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Adaptation of the Tromsø Social Intelligence Scale to the Digital Library Guide Designers: A Case Study of the Transworld University Library

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【Abstract】

Social intelligence plays an important role in multiple intelligences. Despite its significance, in the field of library and information science, there have been few researches on the practice of social intelligence evaluation on digital library designers. The objective of this study is to adopt the Tromsø Social Intelligence Scale (TSIS) to evaluate social intelligence and design performance of digital library guide designers. In addition to TSIS, a computer self-efficiency scale is also applied to measure the designers’ computer skill. Moreover, Kepner-Tregoe Analysis (KTA) is used to score designs and select the best digital library guide. Analyses reveal that the correlation among TSIS, computer skill efficiency, and KTA is high: if the designer is good at basic computer skill, he or she is also generally evaluated as equipped with better social intelligence and as capable of designing better digital library guides.

Keyword

Social intelligence；Computer self-efficiency；Kepner-Tregoe Analysis；Digital library guide design

Introduction

According to Howard Gardner's (1993) multiple intelligent measurement, there were linguistic intelligence, musical intelligence, logical-mathematical intelligence, spatial intelligence, bodily-kinesthetic intelligence, interpersonal intelligence, intrapersonal intelligence, and naturalist intelligence. Social intelligence has played an important role in multiple-intelligence in recent research. Goleman (1995), Hatch and Gardner (1993) proved that emotional intelligence or interpersonal intelligence were close to social intelligence. Furthermore, Lazear (2000) showed that social intelligent measurement could be divided into verbal skill, history, mathematics, science or health, global research, life skill and art. Social intelligence in the computer science field means that each team or members in the class can teach or guide others how to learn the relative items in the computers. Therefore, social intelligence in computer science field belongs to life skill measurement. In recent years, many researchers had divided social intelligence into a multifaceted construct. Kosmitzki and John (1993) indicated seven components of social intelligence: (a) perceptiveness of others' internal states and moods; (b) general ability to deal with other people; (c) knowledge about social rules and social life; (d) insight and sensitivity in complex social situations; (e) use of social techniques to manipulate others; (f) perspective tasking and (g) social adaptation. Bjorkqvist, Osterman, and Kaukiainen (2000) indicated that social intelligence had three different components: perceptual, cognition-analytical and behavioral intelligence. Daniel Goleman (2007) demonstrated that social intelligence included social awareness and social facility. Social awareness is composed of primal empathy, attunement, empathic accuracy and social cognition. Social facility mixed synchrony, self-presentation, influence and concern.

Although there are different ways to measure social intelligence, psychologists always consider that the pencil-and-paper format tests are the most convenient tool to evaluate social intelligence. And cognition is the basis that experts pay most attention to in this method.

The Tromsø Social Intelligence Scale

Silvera, Martinussen and Dahl (2001) constructed a Tromsø Social Intelligence Scale (TSIS) including social information processing, social skills and social awareness. Gini (2006) applied this scale to an Italian adolescent population and found good correlation in social intelligence. The author suggested that different factors such as culture, perceived self-efficacy and self-esteem could be discussed with social intelligence. However, there is few research about social intelligence evaluation in Taiwan. The goal of the present study was to adapt the Tromsø Social Intelligence Scale to the digital library guide designers to evaluate their social intelligence and their design.

Self-efficiency

Bandura's (1986) theory of self-efficiency meant an estimation of one's ability to successfully perform target behaviors to produce outcomes. Owen (1986) suggested that self-efficiency could be easily

and reliably measured and it could be used to assess a composite of affection, cognition, and performance in the attainment of program and course objectives. Murphy, Coover and Owen (1989) developed the computer self-efficiency scale to measure self-efficiency scores. They found that three factors including beginning level computer skills, advanced level computer skills and mainframe computer skills were reliable in estimating computer self-efficiency.

Kepner-Tregoe Technique

Founded in 1958 by Dr. Charles Kepner and Dr. Benjamin Tregoe, Kepner-Tregoe, Inc., is a global organization providing consulting and training services around problem solving, decision making and project execution methodologies. Kepner-Tregoe's trademark technique, Rational Process, which is commonly referred to as the KT Process, is the creation of structured, systematic processes which are used to maximize the critical thinking skills of key stakeholders in a particular situation, problem (potential or real), decision or opportunity. The advantages of Kepner-Tregoe Analysis (KTA) are: (a) it provides explicit decision model; (b) it accounts for mandatory criteria; (c) it accounts for varying importance of criteria; and (d) it provides a single score for each alternative.

KTA includes the following procedures:

1. Identify mandatory criteria “Musts”.
2. Identify other evaluation criteria “Wants”.
3. Weight wants by importance (usually 1-10 weights).
4. Score each alternative on each “Must”.
5. Any alternative not meeting a “Must” is eliminated.
6. Score each alternative on each “Want”.
7. Multiply each alternative’s score on each criterion by the importance weighting of that criterion.
8. Sum up all the weighted scores for each alternative.
9. Select the alternative with the highest score.

Objective of the Research

Lazear (2000) showed that social intelligence in the computer science field meant each team or members in the class could teach or guide others how to learn the relative items in the computers. Besides, library guides on the web are very important and convenient for the users to understand how to use the library, such as borrowing books, searching magazines, operating databases and enjoying movies, etc. Therefore, good digital library guides have to be designed patiently and the designers have to be organized as a project team. A project team could consist of two or three members in charging of editing the script, operating visual or verbal flash and dealing with the functional guide. During the digital library guide design process, the team member involve with intensive social intelligence. Therefore, all the team members will answer the TSIS and computer self-efficiency questionnaires to reveal their relationships between social intelligence and self-efficiency perception. Finally, KTA is used to collect digital library guide movies scores from experts and users’ voting to decide the final digital library guide design among all the alternatives. The reliability of the TSIS and computer self-efficiency

for digital library guide designers in Taiwan will be investigated. The correlation between TSIS and computer self-efficiency will be analyzed. The relationship between the designers' TSIS score and their design score will be discussed.

The following sections are arranged as follows: methods include the research methods of participants, questionnaires design, procedure and evaluation. Results present the results of reliability, correlation and KTA analysis. In discussion, we discuss and analyze the scores between TSIS and KTA. Finally, conclusions are drawn in conclusions.

Methods

Participants

Forty three subjects participated in the digital library guide designing program in Transworld University (TWU) (see Figure 1). Each subject spent one week in learning to edit, capture, discuss, design and upload the digital library guide movies. Because group cooperation could evaluate social intelligence, each participant was assigned to a group which included two or three members.

Figure 1　TWU Digital Library Guide Movies Designing Project

Questionnaires Design

The TSIS questionnaire was given to the participants to measure their social intelligence, including three factors and 21 items in total. The TSIS is a seven-point scale measurement. Scale 1 means extremely poor, and scale 7 means extremely well. Participants were asked to answer the scale.

Furthermore, a personal computer self-efficiency questionnaire including 32 items was also tested to investigate the relationship between different social intelligence and self-efficiency perception. The self-efficiency questionnaire is a five-point scale measurement. Scale 1 means extremely poor confidence, and scale 5 means extremely well confidence. Participants were asked to answer the scale.

Procedures

Each group proceeded the digital library guide system by using the following stages:

1. The instructor taught the digital library editing software, Ulead Video 11 to all the participants.
2. The participants in each group went to the TWU library to collect images.
3. The group members discussed the digital library guide contents in order to design the digital library guide system.
4. The group members cooperated to make the digital library guide movies and upload the final work to the instructor on the web.

Evaluation

After each group finished uploading their system, three experts evaluated each digital library guide design. According to the KTA decision models, the alternative with the highest score from three experts' evaluation and 60 digital library users evaluation was selected. The percentage weights were 30% for each instructor and 10% for the users. The three experts had plentiful experience in activity projects, multimedia design, and news reporting. Regarding to KTA Decision Analysis Worksheets (Table 1), total percentage weight of the "Must" was 50%. In "Must", the percentage weight of project contents, design skills, and expressive functions are 15%, 15% and 20% respectively.

In evaluation of the content of digital library guide design, each expert had his own evaluation criteria and percentage weights. Regarding to the other 50% weights of "Wants", the first expert considered that completely structure, creativity and objects matching level were needed in project contents, and their percentage weights were 15%, 20% and 15% respectively. The second expert thought that difficulty level, creativity and interface design (visual and verbal presentation) were important in a design, and their percentage weights were 15%, 20% and 15% respectively. Finally, the third expert thought that fluent expression, creativity and guide logic were the main items in expressive functions, and their percentage weight were 15%, 20% and 15%.

In this research, reliability, correlation and KTA analysis results will be discussed. Using reliability can confirm the TSIS and computer self-efficiency questionnaires suitable to the designers. The correlation coefficient between factors of TSIS and computer self-efficiency can reveal significant effects and relationship. In order to select the best digital library guide, KTA was applied in this paper. Because the TSIS has been applied only in Norway and Italy, the contribution of this paper might be to promote TSTS to the designers' social intelligence in TWU digital library in Taiwan.

Table 1

Decision Analysis Worksheets

Must	Expert 1		Expert 2		Expert 3	
Contents	15%		15%		15%	
Skills	15%		15%		15%	
Functions	20%		20%		20%	
Wants	completely structure	15%	difficulty level	15%	fluent expression	15%
	creativity	20%	creativity	20%	creativity	20%
	objects matching level	15%	interface design	15%	guide logic	15%
Total weighted Score						

Results

Results of Factor Analysis

A principal component analysis, with varimax rotation, was conducted on the 21 items of the TSIS. Similar to the results of the Silvera, Martinussen and Dahl (2001) and Gini (2006), three factors were extracted. The social information process (SP) had its eigenvalue at 4.39, the social skill (SS) had its eigenvalue at 3.89 and the social awareness (SA) had its eigenvalue at 3.40. The three factors explained 20.92%, 18.52% and 16.19% of the variance, respectively. The factor analysis was also applied on the 32 items of the computer self-efficiency. Three factors were extracted. The beginning level computer skills (Basicski) had its eigenvalue at 6.16, the advanced level computer skills (Advanski) had its eigenvalue at 5.80, and the mainframe computer skills (Mainfram) had its eigenvalue at 5.52. They explain 19.88%, 18.72% and 17.81% of the variance, respectively.

Results of Reliability analysis

In TSIS there are three factors such as SP, SS, and SA. Internal reliability for each of the three factors is evaluated using Cronbach's alpha coefficients. Table 2 shows the factors loadings and acceptable levels of reliability for the three factors of TSIS: SP (α=0.80), SS (α=0.64) and SA (α=0.71). In addition, the reliability of the three subscales in computer self-efficiency is also acceptable (see Table 3). Table 3 shows the factors loadings and acceptable levels of reliability for the three factors of computer self-efficiency: Basicski (α=0.92), Advanski (α=0.91) and Mainfram (α=0.61). Because the the reliability of the item 8: Logging off the mainframe computer system was lower than 0.6, it was deleted at this stage.

Table 2

Reliability analysis of The Tromsø Social Intelligence Scale

TSIS Items	Loading	Alpha
SP subscale		0.80
1. I can predict other peoples' behavior.	.799	
2. I know how my actions will make others feel.	.788	
6. I understand other peoples' feelings.	.719	
9. I understand others' wishes.	.741	
14. I can often understand what others are trying to accomplish without the need for them to say anything.	.739	
17. I can predict how others will react to my behavior.	.481	
19. I can often understand what others really mean through their expression, body language, etc.	.641	
SS subscale		0.64
4. I often feel uncertain around new people who I don't know.	.491	
7. I fit in easily in social situations.	.587	
10. I am good at entering new situations and meeting people for the first time.	.733	
12. I have a hard time getting along with other people.	.775	
15. It takes a long time for me to get to know others well.	.512	
18. I am good at getting on good terms with new people.	.468	
20. I frequently have problems finding good conversation topics.	.737	
SA subscale		0.71
2. I often feel that it is difficult to understand others' choices.	.542	
5. People often surprise me with the things they do.	.564	
8. Other people become angry with me without me being able to explain why.	.577	
11. It seems as though people are often angry or irritated with me when I say what I think.	.737	
13. I find people unpredictable.	.647	
16. I have often hurt others without realizing it.	.767	
21. I am often surprised by others' reactions to what I do.	.606	

Table 3

Reliability analysis of Computer Self-Efficiency subscales

Computer Self-Efficiency Items	Loading	Alpha
Beginning Level		0.92
5. Using the directory.	.568	
20. Adding and deleting information from a data file.	.862	
7. Escaping/ Exiting from the program/ software.	.534	
19. Coping an individual file.	.845	
18. Coping a disk.	.808	
15. Making selections from an onscreen menu.	.688	
21. Moving the cursor around the monitor screen.	.836	
17. Using a printer to make a “hardcopy” of my work.	.702	
23. Using the computer to write a letter or essay.	.646	
12. Handling a floppy disk correctly.	.730	
6. Entering and saving data (numbers or words) into a file.	.504	
27. Storing software correctly.	.518	
30. Getting rid of files when they are no longer needed.	.638	
1. Working on a personal (microcomputer).	.781	
2. Getting the software up and running.	.710	
9. Calling-up a data file to view on the monitor screen.	.522	
31. Organizing and managing files.	.686	
Advanced Level		0.91
28. Explaining why a program(software) will or will not run on a given computer.	.741	
32. Troubleshooting computer problems.	.688	
22. Writing simple programs for the computer.	.623	
24. Describing the function of computer hardware (keyboard, monitor, disk drives, computer processing unit).	.475	
10. Understanding terms/ words relating to computer hardware.	.670	
11. Understanding terms/ words relating to computer software.	.652	
25. Understanding the three stages of data processing: input, processing, output.	.620	
13. Learning to use a variety of programs (software).	.685	
26. Getting help for problems in the computer system.	.636	
14. Learning advanced skills within a specific program (software).	.572	
29. Using the computer to organize information.	.814	
16. Using the computer to analyze number data.	.620	
Mainframe Computer Skills		0.61
3. Logging onto a mainframe computer system.	.556	
4. Working on a mainframe computer.	.338	

Results of Correlation

Correlation coefficients among TSIS subscales and between TSIS subscale and Basicski are shown in Table 4. This table shows that the TSIS subscales are significantly correlated with each other and with the Basicski. Correlation coefficients among the computer self-efficiency subscales are shown in Table 5. This table shows that Basicski is significantly correlated with Advanski, and Advanski is correlated with Mainfram. Most especially, the magnitude of the correlation is high (r=0.74 between Basicski and Advanski). In short, the TSIS and computer self-efficiency can be reliably applied to digital library designers in Taiwan. When the designers are good at the basic computer skill, they have good social intelligence.

Table 4

Correlation coefficients among TSIS subscales and the Basicski scale

	Basicski	SP	SS	SA
SP	.225	1.0	.652**	.437**
SS	.311*	.652**	1.0	.687**
SA	.092	.437**	.687**	1.0

Basicski= beginning level computer skills; N=43.* p<.05, ** p<.01 (two-tailed test).

Table 5

Correlation coefficients among subscales of Computer Self-Efficiency

	Basicski	Advanski	Mainfram
Basicski	1.000	.739**	.227
Advanski		1.000	.381*
Mainfram			1.000

Basicski= beginning level computer skills; Advanski =advanced level computer skills;
Mainfram=mainframe computer skills; N=43.
* p<.05, **p<.01 (two-tailed test).

Results of KTA technique

After designers finished their digital library guide work, three experts evaluated 12 groups' project and 60 users' voting were added to decide the best library guide design. Three experts and digital library users' scores are shown in Table 6.

Table 6

KTA scores of the twelve digital library design

Group	Experts average	Users evaluation	Total score	Rank
1	59	1	60	12
2	65	3	68	8
3	83	10	93	1
4	73	6	79	5
5	70	5	75	6
6	82	9	91	2
7	77	7	84	3
8	74	8	82	4
9	64	2	66	9
10	61	1	62	10
11	60	1	61	11
12	67	4	71	7

Discussion

From Table 6 it appears that group 3 is the best digital library guide designer. Furthermore, the performance of group 3 is 10% higher than the other 10 groups (except the group 6). Thus, the final library guide selected by using KTA is group 3.

Because the performance of group 3 was 10% higher than the other 10 groups, this research tried to investigate the relationship between TSIS and KTA scores. The average scores of the SP, SS and SA subscales for the 12 groups were calculated, and the average values generated from regression factor scores by using SPSS 10 were 0.058, 0.196 and 0.183 respectively. The score of the group 3 for the SP, SS, and SA subscales were 0.243, 0.486 and 0.395. The TSIS scores of group 3 were better than the average values. Therefore, if the social intelligence of the digital library designers is higher than the average, the group will produce better digital design work.

Conclusions

This research applied TSIS and computer self-efficiency to the digital library designers in an university library in Taiwan. The KTA analysis was applied to select the best digital library design. The factor analysis, reliability analysis and correlation analysis were applied. The factor analysis used the same factors with that of previous researches in TSIS and computer self-efficiency. The reliability analysis showed good reliability in subscale of the TSIS and computer self-efficiency. The correlation analysis showed the positive correlated among the TSIS subscales and between the basic level of computer self-efficiency and the three TSIS subscales. Finally, the KTA was applied to collect digital library guide

movies scores to decide the final alternative design. The result shows that if all the designers are good at the basic computer skill, they have good social intelligence, and therefore they can design better digital library guide.

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