A Preliminary Study of Increasing Self-Efficacy in Junior High School Students: Induced Success and a Vicarious Experience\textsuperscript{1, 2}

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Bandura’s self-efficacy source hypothesis was examined by testing whether success and a vicarious experience of success would enhance self-efficacy among 159 7th graders (81 boys, 78 girls). Unknown to themselves or their classmates, 20 students (Success condition) were presented with easier anagram tasks, allowing them to outperform their 60 classmates (Control condition). The Success and Control students had been paired with classmates (Cheerers; Vicarious condition) who were to cheer on their partners during the task. The participants rated their self-efficacy for the anagram task before and after the performance. The results showed that successful performance significantly promoted the self-efficacy of Success students. However, the cheerers of Success students did not have increased self-efficacy through the vicarious success experience.

Promotion of self-efficacy beliefs in school children has been an important issue in educational psychology. Bandura (1997) hypothesized that self-efficacy is formed by the way people interpret information from four sources. The most powerful source is the interpreted result of one's past performances, or mastery experiences. Students who have accomplished a task or had a successful experience are likely to have increased self-efficacy, while unsuccessful performances are likely to have the opposite effect. Self-efficacy is also influenced by the observation of others' activities, or vicarious experiences. Observing the successful performance of others is a form of modeling and may influence the observers’ self-efficacy. Though vicarious experience has a weaker effect than one’s own mastery experience, students with poor mastery experience are more sensitive to it. Vicarious experience is particularly effective when students empathize with the model students. In a classroom, students who observe successful students might increase their own self-efficacy by vicariously experiencing the successful performance of the students themselves (Bandura, 1997; Schunk, 2003). The third and fourth sources of self-efficacy Bandura hypothesized are social persuasions and physiological and affective states. Positive evaluation and encouragement from teachers and others may bolster self-efficacy, whereas negative feedback may undermine it. Students’ physiological and affective states such as anxiety, stress, and fatigue may influence their self-efficacy. Students with high test anxiety may feel less confident in their capabilities for examinations than those with little stress about taking examinations.

Bandura (1997, p. 79) also hypothesized each of these four sources of self-efficacy may operate through one or more of the other sources. Research on the sources of self-efficacy has confirmed the interrelatedness of efficacy-relevant information with correlational approaches using multivariate regression analyses (e.g., Pajares, Britner, & Valiante, 2000; Kupermintz, 2002; Lau & Roeser, 2002; Britner & Pajares, 2006; Usher & Pajares, 2006, 2009). Longitudinal studies of self-efficacy and its contribution to academic achievement have also shown that high self-efficacy at the age of 12 years was associated with better high school grades (Caprara, Fida, Vecchione, Del Bove, Vecchio, Barbaranelli, \textit{et al.}, 2008) and that both perceived control (equivalent to perceived self-efficacy in their terminology) and intrinsic motivation predicted long-term growth in mathematics achievement (Murayama, Pekrun, Lichtenfeld, \& vom Hofe, 2013).

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Recently, Chen and Usher (2013) investigated the four hypothesized sources of self-efficacy from a different perspective. They hypothesized that students tend to differ in how they rely on self-efficacy source information. Some students may regard mastery experiences as more important than the other three sources, while others may rely on those sources of efficacy information more equitably. By utilizing Latent Profile Analysis, they examined latent patterns, or profiles, of the relations among efficacy-relevant experiences and beliefs reported by 1,225 middle and high school students. The results revealed that there are four types of profiles. Although the four efficacy sources Bandura hypothesized revealed to have different weights in the four types of profiles, results support past findings indicating that mastery experiences are a powerful source of self-efficacy.

Although these multivariate analysis methodologies are useful, the ideal demonstration of the causality of the sources-efficacy relationship is an experimental examination. Bandura (1997; pp. 58-59) cited several studies that showed alteration of self-efficacy beliefs through bogus feedback (Weinberg, Gould, & Jackson, 1979; Jacobs, Prentice-Dunn, & Rogers, 1984; Litt, 1988; Bouffard-Bouchard, 1990; Prussia & Kinicki, 1996). Bouffard-Bouchard (1990) examined the relationship between judgments of self-efficacy and performance among 64 college students on a verbal concept-formation task. In that study, the experimenter gave either positive or negative verbal feedback regardless of their actual performance. The positive feedback emphasized the excellence of their performance relative to their peer group while their poor performance was emphasized in the negative feedback. The results showed that the bogus feedback successfully induced positive and negative perceptions of self-efficacy irrespective of their actual competence or performance. However, the bogus feedback only induced an illusionary high self-efficacy that did not reflect the actual performance. The students with induced high self-efficacy got wrong answers more often than those with induced low self-efficacy. That was because the bogus feedback was not the “enactive mastery experience” (Bandura, 1997).

Mori and Uchida (2009) tried to demonstrate the causal relationship between mastery experience and self-efficacy by using a novel experimental method. Instead of bogus feedback, they used a presentation trick in which certain students were able to solve anagram tasks that their classmates could not solve. They prepared an easy and difficult set of anagram tasks and presented them on the same screen in front of the whole class of students. The twist was that certain students were able to see only the easy set, while the other students saw only the difficult set, with no awareness of the duality. The results revealed that the 24 experimental students presented easier anagram tasks outperformed their classmates and increased self-efficacy significantly. Moreover, 17 of the 24 experimental students improved their academic achievement rank 6 mo. after the induced success; the ratio of 17 out of 24 was statistically higher than chance.

As stated above, vicarious experience is another source of self-efficacy (Bandura, 1997; pp. 86-101). However, there have been inconsistent findings of the influence of vicarious experience on self-efficacy in the literature. Some studies revealed positive influences of the vicarious experience (Matsui, Matsui, & Ohnishi, 1990; Hampton, 1998; Usher & Pajares, 2009), whereas others reported non-significant influence on self-efficacy (Usher & Pajares, 2006; Pajares, Johnson, & Usher, 2007; Yurt, 2014). For example, Matsui, et al. (1990) reported that a stepwise regression analysis indicating four sources of efficacy information showed unique contributions to mathematics self-efficacy using data from 97 male and 66 female Japanese first-year undergraduates. Meanwhile, Usher and Pajares (2006) examined the influence of the four sources on the academic self-efficacy beliefs of 263 middle school students using a multivariate regression analysis and found 15% of variance ($R^2$) was explained by mastery experience, but only 2% by vicarious experience. Recently, Yurt (2014) investigated the relationship between the self-efficacy sources and mathematics achievement of 350 7th grade students and found vicarious experiences did not have a significant effect on mathematics achievement.

Research findings on the effects of modeling as a source of self-efficacy information from the experimental studies was also inconclusive (see van Dinther, Dochy, & Segers, 2011 for review). Wang, Ertmer, and Newby (2004) examined how vicarious learning experiences influence 280 undergraduate education majors’ self-efficacy for integrating technology into the classroom. Their self-efficacy beliefs for technology integration were assessed before and after the vicarious experiences of observing positive role models of supervising teachers. The results showed significant effects of vicarious experiences on students’ judgments of self-efficacy for technology integration. Anderson
(2000) conducted an experiment to compare the effects of vicarious experience of observing videotaped models and persuasive efficacy information on self-efficacy beliefs. The results showed the vicarious experience engendered greater efficacy expectations than did persuasive efficacy information. Meanwhile, Johnson and Marakas (2000) examined the effects of observing videotaped model performance on computer skill acquisition and found no significant effect. In Newman and Tuckman (1997), while half of the 60 undergraduates randomly assigned to the control condition wrote test items on class content by themselves, the other half assigned to demonstrational modeling condition observed the instructor providing an example and guidance on how to write test items. The demonstrational modeling influenced the performance of the students significantly but had a smaller effect on their self-efficacy. Further experimental research is needed to investigate the effect of vicarious experience as a source of self-efficacy in academic settings.

The present study aimed to examine whether a vicarious experience of success would enhance self-efficacy by utilizing the Mori and Uchida (2009) experimental procedure. The procedure was replicated with half of the 7th grade students and the other half observed them as a vicarious experience. Unlike Anderson (2000) and Johnson and Marakas (2000), live models were used. Performer-observer pairs were created among classmates with same sex and similar IQ. This was intended to increase the empathy between performers and observers compared to Newman and Tuckman (1997) and Wang, et al. (2004).

**Hypothesis 1.** Students who performed successfully in the task would have increased self-efficacy.

**Hypothesis 2.** Students who observed their successful partners would have increased self-efficacy through the vicarious experience.

**METHOD**

**Participants**

Participants were all the 7th grade students (83 boys, 80 girls, 12-13 years old) of a municipal junior high in a suburb of Nagano City, Japan. The socioeconomic status of the families of the students varied within a narrow middle-class range, and all the students were native Japanese. The participants were members of the five 7th grade classes with approximately 32 students in each class.

**Experimental Design**

**Four experimental conditions.**—The participants were placed into the following four experimental groups to examine the two experimental variables: the effect of success experience (Success vs Control) and the effect of vicarious experience (Performer vs Cheerer). The Success-Performers solved an easier series of anagram tasks to experience success, while the Control-Performers solved a series of anagram tasks of standard level. The Success-Cheerers and Control-Cheerers, having been paired with the Success-Performers and Control-Performers, respectively, cheered on their partners during the task.

Two pairs of boys and two pairs of girls were randomly selected from the student list of each of the five classes for Success-Performers and Success-Cheerers. The Success pairs were chosen from the 26-50th percentile IQs with IQ matching as closely as possible. These students had lower IQs and thus had fewer experiences of success in academic activities under ordinary circumstances. The IQs were based on the most recent group intelligence tests administered at school. Twenty Success pairs were chosen, and one pair as a substitute in case there was attrition. Then, 121 remaining students were paired by sex and IQ to form the 60 Control pairs (one group consisted of three students).

After the pairing assignment, the students were asked to form actual pairs in class and explained the roles of Performers who were to perform the anagram tasks and Cheerers who were to cheer on their partners. Then, the pairs decided their roles randomly using the “rock-paper-scissors” game.

**Omission of data.**—Of the 21 Success pairs, one student was absent on the anagram session day, so the remaining student was assigned to be an additional Cheerer for one of the Success pairs. There were three students in the Control pairs absent on the anagram session day. Those pairs were rearranged to make Performer-Cheerer pairs as much as
possible, but two Performers were without Cheerers. Consequently, data were obtained from 20 Success-Performers, 21 Success-Cheerers, 60 Control-Performers, and 58 Control-Cheerers—159 in total.

Measures

Each participant’s perceived self-efficacy was assessed by rating the applicability of the statement, “I can perform the letter re-arrangement game well.” (An example of the letter re-arrangement game was provided in Japanese five hiragana letters in the same format used in the actual anagram tasks.) The participants responded using a 5-point scale, with anchors 1: Not well and 5: Very well, with 3 being the middle. The self-efficacy rating item was printed on a sheet mixed in with other filler items (e.g., “I can always perform as I planned”) to hide the experimental purpose. The same self-efficacy rating item was used along with different filler items at the pre- and post-experimental stages to measure the effect of the experimental variables. The pre-assessment was done two weeks before the anagram task, and the post-assessment was done on the same day after the anagram tasks. The delayed assessment was administered two weeks later.

Bandura (1997, p. 44) did not recommend using a single-item measure for self-efficacy assessment. However, a pilot study using 11-item general self-efficacy questionnaires adopted from Sakurai (1987) and one item specific for anagram tasks showed that only the single item for anagram tasks was significantly correlated with the actual anagram task performance ($r = .53, p < .01$). Mori and Uchida (2009) used the single-item self-efficacy assessment, and the same procedure was used in the present study. Recently, the validity and reliability of single-item measurement procedures for a variety of psychological traits have been positively evaluated (Skoogh, Ylitalo, Larsson Omerov, Hauksdóttir, Nyberg, Wilderäng, et al., 2010; Yohannes, Dodd, Morris, & Webb, 2011).

Task Manipulation

Success-Performer students did easier anagram tasks so that they would outperform the Control-Performers without their being aware of the difference between the tasks. Using an LCD projector, an image in magenta (mixture of red and blue) and an image in green can be projected on the same screen but are seen separately through two different types of polarizing filters. Thus, an easier configuration of an anagram printed in green and a more difficult one in magenta can be presented simultaneously on the same screen so that viewers in two groups wearing different types of polarizing sunglasses will see only one of them without noticing the other (for a more detailed description of this presentation trick, see Mori, 2007.)

The same sets of anagram tasks with five Japanese hiragana letters from Uchida and Mori (2009) were used in the present study. Ten of the 30 anagrams were arranged differently so that there would be two levels of difficulty. An example of English equivalents would be “STIPUD” and “TPSUDI,” both of which can be re-arranged to make the word “STUPID.” As the example shows, the former is much easier to re-arrange correctly than the latter because only two letters are out of place versus four or five.

Procedure

For each class, the homeroom teacher led the students to an experimental room set up in the school. The seats for participants were arranged in front of a rear screen made of a pane of ground glass measuring 80 x 80 cm. The Performers were seated in the front-center and Cheerers were in the back and sides of the room. Two types of polarizing sunglasses, four pairs for the Success-Performers and up to 28 for the others (the Control-Performers and all the Cheerers) were prepared and placed on the seats. The sunglasses were placed beforehand so that only the Success-Performers would wear the right type of polarizing sunglasses to view the easier anagram tasks. The cover story for having the participants wear sunglasses was to eliminate glare from the projector.

After having the students sit down and put on the sunglasses, the experimenter gave general instructions. Then he handed an answer sheet to each of the Success- and Control-Performers. After that, 30 anagram tasks were projected one by one onto the glass screen by means of a PowerPoint slide show on an Apple iBook. As the anagram tasks were being presented for 10 sec. with 5-sec. intervals between them, the Performers tried to solve each anagram and write their answers on the answer sheet. The Cheerers were instructed to observe their partner’s performance, encouraging them silently during the tasks.
After the presentation of all 30 anagrams, the experimenter announced the correct answers so that the Performers could mark their own answers. Then the experimenter asked who had scored 30 points (i.e., the full score), or 29 points, in descending order down to 20 points. In this way, Performers who had scored 20 or more correct answers raised their hands, were acknowledged for their high performance, and received social approval via applause from the class. Since no students were aware of the presentation trick, these appraisals were natural and genuine.

Two months after the anagram task session, the experimental purpose and trick were disclosed to the students. They were only told that a trick had been used during the presentation of the anagram tasks so that some students would do easier tasks than others, but it was not specified who had observed the easier ones.

RESULTS

Preliminary Analyses

As expected, the Success-Performers who viewed the easier anagram tasks outperformed the Control-Performers; the average numbers of correct answers were 25.35 (SD = 2.80, range = 19-29) and 19.55 (SD = 3.68, range = 6-28), respectively. A two-way (2 Difficulty levels × 2 Sex) analysis of variance (ANOVA) on the anagram scores indicated a statistically significant main effect of the difficulty ($F_{1,76} = 36.68, p < .01, \eta^2 = 0.32$). The main effect of sex and the interaction were not significant ($F_s < 1.57, ps > .10$). Therefore, the experimental manipulation was successful. There were two Success-Performers, one boy and one girl, who scored only 19 points and so did not receive social approval from the class. There were also three Control-Performers, two boys and one girl, who scored 28, 27, and 27, that were above the average of the Success-Performers. Nevertheless, those data were included in the following analyses described below.

Self-efficacy Scores

The mean self-efficacy scores for the four experimental groups at three assessing periods are shown in Fig. 1. As the figure clearly shows, the self-efficacy scores of the Success-Performers rose sharply after they experienced their successful performance on the anagram task and remained high thereafter. However, the scores of the Control-Performers were moderate. The self-efficacy of the Success-Cheerers increased only slightly after the anagram

![Fig.1. Self-efficacy scores of the four experimental groups before and after the anagram task. The vertical bars indicate the standard errors, only shown for Success-Performers and Control-Cheerers.](image-url)
task. In contrast, those of the Control-Cheerers rose considerably. A three-way mixed ANOVA (4 Experimental Groups × 2 Sex × 3 Self-efficacy Assessment Periods) indicated that the interaction of group and Assessment Period was statistically significant ($F_{6,302} = 4.62, p < .01, \eta^2 = 0.03$), as was the main effect of the self-efficacy assessment periods ($F_{2,302} = 16.03, p < .01, \eta^2 = 0.03$). No main effect or interactions related to sex were significant ($Fs < 1.18, ps > .10$). Multiple comparisons using Holm’s method indicated that only the Success-Performers and Control-Cheerers had significantly increased self-efficacy scores after the anagram task and maintained a significant increase for two weeks after that, while the other two groups, Control-Performers and Success-Cheerers, did not show any significant change in self-efficacy throughout the three assessment periods.

**DISCUSSION**

The findings of Mori and Uchida (2009) were replicated; a one-time experience of success, even an induced one, created a small but significant increase in self-efficacy. Students who performed well on the anagram tasks and experienced social approval had increased self-efficacy. Meanwhile, the self-efficacy ratings of the Control-Performers remained moderate throughout the three assessment periods. Although the effect size was small ($\eta^2 = 0.03$), the results supported Bandura’s hypothesis that mastery experience is one of the sources for promoting self-efficacy. It should be noted here that having a successful experience created a positive effect, while not having success did not produce a negative effect.

The main purpose of the present study was to test Bandura’s theoretical assumption that observing the successful experience of others would have a positive effect on observers through vicarious experience. Participants were coupled into similar-IQ pairs before the anagram task, which was intended to intensify the Performer-Cheerer (observer) relationship. Based on Bandura’s assumption of attribute similarity (Bandura, 1997, p. 98), it was expected that the Success-Cheerers would raise their own self-efficacy by vicariously experiencing the success of their partners (Success-Performers) sharing common attributes. However, the results did not support this, as there was no significant effect on the self-efficacy ratings of Success-Cheerers. This was a disappointing result, because schoolteachers would hope for good students to have a positive influence on poorer students. They are eager to recite anecdotes about how a poor student began studying hard after noticing his classmate at a similar academic level accomplish success; “If he did it, then I can do it as well.” However, the results of the present study showed this may not be common.

There was one unexpected finding. The Control-Cheerers had increased self-efficacy after observing their partners being outperformed by others. This is an ironic but promising finding, because it may imply that observing the failure or defeat of others raises self-efficacy. However, it is difficult to interpret. The Control-Cheerers did not observe the failures of their partners in the present experiment. They only observed the absence of successful performance (remember that only those performers who scored 20 or more publicly acknowledged their results in class). Most of the performers they cheered on (57 out of 60 Control-Performers) did not reveal how well or how badly they had performed. They may have shown signs of difficulty or perplexity during the task performance. However, it is doubtful that those subtle signs could have had a positive effect on their observers.

It is worth noting that the Control-Performers were not “losers,” nor were they “defeated” by the Success-Performers. The distinction between Success and Control students was only for experimental purposes. As the participants were unaware of the presentation trick, they did not know which students were in the Success and Control conditions. Therefore, all the Control-Cheerers experienced was that their partners did not show remarkable performance despite their cheering-on efforts.

One speculative interpretation is that people tend to evaluate their own abilities more positively than reality would dictate (“Self-evaluation bias”; Gramzow, Eliot, Asher, & McGregor, 2003). Thus, observers would tend to think that they would perform better in general than they actually could. Accordingly, the Control-Cheerers might have believed that they would have been more successful on these tasks than their partners were. Meanwhile, the Success-Cheerers had a similar self-evaluation bias, but their partners’ performance was good, perhaps matching the bias. Consequently, Success-Cheerers’ self-efficacy ratings did not rise after having observed their partners’ performances. However, this is
only a speculative interpretation, which should be examined further through additional experimental research in the future.

**Conclusions**

The present experiment replicated the finding of Mori and Uchida (2009) showing that experiencing success promotes the self-efficacy of junior high school students in a causal experimental procedure. The finding supported Bandura’s hypothesis that mastery experience is a source of self-efficacy belief. The present study also tested Bandura’s proposal that vicarious experiences of success can increase self-efficacy. However, the results did not support this assumption. The observers who seemed have more direct relation to the successful performers failed to show the vicarious experience effect while those who seemed have less direct relation did show the effect. Further experimental research is needed to investigate the conditions and mechanisms related to how the vicarious experience effect may work.

**REFERENCES**


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