

Full Length Research Paper

The development of web-based collaborative training model for enhancing human performances on ICT for students in Banditpattanasilpa Institute

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This research aimed to develop the model of Web-based Collaborative (WBC) Training model for enhancing human performances on ICT for students in Banditpattanasilpa Institute. The research is divided into three phases: 1) investigating students and teachers' training needs on ICT web-based contents and performance, 2) developing a web-based collaborative training model, 3) assessing the model effectiveness from implementation. The results revealed students and teachers' needs were at high levels for using the ICT, and students' performance of ICT levels were fair for supporting students'. In terms of input components, the model composed of six training factors for the system: need analysis, purpose specification, training curriculum, technique design selected, training process, and assessment. In terms of web-based training, there are three factors: multimedia presentation, interaction, and learning instrument. There are five factors in collaborative learning: positive interdependence, interaction, individual accountability, interpersonal skills, and group process. Three sequential stages of collaborative training started from: training arrangement, training procedure, and evaluation. Training procedures include five activities of collaborative learning: training preparation, training, collaborative training, checking outcome, and conclusion. The results of Model Implementation Efficiency (MIE index) of WBC training model were at 81.86/80.83; the Effectiveness Index (E.I.) was at 0.5582. There was a statistically differentiated significance between pre-test and post-test on the WBC training model of their usage effectiveness by the model in promoting ICT performance at level .05. The students' responses regarding the ICT practical skills were high; also abilities on collaborative learning group processes, individual accountability and positive interdependence were significantly high. Satisfaction from the WBC training model was high.

Key words: e-training, collaborative learning, human performances on ICT, Web-based training.

INTRODUCTION

Presently, according to development of technology, training models and training method have been changed.

Various types of high technologies and communications have been used in training processes, such as digital

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media formats, computers, multimedia and computer networks and those are now used in people daily lives especially in the education sector and training. This can be simplified and facilitated by learners. It is formed as WBT that helps improve learning efficiency that provides student-centered environment.

Training is an important process that helps with human development. It helps enhance people efficiency on working in a particular sector (Dessler. 1999). It also helps improve their learning process and experiences, values, attitude and working skills. Training is the method that helps enhance capability of people in their working areas. Due to limitations of their working knowledge and skills, people need to develop their skills by being provided with training of skills they lack. Training that is designed to improve performance is a strategic human resource practice that can benefit individuals, organizations and society (Aguinis and Kraiger, 2009).

Banditpattanasilpa Institute has engaged to enhance information and communication technology for the use of teachers and students. This is specific to the strategy development of Banditpattanasilpa plan in 2010-2013. This strategy is going to develop English language and to be able to use the information and communication technology within 4 years on the management and administration for developing organization for social needs and responsibility. Focusing on students who are going to complete their study and enter their career, they ought to have knowledge and ability to complete others tasks and can be applied on information and communication technology of their practicing career (Banditpattanasilpa, 2010). However, the office of the education council has followed and assessed the results of using the National Education Act of B.E. 2542 (1999) at Banditpattanasilpa Institute. It is found that the personnel organization ought to be developed and improved. There are many problems such as; the information and communication of this curriculum has not been improved for long time. The quality of using the innovation media for teachers and students cannot be supported by their ability, to least of self-study with computer' use. And also, students had ICT skills to create and present their activities at a moderate level. It is indicated that it is an important problem for teachers and students who ought to use the information and communication technology to manage their teaching to enhance their students' connecting system of their learning.

Web-based training (WBT)

For learning promotion, WBT uses the internet as the training tools while other media do not. The issues can be consulted with specialists through the network and collaborative learning atmosphere and environments can

be created during this training. Thus, WBT helps reduce the training cost on venues, time and other training expenditures. WBT also promotes communication in society, collaborative learning between learners and trainers. Moreover, users can communicate and exchange ideas more personally and freely (Khan. 1997; Horton, 2000).

WBT is an innovative approach to distance learning in which computer-based training (CBT) is transformed by the technologies and methodologies of the World Wide Web, the Internet, and intranets. WBT presents live content, as fresh as the moment and modifies at will, in a structure allowing self-directed, self-paced instruction in any topic. WBT is media-rich training fully capable of evaluation, adaptation, and remediation, all independent of computer platform. WBT is an ideal vehicle for delivering training to individuals anywhere in the world at any time. Advances in computer network technology and improvements in bandwidth will usher in capabilities for unlimited multimedia access.

It is the training in the form of hypermedia using characteristics and resources on the Web to manage usefully on environment also promoting the learning process. WBT is one model of the internet or intranet study that implemented through various types of teaching processes; computer based training, network training, virtual classroom and digital collaboration (Ghasem et al., 2010). It also includes designed and systematic media training which is used in doing the presentation, investigation and discussion. Participants are linked to teachers via an internet system. Monitoring the planning process and evaluation of the participant are also needed (Hoksuwan, 2009; Na Songkhlar, 2004). WBT conducted via the internet network is transferred to participants, using hypermedia as a tool to manage the training environment and relationships. With those factors, participants can gain more knowledge and learn happily from the class and they can apply those to their working life after the training. Besides, participants can control and manage their self- directed plan and learning at any time and places. Training content and curriculum can at any time be available to be updated.

WBT has more benefits over other form of instruction. Liu et al. (2007) found that web-based training (WBT) yielded more success than the traditional classroom-based training (TCT) by considering students' satisfaction level. The students had more extensive experience on WBT. Moreover, on information management, the WBT session allowed teachers to integrate wider ranges of information sources. Adaptability of WBT session is more flexible to changing content over the Internet. Many organizations adopt using WBT for their human resources development because it is responding to personal and group needs as well as interface modification with ease and speed (Driscoll, 1997; Horton, 2000; Witthayaudom, 2007).

Collaborative learning

Collaborative learning is a situation in which two or more people learn or attempt to learn something together, such as positive interdependence, interaction, individual accountability, interpersonal and small group skills, group process (Barkley et al., 2005). Unlike individual learning, people engaged in collaborative learning capitalize on one another's resources and skills (asking one another for information, evaluating one another's ideas, monitoring one another's work, etc.) (Dillenbourg, 1999). More specifically, collaborative learning is based on the model that knowledge can be created within a population where members actively interact by sharing experiences and take on asymmetry roles (Chiu, 2000). It is the learning method that is suitable and generally used in all fields of study, especially with human development work. This method promotes the linkage of members in groups with their different knowledge and experiences, also provides them opportunity to work closely together for success.

Each group member has to learn; they cannot succeed as an individual; the group has to succeed together as a team (Reungsuwan, 2011). They are fairly assigned duties and responsibilities and they must be responsible for themselves and other group members. The members help and support each other for the achievement of the goal (Senge, 1994). Personal responsibility, effective communication, interpersonal and small group skills are important keys to the success and strength of the whole team. The learners have to willingly work together without any bias to achieve the goal. Lesson reflection, discussion, idea sharing, monitoring and evaluation must be continuously performed for problem solving and work skill improvement. Work environments and climates need to be set up for the learners or team members to provide them opportunity to learn happily and more enthusiastically to reach the goal (Kidrakarn, 2005; Khaemmanee, 2010).

As mentioned above, web-based training and collaborative learning are two main areas that support the rationale of this study. Banditpattanasila Institute emphasizes its policy according to Thai government's National Education Act of B.E. 2542 (1999) plan that it has planned to enhance information and communication technology for students.

This study is aimed to develop model of the Web-based Collaborative training (WBC) for innovative approach of distance learning. WBC can be used to improve personal development, activities, and collaborative learning method.

Research aims

1. To study the students and teachers' training needs including students' ICT performance.

2. To develop WBC training model for enhancing human performance on the ICT.

3. To evaluate the effectiveness of WBC training model after the implementation.

METHODOLOGY

This study was divided 3 phases of the research and development method which aimed to formulate a WBC training model for enhancing human performances on ICT as follows:

The 1st Phase: To study students and teachers' needs of their training in ICT and to investigate students' ICT performance. This phase was selected on 2 steps:

Step I: To search and analyze the principle, theory, and previous researches in order to synthesize the training model. The initial phase involves six areas of scholarly literatures: Thai qualification framework for higher education, training, web based training, collaborative learning, ICT literacy, human performance technology. The research brought the literatures reviews for synthesis and analysis to define the research framework and other necessary components.

Step II: To study students and teachers' training needs. These areas of questions covered: the activities on web, purpose formulation, content design, training resource, and training strategy. The possible research questions were administered on two sample groups: teachers (n=34) and students (n=375). The population of the teachers was selected by using Stratified Purposive Sampling method in 17 Banditpattanasila institutes of the academic year 2012; the population of the students was selected by using Cluter Random method from total population of 1,986 who are studying in Banditpattanasila institutes, for the academic year 2012. The sampling of 375 students was based on the proportional allocation method. The questionnaire was based on areas indicated by research questions and administered separately between each group. Content Validity was found through three educational experts, internal consistency of the questionnaire was found through an item-total correlation coefficient (IOC) analysis and reliability of the tools was found through Cronbach's Alpha Coefficient. The reliability of the tools were 0.67-1.00, 0.25-0.77 and 0.95 respectively.

Second part covered study on the students' performance of the ICT. The areas of questions covered: knowledge, skills, and attitudes. The possible research questions were administered on students (n=375). The population of the students was selected by the same criteria from total population of 1,986 who are studying in Banditpattanasila institutes of the academic year 2012. The sampling of 375 students was based on the proportional allocation method. Content Validity was found through educational experts, internal consistency of the questionnaire was found through an item-total correlation coefficient (IOC) analysis and reliability of the tools was found through Cronbach's Alpha Coefficient. The reliability of the tools was 0.67-1.00, 0.39-0.79 and 0.96 respectively.

The 2nd Phase: To development the WBC training model for enhancing human performances on ICT. This is composed of 6 steps:

Step I: Analysis stage: This step was to search for related document, research, and website. The relating information was then separated by content and categorized by type.

Step II: Synthesis stage: This step was to compile the factors and relationships between collaborative learning and Web-based training. It was conducted research and development method on the conceptual framework of systematic development approach (Bertalanffy, 1968) based on input, process, output, and feedback. These four elements are factors relating to the management of the model.

Step III: Invention stage: Taking analysis and synthesis data to invent WBC training model for supporting performance of information and communications technology. The elements from systematic approach were positioned in the structural model.

Step IV: Assessment stage: To assess the suitability of this model for supporting performance of ICT, the structural model was assessed by the nine educational experts in training design, information and communication technology, technology in education. They were asked to comment and to provide suggestion for improvement this model. The experts suggested that motivation could encourage human performance on ICT and evaluation should apply by using variety of instruments.

Step V: Confirmation stage: Researcher adapted the model according to suggestion provided. Then model was resent for confirmation by the same educational experts after revision.

Step VI: Experimental stage: WBC training model for enhancing human performances on ICT was administered to the participants. This step was about the implementation of WBC model in two sections as follows:

Creating and evaluation questions form of human performances of ICT. Areas of performance evaluation are covered: knowledge, skills, attitudes, collaborative learning, and satisfaction. The instruments used to assess five areas are: sixty items of 4-multiple-choice test (knowledge assessment), twenty-five items of four-level of operation (skills assessment), thirty items of 5-point Likert scale; from 1-Strongly disagree to 5-Strongly agree (attitude assessment), ten items of check list and semantic differential scale (collaborative learning assessment), and twenty-four items of 5-point Likert scale; from 1-Strongly disagree to 5-Strongly agree (satisfaction assessment). All of them were approved by three educational experts to check the content validation and to approve the quality of assessments prior to test for internal consistency and reliability. The following values are: (1) For Knowledge, difficulty Index between 0.20-0.80, Discrimination Index between 0.20-0.80, and Reliability Index is 0.96 (2) For skills, items-total correlation coefficient analysis to test internal consistency of the instrument is 0.67-1.00 (3) For attitudes, internal consistency of the questionnaire was found through an item-total correlation coefficient (IOC) analysis and reliability of the tools was found through Cronbach's Alpha Coefficient. The reliability of the tools were 0.67-1.00, 0.25-0.70 and 0.95 respectively. (4) For collaborative learning, internal consistency of the questionnaire was found through an item-total correlation coefficient (IOC) analysis is 0.67-1.00 (5). For satisfaction, internal consistency of the questionnaire was found through an item-total correlation coefficient (IOC) analysis is 0.67-1.00

Designing and development of the WBC program for enhancing human performances on ICT. The WBC uses the Internet as the main training medium. WBC program had 6 units (Basic knowledge of ICT, ICT for Communication, Information Literacy, Document Management, Electronic Presentation, and Data & Information Management). Training period lasted for two months. All of the units offered online. Using a Learning Management System (LMS), a typical online course provides different electronic resources which were: video on demand lectures, PowerPoint presentation, YouTube videos, learning materials as MS word or .pdf files, and using of online discussion board, Facebook, and emails as

communication tools. The online course was constructed on the Moodle LMS platform. Once the WBC was developed, educational technology experts evaluated the appropriateness of WBC program at a high level. They suggested that the quality of the Web page should be enhanced. And then, the WBC program was tried out twice by means of individual try-out and small group try-out. This was done in order to find the weak points for revision.

The 3rd Phase: To study the result on using WBC training model. This aimed to find the effectiveness and efficiency of the WBC training model. In order to enhance the performance of ICT, researchers administered the model on the sample size of 32 students by employing the research design called "one group pre test-post test". Data was analyzed by the mean scores of students' perceptions between pre-test and post-test. The instruments were as follows: 1) WBC training model based on collaborative training 2) ICT testing form which is covered knowledge on: basic knowledge of ICT, ICT for communication, information literacy, document management, electronic presentation, and data and information. 3) practice and skills testing form which is covered on: computer use, personal network use, information search, Microsoft office, and online network. 4) attitude questionnaire on ICT which covered on: accountability on ICT, cognition on ICT, appreciation on ICT, utilization on ICT 5) questionnaire on collaborative learning property which reflects on group activities 6) questionnaire of the model user which indicates satisfaction from using WBC training model.

RESULTS

The characteristics of the developed model focused on students' performance and their expectation of ICT could gain from their potentialities to proficiencies. The educational experts assessed this model for enhancing human performances on ICT at highest level for the suitability. The model is used for training and practicing students. This model was completed with training system factors as follow,

1. There are three components in the model: (1) training system; need analysis, purpose specification, training curriculum, technique design selected, training process, and assessment. (2) training factors on the web; multimedia presentation, interaction, and learning instrument. (3) collaborative learning factors; positive interdependence, interaction, individual accountability, interpersonal skills, and group process.
2. The three step procedure of collaborative learning; training arrangement, training procedure, and evaluation.
3. The activities of collaborative learning factors; preparation training, training, collaborative training, group activity, checking outcome, and conclusion.
4. Students response of the web-based collaborative training model to enhance human performances as follow: The results of Model Implementation Efficiency (MIE index) of WBC were at 81.86/80.83; the Effectiveness Index (E.I.) was at 0.5582 (Figure 1).

The finding of the development WBC training model can be concluded as follows: to assess the web-based

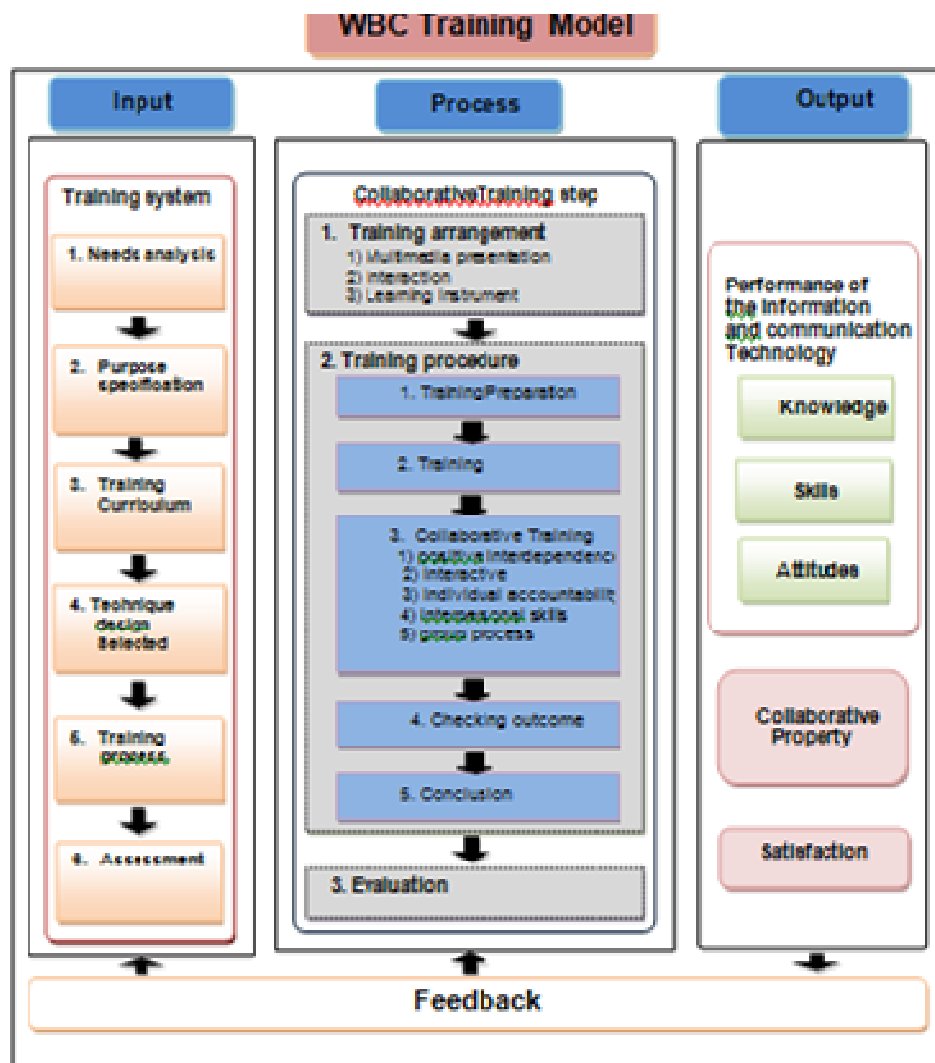


Figure 1. A model of WBC training for Enhancing Human Performances on ICT.

collaborative training model to enhance human performances on ICT. Data reported description of quantitative data by analyzing responses from the student's assessment scores. The class means represent knowledge of the students who were trained with this model. Table 1 indicates the standard deviations, comparisons between pre-test and post-test from training model, and t-test for statistical significance. The means and the standard deviations used in this study were determined by indicating assessment for the scales of the pre- and post- test. Table 1 reveals the results that differences between the pre-test and post-test were statistically significant at the 0.05 level.

In this study, it was also considered important to investigate associations between the students' attitude of their collaborative web-based training environments in

human performances on ICT. This suggests that the scale is reliable for measuring students' attitudes. Table 2 indicates means difference, standard deviations, comparisons between pre-test and post-test training models, and t-test for statistical significance.

Similarly, student's attitudes to use WBC training model in this study were determined by attitude mean score, standard deviation, and differentiated of attitudes between two assessments the mean scores ranged 3.42 for the pre-test and 4.05 for the post-test respectively. Students demonstrated statistically significant differences at level 0.05.

Finally, results from evaluation of collaborative learning properties on WBC training model, the highest property were ranged from: the group dynamic, the individual responsibility, and the collaborative supports, respectively.

Table 1. Mean scores, standard deviation to differences between pre- and post- test the web-based collaborative training model for pair sample with t-test.

Knowledge assessing scale	N	Assessing means scores with standard deviations		t	P
		\bar{X}	S.D.		
Pre-test	32	25.16	6.34	19.57	0.00*
Post-test	32	45.06	3.95		

*Correlation is significant at the 0.05 level (2-tailed).

Table 2. Mean scores, standard deviation of differences between pre-test and post-test training the web-based collaborative training model for pair sample of student' attitudes with t-test.

Attitude scale	Assessing	N	Attitude mean score		t	P
			\bar{X}	S.D.		
Pre-training		32	3.42	0.92	10.741	0.00*
Post-training		32	4.05	0.96		

* Correlation is significant at the 0.05 level (2-tailed).

These three properties were sorted by percentage. In addition, evaluation on interpersonal skill, the highest range was consultation within the group. It was analyzed by mean.

DISCUSSION

The finding of this study can be discussed in several aspects: students' knowledge gains and performance development, skills areas on WBC used variously, and collaboration property conveys socialization impacts enhanced by media.

Knowledge, skills, and performance development

The reasons of development WBC training model for enhancing human performances on the ICT were evaluated with regards to the students' outcomes on application of the WBC training model for enhancement of their activities. This obviously reflected the demand in ICT training required by institution where learning performance can be developed by using WBC. Student's outcomes were highest for their needs and satisfaction with the performance of the WBC training model. The quality evaluation of the Model Implementation Efficiency (MIE index) yielded higher than the expected level at 81.86/80.83. Students' effectiveness index increased 55.82 % after using this model. This result indicates that the process of making this model has confirmed that the

theory of the group of ideas meant for participating the memberships. It is the training in the form of hypermedia using characteristics and resources on the Web to manage usefully on environment also promoting the learning process. WBC is one model of the internet study that implemented through various types of training processes; computer based training, network training, virtual classroom and digital collaboration (Ghasem et al., 2010). Various types of high technologies and communications have been used in training processes, such as digital media formats, computers, multimedia and computer networks and those are now used in people's daily lives especially in the education sector and training. This can be simplified and facilitated by learners. In accordance Liu et al. (2007) found that web-based training (WBT) yielded more success than the traditional classroom-based training (TCT) by considering students' satisfaction level. The students had more extensive experience on WBT. Moreover, on information management, the WBT session allowed teachers to integrate wider ranges of information sources. Adaptability of WBT session is more flexible to changing content over the Internet (Driscoll, 1997; Horton, 2000; Witthayaudom, 2007).

Skills areas on WBC training model

The results revealed skill areas that were effectively developed after using the model. The increments of skills evaluation confirmed that WBC training model enhance

the following skills: computer and IT equipment operation, the Internet functionality and literacy, and ability in web design and maintenance. However, online environment needs special attention by program instructors to enhance practicality and learning. It is suggested that we need sufficient multimedia resources for students to be able to learn independently. This study was designed for students use multimedia in presentation as well as for teachers to evaluation students' outcome in the online environment.

Model for enhancing students skills should be based on these suggested approaches: the web-based training on demand approach by Chiu (2000, 2005) the collaborative learning cognitive and computational approach by Dillenbourg (1999). These approaches aim to help students to learn concepts for organization and to help them become more effective at learning concepts. It includes an efficient method for presenting organized information from a wide range of areas of study.

Collaborative property on WBC training model

Collaborative learning property had shown how group of students learned on this innovative platform differed from traditional instruction. The most observable aspects were ranged from group process, personal responsibility, and helping collaboration. These properties benefited from the networked platform by solving problem of space. This meant that distance and time differences were not obstruction in communication. The barriers of distance and time nevertheless interrupted learning outcomes. However, techniques to help learning on the web with effectiveness are included: motivational enhancement, Learning society establishment, collaborative learning, group dynamics, and interactivity support. When students learn on WBC model, they tend to transfer personal mastery in learning toward group learning. This is strongly encouraged to adopt for innovative learning approach. It is confirm that Computer-supported collaborative learning (CSCL) uses instructional methods designed to encourage or require students to work together on learning tasks. CSCL is similar in concept to the terminology, "networked collaborative learning" (NCL) (Sendall et al., 2008). Collaborative learning is distinguishable from the traditional approach to instruction in which the instructor is the principal source of knowledge and skills (Trentin, 2010). They are fairly assigned duties and responsibilities and they must be responsible for themselves and other group members. The members help and support each other for the achievement of the goal (Senge, 1994). For example, the neologism "the web-based collaborative training model or WBC training model for enhancing human performances on the information and communications technology" refers to the direct transfer method in computer-based learning and training

systems (CBL). In contrast to the linear delivery of content, often directly from the teacher's material, CSCL uses blogs, wikis, and cloud-based document portals. With technological WBC advances, sharing information between multiple people in a network has become much easier and use has increased (Crane, 2009).

This research indicates that to enhance students for improving their learning with the WBC training model to enhance collaborative learning.

Banditpattanasilpa Institute in Thailand had made efforts of instruction toward collaboration learning on the web as technology has advanced. The model employs the idea of collaborative learning. Obviously, this WBC model implies environmental simulation for supporting students' needs and satisfactions. As we mentioned above, by learning via web-based environment, teachers or students do not have to attend the physical classroom to learn but they still achieve learning impact similar to traditional face-to-face instruction. Similarly, Relan and Gillain (1997) who found that learning environment consisting of teamwork would improve systematic knowledge acquisition.

The findings revealed that the majority of the students were satisfied with their learning experience and achieved comparable learning outcomes to students in the face-to-face version of the WBC training model. Students satisfied the flexibility of asynchronous learning. The majority of them were motivated to learn because they received adequate technical support to complete their training by using steps in WBC. It also found improvement in computer skills and learning outcome from participating in such training model.

Conclusion

Using the web-based collaborative training model for improving performance of human performances by application of ICT, Thai students Banditpattanasilpa Institute could efficiently develop their performance. Learning on WBC environment has brought various online resources to enhance their areas of skills for the expected result with effectiveness and efficiency. Web-based environment highly yields collaboration influential underlying the success of educational results. Ideally, this WBC training model should be supported for implementation in various educational institutes in the future.

SUGGESTIONS

The findings suggest that the tasks should be improved as follow. Firstly, teachers and students need to understand the process of collaborative training on web. They need definite instruction to be able to follow independently without teachers' instruction. Since

collaborative learning process is conducted via group dynamic of information exchange over online platform, teachers should keep monitoring and evaluation the ICT competence enhancement. They should provide the activities that motivate the students to be more aware, sharing and responsible for collaborative training. Secondly, the institutes should conduct a research to seek an approach to improve the competencies on each dimension of the students who have been previously trained, in order to ensure the retention and sustainability of knowledge, skills and attitudes. Thirdly, further experiments on using WBC model should investigate the different performance between experimental web-based instruction and controlling lecture-based groups.

Conflict of Interests

The authors have not declared any conflict of interests.

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