Web-based training on learning organization for electrical undergraduate students in Thailand*

Anuvat Tongsakul[1], Kalayanee Jitgarun[2], Weerachai Chaokamneard[3]

(1. Learning Innovation in Technology Program, Faculty of Industrial Education and Technology, KMUTT, Bangkok 10140, Thailand; 2. Department of Electrical Technology Education, Faculty of Industrial Education and Technology, KMUTT, Bangkok 10140, Thailand; 3. Faculty of Engineering, Dhurakij Pundit University, Bangkok 10140, Thailand)

Abstract: The purpose of this research was to utilize web-based training (WBT) to enhance students' knowledge of learning organization (LO) in a context of electrical technology education in Thailand. The sample chosen for this study included 19 fourth year undergraduate students. The WBT was based on the five disciplines according to Senge (1991) as well as the seven habits of highly effective people (Covey, 1989). The tools for pre- and post- testing were LO model evaluation and knowledge of LO. The reliability of the instruments was 0.9274 and 0.9905 respectively. The data were analyzed by using mean (*M*) and standard deviation (*SD*), t-test and Pearson product-moment correlation. When pre- and post- tests mean scores of the LO model evaluation and the knowledge of LO were compared, the mean scores of post-test training were greater than the mean scores of pre-test training. Moreover, there was a significant relationship between pre- and post- tests of LO model evaluation and the knowledge of LO. Thus, it can be concluded that the model of WBT can enhance students' knowledge of LO in this context.

Key words: web-based training; learning organization; electrical undergraduate students

1. Introduction

Learning organization (LO) is an organization which focuses on arousing, urging and motivating every members to have enthusiasm to learn and develop themselves all the time in order to broaden their potential and their organization (Jitgarun, 2003). According to this definition of LO, various missions could be achieved through team-working and learning together as well as systems thinking. Being an LO will be a sustainable advantage in the world of competition which is now globalized. Moreover, an LO focuses on developing human resources by creating a knowledge base and intellectual capital which can be used in competing with other organizations (Sharma & Gupta, 2003). Thus, human resources must have real competence and professional expertise. They must develop by enhancing knowledge and skills continuously using lifelong learning processes. These processes will

* The researchers would like to express a very special thank for the advice of associate professor, Dr. Elizabeth Murphy, Faculty of Education, Memorial University, Newfoundland and Labrador, Canada, as well as to express sincere thanks to Mr. Suthee Ploisawaschai for his editing and proofreading this paper.

Anuvat Tongsakul, Ph.D. candidate, Learning Innovation in Technology Program, Faculty of Industrial Education and Technology, KMUTT; research fields: project-based learning (PBL), learning innovation in technology.

Kalayanee Jitgarun, Ph.D., associate professor, Department of Electrical Technology Education, Faculty of Industrial Education and Technology, KMUTT; research field: curriculum & instruction.

Weerachai Chaokamneard, Faculty of Engineering, Dhurakij Pundit University; research field: telecommunications & computer.

help individuals and organizations to succeed and overcome obstacles (Jitgarun, Thaveesin & Ketkamol, 2003).

Knowledge of LO is particularly important for new workers entering the workforce. However, many workers today appear not to have knowledge of LO. In fact, a study conducted by the Office for National Education Standards and Quality Assessment (2007) found that graduates who went into the labor market encountered workplace problems related to: team-working and learning, commitment, responsibility, time management, enhancement ability and progress.

In spite of the above-mentioned, educational institutes are not always preparing graduating students so that they could work and continue working for their organization with efficiency and effectiveness (Jitgarun, 2006).

With this problem in mind, the researchers recognized the importance of training learners to understand LO. The LO has management strategies for the modern world where excellence, cleverness and perfection along with brain power can help overcome difficulties and all forms of competition so that the organization can sustain its advantages (Sharma & Gupta, 2003). This study involved the design and testing of WBT module to enhance students' knowledge of LO to better prepare graduating students for the world of work.

2. Theoretical framework

Learning organization (LO) is the main strategy essential for administering organizations in the modern world where the focus is on developing human resources to their full potential, and creating a knowledge base and intellectual capital to initiate new products and services (Jitgarun, 2003).

The framework in this paper of LO was developed by Senge (1991) along with Covey (1989). The five disciplines proposed by Senge (1991) are:

(1) Personal mastery (a principle to develop one's creativity and see things as they are);

(2) Mental models (a skill to understand others' thoughts and background in order to see individual differences);

(3) Shared vision (a principle to think in depth and be open to new thinking in order to practice leadership);

(4) Team learning (a principle that each independent member comes together to achieve more results due to the need for interdependence);

(5) Systems thinking (an ability to see things as a whole and know causes and consequences as well as the trends in the future).

The seven habits of Covey (1989) are as follows:

(1) Be proactive (be able to decide without pressure on one's own from other factors and be responsible for the action);

(2) Begin with the end in mind (set values in one's mind as a reference for what has to be done in the future);

(3) Put first things first (practice how to become one's own leader and how to manage time);

(4) Think win-win (think positively in a way that both sides can win);

(5) Seek first to understand …, then to be understood (perceive others' feelings through conversation and listen attentively to others);

(6) Synergy (recognize the value of differences in behaviors, thoughts and styles, and make use of those differences to achieve new and better alternatives);

(7) Sharpen the saw (practice forces inside oneself in overall such as physical body, mind and soul in order to achieve harmony in the long run and be able to work effectively and efficiently).

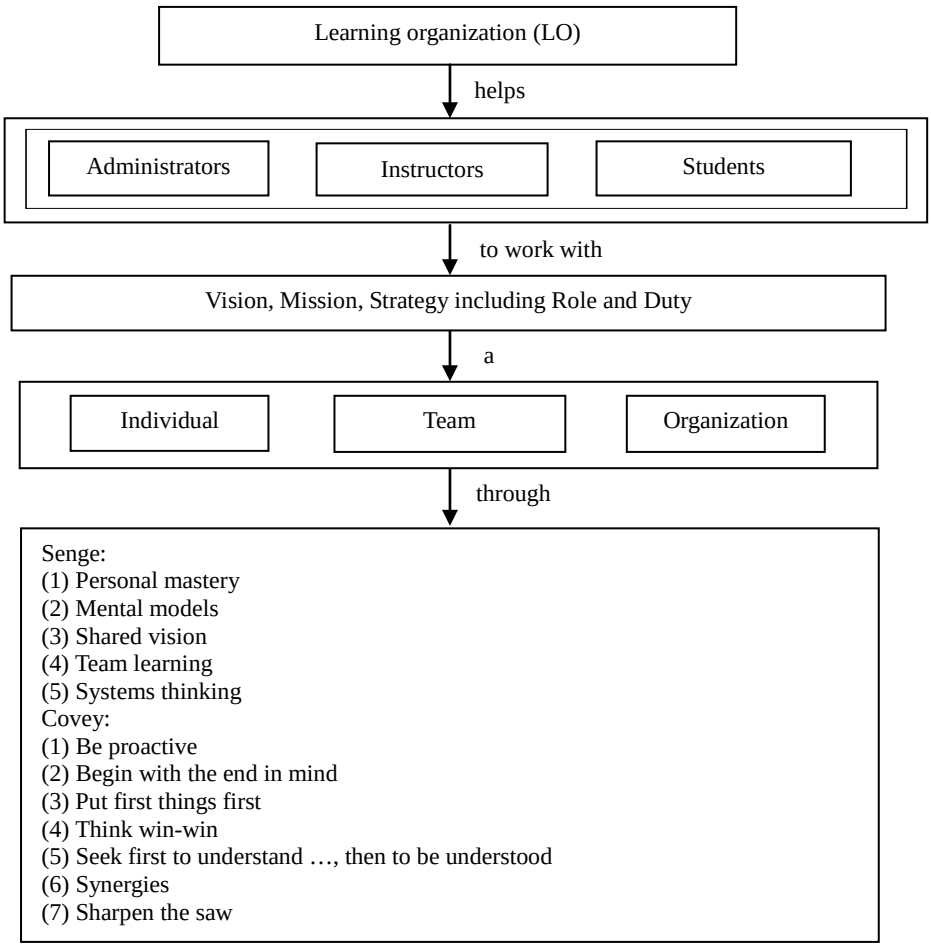

Figure 1 The framework of LO development (Covey, 1989; Senge, 1991; Sharma & Gupta, 2003)

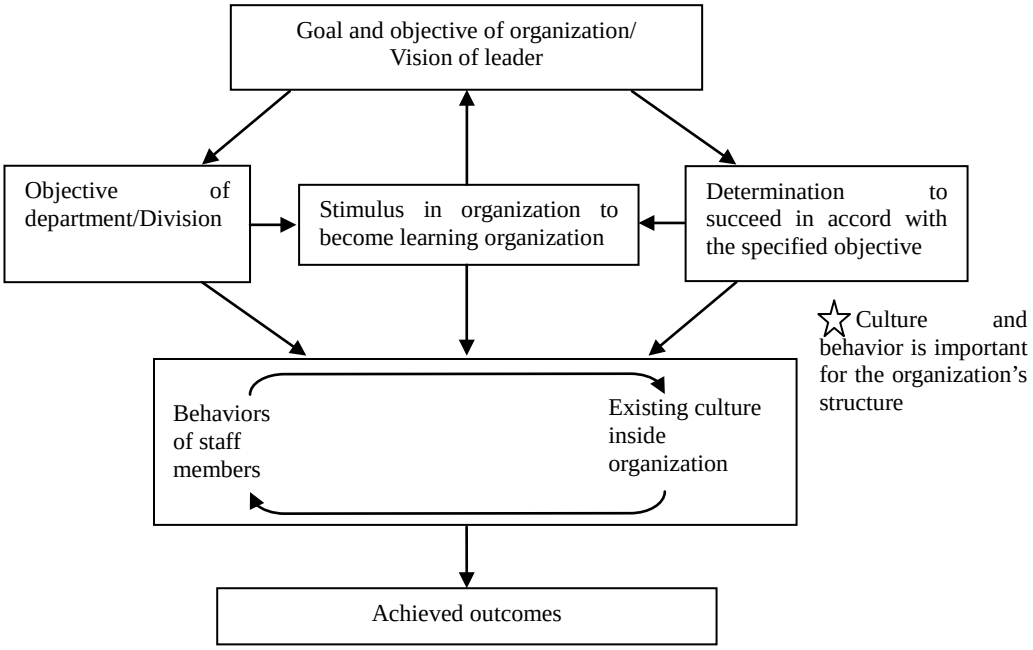

Figure 2 The relationship between policy, goal, vision, behaviors of members, the culture inside organization and LO

The theoretical framework can be summarized as shown in Figure 1 and Figure 2.

The framework shown in Figure 1 was related to the behaviors of individuals and the culture inside such organizations. They were important to the overall structure of the organization because both behaviors of individuals and the culture inside such organizations were interlinked by the vision and mission of the organization leaders. LO, as a result, helps stimulate an organization to achieve its ultimate goal or world-class performance in the end (Ho, 1999), as shown in Figure 2.

3. Methodology

3.1 The design and development of the WBT

In the first phase, the authors developed a WBT module for enhancing knowledge of LO. It took one year (2007) to develop the WBT module. One page from the module is shown in Fiure 3. The WBT module involved 12 lessons of theory and practice based on the five disciplines of Senge (1991) and the seven habits of Covey (1989). Each lesson focused on one of these. The module relied on the use of CDROM and video tapes. The trainer/instructor would be recorded in a room as shown in Figure 3. The module featured in nine different instructors and consisted of 12 lessons. Each lesson had the following components: (1) basic concepts; (2) definitions of terms; (3) principles and/or theories; and (4) trainees' activities which include examples and practice. For example, Covey's "Sharpen the Saw" focuses on practicing forces to achieve harmony to work effectively and efficiently. To achieve harmony requires a reduction of stress. Thus, one of the components of the practical part of that lesson involved going online and doing a stress test.

Figure 3 A WBT module with a trainer using a presentation (Jitgarun, 2007)

The trainer/instructor could use a PowerPoint™ presentation and/or any other forms of teaching materials such as an image, animation, textbook, LEGO/LOGO, etc. After the trainees/students had followed each lesson

through a WBT module in the classroom, they would do some exercises facilitated by the instructor.

The steps involved in developing WBT (Jitgarun, Tongsakul & Meejaleurn, 2008) were as follows:

(1) Record video of trainers/instructors in the classroom. Then, convert the video to MPEG file;

(2) Import the MPEG file into presentation software (e.g., Microsoft Producer for PowerPoint™);

(3) Import video, PowerPoint, sound, etc. (Microsoft Producer for PowerPoint™);

(4) Cut video and presentation file to become synchronous;

(5) Create a menu for a learner to select the content that he or she would like to learn;

(6) Link Microsoft producer to PowerPoint™ with the www;

(7) Design homepage using software such as Macromedia Dreamweaver MX;

(8) Link homepage to Microsoft producer for PowerPoint™, one file at a time;

(9) Upload all files to the web if being used online;

(10) For offline use, export all files, for example, flash, html, image and others to CD.

3.2 Participants

Participants were 19 fourth year electrical technology education students in the Faculty of Industrial Education and Technology at King Mongkut's University of Technology Thonburi, Thailand. Participants were selected by simple random sampling. The purpose of using electrical technology education students as the sample of the study was because, the authors believe that, a team-learning atmosphere in the classroom can be like a mechanism for the students to work together until they reach the ultimate goal. For example, it is customary for the fourth year undergraduate students in Thailand to do projects and while they are working on the projects, they can practice the life skills related to the world of work.

3.3 Instruments

The authors used two instruments for pre- and post- testing as follows: the LO model evaluation and the knowledge of LO. The LO model evaluation contained 60 items to ask organizations such as: If everybody can work according to the plan, will the organization succeed? The knowledge of LO contained 64 items in 12 categories based on Covey and Senge such as "Seek first to understand …, then to be understood". Both used a five-point Likert scale. The authors tested the reliability of the LO model evaluation and the knowledge of LO. The reliability was 0.9274 and 0.9905 respectively.

3.4 Procedures

The procedures of the research are as follows:

(1) A pre-test using the LO model evaluation and the knowledge of LO was administered in the classroom;

(2) The pre-tests were scored by one of the researchers;

(3) Nineteen undergraduate students were trained in LO using the WBT module with 12 lessons for one term during the 2007 academic year. Each lesson required approximately one hour of students' time for a total of approximately 12 hours. They completed activities in the classroom. The trainers/instructors would ask the students to study each lesson from WBT and then do the exercises. There would be no right or wrong answers for the exercises. The purpose of the assignments was to monitor that students understood the lessons;

(4) At the end of the 12 lessons, all students completed a post-test using the same LO model evaluation and the knowledge of LO as already pre-tested.

3.5 Data analysis

The data were analyzed by using Mean (*M*) and Standard Deviation (*SD*). Then, the authors used t-test to compare means between pre- and post- tests scores of LO model evaluation as well as knowledge of LO. The Pearson product-moment correlation was utilized to see if there is any relationship between the LO of organization itself with the students' knowledge of LO.

4. Results

In Table 1, it is presented the results of the pre- and post- testing. The items in the table came from the LO model evaluation. The table presented the highest and lowest means. Results showed that when the high and low means of LO model evaluation were compared, the three lowest post-test of students on LO model evaluation were: (1) members work according to the plan; (2) organization plans before working and sets priorities for unknown tasks; and (3) organization sets the belief "one for all and all for one'' in order that the members learn new things together. And the three highest post-test of students on LO model evaluation were: (1) organization creates confidence to its members that success comes from hard work from all members; (2) organization allows members with different backgrounds to share their best idea; and (3) diversity in thinking of the members will lead to the best idea in the long run.

Table 1 Comparison between high and low of mean (*M*), standard deviation (*SD*) classified by pre- and post-tests of LO model evaluation

Pre-test			Post-test		
High	*M*	*SD*	High	*M*	*SD*
42. Setting what has to be done in the schedule helps achieve the objectives easily.	4.21	0.92	3. Organization creates confidence to its members that success comes from hard work from all members.	4.52	0.51
58. If everybody can work according to the plan, the organization will succeed.	4.05	0.97	52. Organization allows members with different backgrounds to share their best idea.	4.42	0.69
60. During work, all members understand that everybody shares the success.	3.95	0.91	54. Diversity in thinking of the members will lead to the best idea in the long run.	4.37	0.50
Pre-test			Post-test		
Low	*M*	*SD*	Low	*M*	*SD*
24. Members have morale and devotion to work.	3.37	0.96	44. Members work according to the plan.	3.75	0.91
22. Organization cares for the health of members and provides them with special welfare.	3.37	1.17	43. Organization plans before working and sets priorities for unknown tasks.	3.75	0.72
53. During work, members show their full potential.	3.42	0.96	13. Organization sets the belief "one for all and all for one" so that the members learn new things together.	3.78	0.71

Table 2 reveals that when the high and low means of knowledge of LO were compared, the three lowest post-test of students were on think win-win; mental models, and systems thinking and the three highest post-test of students were on synergy seek first to understand …, then to be understood and put first things first.

From Table 3, when the pre-test (*M*=3.74, *SD*=0.70) and post-test scores (*M*=4.11, *SD*=0.31) were compared using t-test of LO model evaluation and knowledge of LO, it was found that the t-value was 2.15 with the statistically significant difference at the 0.05 level. This meant that the WBT module on LO enhanced students' knowledge of LO. When the average scores of pre-test (*M*=3.67, *SD*=0.69) and post-test (*M*=4.24, *SD*=0.23)

scores were compared using the t-test of knowledge of LO, it was found that t-value was 3.34 with the statistically significant difference at the 0.01 level. This meant that the WBT module on LO helped the students gain more knowledge of LO.

Table 2 Comparison between high and low of mean (*M*), standard deviation (*SD*) classified by pre- and post-tests of knowledge of LO

Pre-test			Post-test		
High	*M*	*SD*	High	*M*	*SD*
2. Mental models	3.83	0.74	11. Synergy	4.58	0.42
10. Seek first to understand… then to be understood	3.74	0.77	10. Seek first to understand …, then to be understood	4.42	0.45
11. Synergy	3.74	0.89	8. Put first things first	4.34	0.44
Pre-test			Post-test		
Low	*M*	*SD*	Low	*M*	*SD*
9. Think win-win	3.54	1.07	9. Think win-win	4.08	0.70
12. Sharpen the saw	3.57	0.82	2. Mental models	4.11	0.60
1. Personal mastery	3.58	0.66	5. Systems thinking	4.16	0.35

Table 3 Comparison between pre- and post-tests using t-test of LO model evaluation and knowledge of LO

Items	*N*	*M*	*SD*	*t*
LO model evaluation				
pre-test	19	3.74	0.70	2.15*
post-test	19	4.11	0.31	
Knowledge of LO				
pre-test	19	3.67	0.69	3.34**
post-test	19	4.24	0.23	

Notes: * $p<0.05$; ** $p<0.01$.

Table 4 Relationship between LO model evaluation and knowledge of LO

Items	*r*
LO model evaluation	
pre-post tests	-0.205
Knowledge of LO	
pre-post tests	-0.083
LO model evaluation—Knowledge of LO	
pre-pre tests	0.627**
post-post tests	0.158

Note: ** $p<0.01$.

From Table 4, when the Pearson product moment correlation was utilized, it was found that there was a significant relationship between pre- and pre- tests of LO model evaluation and knowledge of LO. This meant that before training, the students' knowledge on LO might have come from the LO of organization itself.

5. Discussion, implications and limitations

According to the evaluation of WBT module on LO, when the mean scores (*M*) of pre- and post-tests were compared, the high and low values were not the same. Moreover, the mean scores of pre- and post- tests were high and low alternatively. To illustrate, the lowest variables were "think win-win" while "mental models" gained high value. Then, after administering the post-test, "mental models" gained low value as did "systems thinking". This might be because LO was not part of any subjects. There is a need for academic staff to find time to teach LO and let the students practice it by themselves. This need for time has implications for policy. Institutions wishing to promote LO may need to provide the necessary time for the staff.

"Systems thinking" is very useful for undergraduate students (Sussman, 2007), because it can be used as an approach to teach problem-solving skills, basic design ideas, models to achieve efficient and effective teamwork. After all, not all students can understand all the content in depth. However, in this study, the average mean scores of the post-test for "systems thinking" were quite moderate. This reason might be that the activities in "systems thinking" were not integrated in any subjects the students had taken. Moreover, "systems thinking" skills required more concrete contents to achieve the results so that the students became aware of their connection within the bigger system (Assaraf & Orion, 2005). Results may have been different with graduate students.

The reason why "think win-win" achieved quite a low average mean scores was partly because the term "win-win" was probably misused and overused or used so many times that nobody was aware of its real meaning; the term "win-win" was often used to replace the term compromise which was incorrect (McNary, 2003). In a Thai context, people normally tackle the conflicts to please the others by compromise. In this way, one side must be willing to lose (give up), first in order to win (gain something back), later in the future. The students might have misinterpreted the idea due to the above-mentioned fact. If the study had been conducted in another country, results might therefore have been different.

The students gained additional knowledge and understanding about LO partly because the WBT module on LO was clear and easy to follow. Probably, the knowledge during the pre-test about LO was related with being an LO inside the organization. This knowledge of LO could as well be measured in the pre-test of LO model evaluation (r=0.627**). The reason why the pre-tests of both LO model evaluation and the knowledge of LO were significantly correlated was because the university (King Mongkut's University of Technology Thonburi) has established Learning Institute to develop and promote learning organization on campus. Learning Institute is the organization which provides workshops and training courses to the university staff (academic as well as supporting staff) and the students on various aspects of learning organization, especially 5 disciplines and 7 habits of highly effective people. Most of the university staff and students usually attend such a workshop as dialogue.

Moreover, educational institutes might wish to emphasize the importance of LO and provide final year students with training on LO. They also wish to provide students with real practice on LO so that the students could master the skills of being a LO and be able to work with others in the organizations effectively and efficiently after their graduation. This need for practice also has policy and, possibly, curriculum implications.

To conclude, the students' knowledge of LO in this case may be classified as explicit knowledge (Sanchez & Linden, 2000) which was transferred through attending the training session. However, it is quite difficult to transfer experiences or tacit knowledge (Sanchez & Linden, 2000) from the trainers to the trainees in only one

session. Therefore, the researchers suggest strongly that, in order to achieve knowledge of LO, there should be more than one session to provide the trainees with opportunities to share their experiences of applying their knowledge to LO in their context.

References:

Assaraf, O. & Orion, N. (2005). Development of systems thinking skills in the context of earth systems education. *Journal of Research in Science Teaching, 42*(5), 518-560.

Covey, S. (1989). *The seven habits of highly effective people*. USA: Free Press.

Ho, S. K. M. (1999). Total learning organization. *Journal of the Learning Organization, 6*(3), 116-120.

Jitgarun, K. (2006). *The development of student into learning organization: Case study KMUTT (phase 1-2).* Retrieved June 17, 2009, from http://www.kmutt.ac.th/rippc/slo.htm.

Jitgarun, K. (2007). *E-KMUTT, classroom on demand, ETE 525 learning organizations*. Retrieved June 17, 2009, from http://eu2.lib.kmutt.ac.th/webvdo/ete525/Lecture_9_files/Default.htm.

Jitgarun, K., Thaveesin, S. & Ketkamol, P. (2003). *The development of training program for administrators at Ministry of Education.* Retrieved June 17, 2009, from http://www.moe.go.th /wijai/kalyanee.doc.

Jitgarun, K., Tongsakul, A. & Meejaleurn, S. (2008). Virtual-based training and creative thinking in higher-level education. Proceedings of *EDU-COM 2008*, Khon Kaen Province, Thailand, 268-276.

McNary, L. (2003). The term "win-win" in conflict management: A classic case of misuse and overuse. *Journal of Business Communication, 40*.

The Office for National Education Standards and Quality Assessment (Public Organization). (2007). *First external quality assurance report for vocational education between B. E. 2544-2548 (2001-2005) or Round I.* Bangkok: Amarin Printing and Publishing.

Sanchez, R & Linden. (2000). *"Tacit knowledge" versus "explicit knowledge" approaches to knowledge management practice.* Retrieved June 17, 2009, from http://ir.lib.cbs.dk/download/ ISBN/x65640929x.pdf.

Senge, P. (1991). *The fifth discipline: The art and practice of the learning organization.* New York: Century Business.

Sharma, S. & Gupta, J. (2003). A framework for building learning organizations. In: *Critical reflections on information systems: A systematic approach*. USA: IGI Publishing, 246-248.

Sussman, J. (2007). *Teaching systems thinking to engineering undergraduates using the CLIOS process*. Retrieved June 17, 2009, from http://icee2007.dei.uc.pt/proceedings/papers/268.pdf.

(Edited by Nicole and Lily)