, enhancing teaching ability, collaboration, communication, teaching case, subject, fulfilling, acceptance, not boring, participation, application, professional development, link, unusable, sustainable, promotion, teaching and research, and teaching design. And by analyzing the relationships of the 18 open encodings and interview material, the researchers synthesized 8 spindle encodings: adaptive learning content (usage of tool, teaching case), subject, application of knowledge (teaching design, application), collaboration knowledge building (collaboration, communication), positive attitude (fulfilling, acceptance, not boring, participation, sustainable, promotion), availability of content (link, unusable), professional development, and enhancing teaching ability. And based on the repeated reading and analysis of the interview data, open encodings and spindle encodings, the researchers finally determined seven select encodings: adaptive learning content (usage of tool, teaching case), subject, application of knowledge (teaching design, application), collaboration knowledge building (collaboration, communication), positive attitude (fulfilling, acceptance, not boring, participation, sustainable, promotion), availability of content (link, unusable), and enhancing teaching ability. Through further analysis of these encodings and the interview material, the researchers obtained the following conclusions:

(1) Adaptive learning content closely related to subject is helpful for the application of knowledge and the improvement of teachers' teaching ability. The adaptive learning content in the training contains not only the knowledge about usage of a tool, but also the teaching cases of the tool in accordance with teacher's subject. So, teachers learned how to apply the tools into their teaching, and their teaching ability was improved.
(2) Collaboration knowledge building activities help teachers learn more in the collaboration and communication to improve teachers' teaching ability further. The teachers discussed while they practiced in the collaboration knowledge building activities. In the process, teachers applied the knowledge to teaching practice, solved their learning problems and generated a lot of ideas by collaboration and communication, and then their teaching ability was improved.
(3) Adaptive learning content, collaboration and communication activities make teachers' positive attitude to training. Adaptive learning content made teachers obtain the knowledge combining with their teaching practice; meanwhile, collaboration and communication activities gave teachers the opportunities to communicate and learn from others. So, the teachers thought that the training was fulfilling, not boring, and made their participation and acceptability to be improved. They also suggested that the training model should be continued and promoted.
(4) Availability of content has an important influence on learning experience. Teachers said that they would be happier and less upset if network links in some LCs were usable.

Discussion

Findings indicated that the model could promote teachers' learning well. The goal of training was introducing the instructional cognitive tools to teachers and guiding them to apply the tools into subject teaching. In the training model, u-learning is novel and interesting, which improved teacher's learning enthusiasm and was possible to increase teachers' motivation (Keller, 2008; Keller & Suzuki, 1988). Using the dynamic resource organization method to implement dynamic learning content in u-learning environment, every teacher could access adaptive and personalized learning content related to his/her teaching subject quickly. The teachers gained not only the knowledge of tools, such as the features of tools and the usage of the tools, but also the application of the tools to their subjects. Moreover, collaborative activity was conducive to teacher's learning initiative (Järvelä, Volet, & Järvenoja, 2010), thorough comprehension of information (Hung & Chen, 2000), and improvement of teaching skills. In the collaborative activity, teachers helped each other to learn the tools and had more than one idea about the teaching design. They could discuss and communicate with each other and gain more knowledge from others. The teacher's abilities to teaching design and integrating the subject curriculum with the tools were enhanced after training, which meant that they had learned how to use and apply the tools in their teaching.

The results also showed that the teachers held positive attitude toward the training model. Consistent with the previous research results (Cheng & Marsic, 2002; Hwang, Wu, & Ke, 2011; Shih et al., 2011), u-learning was novel and interesting. Teachers were satisfied with the learning content because the content met their needs. Their participation and acceptability also were improved because it was they who did teaching design and communicated with others in the training, which was helpful for their learning and teaching practice.

While the model has a positive training effect, it also needs some improvement. For one, it is necessary to further ensure the availability and the amount of training content. In this training, teacher learning efficiency improved, thus indicating a need for more content than learning in the traditional training context. Some related content (links) were not available because of the network used for this training (link), which caused us to realize the importance of guaranteeing personalized content, while at the same time, the need to guarantee the availability of content.

Also, the size of the training and the situations should be expanded. This teacher training was conducted in a limited space, and therefore, the number of teachers involved was small. The ubiquitous and situational characteristics of u-learning make the training model unsuitable for training in small spaces. Thus, it is best if it can be applied to training in multiple fields or in large areas that are more suitable and that better represent real-world situations. Drawing on the successful experience of the training, we will further extend the training model from a limited classroom to training venues with more space, such as museums, botanical gardens, and so on, and also extend the application field from teacher training to other fields, including medical personnel training, gardening staff training, and so on.

Conclusions

This study aimed to address the existing problems in traditional teacher training, which includes a disconnect between training content and concrete practice, and a lack of subject-specific personalization in materials and application. Researchers proposed a context-adaptive teacher training model in the u-learning environment, which consists of both u-learning and collaborative learning. U-learning was integrated into teacher training to provide teachers with adaptive and personalized learning content, and collaborative learning activities were carried out to promote thorough comprehension and migration of knowledge. Researchers applied the model in a training practice, and the results showed that the model could promote teachers' learning well, and teachers held positive attitude toward the model. Moreover, researchers will carry on further research and apply the model in large-scale training or other areas based on the experience.

Disclosure statement

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