

# The effect of distal utility value intervention for students' learning

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**Abstract :** The purpose of this study was to determine whether a utility value intervention influenced students' motivation and performance. Specifically, we examined the effect of distal utility value (i.e., the recognition of content usefulness for skill development that can improve daily and future endeavors) instruction in this study. Fifty-one Japanese undergraduate students completed an experimental session in the laboratory, in which they performed a series of logical reasoning problem-solving tasks. The experimental group was told that the task would improve their logical thinking while the control group was not. The results indicated that the information about the distal utility of the practice increased participants' interest and engagement, but did not significantly affect actual performance. The theoretical and practical implications of these findings were discussed.

**Key Word :** motivation

expectancy-value theory

task value

utility value intervention

## 1. Introduction

Previous studies have indicated that, when students value schoolwork, they are motivated and engaged in the learning process. Thus, a number of theorists and researchers have emphasized the necessity of teaching students the value of learning (e.g., Brophy, 1999; 2004; Eccles & Wigfield, 2002).

### 1.1. Eccles' Expectancy-Value Model

A useful theoretical framework is the modern expectancy-value model proposed by Eccles and colleagues. Eccles and Wigfield (1985) defined task value with respect to the qualities of different tasks and how those qualities influence people's desire to do the task. Moreover, they specified four major components of task value: interest value, attainment value, utility value, and cost. Interest value is the enjoyment gained from doing a task. Attainment value is the personal importance of doing well on a given task. Utility value is the instrumentality in reaching a variety of long- and short-term future goals. Finally, cost refers to the sacrifices that must be made to perform a task. A substantial body of evidence indicates that perceived task value correlates with academic choice, persistence, effective learning strategies, and interest (for a review, see Wigfield &

Cambria, 2010; Wigfield, Hoa, & Klauda, 2008).

### 1.2. Perceived Value and Interest Development

In recent years, a growing body of theoretical and empirical research has emerged suggesting that perceived value is related to interest and may be manipulated to enhance interest level. Hidi and Renninger (2006) proposed a four-phase model of interest development. It contains two types of interest: situational and individual (see Hidi & Renninger, 2006). Situational interest is an affective reaction triggered by environmental stimuli and is further separated into triggered (i.e., immediate emotional and affective reactions to the task) and maintained situational interest (i.e., intention to return to the activity). Individual interest refers to a person's relatively enduring predisposition to review specific content over time. Additionally, Hidi and Renninger (2006) distinguished between emerging (i.e., predisposition to seek repeated engagement with the activity) and well-developed individual interest (i.e., predisposition to seek repeated reengagement with the activity over a long period). They proposed a model of how situational interest develops into individual interest. In the model, they assume that perceived meaningfulness is necessary for the development of interest and that value might help learners at the early stage move towards the later

stage. Given this, value is thought to promote interest development.

Several studies have focused on the relationships among perceived utility value, interest, and learning performance (e.g., Durik & Harackiewicz, 2007; Hulleman, Durik, Schweigert, & Harackiewicz, 2008; Hulleman, Godes, Hendricks, & Harackiewicz, 2010; Hulleman & Harackiewicz, 2009; for review, see Harackiewicz, Tibbetts, Canning, & Hyde, 2014). For example, Durik and Harackiewicz (2007) found that, when a new mathematics technique was taught with emphasis on its usefulness in daily life, it promoted interest in students who already had a higher level of initial interest compared to control students. Consistent with Durik and Harackiewicz (2007), Hulleman and Harackiewicz (2009), and Hulleman et al. (2010) found that having students write specific examples of how they could use the learning contents in their own lives improved their interest and learning. These improvements in interest and performance occurred in students with lower levels of initial interest compared to control students. Although these results suggest that students' characteristics need to be considered, it appears that utility value interventions may be an effective strategy for enhancing learners' interest.

### 1.3. Different Types of Utility Value

Recently, some empirical studies have emerged with focus on difference in quality of utility value (e.g., Brown, Smith, Thoman, Allen, & Muragishi, 2015; Shechter, Durik, Miyamoto, & Harackiewicz, 2011). In an important study, Shechter et al. (2011) proposed a distinction between utility value and time proximity. Time proximity refers to the potential of the learning content to fulfill the learner's short- (proximal) or long-term (distal) goals. Learning content has *proximal utility value* if a learner can practice it relatively soon after acquisition. Examples of material with high proximal utility value (Shechter et al., 2011) include managing personal finances, shopping at the supermarket, and calculating a server's tip after being instructed in a technique of mental mathematics. By contrast, learning content has *distal utility value* if it can be used to achieve a goal in the distant future (Shechter et al., 2011). Thus, to increase participants' perception of distal utility value, the researchers emphasized the use of mental math techniques for future college courses, graduate school, and career endeavors.

Much of the content learned in school does not have proximal utility value, so it is important to consider distal utility value in an educational setting. In Shechter, et al. (2011), distal utility value was depicted as a concrete and procedural construct (i.e., taking courses for credit or passing entrance examinations). However, a limitation in this is that concrete and procedural distal utility value may direct students' learning exclusively towards a useful point and not be extended to times beyond that. If that is the case, these distal utility values may lead students to learn just enough to achieve the procedural goals and may narrow the range of learning. Considering this problem, one must consider what aspect of distal utility value promotes students' long-term adaptation, even if it is not helpful procedurally.

In a classroom setting, there are some cases in which the abilities (e.g., capacity to think and judge) gained through studying can help a person in everyday life (e.g., Rychen & Salganik, 2003). Brophy (2004) noted that learning value includes not only practical applications but also the broadening of one's perspective and awareness through studying. For example, through training in critical thinking, students acquire the ability to obtain sound information about the subject matter of an argument. In addition, they will be able to make appropriate judgments in situations in which perception is biased. These acquired abilities or skills are useful in events of daily life (e.g., debates, selecting information, evaluating another's ideas).

School education provides students with various abilities or skills oriented to their present as well as their future lives. Thus, it is valuable to examine the effect of this kind of distal utility value instruction on learners' motivation.

### 1.4. Purpose

The purpose of this study was to examine the effects of distal utility value instruction. Our experimental intervention is based on that of Harackiewicz and colleagues (e.g., Durik & Harackiewicz, 2007; Hulleman et al., 2010; Shechter et al., 2011). Specifically, we examine distal utility value from the perspective of training abilities or skills useful for the future. We hypothesized that the students who were taught the importance of distal utility value would perceive an individual connection to the learning content and, consequently, exhibit greater interest, engagement, and learning

performance (Hidi & Renninger, 2006; Hidi & Ainley, 2008; Renninger & Hidi, 2016). As an interest variable, Hulleman et al. (2010) focused on triggered and maintained situational interest. It is important to consider the development of interest; thus, we follow the differentiation between these types of interest in testing our hypothesis.

## 2. Method

### 2.1. Participants

The sample consisted of 51 undergraduate students (10 men, 41 women) from Nagoya University, who received extra credit for participating in the study. Participants completed the experimental session in small groups of three or four students. All participants signed informed consent forms.

### 2.2. Measures

Participants responded to all self-report scale items in this study on a 9-point Likert-type scale ranging from 1 (*strongly disagree*) to 9 (*strongly agree*).

**Logical thinking:** Participants' awareness of logical thinking was assessed using six items from the logical thinking subscale of a critical disposition scale (Hirayama & Kusumi, 2004). Examples of items were "I'm good at thinking about a complicated problem methodically," "I'm good at organizing an idea," and "I have confidence in thinking exactly."

**Interest:** We measured interest (i.e., triggered and maintained situational interest), behavioral engagement, and actual performance as outcome variables. Participants' triggered situational interest in logical reasoning problem solving was measured with a five-item scale (e.g., "I think it is interesting to solve this task," "I think this task is boring (Reversed)," "Solving this task is fun."). Participants' maintained situational interest was measured with a three-item scale ("I want to engage in such a problem more through referencing the Internet or books," "I want to look for this task by myself and solve it," "I want to have an opportunity to work on such a task."). These items were based on Hulleman et al. (2010).

**Behavioral engagement:** Participants' behavioral engagement was measured with a five-item scale (e.g., "I concentrated on this task," "I was absorbed in this task," "I was not able to work persistently."). These items were based on Umemoto and Tanaka (2012).

**Manipulation check:** We used one item ("I think

this task is useful for enhancing my logical thinking.") as a manipulation check for participants in the experimental group.<sup>1)</sup>

### 2.3. Experimental Task

A logical reasoning problem-solving task was used. We selected items from the problem collection of the Synthetic Personality Inventory (SPI) and the national civil service examination. The SPI is often used as an employment examination in Japan. Items and time limitations were examined through a pilot test. The following is an example of the items selected from this pilot study:

"Five people—A, B, C, D, and E—run a race. Based on these race results (i.e., [a] C finished right after E, [b] D finished two ahead of E, and [c] A finished last), which of the following is correct? (1) A was three behind C, (2) B was first, (3) C was two behind D, (4) D was one ahead of B, or (5) E was second." All items were multiple-choice. One point was given for each correct response; thus, task performance scores ranged from 1 to 6.

### 2.4. Procedure

Before the experimental session, participants were asked to assess their awareness of logical thinking on a website; these data were used as a covariate of the dependent variable. Participants in the experimental group then received the following instruction:

"This is a task designed to enhance your logical thinking abilities. Logical thinking ability allows you to elaborate on information obtained through lectures, textbooks, and so on. These procedures will promote your understanding about it. In addition, logical thinking ability will help you to construct logical sentences. This will help you when you need to write various types of essays and reports."

Instruction was conducted using PowerPoint. Participants in the experimental group were informed of the importance of logical thinking ability in daily life and how completing the tasks would strengthen this ability. The other hand, participants in the control group did not receive any intervention.

After that, all participants were given 20 minutes to learn the task (i.e., logical reasoning problem-solving task). The task consisted of four problems. In this training period, participants were given correct answers and explanations about the task problems.

Table1 Zero-order correlations and descriptive statistics for all variables in this study.

	Mean	SD	$\alpha$	1	2	3	4
1 Awareness for logical thinking	4.63	1.20	.86	—			
2 Triggered situational interest	6.79	1.12	.91	.41 ***	—		
3 Maintained situational interest	4.86	1.50	.94	.21	.65 ***	—	
4 Behavioral engagement	7.03	1.15	.87	.31 *	.79 ***	.40 ***	—
5 Task performance	3.54	1.22	—	.10	.18	.25 *	.16

\*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$

Table2 Descriptive statistics for dependent variables by conditions and  $F$  value

	experimental group ( $n = 27$ )		control group ( $n = 21$ )		
	Mean	SD	Mean	SD	$F$ ( $df$ )
Awareness for logical thinking	4.49	1.30	4.81	1.07	
Triggered situational interest	7.00	1.07	6.50	1.14	4.75* (1, 45)
Maintained situational interest	5.23	1.37	4.38	1.55	5.27* (1, 45)
Behavioral engagement	7.26	1.20	6.72	1.02	4.17* (1, 45)
Task performance	3.63	1.04	3.43	1.43	0.43 (1, 45)

\*  $p < .05$

Following this, participants completed a range of measures. Finally, participants were given 30 minutes to complete an experimental task with six problems; the results assessed learning performance. During this period, participants did not receive answers and explanations and were told that they did not need to select an answer for problems they did not understand.

### 3. Results

#### 3.1. Manipulation Check

To assess the effect of the intervention, we examined responses to the manipulation check item. Because three of the 30 participants in the experimental group answered fewer than five (*neither agree nor not agree*) items, their data were removed following this analysis. Thus, data from 90% of participants were included in the final analysis ( $M = 6.96$ ,  $SD = 1.01$ ). Descriptive statistics and zero-order correlations for the study measures are presented in Table 1.

#### 3.2. Intervention Effects

To examine the effects of the intervention intended to increase distal utility value, we conducted separate single-factor (group: experimental and control) ANCOVAs with awareness of logical thinking as the covariate for each dependent variable (see Table 2).

The effect of condition was significant for triggered situational interest,  $F(1, 45) = 4.75$ ,  $\eta_p^2 = .10$ , maintained situational interest,  $F(1, 45) = 5.27$ ,  $\eta_p^2 = .10$ , and behavioral engagement,  $F(1, 45) = 4.17$ ,  $\eta_p^2 = .08$ ,  $ps < .05$ . However, there were no significant effects of condition on task performance,  $F(1, 45) = 0.43$ ,  $\eta_p^2 = .01$ ,  $ps > .05$ .

### 4. Discussion

Many previous studies have examined proximal utility value, which refers to the immediate usefulness of learning content (e.g., instructing students on the usefulness of mental math when shopping). The present study extends these studies by assessing the effects of instructing students on distal utility value (i.e., training in logical thinking).

The results indicated that participants who received distal utility value instruction exhibited increased triggered and maintained situational interest and behavioral engagement, even when individual differences in awareness of logical thinking were controlled for. Learning can be facilitated not only through instruction on the immediate uses of the material but also through conveying its long-term applicability. Our result shows that perceiving training content as useful enhances both situational interest and task involvement. These results are consistent with prior studies (Hulleman & Harackiewicz, 2009; Hulleman et al., 2010; Shechter

et al., 2011). Moreover, prior studies paid attention to only the concrete and procedural side of distal utility value. However, there is a more abstract side in distal utility value (i.e., training abilities that are useful in the future). The present findings shed light on a new aspect of distal utility value and indicate the versatility of utility value interventions in the classroom setting.

Importantly, participants who received instruction on the distal utility value of the material had increased scores for maintained situational interest. Informing learners about distal utility increased and developed their interest. This interpretation is consistent with the theoretical provision of Hidi and Renninger (2006) and the empirical findings of Hulleman and colleagues (e.g., Hulleman et al., 2010). When students have a maintained situational interest, they are likely to experience positive affect and to continue to develop their knowledge and valuing of the learning content (e.g., Renninger & Hidi, 2016). Although the intervention effect on actual performance was not significant, a weak positive correlation between maintained situational interest and actual performance was seen in this study. The intervention effect might not be seen by such brief work, but it may lead to performance improvement by repeated practice.

This suggests that teachers might be able to enhance students' interest and academic performance by teaching them the relevance of what they are learning. This would help students to make better sense of what they are taught in school. From the perspective of educational practice, the presently demonstrated aspect of distal utility value (i.e., utility of training abilities that are useful in the future) is meaningful. Hulleman, et al. (2010) asserted that utility value interventions are not only easy and inexpensive to implement but also applicable to a diverse array of topics or activities. Indeed, distal utility value interventions will have wide applicability; it can be said that it is an effective teaching strategy for enhancing students' interest.

However, there are several limitations to our research. First, the hypothesis regarding actual performance was not supported in the present research. The distal utility value intervention succeeded in enhancing interest and engagement but did not enhance actual performance. This contradiction may be explained in part by differences

in experimental tasks, but it is not possible to confirm this at present. It is also possible that other factors affected the dependent variables. Thus, replication of this study is necessary. Future research is needed to consider individual differences in cognitive characteristics and baseline intelligence. Moreover, Shechter et al. (2011) mentioned there are cultural differences in preference for utility value type (i.e., proximal vs. distal). Thus, it is necessary to conduct this experiment in different cultural populations.

Because effect sizes were relatively small, it is necessary to improve the intervention method. For the reason of abstractness of the distal utility value that we treated in this study, participants might have difficulty recognizing an actual feeling as useful. How practitioners allow students to recognize the actual feeling of trained ability is an issue for future study.

Finally, since the present study was conducted in a laboratory, it is important to extend these findings to a classroom setting. Our experimental approach is effective for drawing firmer conclusions regarding causality. Nevertheless, further testing of the present findings is needed to enhance their ecological validity.

## 5. Note

- 1) Because there was a possibility that participants would recognize the utility value of the experimental task merely by reading manipulation check item, participants in the control group did not answer this item.

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