

Analysis on Students' Computer Self-Efficacy Instrument

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Abstract: This study aims to investigate students' computer self-efficacy in online education in sociology course at the Department of Educational Technology, Faculty of Education Science, Universitas Negeri Makassar. This paper reports analysis of an instrument used in our study. The instrument in this present study was developed to measure computer self-efficacy of students in online education. The instrument of the study was adapted from Computer User Self-Efficacy (CUSE) scale. The instrument was measured by weighting the scale, testing the validity and the reliability. The measurement result shows that 15 items were dismissed because it has no fixed scale intervals. The validity score of the instrument is valid because it is above 0.30. The research scale is moving from 0.336 to 0.747. Furthermore, all items in the computer self-efficacy instrument are reliable since the Cronbach's Alpha coefficient (0.930) is 0.7.

Keywords: instrument analysis, computer self-efficacy, instrument development, cuse scale

I. INTRODUCTION

Nowadays, internet becomes one of the key facilities in education. Internet based learning is one of the most intriguing multi modalities in enhancing students' achievement. As a main key in learning process, internet is expected to facilitate an increase in the intensity of the learning activities. A learning material must be designed to engage learners in improving learning outcomes. To make internet-based learning succeed in the learning process, some characteristics should be considered by the education practitioners and teachers. The characteristics are as follows: online learners must be sustainable, self-contained, highly motivated, and have skills to use technology (Boyd, 2004; Evans & Haase, 2001; Palloff & Pratt, 1999) in (Gallagher, 2007). In addition, Evans & Haase (2001) mentioned that online learners may not be accustomed in all kinds of technology and learning facilities, but the learners are willing to take the initiative and have motivation to learn and try new things that are unfamiliar for them.

Comfort in the online learning can provide great benefits, but not all learners feel the comfortable and succeed in online learning (Boyd, 2004; Hew, Knapczyk, & Frey, 2005). This is because there are some factors may contribute to the learning process. The learners may not have characteristics that support the success of online learning, such as mastery of basic technology skills, independent learning, and the lack of intrinsic motivation (Boyd, 2004).

Another factor that influences the success in online learning or education is the computer self-efficacy. Cassidy & Eachus (2002) reported that the computer self-efficacy is an important factor for the success in the use of computers. Bandura, Barbaranelli, Caprara, & Pastorelli (1994) stated that the person who has a high self-efficacy would have the patience in solving the difficulties they found in the learning process. Similarly, Papasratorn & Wangpipatwong (2006) argued that self-efficacy and attitudes towards computers are important factor in e-

learning courses. Therefore, people who have a low computer self-efficacy will feel uncomfortable in the e-learning courses which effect on the expected results. Boverie, Nagel, McGee, & Garcia (1998) also found that the higher a person's computer self-efficacy, the more satisfied in online course.

In this present paper, a computer self-efficacy instrument was tested. The instrument aims to explore the students' ability to use the computer before joining online-based learning. This study also refers to the Cassidy & Eachus's study (2002).

II. LITERATURE REVIEW

The basic concept of self-efficacy was first proposed by Bandura on social learning theory. This concept is expressed by Bandura in relation to the discussion of one's beliefs about his own ability (Lenox & Subich, 1994). Elliot (2000) argues that self-efficacy is "Individuals beliefs in their abilities to exert control over their lives, feeling of competency". Hjelle & Ziegler (1992) defines self-efficacy as "An individual belief that he or she can execute the behavior required to produce a certain response outcomes". Another definition by Schunk, (1983) Self-efficacy is concerned with judgement about how well one can organize and execute course of action required in situations that may contain ambiguous, unpredictable, and stressful elements". Furthermore, Sullivan & Mahalik (2000) suggested that "Self-efficacy is considered a cognitive structure created by cumulative learning experiences that leads to the belief or expectation that one can successfully perform a specific task or activity."

Thus, Alimuddin (2005) argued that self-efficacy can be defined as: (1) the cognitive structure as an assessment of self-confidence and expectation for a successful activity in daily activities; (2) steering and controlling behavior; and (3) a broad behavioral aspects of the achievement of specific tasks to be more general, complicated, confusing, uncertain, and full of suspense activities.

The construct of self-efficacy is divided into two, namely (1) efficacy belief and (2) outcomes expectancies. Efficacy belief refer to someone's confidence to be mastered the behaviors needed to achieve a feat (Bandura, 1997; Elliot, 2000; Luzzo & McWhirter, 2001). The belief may vary according to three dimensions: the difficulty level of the task (magnitude), vast areas of behavior (generality), and the steadiness of conviction (strength). These dimensions are reflected in the perceived self-efficacy which is the level of belief and hope of someone to succeed as he perceives himself (Bandura, 1986).

Outcome expectation is someone estimates about the consequences of actions that will be done (Elliot, 2000; Schwarzer & Renner, 2000). The expectation has three forms, namely (1) a positive expectation as a incentive; (2) a negative expectation as disincentive, and (3) positive or negative effect from a physical and social environment (Bandura, 1997).

The decision to take online courses may be associated with learning models. However, computer self-efficacy may also be a consideration in taking an online learning. People who think that they will succeed in carrying out a given task will most likely succeed. Meanwhile, people who believe that they will fail to perform specific tasks, then they usually will indeed fail (Lee & Witta, 2001; Ross, Hogaboam-Gray, & Hannay, 2001).

People who have a high self-efficacy would have a high patience to resolve the difficulties that they found (Bandura et al., 1994). How big is the person judges himself will experience obstacles in carrying out certain activities can be seen as coping self-efficacy, the level of confidence to self-ability in managing the difficult and complex situation (Bandura, 1997; Luzzo & McWhirter, 2001).

Online learning requires people to use technology and not all teachers and learners are familiar with the technology facilities used in the learning process. Wang and Newlin (2002) found that computer self-efficacy is related to reasons why someone choose to take online courses. Learners who have high computer self-efficacy took the course because of their curiosity about the online course, not solely because of the availability of the course, as experienced by those who follow the online courses because of the availability of the program which they are the lower in self-efficacy.

Cassidy & Eachus (2002) reported that the computer self-efficacy is an important factor in understanding the success of the people who use computers. Those who have a high computer self-efficacy tend to be more frequent use the computers and happy to use it. Self-Efficacy can be defined as a belief that a person has about their ability to be able to carry out a particular task well.

Howland & Moore (2002) found that people who had a positive experience to the online learning shows the level of independence and responsibility in learning higher. Meanwhile, those who had a negative experience to online learning expect the learners provide all the information needed without try to find it out by their self. Kurubacak & Baptiste (2002) states that the experience of

using technology affects the beliefs, expectations, and attitudes towards online learning.

Similarly, An & Frick, (2006) found the same results in a study conducted on students who took the communication course using computer. Most of the 105 students surveyed seem happy to use computer technology, has an access to a computer and believe themselves to be self-directed. In addition, there is a significant correlation between perceived conveniences regarding the use of technology and the convenience experienced in the communication courses using computer.

Computer Self-efficacy on someone may not be high in the beginning of the online courses. It is shown by Lee & Witta (2001) in his study of 16 years old students that follow online course. Their self-efficacy constantly changed significantly from the beginning to the end of the semester. Therefore, the learners must have the ability to overcome obstacles in online learning and not quickly frustrated and give up until they reached a high computer self-efficacy in the course.

III. METHOD

Before the research instrument is used, it is necessary to test the instrument. The test result is important to determine validity and the reliability of the instrument in the study. In a study using an instrument that has previously been reliable, the computation of reliability coefficient was still necessary to do.

This is because the subject of this study differs from the subject used to test the reliability in previous study (Azwar, 1995). Therefore, the computer self-efficacy questionnaire was developed in this study based on the subject of this study and adapted from Computer User Self-Efficacy (CUSE) scale of Cassidy & Eachus (2002). Before employing the instrument in this study, it was firstly measured to see its validity and reliability.

One step that needs to be done is weighting the scale. A weighting scale needs to go through a validation process of calculating the weight scale for each statement and each category. In this study, the weight calculation on computer self-efficacy instrument was using Summated Rating (Edwards, 1983). The steps are as follows:

1. Calculating the subject's answers from 4 categories: strongly agree, agree, disagree, and strongly disagree.
2. Calculating the proportion of subject responses of each category by using the formula:

$$P = \frac{\sum f}{N}$$

P = proportion
f = frequency of each category
N = number of respondents

3. Calculating cumulative proportion (cp) for each category.
4. Calculating midpoint of the cumulative proportion respectively by using the formula:

$$Mdpcp = cp + 0.5 (p)$$

Mdpcp = Midpoint
 cp = Cumulative proportion of the previous category
 P = Proportion of category

5. Finding the value of z in the table: C (in Guilford, 4AD) from each category based on the value obtained in step d.
6. Change all the numbers to positive by adding the absolute negative number that is the biggest negative number.
7. Adding the biggest negative value in step 6 with the desired lowest number which is 1.
8. Give the weight score for the scale of each category of each statement.

IV. RESULT AND DISCUSSION

Table 1 and Table 2 are example of calculating the weighting on computer self-efficacy scale by using the Summated ratings method. An experiment was conducted on 30 students majoring in Educational Administration, FIP UNM, 4th semester, academic year 2008/2009 with total number of items is 60.

Based on the analysis, 15 out of 60 item of computer self-efficacy instrument dismissed since it has no fixed scale interval (e.g. 1, 2, 2, 4). While 45 other items can be used since they have a fixed intervals weighted scale (e.g. 1, 2, 3, 4).

Furthermore, the validity test is conducted to determine the validity of the research instruments used. As suggested by Azwar (1996), an instrument must be able to measure what should be measured, so that the data obtained can describe the real situation. The scale validity is calculated by correlating the value of the item to the total value which is an indication of item consistency with the test. The criteria for a valid item use restrictions $r_{ix} > 0,30$. According to Long, et al (1985) test items with item correlation index is greater than 0.30 has a good validity, while the item that has an index of correlation which are in the range between 0.10 to 0.30 is recommended for

revised, and a smaller correlation index, 0.10 to negative should be discarded. Correlation technique used is the product-moment correlation of Pearson.

The analysis found that 8 out of 45-item scale of computer self-efficacy are dismissed at the first stage. The eight items were disqualified because the validity below 0.30. Meanwhile, the 37 items have a validity score above 0.30 are valid. The validity of computer self-efficacy moves from 0.337 to 0.721. Furthermore, a second stage of the experiment was conducted. Based on the results of the second trial, the entire item has a validity score above 0.30, so it is declared valid. The scale is moving from 0.336 to 0.747. Based on the validity of the test results, there are 37 items in the computer self-efficacy instrument declared valid.

The next test was to test the reliability of the computer self-efficacy instrument. A research instrument can be said to be good if the tools have a high reliability (Anwar, 1996). Anastasi (1988) apply the Spearman Brown limit of the reliability coefficient more than 0.800, while according to the Gay (1985) stated coefficient of reliability of 0.763 is acceptable. Yamin & Kurniawan (2009) suggests that when the value of Cronbach's Alpha coefficient ($r_{\text{Alpha}} > 0,7$), then all of the test items declared unreliable. Since our Cronbach's Alpha coefficient (0.930) $> 0,7$, then all the computer self-efficacy instrument are reliable.

The instrument for measuring self-efficacy computer capability was adapted from a questionnaire called Computer User Self-Efficacy (CUSE) Scale, a self-reported scale composed by Cassidy and Eachus. One measure of self-efficacy in computer skills is Computer User Self-Efficacy Scale (CUSE) or Self-efficacy Scale for Computer Users designed to assess self-efficacy against computer use for adult learners (Cassidy & Eachus, 2002). This instrument has been tested with a level of reliability ($\alpha = 0.97$) measured using alpha conbrach. Test of re-test of reliability level is also high ($\alpha = 0.97$) with statistically significant level ($r = .86$, $N = 74$, $p < 0.0005$) for one month (Gallagher, D. 2007: 40).

Table 1
Calculating Weight Scale for Positive Item

Number Item: 1 (+)	Strongly disagree	Disagree	Agree	Strongly agree
F	1	5	17	7
P	1 : 30 = 0.033	5 : 30 = 0.167	17 : 30 = 0.567	7 : 30 = 0.23
cp	0.033	0.033 + 0.167 = 0.2	0.2 + 0.567 = 0.767	0.767 + 0.23 = 1
Mdpcp	0 + 0.5 (0.033) = 0.0167	0.033 + 0.5 (0.167) = 0.117	0.2 + 0.5 (0.567) = 0.483	0.767 + 0.5 (0.23) = 0.883
Z	-2.144	-1.195	-0.043	1.19
z + 1 + 2.144	-2.144 + 1 + 2.144 = 1	-1.195 + 1 + 2.144 = 1.949	-0.043 + 1 + 2.144 = 3.101	1.19 + 1 + 2.144 = 4.334
z Rounded	1	2	3	4

Table 2
Calculating Weight Scale for Negative Item

Number Item: 1 (+)	Strongly disagree	Disagree	Agree	Strongly agree
F	1	12	11	6
P	1 : 30 = 0.033	12 : 30 = 0.4	11 : 30 = 0.367	6 : 30 = 0.2
cp	0.033	0.033 + 0.4 = 0.433	0.477 + 0.367 = 0.8	0.8 + 0.2 = 1
Mdpcp	0 + 0.5 (0.033) = 0.0167	0.033 + 0.5 (0.4) = 0.233	0.433 + 0.5 (0.367) = 0.616667	0.8 + 0.5 (0.2) = 0.9
Z	-2.144	-0.729	0.295	1.282
z + 1 + 2.144	-2.144 + 1 + 2.144 = 1	-0.729 + 1 + 2.144 = 2.415	0.295 + 1 + 2.144 = 3.439	1.282 + 1 + 2.144 = 4.426
z Rounded	1	2	3	4

The questionnaire is divided into two parts: the first part is called the demographic information about the individual and the individual's experience with the computer, while the second part is more detail about the use of the computer through 30 statements with the four-point likert scale range from strongly disagree to strongly agree. From 30 questions, 13 questions are positive and 17 questions are negative, summarizing the 30 questions creates an overall self-efficacy score.

Referring to the self-efficacy instrument composed by Cassidy & Eachus (2002), for the purposes of this study the instrument is modified and re-developed by the researcher. Initially the number of questions developed were 60 questions. After field trials and test results were analyzed using summated rating method (Edward, 1975), then from 60 items about 15 not-good questions, leaving 45 items. Furthermore, validity test and reliability test are performed again.

Validity test is done by product-moment correlation technique from Pearson. The result of the analysis shows that from 45 items of self-efficacy, eight of them are declared to fail because they do not reach the correlation coefficient of at least 0.30, while 37 other questions are valid because they have validity numbers above 0.30. While the reliability test by using Cronbach Alpha technique, obtained reliability value of $\alpha = 0.930$, this means that the research instruments stated reliable. Of 37 questions as many as 25 questions are positive and 12 questions are negative.

A high number of scale scores indicates a more positive self-efficacy against computers. To determine the low and high self-efficacy, the scoring group is divided into two, i.e. the 37-93 score is categorized as low and the score of 94-148 is categorized as high.

V. CONCLUSION

Based upon the results and discussion of the study, the study therefore concludes that based on analysis using Summated Rating, 15 out of 60 items of computer self-efficacy instrument are dismissed since it has no fixed scale interval, such as 1, 2, 2, 4. Meanwhile, the other 45 items can be used because it has fixed intervals; 1, 2, 3, 4.

The validity of instrument was calculated by correlating the value of items with a total value which indicates the consistency of the item with the test. The analysis showed that 8 out of 45 items in computer self-efficacy instrument has validity under 0.30. Meanwhile, the 37 other items have a validity score above 0.30 so they are valid. The validity of the scale moves from 0.337 to 0.721. Furthermore, the second test showed that the whole item has a validity score above 0.30 means they are valid. The scale is moving from 0.336 to 0.747. The 37 items analyzed resulted Cronbach's Alpha coefficient of 0.930, then all the items reliable.

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