

User Preferences toward Positive and Negative Feedback Information in Online Learning: Goal Achievement and Information Value Perspectives

Chung-Hui Tseng

Department of International Business, Tamkang University, No.151, Yingzhuan Rd., Tamsui Dist., New Taipei City 25137, Taiwan.

* Corresponding author. Tel.: +886-2-26215656 ext.2857; email: 136466@mail.tku.edu.tw

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Abstract: We adopted 2 theoretical perspectives (goal achievement and information value) to determine the conditions under which people prefer to receive positive or negative feedback information. A quasiexperiment and a survey were conducted to test hypotheses. Based on the perspective of goal achievement and the results of a 2-group quasiexperiment, the findings suggest that goal commitment in the goal-setting stage, mastery strategies used in the goal operating stage, and optimistic expectations and negative emotions during the goal monitoring stage were associated with people's preference for positive feedback information. In addition, the results indicate that people determining a rate of progress during the goal-setting stage prefer negative feedback information. Based on the perspective of information value and the results of an e-mail survey, the findings indicate that people with proficiency in using an online service prefer negative feedback information, whereas people with basic familiarity of an online service prefer positive feedback information.

Key words: Feedback information, goal achievement, information value, e-learning.

1. Introduction

Feedback information has become increasingly crucial in the context of learning because it can be instructive in improving learning effectiveness [1]-[4]. To improve users' loyalty and eliminate brand-switching intention, e-learning businesses want to understand the factors on which users base their choices, as well as the type of feedback information they prefer. Although numerous studies have discussed feedback effectiveness in human-computer interaction [5]-[6] for educational and training purposes [7]-[11], the type of feedback information that people prefer requires further elucidation. In e-learning, people typically receive a high amount of information, and they exhibit goal-directed behaviors. People are particularly motivated to consume online goods and services as a means of goal attainment [12], and a highly frequent support of information in online environments is typically provided. Therefore, we comprehensively investigated feedback-information preferences in e-learning from two perspectives: goal achievement and information value.

Feedback information provided in an e-learning environment can be divided into positive and negative types: positive feedback indicates strength, correct responses, and accomplishments, whereas negative feedback refers to weakness, incorrect responses, and a lack of accomplishments [13], [14]. For example, an

online English tutoring service might provide positive feedback information (e.g. “Good job! You got 20 questions correct.”) or negative feedback information (e.g. “Such a pity! You got 5 questions incorrect.”) after a user completes an online test. Previous studies on goal achievement have indicated that human behavior is based on seeking positive, and avoiding negative end states [15]-[17]. Thus, positive feedback information might always be welcomed because it appears to lead to positive end states. However, no consensus has yet been reached regarding the influence of positive and negative feedback on future effort [18]-[19]. In other words, negative feedback information might be a valuable element in the improvements of learning. Therefore, this study involved employing various perspectives to elucidate people’s preferences toward positive and negative feedback information.

From the perspective of goal achievement, we argue that people might prefer positive or negative feedback depending on their specific stage in the goal-pursuing process. Goals typically affect people’s attitudes and behaviors [20]-[23], and feedback is information that indicates how adequately people are achieving various goals. Hence, the perspective of goal achievement was relevant to this study. From a perspective of information value, we proposed that whether people prefer positive or negative feedback depends on how informative feedback is. Numerous studies have suggested that people might consider a certain type of feedback as more informative and valuable, based on their level of product knowledge [24]-[27]. Therefore, we investigated feedback preferences from the perspective of information value, in relation to levels of product knowledge. This study employed these two perspectives and conducted one experiment and one survey to test our hypotheses. Unlike previous studies, this paper provides a more comprehensive insight into feedback preference.

2. Conceptual Background and Hypothesis Development

2.1. Perspective of Goal Achievement

Because feedback provides crucial information for people who are pursuing goals, this study employed the perspective of goal achievement to investigate the feedback preferences of online users. Accordingly, feedback provides information about people’s level of commitment toward a goal, and the rate at which they are progressing toward it [13], [28], [29]. Previous studies on goal achievement have demonstrated that the level of goal commitment and the rate of goal progress are two essential issues in goal-setting stage; furthermore, goal setting, operating, and monitoring are critical for people in the process of achieving goals [3], [30], [31]. Whether people prefer positive or negative feedback might vary in various stages of goal achievement, including goal setting, operating, and monitoring. Although previous studies have discussed the relationship between goal setting and feedback information [13], [32], few of them have provided comprehensive discussions of the three constructs, goal setting, operating, and monitoring, and preferred feedback type.

2.2. Positive Feedback Preferences from a Goal Achievement Perspective

In goal-directed behavior, goal setting is the first task. It involves establishing a commitment to a goal and setting a rate of progress for achieving that goal [28], [29]. Feedback information informs people about the value of a goal, probability of success [33]-[37], and rate of progress [1], [17], [30], [38]. In particular, positive feedback information indicates accomplishments, which can enable a person to feel confident about the appropriateness of committing to his or her goals. In other words, people who establish a commitment to achieve a goal might prefer positive feedback. Thus, we proposed the following hypothesis:

Hypothesis 1: Goal commitment is significantly associated with a preference for positive feedback.

Goal operating involves activities and strategies for achieving goals [3], [31]. In goal operating, most people apply two types of strategy to achieve a goal: mastery-oriented and helpless-oriented strategies [39],

[40]. Mastery-oriented strategies indicate persistence and tenacity, such as increasing the duration and frequency of practice, and seeking support from others [41], [42]. By contrast, helpless-oriented strategies refer to people's passive reactions when they consider circumstances to be beyond their control [40], [43], [44]. In other words, helpless-oriented strategies involve passive reactions whereas mastery-oriented strategies involve proactive behaviors. For people who use mastery-oriented strategies to achieve their goals, positive feedback information can inform them about their accomplishments and elucidate the results of their ongoing efforts. For people who use helpless-oriented strategies to achieve their goals, positive feedback information might cause them to feel encouraged and attempt to change their strategy. In other words, both strategies might be associated with a preference for positive feedback. Therefore, we proposed the following hypotheses:

Hypothesis 2: Mastery-oriented strategies are significantly associated with positive feedback preference.

Hypothesis 3: Helpless-oriented strategies are significantly associated with positive feedback preference.

Once people have established their goals and applied certain strategies, they must monitor the degree to which their behavior is facilitating the attainment of their goal [31]. Goal monitoring involves considering potential constraints and available resources [3], [30]. Optimistic expectations and negative emotions indicate how successful a person's goal operating efforts have been in achieving a goal [31], [45], [46]. During the goal monitoring process, people might be optimistic if the probability of achieving their desired rate of progress or goal is high [46]. By contrast, people might experience negative emotions such as sadness and anxiety if their current rate of progress does not meet their expectations [42], [47]. In particular, positive feedback information indicates an increasing probability of success, and therefore optimistic expectations might be associated with positive feedback preference. In addition, positive feedback information can enable people to reduce their negative emotions; when people experience negative emotions during the goal monitoring process, they might prefer positive feedback information. Thus, negative emotions might also be associated with a preference for positive feedback. Therefore, we proposed the following hypothesis:

Hypothesis 4: Optimistic expectations are significantly associated with positive feedback preference.

Hypothesis 5: Negative emotions are significantly associated with positive feedback preference.

2.3. Negative Feedback Preferences from a Goal Achievement Perspective

When do people prefer negative feedback information in goal-directed behavior? We proposed that people might only embrace negative feedback in the goal-setting stage, when they determine a rate of progress. First, a goal is defined; subsequently, an appropriate rate of progress toward the goal is determined [13], [32]. When determining the rate of progress, negative feedback information might enable identifying areas of failure or insufficient progress [1], [18], [30], [38]. Therefore, people setting a rate of progress might prefer negative feedback information because it can clarify where and how they should improve. In other words, negative feedback information can strengthen their resolve for achieving their goals.

Furthermore, people who apply mastery-oriented or helpless-oriented strategies in goal operating might not welcome negative feedback information; negative feedback information can damage their confidence and cause them to doubt their selected strategy. During the goal monitoring process, people with negative emotions or optimistic expectations might also reject negative feedback information, because negative feedback information can exacerbate their negative emotions as well as diminish their optimistic expectation of success. Therefore, we hypothesized that in goal-directed behavior people prefer negative

feedback information only when they are in the stage of setting a rate of progress.

Hypothesis 6: Goal progress is significantly associated with negative feedback preference.

2.4. Feedback Preferences from an Information Value Perspective

Feedback requires information about how people achieve a goal; to clarify feedback preference, adopting an information value perspective, in addition to a goal achievement perspective, might provide a more comprehensive perspective. From the perspective of information value, whether people prefer positive feedback depends on the type of feedback they have received less often in the past, as well as the type they perceive as more informative and valuable [13], [48], [49]. People might consider a certain type of feedback as more informative and valuable, based on their level of product knowledge [13]. Product knowledge refers to a user's knowledge about a product, including their usage experience [50]-[54]. Novices in particular might have only limited familiarity with a product or service. They might prefer positive feedback, because it would be informative and valuable in building their confidence. Therefore, we proposed that basic familiarity with a product is significantly associated with a preference for positive feedback information.

Hypothesis 7: Basic familiarity with a product/service is significantly associated with a preference for positive feedback.

By contrast, we propose that people with proficient product knowledge (e.g. experts) prefer negative feedback. The difference between a novice and an expert is reflected in the variation between the levels of product knowledge. Previous studies have asserted that a high level of product knowledge can enable people to acquire new information [53]. Experts are typically proficient in using certain products or services and have received abundant positive feedback in the past; consequently, negative feedback has more informational value for them. Therefore, we proposed the following hypothesis:

Hypothesis 8: Proficiency in using a products/service is significantly associated with a preference for negative feedback.

3. Methodology

We designed a quasiexperiment and a survey to test the hypotheses based on two distinct perspectives. The quasiexperiment was conducted to examine feedback preferences of online users and based on the goal achievement perspective, whereas the survey investigated feedback preferences based on the information value perspective. To provide a practical contribution for e-learning, both studies were designed in an e-learning context.

The quasiexperiment was designed to elucidate the preferences of users in a goal-directed context; the participants were freshmen enrolled in a business English course at a university. The students were required to use an English webpage and achieve a goal, namely passing an online test. A two-group (positive vs. negative feedback) between-subject factorial design was adopted. Participants were randomly assigned to a positive or negative feedback group. All participants completed an English test comprising 20 questions. After completing the test, the participants assigned to the positive feedback group were told "Good job! You got [x] questions correct" whereas the participants assigned to the negative feedback group were told: "Such pity! You got [x] questions incorrect." After completing the online test, the students were requested to complete a questionnaire regarding preferences toward positive and negative feedback information, goal commitment, goal progress, mastery-oriented strategies, helpless-oriented strategies, optimistic expectations, and negative emotions. The measurement items of these variables are provided in the Appendix.

The survey investigated the relationship between people's product knowledge of an e-learning service and their feedback preferences. Independent variables were basic familiarity and proficiency

(measurement items are provided in the Appendix); the dependent variables were identical to those used in the aforementioned experiment. Using e-mail, participants completed a questionnaire about their opinions on feedback information regarding a widely known online learning game and a widely known online English tutoring service in Taiwan. All participants were college students because they are the main users interested in online learning games and online English tutoring services.

The questions regarding the preferences toward positive or negative feedback (both in the experiment and the survey) were adopted from [13]. The following two questions regarding preferences toward positive feedback were measured using a 7-point Likert-type scale: (a) "Do you appreciate to receive feedback messages such as 'Good job! You got [x] questions correct in the English test' or 'Good job! You passed [x] checkpoints in the online game'?" (1 = *least preferred*; 7 = *most preferred*); and (b) "If you received the aforementioned feedback messages, would you continue using this e-learning service?" (1 = *most unlikely*; 7 = *most likely*). The following two questions were employed to measure preference toward negative feedback: (a) "Do you appreciate to receive feedback messages such as 'Such a pity! You got [x] questions incorrect in the English test' or 'Such a pity! You failed to pass [x] checkpoints in the online game'?" (1 = *least preferred*; 7 = *most preferred*); and (b) "If you received the aforementioned feedback messages, would you continue using this e-learning service?" (1 = *most unlikely*; 7 = *most likely*). The measurements of all independent variables are listed in the Appendix; a 7-point Likert-type scale was used (1 = *completely disagree*; 7 = *completely agree*). To test the hypotheses, regression analysis was performed using the SPSS statistical software package.

4. Results

4.1. Results of the Quasiexperiment

Table 1. Reliability and Validity Test

Constructs	Scale Item	Factor Loading (t-value)	Cronbach's α
Goal commitment	Commit1	1.00	.95
	Commit2	.97* (22.57)	
Goal progress	Progress1	1.00	.95
	Progress2	.95* (23.29)	
Mastery-oriented strategies	Mastery 1	1.00	.85
	Mastery 2	.82* (17.50)	
	Mastery 3	.96* (26.36)	
	Mastery 4	.36* (5.49)	
	Mastery 5	.36* (5.50)	
Helpless-oriented strategies	Helpless 1	1.00	.81
	Helpless2	.66* (11.61)	
	Helpless 3	.80* (16.12)	
	Helpless 4	.93* (22.43)	
Optimistic expectation	Expect 1	1.00	.97
	Expect 2	.99* (23.16)	
Negative emotion	Emotion1	1.00	.97
	Emotion 2	.98* (27.62)	
	Emotion 3	.92* (23.04)	
Positive feedback preference	Positive 1	1.00	.90
	Positive 2	.98* (14.33)	
Negative feedback preference	Negative 1	1.00	.80
	Negative 2	.71* (8.84)	

Goodness of Fit:

$\chi^2=884.15(p=.00)$, $df=189$, $NFI=.89$, $NNFI=.89$, $GFI=.85$, $AGFI=.84$, $RMSEA=0.041$

*: $p<.05$

A total number of 221 participants from a college (121 in the positive feedback group and 100 in the negative feedback group) participated in the experiment and completed the questionnaire. Table 1 demonstrates that the reliability of all variables was favorable, and the confirmatory factor analysis (using the LISREL 8.0 statistical software package) was acceptable, including acceptable goodness of fit and

statistically significant t values for each scale item with each construct. Thus, the data exhibited adequate reliability and convergent validity. To test the hypotheses, we used regression analysis in two models corresponding to two dependent variables. Table 2 provides the results of the hypothesis tests obtained using the two models. In Model 1 (left column in Table 2), goal commitment ($\beta = .23$, $t = 2.38$), mastery strategies ($\beta = .27$, $t = 2.78$), optimistic expectation ($\beta = .17$, $t = 2.27$), and negative emotion ($\beta = .14$, $t = 1.99$) exhibited a significant association with a preference for positive feedback; thus, Hypotheses 1, 2, 4, and 5 were supported. In Model 2 (right column in Table 2), no independent variables exhibited a significant relationship with a preference for negative feedback, except goal progress ($\beta = .20$, $t = 1.96$); therefore, Hypothesis 6 was supported. Fig. 1 indicated results of Hypotheses 1-6.

Table 2. Results of Regression Analyses in the Experiment

Independent variable	Model 1 (Positive Feedback Preference)		Model 2 (Negative Feedback Preference)	
	Standard β (t -value)	VIF	Standard β (t -value)	VIF
Goal commitment	.23 (2.38)*	2.98	-.09 (-.80)	2.98
Goal progress	.07 (.67)	3.52	.20 (1.96)*	3.52
Mastery strategies	.27 (2.78)**	2.91	.10 (.86)	2.91
Helpless strategies	-.04 (-.47)	1.98	.12 (1.25)	1.98
Optimistic expectation	.17 (2.27)*	1.79	-.04 (-.45)	1.79
Negative emotion	.14 (1.99)*	1.59	-.06 (-.75)	1.59
Adjust-R ²	.30		.03	
F-value	16.61***		.96	

*: $p < .05$; **: $p < .01$; ***: $p < .001$

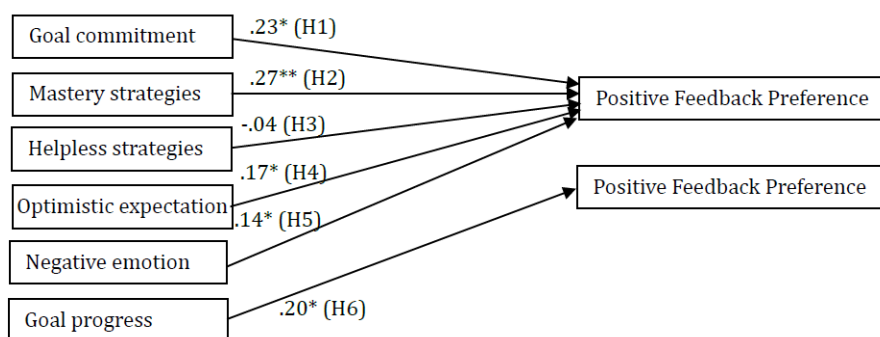


Fig. 1. Results of H1~H6.

4.2. Results of the Survey

We collected 190 completed questionnaires from 88 male and 102 female participants in the same college, and the respondents in quasi-experiment and survey were not the same. The Cronbach's alpha coefficients indicated that the reliability of the measurement items was acceptable for basic familiarity (Cronbach's $\alpha = .89$), proficiency (Cronbach's $\alpha = .88$), positive feedback (Cronbach's $\alpha = .86$), and negative feedback (Cronbach's $\alpha = .89$). To test the hypotheses, we used regression analysis in four models corresponding to two dependent variables (positive and negative feedback preference) and two e-learning products or services (an online learning game and an online English tutoring service). Table 3 presents the results of employing the regression models. Regarding the online learning game, employing Model 3 indicated that basic familiarity ($\beta = .23$, $t = 2.27$) and proficiency ($\beta = .25$, $t = 2.46$); both exhibited a significantly positive association with a preference for positive feedback, whereas, according to Model 4,

only proficiency ($\beta = .28, t = 2.54$) exhibited a positive association with a preference for negative feedback. Regarding the online English tutoring service, Model 5 indicated that only basic familiarity ($\beta = .23, t = 2.30$) exhibited a significant association with a preference for positive feedback, whereas, according to Model 6, only proficiency ($\beta = .22, t = 2.28$) exhibited a significant association with a preference for negative feedback. Therefore, Hypotheses 7 and 8 were supported. Fig. 2 indicated results of Hypotheses 7 and 8. In addition, people proficient in the use of the online learning game valued both positive and negative feedback information.

Table 3. Results of Regression Analyses in Survey 2

	Online Learning Game		Online English Tutor Service	
	Model 3	Model 4	Model 5	Model 6
Dependent Variable	Positive Feedback Preference	Negative Feedback Preference	Positive Feedback Preference	Negative Feedback Preference
Basic Familiarity	.23 ¹ (2.27)*	.02 (.15)	.23 (2.30)*	.18 (1.81)
Proficient Knowledge	.25 (2.46)*	.28 (2.54)*	.12 (1.23)	.22 (2.28)*
Adjust-R ²	.19	.06	.10	.13
F-value	23.27***	6.98***	10.90***	14.33***

¹ The value is Standard β and the value in parenthesis is t -value; ***: $p < .001$; **: $p < .01$; *: $p < .05$

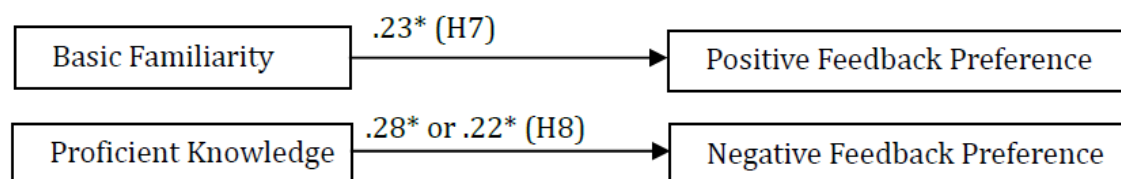


Fig. 2. Results of H7 & H8.

5. Discussion

This study involved investigating the preferences of people toward positive and negative feedback information in e-learning. From the perspective of goal achievement, the results of the experiment suggested that goal commitment in the goal-setting stage, mastery strategies used during the goal operating process, and optimistic expectation and negative emotions during the goal monitoring process are association with people' preference for positive feedback information. The results demonstrated that the people pursuing a goal overwhelmingly preferred to receive positive feedback information, except when they determined a rate of progress regarding this goal and employed helpless strategies. Employing a helpless strategy in the stage of goal operating might result from fewer questions answered correctly; and thereby, people might receive feedback in the following form: "You got zero questions correct!" These types of expression might frustrate people and consequently cause a lower preference for feedback information. In addition, the results suggested that people determining a rate of progress preferred negative feedback information. These people typically wanted to know how much they had not yet achieved, and negative feedback information, such as "You got 3 questions incorrect," was useful.

From the perspective of information value, the results of the survey indicate that people with proficiency in using an online English tutoring service preferred negative feedback information, whereas people exhibiting a basic familiarity with this online service preferred positive feedback. In addition, people with proficiency in using an online learning game valued positive as well as negative feedback information, whereas people exhibiting a basic familiarity with this online game preferred positive feedback. The results

demonstrated that negative feedback information has a considerably higher informative value for people with superior product knowledge, whereas positive feedback information is more informative for novices. However, the results indicated that a preference for positive feedback might also be exhibited by experts in an online learning game. This might be because an online game is a hedonic product, and positive feedback information providing joyful feelings is thus welcomed by players, regardless of the level of product knowledge they exhibit.

The two perspectives regarding the feedback preference might correlate with each other. The results suggested that people who set a rate of progress and have superior product knowledge preferred negative feedback information. In particular, people with superior product knowledge are typically experts, and experts typically devote themselves to pursuing progress in achieving their goals. In other words, superior product knowledge and pursuing progress in achieving goals might be characteristics of an expert. Therefore, designing specific programs based on users' roles (e.g. an expert) is crucial in e-learning.

6. Conclusion

Unlike previous studies, this paper provides a more comprehensive insight into feedback preference. First, people's preference toward feedback information is subject to changes. Preferences vary because of specific circumstances and variations in personality, such as a person's level of product knowledge, and their status in relation to the processes of goal setting, operating, and monitoring. This study adopted two perspectives to investigate feedback preferences and thereby contributes to providing a comprehensive perspective for researching feedback preferences. This paper discussed preferences for both positive and negative feedback; the results indicated that people might prefer and benefit from negative feedback, which contradicts assumptions that positive feedback is the more preferred form of feedback. Third, this research incorporated the concepts of goal achievement and feedback preference. A person's status during the process of pursuing goals can be considered an indicator for predicting the preferred type of feedback information. The findings can contribute to connecting research on goal-directed behaviors and feedback preference. Finally, the findings of this research indicate that the informative value of feedback information is critical for online users; in addition, the level of product knowledge they have determines whether they perceive feedback as informative. Adopting a perspective based on the concept of information value could benefit designers of online services and enable them to provide a more informative context for people with varying levels of product knowledge.

In summary, this study adopted two theoretical perspectives to investigate preferences in receiving feedback information. The study involved conducting a quasiexperiment and a survey to test hypotheses; the results demonstrated an association between various variables and feedback information. The results did not suggest a causal relationship among the aforementioned variables, and a third variable might affect the relationship, such as personal characteristics (e.g. introversion or extroversion), online experience (e.g. being an online user for a long or short period of time), or the modality of presentation of the feedback information (e.g. text, pictures, animation with or without sound). Moreover, in the measurement of the preferences regarding feedback information, a behavior intention as continuous using this e-learning service after receiving feedback information is measured. In other words, the concept of feedback information preference in this study (based on [13]) reflects users' preference and outcomes from feedback information. Future studies can investigate what types of outcome might be motivated by feedback information. Furthermore, the study involved data obtained from college students; therefore, the generalizability of the findings remains limited. Future studies should investigate these relationships by using specific variables, participants, and contexts. Finally, this study can be further expanded to include the analysis of goal-directed behaviors in online learning.

Appendix

Measurement Items of Independent Variables

Concept	Measurement Items	References
Goal setting	<i>Goal commitment</i>	
	I am committed to my learning objectives.	[55]
	I am really care about my English ability.	
	<i>Goal progress</i>	
	Having worked out that much, I am closer to my workout objectives.	[55]
	Having worked out that much, I must have really improved my English ability.	
Goal operating	<i>Mastery strategies</i>	
	I have little control about the record of this test.	[56]
	Some of my problems about the course I can't seem to solve it at all.	
	There is not much that I can do to change the record of this test.	
	I can do almost everything, if I want to.	
	What will happen in the future considerably depends on myself.	
	<i>Helpless strategies</i>	
	Move on to other things; there's little hope for the record of this test getting better.	[57]
	Know there's little I can do about the record of this test.	
	I give up the attempt to get what I want.	
	I just give up trying to reach my goal.	
Goal monitor- ing	<i>Negative emotion</i>	
	Having worked out that much, I feel bad recently.	[58]
	Having worked out that much, I am unhappy recently.	
	Having worked out that much, I have negative mood recently.	
	<i>Optimistic expectation</i>	
	I expect to get a good performance record about this test.	[31], [59]
	I expect the record of this tesy will make me satisfied.	
Product Knowledge	<i>Basic familiarity</i>	
	I am familiar with this e-learning service.	[54]
	I often hear my friends talking about this e-learning service.	
	<i>Proficient knowledge</i>	
	I am proficient using this e-learning service.	
	I am good at using this e-learning service.	

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Chung-Hui Tseng (PhD in marketing, National Chengchi University, Taiwan) is a faculty at the Department of International Business of Tamkang University in Taiwan. Her major is consumer behavior. Her recent work has focused on consumer behavior, food safety, electronic commerce, and promotion strategies. Her papers have been published in *Internet Research* (forthcoming), *Journal of Electronic Commerce Research* (forthcoming), *British Food Journal*, *Journal of e-Business*, *Management Review*, *NTU Management Review*, *Sun Yat-Sen Management Review*, etc.