Effects of Feedback Types on the Student's Self-Efficacy

Kai-Hsiang Yang and Yi-Hsuan Wu

***Abstract*—Self-efficacy has been found to play a key role in academic learning, and has a positive correlation with the student's learning performance. Hence, how to improve student's self-efficacy has become a major topic.**

Previous research shows that feedback can promote students' positive attitude towards learning and enhance the learning achievement. Hence, this study investigated the impact of the type of feedback for self-efficacy.

There were 13 senior high school students participated in this study, and our results showed that self-efficacy and feedback behavior has a significant correlation. From the point of view of receiving different kinds of feedback, receiving KCR type of feedback can enhance student's self-efficacy.

Our findings can be used as a reference for teachers to design their Web-based learning courses. In particular, the EF type of feedback is regarded as a higher level of feedback. The more EF types of feedback students receive, the less self-efficacy students have. One possible reason is that the EF type of feedback is few, while many students receive the KCR types of feedback.

***Index Terms*—Feedback types, self-efficacy, web-based learning.**

I. Introduction

In recent years, web-based learning has been widespread in education, because it provides students to get more information and more opportunities to cooperate with peers, and it is easy to combine living and learning of subject matter, you can increase students' interest in learning with the Internet multimedia presentation, can stimulate the curiosity of students, enhance students' willingness to learn [1].

However, despite the web-based environment to provide more flexibility for students to learn, the study pointed out, many learners are unable to adapt to the network learning, often a lack of focus, active participation, self-confidence [2], [3]. Another study found that web-based learning is often caused by learners who get lost, affecting academic performance, thereby reducing confidence in learning [4]. Therefore, how to improve students' self-efficacy has become a major research topic.

The result of Wallace etc. shows that the most effective tools of the reconstruction of the behavior of others is the reward, and many rewards already exists in the web-based learning [5]. The reward here is not simply a reward for learners, a sense of accomplishment, achievement of progress, self-satisfaction improvement, and so on, as a reward. The research of Judson and Sawada [6] pointed out that feedback can affect student's achievement, learning attitude and learning motivation.

The study of Slain, etc. [7] shows that feedback can promote students' positive attitude towards learning and enhance the achievement. Therefore, to enhance the learner's self-efficacy, feedback is the most effective reward.

This study investigated the impact of different types of on student's self-efficacy. Our findings can help teachers to provide many types of feedback to students, so that their self-efficacy can be greatly improved.

Manuscript received April 10, 2013; revised June 12, 2013. This work was supported in part by the National Science Council of Taiwan under grants NSC 101-2514-S-152-004 and NSC 101-2221-E-152-006.

Kai-Hsiang Yang is with the Department of Mathematics and Information Education, National Taipei University of Education, Taiwan (e-mail: khyang@tea.ntue.edu.tw).

Yi-Hsuan Wu is with Department of Business Administration, China University of Science and Technology, Taiwan (e-mail: hsuan@cc.cust.edu.tw).

II. Literature

A. Self-Efficacy

Motivation to learn or personal beliefs have been explored in the field of education, many times, but in the Web-based learning has rarely been studied. However, some researchers have suggested that motivation is a more important factor in the cyberspace. Self-efficacy in 1997 by a Canadian psychologist Bandura refers to a person believes that he can complete the specific target belief, self-efficacy in learning than the motivation to learn more long-term and significant impact [8].

Self-efficacy has been found to play a key role in many academic learning applications, such as: learning the self-efficacy and computer skills [9], engineering skills [10], and group specified skills [11], sports skills [12], food and beverage skills [13], nursing skills [14]. Lots of research show that the higher self-efficacy the student has, the better performance the student provides.

Their study also noted that self-efficacy and web learning are closely related. For example, research indicates that self-efficacy affect students' online behavior. The study of Tsai and Tsai shows that student's performance is better than the lower web-based learning task self-efficacy with higher Internet self-efficacy students; an web search strategy study also pointed out that high network student self-efficacy than low web self-efficacy in an web-based learning tasks, students have better information search strategy.

These studies have shown that closely related to the students' learning and self-efficacy. Self-efficacy has been proven, to date, both in traditional learning or web - based learning has a significant impact, it can be said - If the teachers to improve student academic achievement, willingness to learn or learning beliefs from self-the performance will be a good choice to begin.

B. Feedback

Many studies have generally found that: learners in the learning often provide effective feedback results [16], [17].

The study found that the papers study the mechanism of peer feedback can often be improved in the feedback obtained [18]. In addition, the study shows that the peer-reviewed to provide high-quality feedback [19].

The study of Dempsey, Driscoll, and Swindell pointed out, the feedback information is often divided into the following three types: knowledge reactive feedback-KR (knowledge of results); reactions feedback-correction-based knowledge the KCR (Knowledge of correct response) [20]; elaborate on the type of feedback-EF (elaborated feedback). Knowledge of results (KR), just responding to the learner's response is correct or incorrect, such as "You're right"; knowledge of correct response (KCR) is to inform the the learner correct answer content, such as "right the answer is: "; elaborated feedback (EF) explains why the learner response or answer is correct or not correct, and to provide relevant information.

In particular, three types of feedback there is no absolute good or bad, but under certain circumstances, to provide a particular type of feedback subjects will have on the common learning characteristics or contribute to the development of a capacity. Another result suggested that type of elaborated feedback is crucial in the development of the concept of a deeper level understanding and help applied to more complex situations [21].

In many studies, elaborated feedback and the Knowledge of the correct response is generally regarded as ratio Knowledge of results is better to feedback behavior. In this study, therefore study the role of these feedback behaviors play in the web learning context. Research suggests that feedback is the most effective help individual students to correct the error, the reconstruction of knowledge, incentive meta-cognitive process, improve academic performance and enhance motivation source of information [22]. Source of feedback to themselves and others is the most useful to receive feedback from other people [23]. Previous studies have confirmed that effective learning to accept feedback is very important [24].

Feedback influence the findings, the knowledge of the correct response and a variety of feedback to achieve the same results, but noticeable than other types of feedback spend less time [25]. In other words, the KCR type of feedback is more effective than other types of feedback. The aforementioned examples, in [26], show that different types of feedback may lead to different learning outcomes. Therefore, the study received feedback (eg: KR, KCR, EF) the role played in the web of students' academic performance.

The study shows that the feedback can affect learners' motivation and self-confidence [27]. In particular, the feedback affect self-efficacy (for example: you can do this task better) [28]. Therefore, we study the effects of EF, KR and KCR types of feedback on students' self-efficacy, and our results show that the EF type of feedback is highly associated with students' learning motivation [29].

Many studies have found that feedback can indeed affect the willingness to learn and self-confidence of the learners, thereby affecting academic performance. In other words, to accept feedback is regarded as one of the most effective factors that enhance self-efficacy and achievement.

III. Research Methods

A. Research Purposes and Research Questions

Based on the above literature mentioned, the purpose of this paper is to study the effect of KR, KCR and EF types of feedback on students' self-efficacy.

B. Research Process

1) Task

Experimental subjects are students in a high school which is located in the vicinity of the aboriginal tribes, so students are almost native people. These young students are becoming less and less familiar with their own unique culture. Hence, we design an information thematic course to help they understand their own culture.

All homework in the class are related to these students' culture and their can choose a topic related to their own culture, and follow all steps in our Web learning platform to create their own e-book files. We use these e-books as their outcome and some teachers will provide grades to these e-books.

2) Process

In our experience, teachers use our Web learning platform to teach all instructions for creating an e-book file, and students are divided into several groups. Teachers ask each group to find out a topic related to their own culture in three weeks as the theme of their e-book. When students completed the task, they will be asked to fill out self-efficacy questionnaire, and should upload each responsible e-book files to the learning platform. All the uploaded files and questionnaire can be seen, so that students can reference other e-book files and provide their feedback to other groups.

Teachers will collect all feedback, and send the feedback to students. Which means each of 13 students will receive feedback from other 12 students. After that, students should revise their work and upload their e-book files again. And all students will be asked to fill in the self-efficacy questionnaire again. Thought this process, the investigators were able to compare the differences in student self-efficacy and peer-feedback.

In particular, we use an anonymous evaluation in our experiments so that students can provide feedback without any pressure. Some studies also mentioned this point [30, 31]. Asian students are more concerned about the relationship with other people, and therefore may not provide grams criticism or feedback to their classmates. Therefore, in order to obtain more reliable peer feedback, we use anonymous evaluation.

C. Research Tools

1) Questionnaire

The questionnaires consisted of the scales of ‘‘self-efficacy” using a 5-point Liker scale ranging from (1) ‘‘not at all true of me” to (5) ‘‘very true of me”. Since this study was conducted with students in Taiwan, the authors used the Chinese version of MSLQ, which has been proved very reliable with α of .9. The self-efficacy scale consisted of ten items (for example, “I'm sure I can use the Internet to collect information”).

2) Participants

There are 13 students participated in the study, and all participants are enrolled in a comprehensive high school in Yi-Lan County of Taiwan.

IV. Results

The first goal of our study is to analyze the effects of different types of feedback on students' self-efficacy. The results are shown in the Table II and Table III, where $P = 0.011 < 0.05$ and $P = 0.007 < 0.05$, which has significantly differences; that is, to receive the KCR and EF types of feedback have a significant impact on the enhancement of self-efficacy; while receiving the KR type of feedback has no significant impact. The more KCR type of feedback students receive, the more self-efficacy they have. But it is worth mentioning that the more EF type of feedback students receive, the less self-efficacy they have.

TABLE I: Receive of KR Feedback for Self-Efficacy

	Sun of Squares	df	Mean Squar	F	Sig
Between Groups	147.026	2	73.513	1.423	.286
Within Groups	516.667	10	51.667		
Total	663.692	12			

TABLE II: Receive of KCR Feedback for Self-Efficacy

	Sun of Squares	df	Mean Squar	F	Sig
Between Groups	395.359	2	197.679	7.367	.011
Within Groups	268.333	10	26.833		
Total	663.692	12			

TABLE III: Receive of EF Feedback for Self-Efficacy

	Sun of Squares	df	Mean Squar	F	Sig
Between Groups	419.597	2	209.799	8.595	.007
Within Groups	244.095	10	24.410		
Total	663.692	12			

V. Conclusion and Discussion

In this paper, we showed that self-efficacy and the types of feedback that students received have a significant correlation. On the other hand, self-efficacy and students' learning performance are closely related [32]. Hence, our findings can provide teachers to enhance students' self-efficacy by providing more types of feedback to their students; while it may directly or indirectly affect students' academic performance.

From the point of view of receiving feedback, receiving the KCR and EF types of feedback can significantly improve students' self-efficacy. The more KCR types of feedback students receive the more self-efficacy they have. These findings can be used for teachers to design their courses. In particular, the EF type feedback is regarded as a higher level of feedback, and our result show that the more EF type of feedback students receive, the less self-efficacy they have. One possible reason is that when students receive more EF type of feedback, they will receive less KCR type of feedback, so it reduces the self-efficacy.

This study further suggests that teachers can provide students with more high-quality feedback, so that students' self-efficacy could be highly enhanced.

Some possible future works are as follows. First, in this study, students only receive feedback from their peers. To a better understanding of the role of feedback in the learning process, it should consider receiving feedback from different sources, for example, the teacher feedback and peer feedback. In addition, although the anonymous peer-evaluation can help to relieve stress, but study of the effect of anonymous and non-anonymous feedback process on students' self-efficacy is also an important issue in future studies.

References

[1] P. Palmieri, "Technology in education. Do we need it?" *ARIS Bulletin*, vol. 8, no. 2, pp. 1–5, 1997.

[2] P. M. Boechler, "How spatial is hyperspace? Interacting with hypertext documents: Cognitive processes and concepts," *Cyber Psychology and Behavior*, vol. 4, no. 1, pp. 23–46, 2001.

[3] B. Hansan, "The influences of specific computer experiences on computer self-efficacy belief," *Computers in Human Behavior*, vol. 19, pp. 443–450, 2003.

[4] C. Stanton, "Efficacy of a map on search, orientation an access behavior in a hypermedia system," *Computer and Education*, vol. 35, pp. 263-279, 2000.

[5] P. M. Wallace, *The psychology of the Internet*, New York: Cambridge University, 2001.

[6] E. Judson and D. Sawada, "Learning from past and present: Electronic response systems in college lecture halls," *Journal of Computers in Mathematics and Science Teaching*, vol. 21, no. 2, pp. 167-181, 2002.

[7] D. Slain, M. Abate, B. M. Hodges, M. K. Stamatakis, and S. Wolak, "An interactive response system to promote active learning in the doctor of pharmacy curriculum," *American Journal of Pharmaceutical Education*, vol. 68, no. 5, pp. 1-9, 2004.

[8] A. Bandura, *Self-Efficacy: The Exercises of Control*, New York: Freeman and Company, 1997.

[9] E. M. Richard, J. M. Diefendorff and J. H. Martin, "Revisiting the within-person self-efficacy and performance relation," *Human Performance*, vol. 19, no. 1, pp. 67-87, 2006.

[10] M. A. Hutchison, D. K. Follman, M. Sumpter, and G. M. Bodner, "Factors influencing the self-efficacy beliefs of first-year engineering students," *Journal of Engineering Education*, vol. 95, no. 1, pp. 39-47, 2006.

[11] G. B. Yeo and A. Neal, "An examination of the dynamic relationship between self-efficacy and performance across levels of analysis and levels of specificity," *Journal of Applied Psychology*, vol. 91, no. 5, pp. 1088, 2006.

[12] E. McAuley, J. F. Konopack, K. S. Morris and R. W. Motl, "Physical activity and functional limitations in older women: influence of self-efficacy," *Journals of Gerontology: Series B Psychological sciences and social sciences*, vol. 61B, no. 5, pp. 270-277, 2006.

[13] S. Mellor, L. A. Barclay, C. A. Bulger, and L. M. Kath, "Augmenting the effect of verbal persuasion on self-efficacy to serve as a steward: Gender similarity in a union environment," *Journal of Occupational and Organizational Psychology*, vol. 1, no. 79, pp. 121-129, 2006.

[14] L. S. Jenkins, K. Shaivone, N. Budd, C. F. Waltz, and K. A. Griffith, "Use of genitourinary teaching associates (GUTAs) to teach nurse practitioner students: is self-efficacy theory a useful framework?" *Journal of Nursing Education*, vol. 45, no. 1, pp. 35-37, 2006.

[15] M. J. Tsai and C. C. Tsai, "Information searching strategies in web-based science learning: The role of internet self-efficacy," *Innovations in Education and Teaching International*, vol. 40, no. 1, pp. 43–50, 2003.

[16] R. L. Bangert-Drowns, C. L. C. Kulick, J. A. Kulick, and M. T. Morgan, "The instructional effect of feedback in test-like events," *Review of Educational Research*, vol. 61, pp. 213–238, 1991.

[17] D. Butler and P. H. Winne, "Feedback and self-regulated learning: A theoretical synthesis," *Review of Educational Research*, vol. 65, no. 3, pp. 245–281, 1995.

[18] N. Reese-Durham, "Peer evaluation as an active learning technique," *Journal of Instructional Psychology*, vol. 32, no. 4, pp. 328–345, 2005.
[19] E. Z. F. Liu, S. S. J. Lin, C. H. Chiu, and S. M. Yuan, "Web-based peer review: The learner as both adapter and reviewer," *IEEE Transactions on Education*, vol. 44, no. 3, pp. 246–251, 2001.
[20] J. V. Dempsey, M. P. Driscoll and L. K. Swindell, *Interactive instruction and feedback*, Englewood Cliffs, NJ: Educational Technology Publications, 1993.
[21] R. L. Bangert-Drowns, C. L. C. Kulick, J. A. Kulick, and M. T. Morgan, "The instructional effect of feedback in test-like events," *Review of Educational Research*, vol. 61, pp. 213–238, 1991.
[22] C. A. Warden, "EFL business writing behaviors in differing feedback environments," *Language Learning*, vol. 50, no. 4, pp. 573–616, 2000.
[23] D. W. Johnson and R. T. Johnson, *Cooperative learning and feedback in technology-based instruction*, NJ: Educational Technology Publications, 1993.
[24] J. A. Kulik and C. L. C. Kulik, "Timing of feedback and verbal learning," *Review of Educational Research*, vol. 58, no. 1, pp. 79–97, 1988.
[25] J. V. Dempsey, M. P. Driscoll, and B. C. Litchfield, "Feedback, retention, discrimination error, and feedback study time," *Journal of Research on Computing in Education*, vol. 25, no. 3, pp. 303–326, 1993.
[26] S. C. Tseng and C. C. Tsai, "On-line peer assessment and the role of the peer feedback: A study of high school computer course," *Computers and Education*, vol. 49, pp. 1161–1174, 2007.
[27] J. V. Dempsey, M. P. Driscoll, and B. C. Litchfield, "Feedback, retention, discrimination error, and feedback study time," *Journal of Research on Computing in Education*, vol. 25, no. 3, pp. 303–326, 1993.
[28] P. R. Pintrich and D. H. Schunk, *Motivation in education: Theory, research, and applications*, 2nd ed., Englewood Cliffs, NJ: Prentice Hall, 2002.
[29] S. Narciss and K. Huth, "Fostering achievement and motivation with bug-related tutoring feedback in a computer-based training for written subtraction," *Learning and Instruction*, vol. 16, no. 4, pp. 310–322, 2006.
[30] S. J. Hanrahan and G. Isaacs, "Assessing self- and peer-assessment: The student' views," *Higher Education Research and Development*, vol. 20, no. 1, pp. 53–70, 2001.
[31] K. J. Topping, E. F. Smith, I. Swanson, and A. Elliot, "Formative peer assessment of academic writing between postgraduate students," *Assessment and Evaluation in Higher Education*, vol. 25, no. 2, pp. 149–169, 2000.
[32] P. R. Pintrich and B. Schrauben, *Students' motivational beliefs and their cognitive engagement in classroom tasks*, NJ: Lawrence Erlbaum Associates, pp. 149–183, 1992.

Kai-Hsiang Yang received the BA degree from the Department of Mathematics, National Taiwan University, and the PhD degree from the Department of Computer Science and Information Engineering, National Taiwan University. He is an assistant professor at National Taipei University of Education. His research interests include web mining, information education and information retrieval.

Yi-Hsuan Wu received the Master degree from the Department of Business Administration, National Taiwan University, and she is currently a PhD candidate of International Business Department, National Taiwan University. She is the lecturer at the China University of Science and Technology, Taiwan. Her research interests include knowledge management, international marketing management and information education.