Constructing a model for assessing knowledge transfer

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ABSTRACT

Knowledge transfer is important in the educational system. Most universities emphasized on the effectiveness of knowledge transfer from the instructor to learners since the effectiveness of knowledge transfer can improve the teaching methods. This paper describes the model that can explain the assessment of knowledge transfer from the instructor to learners. The model is based on the knowledge and experience of the authors in the educational environment plus the extensive literature search on the subject. The authors used experimental research and collected data from thirty respondents to represent the model for assessing knowledge transfer. The authors hope that this model can explain the effectiveness of knowledge transfer through improvement to the teaching methods for instructors and also improve the learners' learning in the higher education system.

Keywords

Knowledge, Knowledge management, Externalization, Teaching method, Instructor, Learners, Education

1.0 INTRODUCTION

In the knowledge era, education is a process of improving the quality and performance of human. Knowledge is a part of educational system, and knowledge includes both experience and understanding of people in the organization. It can be the information such as documents and reports. Knowledge can be divided into two primary forms, which are explicit knowledge and tacit knowledge. Explicit knowledge can be expressed and transfer in format and system methods by rules and procedures. It can be transmitted as data found in databases, documentation and books (Nonaka et al., 2000). In contrast, tacit knowledge is embedded in the human mind and body such as ideas, experience, insight and skills. Knowledge transfer is a process to transfer knowledge from a source to a recipient. In education, knowledge transfer is significant and useful, since the goal of education is to improve the abilities and skills of learners. Many researchers have studied the problems of knowledge transfer and examined ways and means to improve knowledge transfer from the instructor to learners. However, knowledge including learning experiences from individuals' memory, therefore, the success of knowledge transfer in the education system does not only depend on the instructor and learners but it depend too on the factors that can cause problems to knowledge transfer such as the characteristics of knowledge itself, learners, the sources and the method of knowledge transfer (Gouza, 2006). This paper focused on the method to construct a model of assessing knowledge transfer from the instructor to leamers that is based on previous studies. In addition, knowledge and experience of the authors in the educational environment are also considered plus the extensive literature search on the subject.

2.0 LITERATURE REVIEW

2.1 Knowledge transfer

Nowadays knowledge transfer is a part of organizations' life. Knowledge transfer is a process to transmitting knowledge such as experience, lesson learns from one source to other source. Knowledge transfer involves communication between human beings and communication between individuals (Abilino et al., 2004). It can be mediated by technology and what can be translated into information. Knowledge transfer implies individual within one organization advising individuals from the same or another organization on certain problems and procedures. However, knowledge transfer is necessary to understand how knowledge could be transferred between individuals and recognize the methods of knowledge transfer. Davenport and Prusak (1998) stated that, knowledge transfer involves two actions which are transmissions; the process of sending knowledge to potential recipient and absorption by that person or a group of persons. The next section will describe some of the knowledge transfer models previously studied and considered in this study.

2.2 Knowledge transfer models

Knowledge transfer cannot occur without human intervention (Gorgoglione, 2004). There are many studies on the model of knowledge transfer. Hansen (1999) presented a model having two stages: Search and Transfer. Szulanski (2000) put forward a model with four stages: Initiation, Implementation, Ramp -up and Integration. Based on Hansen and Szulanski, Kwan and Cheung (2006) proposed a four –stage knowledge transfer process of Motivation, Match, Implementation and Retentive. However, for this paper the authors emphasized on the SECI model that has been developed by Nonaka and Takeuchi (1995) to support the knowledge transfer between the instructor and learners. The SECI model is a process of knowledge creation between tacit and explicit knowledge, and comprises socialization (tacit-to-tacit), externalization (tacit –to- explicit), combination (explicit-to-explicit), and

internalization (explicit-to-tacit). Figure 1 illustrates the SECI model.

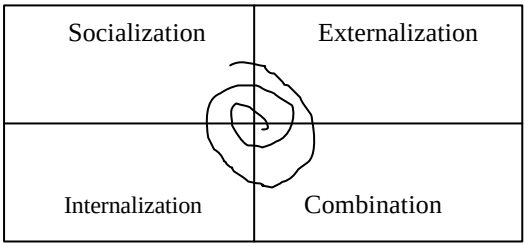

Figure 1: the SECI model

Other researchers studied the SECI model focusing on knowledge sharing between person to person, person to group and organization. Rice and Rice (2001) stated that the SECI model is a process by which organization spiral their knowledge within and outside their organizations with the aim of refining and adding the value to the stock of knowledge that exists in the organization. However, in the process of knowledge transfer, many problems can occur and affected knowledge transfer. Therefore the next section will describe the barriers of knowledge transfer.

2.3 The barriers of knowledge transfer

There are many factors affecting knowledge transfer and externalization, since the transfer of knowledge depends on time, scope, complexity and strategy. These factors will determine the effort and resources of the knowledge transfer and education. The goals of education is to improve the pedagogical skills, teaching and learning capabilities and social networks to transfer the knowledge for its successful implementation (Pardhan & Rainer, 2004). The barriers to transfer knowledge occur from many factors such as communication problems, language problems, interpretation problems and technologies and techniques that are used in the transfer of knowledge. Guzman and Wilson (2005) stated that the barriers and problems of knowledge transfer is complexity of social process that occurs during the transfer process. Furthermore, organizational knowledge is complex because knowledge is based on individual interpretation, cognition and behavior that in turn can be shaped by contextual rules and resources. Nooteboom (2001), identified the barriers of knowledge transfer from the lack of absorptive and communication capacity. Therefore, the barriers and factors can contribute to a situation where knowledge transfer can become more problematic if not managed.

2.4 The Externalization in the Higher Education

Externalization is a part of the SECI model, which is used to transfer knowledge from the instructor to learners. Externalization is divided into two parts; metaphor and analogy (Nonaka &Takeuchi, 1995). A metaphor is a partial map between concepts (Ramadoss & Balasundaram, 2006). A metaphor can help people to learn things in a better way, and can help in understanding and communicating our world through mapping two concepts, since to understand one concept we use the other concepts. Metaphor can be a powerful instructional strategy when used as a cognitive tool which means that they are explicit and that the learning environment provides learning activities based on metaphor, such as when the learners look at the pictures then they can imagine the concept of the pictures. Analogy can be used in the process of learning and can be extremely effective in communicating complex aspect of the learning management. Furthermore, after the barriers or problems of knowledge transfer have been solved, we have to emphasize on the learners' perception, such as what knowledge that learners can perceive from the process of knowledge transfer.

2.5 Learners' Perception

Percept can be hearing, vision, and /or smell, each involve different neurons of each individual (Little, 1999). Mosher (1998) stated that perception may not be what you think it is. Perception is not just a collection of inputs from our sensory system. Instead, it is the brain's interpretation of stimuli which is based on individual's genetics and past experiences. Many researchers have studied the learners' perception. According to Gerzin et al., (2003), the relationship between knowledge transfer and learners' perception is significant. While Warren et al., (2005) noted that to improve the learners' perception we have to focus on three factors. The first is learners' perception of the agents (emotion, facial expression, gaze, image, voice and initial reaction). The second is learners' frustration and confidence, and the last is learners-agent social interaction (feedback, overall nature and manner).

3.0 RESEARCH METHOD

This study is based on an experimental research; the steps of the research design will be described in the following section.

3.1 Developing the instruments

The instrument was developed based on the knowledge and experience of the authors in environmental education plus extensive literature search on the subject. The authors selected the Innovation for learning subject (Educ104) which studies information technology and new innovations discovered by humans. Then the author developed the instrument, which consists of five parts; personal data, multiple choices, behavior assessment, knowledge assessment and tools and teaching techniques. However, for this paper the authors emphasized on three parts to construct a model for assessing the knowledge transfer from learners. These are, behavior assessment comprising 35 items, knowledge assessment (15 items), and tools and teaching techniques (35 items). The authors considered four experts from Nakhon Si Thammarat Rajabhat University in Southern Thailand. Two of the experts were from the psychology program, one expert from research method program and the other in the field of knowledge management. The instrument was vetted by the experts

after the initial design. It went through a series of refinement based on feedbacks from the experts. It was then subjected to tests of validity and reliability. The next section will describe the dependent variables of knowledge transfer.

3.2 Dependent variables

The dependent variables that are used to construct the model of assessing knowledge transfer in this paper came from the instruments developed by the authors. The first part is behavior assessment, which consists of two parts; attitude and practice. Attitude assessment is for assessing the feeling and perception of learners about the subject that they have studied. Practice assessment is for assessing the behavior of learners when they used the technologies. The second part is knowledge assessment used for assessing knowledge from learners after the process of knowledge transfer is completed. Each part comprises 10 variables. The third part is tools and teaching techniques. There are 23 variables in this part. Measurement of the instrument is based on a five-point Likert scale (ranging from 1 to 5, where 1 denotes strongly disagree; 2 disagree; 3 uncertain; 4 agree and 5 strongly agree). Table 1 shows the measurement instruments and scales of the instrument.

Table 1: Measurement instruments and scales

Constructs	items	Scale
Behavior assessment		
- Attitude assessment	10	5 –point Likert
- Practice assessment	10	5-point Likert
Knowledge assessment	10	5-point Likert
Tools &teaching technique	23	5-point Likert

From table 1: Mearsurement instrument and scales, each part of the instrument are completed by using factor analysis. The next section will describe the factor analysis based on initial data collected for the study.

3.3 Factor analysis

Factor analysis is a technique used to identify factors that statistically explain the variation and covariation among measures (Field, 2005). There are two reasons for using factor analysis in this study. The first is to develop the questionnaire and the second to reduce the list of duplicate items in the questionnaire and test their validity and reliability. The authors collected data from thirty respondents and input to a Statistical Program. There are four basic steps of a factor analysis. First is calculating a correlation matrix of all variables to be used in the analysis. Second is to extract factors. Third is to rotate the factors to create a more understandable factor structure and the last step is interpreting results. The factor analysis was run in the first round to reduce list of duplicate items and the second round is to test for validity and reliability of the instrument. In each factor, groups were formed to represent the factor value of each variable. However, the authors had selected each variable of the factors based on the reliability of the variable and the purpose of the study. Table 2 shows the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's test representing the results of the reliability analysis.

Table 2: Results of the reliability analysis of the instrument

Construct	Variable name	Items	Alpha
Behavior assessment			
- Attitude assessment	Attitude	10	0.78
- Practice assessment	Practice	10	0.74
Knowledge assessment	Knowledge	10	0.83
Tools and teaching techniques	Teaching techniques	25	0.90

Table 2 shows the results of the reliability analysis from the three parts of the instrument. The first part is behavior assessment which consists of two subsections; attitude assessment and practice assessment. An attitude variable comprises 10 items and represents the alpha value equals 0.78. A Practice variable also comprises 10 items and represents the alpha value equals 0.74. The second part is knowledge assessment or knowledge variable comprises 10 items and represents the alpha value equals 0.83. The last part of the instrument is tools and teaching technique or teaching technique variable comprises 23 items and represent the alpha value equals 0.90. However, Kaiser (1974); Field (2005) and George and Mallery (2006) recommends accepting values greater than 0.5 as acceptable (values below this should lead to either collecting more data or rethink which variable to include). Furthermore a value between 0.5 and 0.7 is mediocre, a value between 0.7 and 0.8 is good, a value between 0.8 and 0.9 is great and a value above 0.9 is superb. Table 2 shows the values of 0.78 and 0.74 for attitude and practice assessment, respectively representing the behavior construct. These values are considered good and therefore valid. Items in the knowledge assessment and tools and teaching techniques shows values of 0.83 and 0.90, respectively, which fall in the range of 'great' and therefore valid. Thus, we are confident that the values of the items that formed the construct are valid and appropriate for this study.

3.4 Data collection

There are thirty respondents from Nakhon Si Thammarat Rajabhat University in Southern Thailand that participated in this study. There are two stages of data collection. First, the data were collected for running a factor analysis to reduce list of duplicate items. Second, the data were collected to test for validity and reliability of the instrument to construct a model for assessing knowledge transfer.

4.0 RESULTS

All respondents were undergraduate students, in term of gender, 3 (10%) were males and the remaining 27 (90%) were females. Most respondents were Buddhist (60%) and Muslim (40%) and age between 20-22 years old. Table 3 shows the descriptive statistic of the variables; Mean and SD in the next page.

Table 3: Mean Scale of attitude assessment

Items	Variables	Mean	S.D.
1.	Motivation	4.20	0.531
2.	Sharing ideas	4.20	0.551
3.	Searching information	4.00	0.662
4.	Knowledgeable	3.60	0.669
5.	Downloading	3.60	0.669
6.	Matching	3.00	0.928
7.	Difficult chatting	2.80	0.935
8.	Difficult learning	2.63	0.999
9.	Confidence	3.10	0.885
10.	Excellent grade	4.27	0.691

Table 3 shows the Mean and Standard deviation of attitude assessment. The mean is useful to compare various populations, or to see how a variable evolves over time (Antonius, 2003). From this table the mean value is higher from 4.20 to lower at 2.63 which mean each variable represents the attitude or the feeling of the respondents. The motivation variable has a mean value of 4.17 which means the respondents feel the subject is interesting. In contrast, the difficult learning represents the value as 2.63 means the respondents feel the subject is complicated. The standard deviation is the distance that separates it from the mean for this table the value is 0.999 to 0.531.

Table 4: Mean Scale of practice assessment

Items	Variables	Mean	S.D.
1.	Registering e-mail	3.00	1.348
2.	Attachment file	3.00	0.969
3.	Using whiteboard	3.12	0.977
4.	Chatting group	3.26	0,898
5.	Create bookmark	2.82	1.086
6.	Using Blog	2.65	1.070
7.	e-learning	3.62	0.739
8.	Using application	2.91	1.026
9.	e-library	2.62	1.206
10.	Discussion	2.72	1..132

Table 4 shows the Mean and Standard deviation of practice assessment. These data represent the value from 3.26 to 2.62. Practice assessment is to assess the practice and skills of learners. Therefore, if the variable has a higher mean value, that means majority of learners can do it. The e-learning variable has a mean value of 3.62. This means most learners can use e-learning by themselves. The e-library variable on the other hand has a mean value of 2.62 which means only a few learners can use e-library.

Table 5: Mean Scale of knowledge assessment

Items	Variables	Mean	S.D.
1.	Explaining the definition	3.17	0.834
2.	Explaining& analyzing	3.30	0.837
3.	Describing & Comparing	2.27	0.907
4.	Metaphor	2.80	0.907
5.	Describing the different between 2 things	2.5	1.196
6.	Synthesis	2.43	0.728
7.	Give the example of knowledge	2.80	0.761
8.	Comparing the knowledge	1.80	0.858
9.	Classifying	3.20	0.761
10.	Making decision	3.27	0.907

Table 5 shows the Mean and Standard deviation of knowledge assessment. These data represent the value from 3.30 to 1.77, and the mean are different in each variable, since each variable represents knowledge that learners can perceived after the process of knowledge transfer has been finished. From this table we can describe; most learners can explain the definitions of knowledge analyze, classify, and make decisions at a good level. However, when they have to show examples of knowledge, and using metaphor to understand the knowledge, these variables represent a mean value of 2.8 which means the learners had perceived the knowledge at a fair level. For the variables 'comparing between 2 things', 'synthesis' and 'comparing the knowledge' with mean values of 2.5, 2.43 and 1.77, respectively, the learners had perceived the knowledge at a poor level. Therefore, in this part the instructors have to improve the process of knowledge transfer to learners.

Table 5: Mean Scale of tools as teaching techniques.

Items	Variables	Mean	S.D.
1.	Course syllabus	3.77	0.728
2.	Introduction to learning	3.47	0.681
3.	Using whiteboard for announcement	4.03	0.718
4.	Linking and Overview of the subject	3.83	0.648
5.	Sequence of subject details	3.83	0.874
6.	Flow of subject details	3.73	0.640
7.	Appropriateness of tools for teaching	3.20	0.761
8.	Resource based	4.23	0.728
9.	Example of assignment	3.50	0.731
10	Discussion and share ideas	3.40	0.724
11	Appropriate text color	4.03	0.718
12	The concept of each lesson is very clear	3.20	0.761
13	Display the potential of learning	3.53	1.008
14	Represent good questions	3.67	0.711
15	Total questions	3.70	0.750
16	Speed of loading data	3.17	1.053
17	Speed of data link	3.33	0.922
18	Submitted homework	3.50	1.075
19	Easy to test	3.47	0.778
20	Interested in the subject	3.97	0.669
21	Good method of teaching	4.20	0.714
22	Understanding	3.67	0.802
23	Motivation of learning	4.07	0.640

Table 5 shows mean values of 3.17 and above, which indicate that the instrument is appropriate for the study and can form part of the construct for a model of assessing knowledge transfer.

5.0 CONCLUSION

The purpose of this paper is to study the variables to construct a model of assessing knowledge transfer. There are three parts of the instruments. The first part is behavior assessment; attitude and practice. Each part comprises 10 items. The second part is knowledge assessment comprises 10 items and the last is tools and teaching techniques comprises 23 items. All parts of the instrument represent values that are appropriate and acceptable. Therefore, the instrument to assess knowledge transfer presented in this study can be used confidently and represent an appropriate and valid construct for assessing knowledge transfer.

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