Integration of Pre-service Training and Service Learning via Online Instruction

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Abstract: - The advantages of service learning, schools are increasingly incorporating the concept of service-learning into pre-service teacher training. However, the feasibility of integrating service-learning in pre-service teachers training has seldom been considered. Owing to advances in the development of information technology and pervasiveness of the Internet, teaching and learning are much cheaper and more convenient online today than in the past. Accordingly, this study attempts to integrate service-learning into pre-service teacher training via online instruction, and to identify how pre-service teachers give online instruction, and the benefit that they obtain from this experience. Video records and interviews are adopted to collect the feedback and respond from the pre-service teachers.Results of this study demonstrate that in addition to giving online instruction, pre-service teachers gain four benefits from participating in online instruction.

Key-Words: - Online instruction, Service learning, Pre-service training, E-tutor, One-on-one tutoring

1 Introduction

Teachers profoundly play significant roles in educational environment, as they need to show strong professional knowledge and skills to enhance student learning. Teacher training is thus of priority concern an essential issue in education. Both the development of the professional knowledge and the connection between theory and practical situation are important in training. Insight into current social conditions, understanding of different cultures and concern for underprivileged minorities are areas requiring further concern. These purposes can be attained by integrating service-learning into school academic curricula. Service-learning not only enables pre-service teachers to apply their professional knowledge in practical situations, but also improves their understanding of needs of society and of social justice

Environmental factors suggest that educational resources are not distributed equally: many more resources are available in urban regions than in rural regions. Accordingly, sharing educational resources with rural areas becomes an important issue. Distance learning education is a conventional means of addressing this problem. Distance learning education used to be rather expensive, due to information technology and the Internet were scarce, and the modes of interaction were restricted. For instance, two-way interaction between teachers and students was not possible until recently, leading to poor quality of instruction in distance learning. The recent development of information technology and the Internet has increased the convenience for teachers of adopting these tools to teach students. Many different distance education methods have been formed. For example, discussion forums and e-mail are used for asynchronous online instruction, and video conferencing systems are applied for synchronous online instruction. Among these different modes of distance education, synchronous online instruction is most similar to face-to-face instruction, thus breaking the distance barrier between instructor and learner.

In view of the merits of online instruction, this study applies it to combine service-learning and teacher training. An e-tutor program was held by Chung Hwa Telecom and a university in northern Taiwan. This program aims to provide pre-service teachers an opportunity to teach students in rural areas via the Internet. This program lasted for two semesters. Fifty-five

pre-service teachers participated in this program. Interviews and video recordings were utilized to discover the pre-service teachers' opinions on teaching by online tutoring. The two research questions are stated below:

1. How do pre-service teachers teach in E-tutor program?
2. What do pre-service teachers learn through participating in E-tutor program?

2 Literature Review

In this session, the researcher reviews the literature of service-learning and distance education.

2.1 Service Learning

2.1.1 What Is Service Learning?

Service-learning is not only an educational philosophy, but also a pedagogical method [1]. From the perspective of educational philosophy, service-learning consists of two beliefs. First, service-learning should develop the learners' social responsibility, the concept of serving others and understanding of social justice [2]. Second, service-learning should prepare learners for future life as citizens. Service-learning enables learners to understand the operation and needs of society.

Service-learning is an instructional approach that integrates service activities into school academic curricula. By combining of service activities and school academic curriculums, learners can improve their professional knowledge and understanding of social justice [3].

2.1.2 The Theoretical Base of Service Learning

Experiential learning theory is a significant service-learning theory. Experiential Learning Theory (ELT) was presented by David Kolb, who provided the concept of an experiential learning circle. ELT divides learning into four parts:

Concrete experience: learners capture information through concrete experience.

Reflective observation: learners perform reflection activities to focus on their observations, deepen their understanding of information.

Abstract conceptualization: learners combine the new and the old experience

Active experimentation: learners actively apply new perspectives reached by integrating the new and old experience.

Simply providing experience is not sufficient to elevate the learning outcome from service-learning. Reflection is a very significant part of service-learning, allowing individuals to monitor their behaviors and thinking process [4], and develop a better concept about the experience. Moreover, through systematic reflection activities, learners can connect the service-learning activities to the learning experience, and thus improve learning outcomes [5].

2.2 Distance Education

2.2.1 The Development of Distance Education

Development of distance learning [6-7] is influenced by the improvement of technology. Based on the levels of interaction, the development of distance learning has three stages [8]:

Stage 1 (1880–1960s): This is a passive distance learning stage. The teaching messages are conveyed one-way, with no real-time communication between teachers and students. An example is correspondence courses. The technology applications of distance learning in this stage are printed materials, hardcopy, recorded tape, video tape and radio programs.

Stage 2 (1960s–1990s): The interaction between learners and teachers is more active in this stage than in stage 1, since they can engage in bilateral message exchange and interaction. Both synchronous and asynchronous teaching and learning are possible. The technology applications of distance learning in stage 2 are bilateral video training, bilateral audio distance training, unilateral satellite video, computer assistant instruction and BBSs (Bulletin Board Systems).

Stage 3 (1990s–21st century): This is a complex era for distance learning. As well as the WWW (World Wide Web) and Internet technology, technology applications adopted in previous phases are also applied. This stage involves highly active interaction with no specific teaching methods. The use of educational technologies depends on the teaching objective and content.

Future of distance learning education: Distance learning will emphasize the lively learning environment in the future [7]. The key objective of researchers will be to develop a distance education system that can generate an environment similar to the real face-to-face context. Distance learning will involve interactive video, audio and visual reality systems, thus eliminating distance between students and the teacher.

Furthermore, distance-learning will address not merely the physical distance, but also the emotional distance between students and teacher [9]. This gap in understanding between students and teacher needs to be shortened. This goal will be attained by discerning new improved educational strategies and education resources to integrate technological innovations into educational practice [7].

2.2.2 The Modes of Distance Education

Distance learning can be classified as synchronous and asynchronous, according to the mode of interaction [10]:

Asynchronous distance learning: The instructors post softcopy or pre-recorded video-audio teaching materials on the webpage for students to download or read. Meanwhile, the teacher can host a BBS or a blog, to allow students to have asynchronous discussions. The time and spatial limitation can be broken in this model. The learner can have individual learning in "different times and places". Both the teacher and students can teach and learn in their own time, and record their interaction activities at the same time. Additionally, those records become valuable references for other students in the same course or condition [8].

BBS (Bulletin Board System) is the most common utilized learning platform in asynchronous instruction. In the asynchronous model, the instructor's leading tactics influence students' intentions in discussion. Timely awards, and immediate responses to students' questions are critical strategies affecting the results of adopting discussion bulletin boards for asynchronous distance learning. Other factors influencing asynchronous e-learning are the variegation of the choice of media, system reliability, interaction, flexible materials designation, and knowledge of information technology among students and teachers [8].

Synchronous distance learning: Instructors and students are the primary participants in the synchronous model. They can communicate and interact with each other in a high speed Internet networking system, computerized video-audio setups and packaged software. This environment enables the participants to have bilateral real-time teaching-learning exchanges in different locations. The teacher can distribute the materials with video-audio and multimedia to students, and receive real-time responses from student sides. This scenario is similar to face-to-face interaction [8].

The broadband Internet enables the adoption of new communication models, improving the interaction between participants, and thus improving learning achievement. Traditional instant messenger systems require both sides to communicate with each other by typing words, which is time consuming, and creates difficulties in self-expression. Therefore, the lack of an effective mechanism interaction will lead participants to give up on-line learning.

3 Research Methodology

3.1 Participants

E-tutor program lasted for two semesters. In this section, the information about gender, major, and degree of the pre-service teachers will be analyzed.

Table 1. The gender of the pre-service teachers in the first semester.

Gender	Number
Male	12
Female	15
Total	27

In the first semester, twelve pre-service teachers are male, and fifteen pre-service teachers are female. There are twenty-seven pre-service teachers participating in E-tutor program in the first semester (table 1).

Table 2. The gender of the pre-service teachers in the second semester.

Gender	Number
Male	10
Female	18
Total	28

In the second semester, ten pre-service teachers are male, and eighteen pre-service teachers are female. There are twenty-eight pre-service teachers participating in E-tutor program in the second semester (table 2).

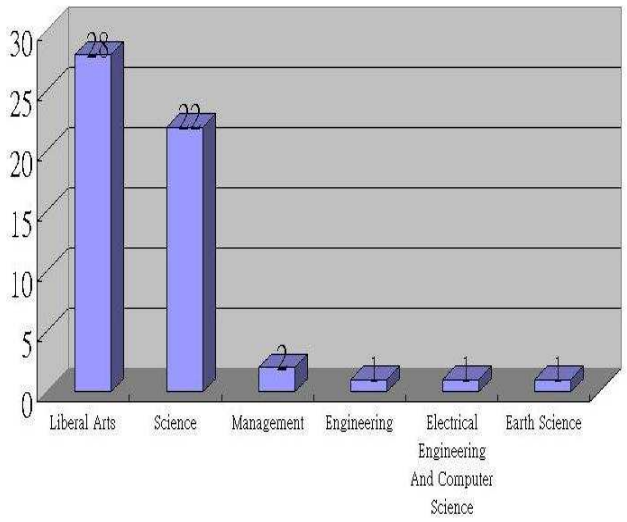

Figure 1. The major subject of the pre-service teachers.

The pre-service teachers came from six different colleges. Twenty-eight of them came from the College of Liberal Arts, which comprises three departments (Chinese Literature, English, and French Language and Literature) and four graduate institutes (Philosophy, Art studies, History and Learning & Instruction). Twenty-two pre-service teachers came from the College of Science, which has five departments (Physics, Mathematics, Chemistry, Life Science and Optics & Photonics) and four graduate institutes (Statistics, Astronomy, Cognitive & Neuroscience and System Biology & Bioinformatics). Two pre-service teachers came from College of Management, which consists of four departments (Business Administration, Information Management, Finance and Economics) and three graduate institutes (Industrial Economics, Human Resource Management and Industrial Management). One pre-service teacher came from the College of Engineering, which is composed of three departments (Chemical and Materials Engineering, Civil Engineering and Mechanical Engineering) and six graduate institutes (Opto-mechatronics Engineering, Energy Engineering, Environmental Engineering, Construction Engineering & Management, Materials Science & Engineering and Biomedical Engineering). One pre-service teacher came from the College of Electrical Engineering and Computer Science, which has three departments (Electrical Engineering, Computer Science and Information Engineering and Communication Engineering) and two graduate institutes (Software Engineering and Network Learning Technology). One pre-service teacher came from the College of Earth Sciences, which comprises two departments (Earth Sciences and Atmospheric Sciences) and four graduate institutes (Geophysics, Atmospheric Physics Space Science, Applied Geology and Hydrological Sciences). More than half of the pre-service teachers in this study came from Liberal Arts colleges, and the next largest proportion came from Science colleges. In total, fifty pre-service teachers came from Liberal Arts or Science colleges (Fig. 1).

Table 3. The degree of the pre-service teachers

Degree	Number
Undergraduate	32
Graduate	21
Ph. D. candidate	2
Total	55

Most pre-service teachers participating in this study were undergraduate students, whle two were Ph. D. students (Table 3).

3.2 Description of E-tutor Program

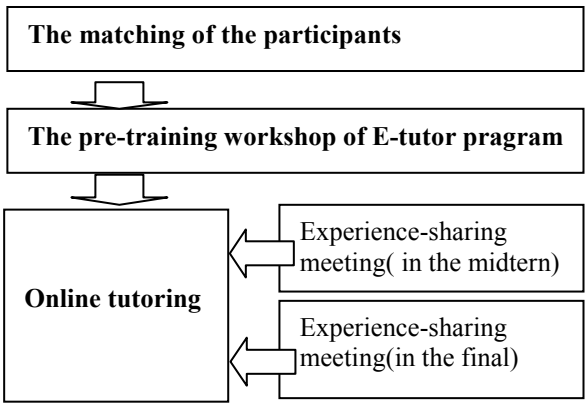

Figure 2. Process of E-tutor program during the first semester.

In the first semester, the E-tutor program consisted of four stages: 1. matching of participants, 2. pre-training workshop for the E-tutor program, 3. online tutoring and 4. Experience-sharing meeting (Fig. 2). In the first stage, the pre-service teachers were matched with students. After the matching, Chung Hwa Telecom held a two-hour pre-training workshop for the pre-service teachers. The purpose of the workshop was to familiarize the pre-service teachers with the X-learn system, the process and the objective of E-tutor program. During the two-hour workshop, the pre-service teachers were told about their students, and were given the opportunity to use the X-learn system. Technicians

were available to help solve the problems faced by the pre-service teachers. After the pre-training workshop, the pre-service teachers began to give one-on-one online tutoring through the X-learning system two hours a week in their dormitory or in the computer lab. Experience-sharing meetings were held in the midterm and final weeks of the semester for the pre-service teachers to exchange their online tutoring experience.

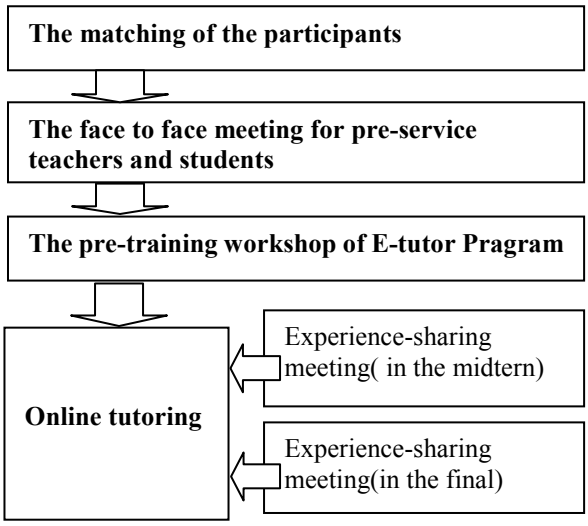

Figure 3. Process of E-tutor program during the second semester.

A face-to-face meeting was held for the pre-service teachers and the students before their online instruction, in the second semester, to enable them to get to know each other (Fig. 3).

Table 4. Differences between the two semesters

Differences	The first semester	The second semester
Online tutoring Subjects	English and Math	Chinese, English, and Math
Face-to-face meeting	No	Yes

E-tutor programs in the first and second semesters differed from each other in two ways. One is the subjects taught. Only two subjects (English, and Math) were included in the first semester program, while Chinese was added as the third subject in the second semester. Another difference is in the face-to-face meeting pre-service teachers and the students — this only occurred in the second semester (Table 4).

3.3 Procedures

Chung Hwa Telecom held a two-hour pre-training workshop of E-tutor program for the pre-service teachers in the first week. The purpose of the workshop was to help the pre-service teachers familiar with X-learn system and the procedure of the E-tutor program. The pre-service teachers provided online tutoring through X-learn system two hours a week from the second to the 14th week. The pre-service teachers could ask the technicians of Chung Hwa Telecom for help using e-mail or Instant Messenger if any problem arose during online tutoring. Meetings for online tutoring experience sharing were held in the middle and the final of the semester. These meetings allowed the pre-service teachers to exchange their online tutoring experience, instructional strategies, difficulties faced and what they had learned from online tutoring.

3.4 Data Collection and Analysis

To gather data about how pre-service teachers gave online tutoring during each semester, and what they learn from online tutoring, two experience-sharing meetings were held, and the pre-service teachers were interviewed. Five topics were discussed in the experience-sharing forums: 1. the problems faced during online tutoring (Fig. 4); 2. how teachers managed online tutoring (Fig. 5); 3. the teaching strategy adopted in online tutoring (Fig. 6); 4. the expectations from their students, and 5. expectation from themselves. The video record of the experience-sharing activities, and the audio record of the interview were utilized to collect feedback on online tutoring from the pre-service teachers.

Figure 4. The pre-service teachers sharing the problem they face on X-learn system.

Figure 5. The pre-service teachers sharing how they manage their online tutoring.

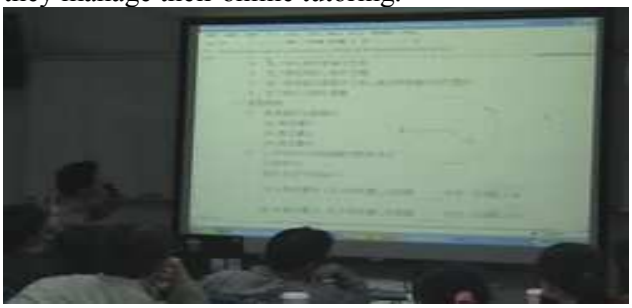

Figure 6. The pre-service teachers sharing their teaching strategy during the experience sharing meeting.

4 Data Analysis

4.1 How Pre-service Teachers Taught in E-tutor Program

This section discusses two questions:

1. How did pre-service teachers prepare their teaching materials?
2. What activities were involved in online tutoring?

4.1.1 How Pre-service Teachers Prepared Their Teaching Material

The results of interview and experience-sharing meetings indicate that the pre-service teachers spent 1–4 hours preparing their teaching material. The pre-service teachers obtained more teaching resources from the Internet, textbooks and other reference books. The format of the teaching material was ppt, pdf and jpg. They generally produced their teaching materials from the dormitory and the computer lab.

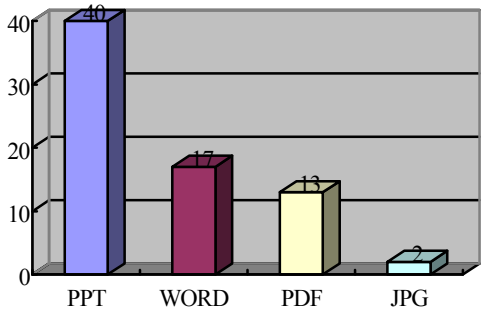

Figure 7. Formats of teaching material.

Teaching materials used in the X-learn must be in any of four formats. The PPF format was applied most frequently in this study (Fig. 7).

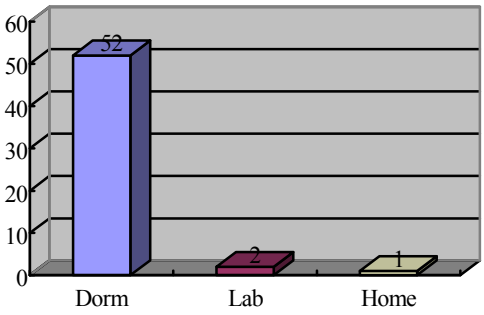

Figure 8. Locations for online tutoring.

Analysis results reveal that 52 pre-service teachers did the online tutoring in their dorms; two did online tutoring in the computer lab, and one did online tutoring at home (Fig. 8).

4.1.2 What Activities Were Involved in Online Tutoring?

Table 5. Activities in online tutoring of English.

Subject	Activity		Function
	1.Grammar Instruction		Audio (1,2,3,4,5,8,9)
	2.Article Explaining		Chatting Room (1,2,3,4,5,6,8)
	3.Dialog Practice		Desktop Sharing (4,7)
	4.Singing Songs		Document Management (8,10)
	5.Asking		Emoticon

English	Questions		(11)
	6.Giving Exam		Material Category (10)
	7.Material Presentation		Member Management (1,2)
	8.Question Answering		Presentation Area (1,4,5,6,7,8,9)
	9.Pronunciation Instruction		Recording (12)
	10.Material Uploading		Video (1,2,3,4,5,9)
	11.Social Interaction		Whiteboard (1,2,5,6,7,8)
	12.Instruction Review		

This section analyzes the activities in online tutoring. English online tutoring consisted of twelve activities. The Audio, video, whiteboard, presentation area and chat room were the five functions adopted most OR often. Audio interaction, chat rooms and presentation areas were applied in seven activities in English online tutoring. Video interaction and whiteboards were employed in six activities. Desktop sharing, document management, member manage were utilized in two activities. [Emoticon and material category, and recording were utilized in one activity (table 5).

Table 6. Activities in online tutoring of Mathematics.

Subject	**Activity**		**Function**
	1.Giving Exam		Audio (1,2,3,4)
			Chatting Room (1,2,3,4)
	2.Explain the Content		Desktop Sharing (1,)
			Document Management (5)
	3.Solving Problem		Emoticon (4)
			Material Category (5)
	4.Social Interaction		Member Management
			Presentation Area (1,2,3,4)
	5.Material Uploading		Recording (6)
			Video (1,2,3,4)
	6.Instruction Review		Whiteboard (1,2,3,4)

Six instructional activities were involved in math online tutoring. Voice, video, whiteboard, presentation area and chat room were the five functions adopted most in math online tutoring. In math online tutoring, audio interaction, presentation area, video interaction, and whiteboard were found to be used in four activities. Desktop sharing, document management, emoticon, material category, member management, and recording were applied in one activity (Table 6).

4.1.3 How did Pre-service Teachers Evaluate Students?

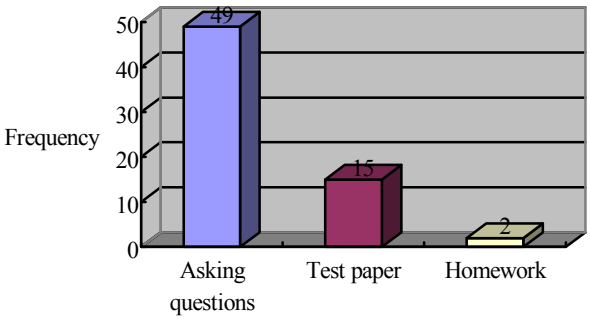

Figure 8. Evaluating strategies applied in online tutoring

Asking question, giving test papers and assigning homework were the three ways utilized by the pre-service teachers to evaluate their students, according to the interview and the video record. Asking questions is the strategy adopted most frequently during online tutoring (Fig. 8).

Teacher2: After I finish my explanation, I will give some questions related to the content for the students. This helps me to determine whether my student really understands what I have just taught.

Teacher 4: I set some examination papers before the class. After my instruction, I give the examination to

my students to complete. After my student finishes the paper, we check the answers together, and identify any problems.

4.2 What Pre-service Teachers Learn from Participating in the E-tutor Program

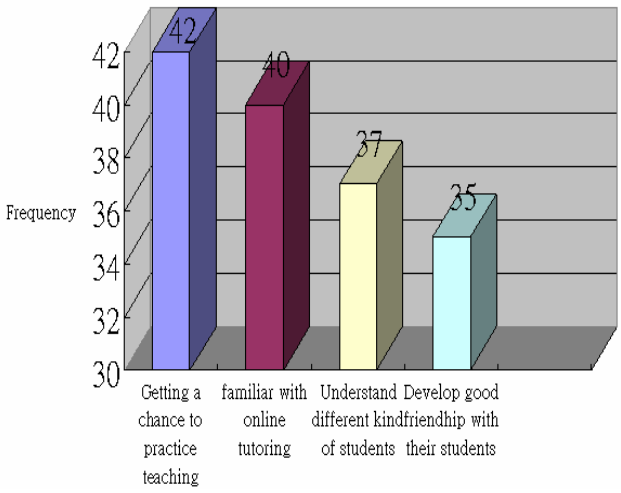

Figure 9. Benefits obtained by the pre-service teachers when participating in the E-tutor program

An analysis the audio record of interview and the video record of experience-sharing meeting identifies that the pre-service teachers gained four benefits from participating in this program (Fig. 9).

Forty-two pre-service teachers found that participating in this program gave them an opportunity to practice their teaching. In this activity, they learned how to make their teaching material more appropriate for their students, and learned to modify their teaching content according to their students' learning. Furthermore, the teachers realized the problems with their teaching.

Teacher 6: I never had any teaching experience before participating in this program, and this experience helped me discover the skills I need to improve, and what knowledge I lack.

Teacher 48: Participating in the E-tutor program gave me an opportunity to practice my teaching. From this online tutoring experience, I learned that a teacher always(has to adjust the speed of teaching to fit the learning needs of the students.

Forty pre-service teachers stated that teaching online is a unique experience for them. Although they could hear their students' voices, and cold see their students through the webcam, the experience was still quite different from face-to-face learning. In this activity, they learned what they should pay attention to during the online tutoring, and considered what instructional resources they should adopt during online tutoring.

Teacher 5: I never teach students through the Internet. However, it is a very interesting and convenient. It saves lots of time, and makes me more familiar with online tutoring. I think it is a trend, and I'll have to learn it.

Teacher 45: Online tutoring is a unique experience. Many technologies and resource can be utilized to teach students. From the experience, I learned how to use technology effectively, and how to solve the problem during online tutoring.

Contact with different students helped the pre-service teachers to understand the students' lives, thoughts and needs. The students' backgrounds were very different from those of the pre-service teachers. Some pre-service teachers found that their students did not concentrate on learning, and were more interested in non-learning-related material. To improve the effectiveness of their teaching, the teachers attempted to understand their students' background and thoughts, and then designed their teaching based on their students' needs. Thirty-seven pre-service teachers stated as a result of this experience, they to understood different students, knew what the students need, and wanted to help them. Thirty-five pre-service teachers also developed close relationships with their students. Many pre-service teachers said that during the online tutoring, they not only taught the subject-related content, but also shared their lives with their students.

Teacher 7: Participating in this program has helped improve my understanding of students living in rural areas. I realize the difference between the life in urban and rural areas. Moreover, I have begun to think about my students' needs, and now try to help hem.

Teacher14: During online tutoring, we also share what happen in our life with each other. At last, I feel that our relationship is not just like teacher and student, but more like friends.

5 Conclusion

Advances in development of information technology and popularity of the Internet have led researchers to focus strongly on online tutoring.

Applying online tutoring in teaching has several merits. Online tutoring can not only break the limitation of space for teachers to teach student in different places [6, 11], but also increase realism [7], implying that online tutoring can provide two-way communication with audio and video information, similar to face to face tutoring. Due to these advantages of online tutoring, researchers are likely to become increasingly interested in it in the future.

This study raises two interesting points:

1. Following a previous study [12], the pre-service teachers interviewed in this work stated that participating in the E-tutor program gave them a chance to practice teaching, and identify deficiencies in their instruction methods. During the online tutoring, the pre-service teachers always adjusted the teaching speed, the content, and the teaching strategy based on their students' learning.
2. This experience reveals that the pre-service teachers developed good relationships with their students, knew much about the students in rural areas, realized what their students needed, and tried to help them.

Participating in the E-tutor program was a unique experience for the pre-service teachers. They learned many things from this experience: they discovered how to teach student online and what skills they needed to improve, and identified the knowledge that they lacked. This is beneficial for pre-service teachers before entering an authentic teaching environment. Hopefully, researchers and system designers can obtain information about how to implement an online tutoring program. Moreover, we plan to create an alternative channel for teaching and learning without time and space limitations.

Acknowledgments:

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