The Effects of Instructional Design with the KBCP Framework to Promote Using Learning Strategies for High School Students

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Abstract

High school students tend not to use effective learning strategies. In this study, we aimed to clarify the effects of the instruction based on the knowledge, belief, commitment, and planning (KBCP) framework to promote the use of learning strategies for high school students. We developed a set of instructional classes in a form of blended learning with the KBCP framework to promote the use of effective learning strategies. As a pre-task, students learned about learning strategies through an online video material. Then, students used the learning strategies in class and at home. Wilcoxon signed-rank tests revealed that students used learning strategies more after the instruction than before.

Keywords: Learning Strategy, KBCP Framework, Instructional Design, Perceived Utility, Perceived Cost

Introduction

Internationally, high school students often use only superficial learning strategies, such as reading textbooks repeatedly. Conversely, they do not frequently use effective learning strategies, such as self-testing (Agarwal et al., 2014). Additionally, in Japan, the Programme for International Student Assessment (PISA) found that Japanese students ranked the lowest in the world in all the memorization strategies, elaboration strategies, and control strategies (National Institute for Educational Policy Research, 2009). Thus, both domestically and internationally, high school students tend not to use many effective learning strategies in their learning. Therefore, teachers need to teach learning strategies to promote the use of effective learning strategies (Dunlosky et al., 2013).

Generally, two factors contribute to using learning strategies: perceived effectiveness and perceived cost (Yoshida & Murayama, 2013). Perceived effectiveness refers to how effective learners feel for using learning strategies and perceived cost refers to the perceived burden of using them. Thus, it is important to increase the perceived effectiveness of learning strategies and decrease the perceived cost of learning strategies (Karabenick et al., 2021).

In this study, we used the KBCP framework (McDaniel & Einstein, 2020), which is a framework for instruction that promotes the use of learning strategies. The KBCP framework consists of knowledge of students' learning strategies, belief in their effectiveness, and commitment to and planning for their use.

However, only few high schools in Japan have introduced the teaching of learning strategies into their curriculum. Therefore, it is necessary to teach learning strategies in parallel with subject instruction (Selçuk et al., 2011).

This study aimed to examine the impact of instructional design with the KBCP framework to promote the use of learning strategies for high school students.

Method

Procedure

Twenty-seven Japanese second-year regular course students from a private high school A in Tokyo, Japan, participated in our experiment. 15 (56%) completed all the KBCP activities described below. We instructed students in learning strategies in parallel with the mathematics class. It was conducted about one week from late February to early March. We instructed the learning strategies of "After-Event Reviews (AERs)" (Ellis et al., 2006). The AERs are to draw instructions from successful or unsuccessful experiences regarding the eventual actions required, and they have two aspects: superficial learning strategies and deep learning strategies. For instance, the superficial learning strategies involve reviewing the mistakes so as not to repeat same mistakes. In contrast, the deep learning strategies mean discovering the mistakes that learners tend to make (Oshio 2017).

We conducted a questionnaire survey, and it contained twenty items on 5-point Likert scale: use of the learning strategies (five items), perceived effectiveness (five items), and perceived cost (ten items). The survey also included another twelve items on the following: knowledge: test (two items, writing), belief (two items), commitment (two items), and planning (six items).

Instructional Classes based on KBCP framework

We designed a set of instructional classes in which students were encouraged to acquire learning strategies as a pre-task so that they use learning strategies in class and at home. The feature of our classes is that students could accomplish the subject's learning outcomes and could be able to use learning strategies simultaneously.

In the pre-tasks, students watched online video materials based on the KBCP framework. In the videos, students learned the outline and usage of learning strategies using videos and handouts (Knowledge) and watched a teacher's demonstration (Belief). Thereafter, students wrote down the advantages and disadvantages of using learning strategies (Commitment) and planed when and how to use learning strategies (Planning).

Students revised their plan in the first class after the pre-assignment (Planning). They shared their plans within the group and revised them by referring to other students' plans. In subsequent classes and home study, students used their plans as a guide for learning strategies.

Results

We compared the mean values of the learning strategies before and after their use, perceived utility, and perceived cost by Wilcoxon signed-ranks test. Results show that students were significantly more likely to use learning strategies after the instruction (M_{post} = 4.03, SD_{post} = 0.67) than before (M_{pre} = 3.67, SD_{pre} = 0.84), z = 16.50, p = .084, r = .58 (Table 1). Furthermore, we found that students were significantly more likely to the perceived cost of learning strategies after the instruction (M_{post} = 3.17, SD_{post} = 0.66) than before (M_{pre} = 2.81, SD_{pre} = 0.65), z = 84.00, p = .051, r = .60 (Table 1). We compared the mean values of learning strategies before and after use for each of the subitem by Wilcoxon signed-ranks test. The results show that students were significantly more likely to use "I focus on my

mistakes so that I do not repeat them" after the instruction (M_{post} = 4.20, SD_{post} = 0.86) than before (M_{pre} = 3.73, SD_{pre} = 0.88), z = 10.00, p = .059, r = .64 (Table 2).

To clarify which KBCP activities contributed to using learning strategies, we conducted a correlation analysis of post-learning strategies use with knowledge, beliefs, commitment, and planning. The results show that post-learning strategies use positively correlate with belief, commitment, and planning. The correlation coefficients (with p-value in parentheses) for belief, commitment and planning were r = .74 (p = .002), r = .58 (p = .023), and r = .57 (p = .027), respectively (Table 3).

Table 1

Pre- and Post-comparison of learning strategy use, perceived utility, and perceived cost.

	M_{pre}	SD_{pre}	M_{post}	SD_{post}	M_{post} - M_{pre}	z	r
Learning Strategy Use	3.67	0.84	4.03	0.67	0.30	16.50†	0.58
Perceived Utility	4.13	0.78	4.36	0.61	0.20	24.00	0.47
Perceived Cost	2.81	0.65	3.17	0.66	-0.25	84.00†	0.60

n = 15 †p< .10, r: effect size

Table 2

Pre- and Post-comparison of learning strategy use.

Learning Strategy Use	M_{pre}	SD_{pre}	M_{post}	SD_{post}	M_{post} - M_{pre}	z	r
I consider cautions and countermeasures to avoid making similar mistakes	3.53	1.06	3.87	0.74	0.34	17.00	0.38
I focus on my mistakes so that I do not repeat them	3.73	0.88	4.20	0.86	0.47	10.00†	0.64
When I get a question wrong, I think about how I could have gotten the answer right	3.87	0.99	4.07	0.96	0.20	20.00	0.27
I identify patterns and habits of mistakes I tend to make	3.13	1.13	3.67	0.98	0.54	11.00	0.51
When I get a question wrong, I review it and think about where I went wrong	4.07	1.03	4.33	0.82	0.26	2.50	0.67

n = 15 †p < .10, r: Effect Size

Table 3

Results of correlation analysis of post-learning strategy use with knowledge, beliefs, commitment, and planning.

	Post Learning Strategy Use	Knowledge	Belief	Commitment	Planning
Post Learning Strategy Use					
Knowledge	-.09				
Belief	.74**	-.16			
Commitment	.58*	-.17	.67**		
Planning	.57*	.39	.36	.10	

n = 15 *p < .05, **p < .01

Discussion

Results show that our instructional design with the KBCP framework resulted in students using more learning strategies overall. However, although the students could perform superficial learning strategies, they could not perform deep learning strategies. The results also indicated that perceived cost might not affect the use of learning strategies (Karabenick et al., 2021). The use of learning strategies correlated with beliefs, commitment, and planning. Conversely, there was no significant difference in the correlation for knowledge. This would be partly because that knowledge of learning strategies alone does not lead to their use (Manalo et al., 2018). We hypothesize that the teaching belief, commitment, and planning as well as the knowledge of the learning strategies may be necessary.

Future Work

In the future, we need to conduct a survey with more participants to determine which KBCP activities contributed to using learning strategies. Furthermore, we need to improve the instructional design to encourage the use of deep learning strategies. For instance, we could add the following activities in the pre-assignments, in class, and the home study: students would share and improve their plans, and teachers would provide detailed feedback on students' plans. In the future, we will design, implement, and evaluate classes that include these activities.

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