RESEARCH ARTICLE

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The Effect of Self-Confidence Reinforcement on Changes in Students' Cognitive Ability in Collaborative Learning

Firdaus H. P. Yudho, Andi K. Pratama, Rekha R. Julianti, Akhmad Dimyati, and Rahmat Iqbal

ABSTRACT

Self-confidence as an important psychological component in the academic learning process is always interesting to review in various situations and learning models for physical education students, both in schools and colleges environment. Reinforcement that strengthens the quality of students' self-confidence is something that might have a significant impact on improving students' cognitive and even overall learning outcomes. This study aims to investigate the effect of reinforcement performed by the teacher on students' self-confidence, as well as to reveal the effect of self-confidence itself on student learning outcomes cognitively. The self-confidence instrument used in this study was a self-confidence questionnaire, totaling 38 questions, which were addressed to 38 research sample students of physical education at universities. The confidence level of the samples themselves became the reference for categorizing the research samples into samples based on gender with high and low levels of confidence. The method used in this study is a quasi-experimental test with 3 stages of testing to determine the cognitive abilities of students before and after the learning process, as many as 12 face-to-face meetings. The learning process is carried out using a collaborative learning model with the peer-teaching method carried out by 12 groups in turns. The data were then analyzed using statistical software with the conclusion of a significant effect between the confidence level of the samples on their cognitive abilities, and the reinforcement to enhance the student's self-confidence carried out by the teacher in the middle of the learning process affected significantly in increasing the cognitive abilities of the samples in following the learning process.

Keywords: cognitive ability, collaborative learning, physical education, reinforcement, self-confidence.

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I. Introduction

In 1963, Bandura and Walters wrote Social Learning and Personality Development, expanding the boundaries of social learning theory with the principles of observational learning and representative reinforcement that are now known (Pajares, 2002). In cooperative group learning, individuals share information and expertise to work together on a task. The emphasis is on the task rather than the process, and the experience is quite structured. Educators remain in control of the content and the process. In collaborative group learning, individuals work together to build their understanding of each other and their social world. The emphasis is on processes and interactions among the people involved. The teacher establishes an atmosphere in which such inquiry is possible and participates in joint exploration. Collaborative group learning produces communicative knowledge (Cranton, 1996). The benefits of collaborative learning include the Development of higher-order thinking, oral communication, self-management, and leadership skills. Promotion of student and institutional interaction. Increase student retention, self-esteem, and responsibility. Exposure and increased understanding of multiple perspectives (Singaram *et al*., 2022; Bhat *et al*., 2020; Vijayalakshmi & Kanchana, 2020). The collaborative learning process monitored by lecturers has a better effect on learning outcomes (Yudho, 2022). Collaborative learning commitment can help students acquire skills by creating a sense of comfort in learning, reflecting on the responsibility for self-improvement, and seeking to help peers through the role of observer and reflection (Blegur & Lumba, 2022). Students' confidence and happiness and increased self-esteem develop as a result of positive feedback and encouragement from team members (Schulze, 2022) and this applies to collaborative learning. Peer-trained high school students demonstrate comparable skills and are as effective as professional-led teaching both offline (Santomauro *et al*., 2017), as well as online (Hardt *et al*., 2022). The effectiveness of collaborative learning itself cannot be separated from the role of a teacher in the learning process in the classroom. The findings show that peer coaching enriches teachers' reflection on their practice, provides teachers with peer advice on how to improve their

practice, and fosters a community of teachers who are intent on improving and strengthening their teaching skills (Soisangwarn & Wongwanich, 2014). In previous studies, students performed worse on questions drawn from peer teaching due to poor quality of teaching among students, as they were randomly selected to lead the learning materials (AlShareef, 2020). Studies on teacher self-confidence and teachers' inclusive practices in schools illustrate that for inclusion to be effective in schools (Woodcock *et al*., 2022). What makes learning such as science lessons complicated is that young students often lack critical thinking competencies for scientific argumentation: the ability to understand principles (theories, and laws about a scientific problem); skills to use the correct epistemology (for evaluation); as well as the capacity to construct, and to communicate one's knowledge (Uus *et al*., 2022). In addition, the confidence factor of students in participating in the learning process is also seen as influencing learning achievement. The relationship between these two aspects of learning and self-confidence has been explained by physiological neurobiological processes involving the prefrontal cortex and thalamus (Raharjanti *et al*., 2021). Complexity, awareness, presentation skills and confidence, and teamwork (or group work) are some of the learning objectives (Amaechi *et al*., 2022). In addition, empowering learners to embark on their own motivational and persistence efforts will help them optimize their learning experience with more confidence (Yun & Park, 2020). On the other hand, teachers' beliefs and confidence and their attitudes towards education are positive values and have a significant relationship with teacher performance (Yada *et al*., 2022). The level of self-confidence plays a role in a person's growth mindset, where the growth mindset affects a person's success in various things in life (Imawan & Ismail, 2022). In the field of sports, different image training patterns are beneficial for efficient learning for young athletes under certain circumstances which will improve sports performance, self-confidence, and reduce state anxiety levels (Chien *et al*., 2022). Previous research revealed that to increase motivation and self-confidence, it is important to focus on the competencies already acquired and to incorporate everyday life problems into learning (Ortiz-Ordoñez *et al*., 2015). To improve learning performance and student self-confidence, reinforcement is needed by the teacher to the students. Reinforcement itself has had a positive impact, and some students have forged stronger partnerships in learning (Mohd Meerah & Halim, 2011). Simulation-based experiences such as peer teaching allow students to experience situations they might have experienced in actual practice before. It can improve their performance in real practice because the reality increases on standard or normal object groups (Üzen Cura *et al*., 2020). To obtain high academic achievement in physical education classes, contributions from self-confidence, academic stress, and problem-solving strategies are needed (Yuda *et al*., 2022). In a digital environment, students' desire to communicate is significantly correlated with education level, self-confidence, and motivation (Mulyono & Saskia, 2020). Students who are more likely to think critically are also more open to diversity and challenges and have a stronger creative self-concept. These results highlight the importance of increasing students' disposition to use critical thinking so as to strengthen their creative self-concept (Álvarez-Huerta *et al*., 2022).

II. METHODS

This study uses a comparative quantitative approach with a quasi-experimental method, which compares the three stages of the test with similar test questions as research evaluation data (see in Fig. 1). The samples used in this study were 38 students from the physical education program in higher education, consisting of 29 men and 9 Women±19-20 years old and physically and psychologically healthy. In each phase of the learning treatment, the face-to-face learning process was carried out 6 times for the first phase and 6 times for the second phase. To measure the confidence level of the samples, a psychological self-confidence test was conducted in the form of a questionnaire with a total of 38 questions using a Likert scale of 1-4. A score of 1 represents the lowest score and 4 represents the highest score on each given question. There are four alternative answers: Strongly agree (SS), Agree (S), Disagree (TS), and Strongly disagree (STS). The Likert scale is used to measure attitudes, opinions, and perceptions of a person or group of people about social phenomena (Yudho & Nugroho, 2021). The answers to each instrument item using a Likert scale have a gradation from very positive to very negative in the form of words, strongly agree, agree, disagree, and strongly disagree. See in the Table I below.

TABLE I: QUESTIONNAIRE SCALE

Alternative Answer	Statement Type	
	Positive	Negative
Strongly Agree (SS)	4	1
Agree (S)	3	2
Disagree (TS)	2	3
Strongly Disagree (STS)	1	4

To obtain data on the cognitive abilities of the samples, a multiple-choice closed-ended test consisting of 30 questions was used as the learning material for the Sports Nutrition subject. In each treatment of the research participants, a learning process was carried out using a cooperative learning model using the peer teaching-group discussion method where the samples were divided into 12 groups that presented different materials and carried out 2×6 face-to-face meetings. Each meeting is a learning session with Sports Nutrition subject material with a duration of 2×45 minutes. The cognitive test was given three times before the lecture started (Pretest/Test 1). the second test during the midterm exam (Posttest 1/Test 2) and the final test during the final exam of the course (Posttest 2/Test 3). After the second cognitive and SC test session was carried out, reinforcement was carried out by the researcher to increase the confidence of the samples in participating in the second peer teaching session so that the next learning session had a better improvement than the previous peer teaching session. At this reinforcement stage, the samples were given motivation and refreshment to remind them of the meaning of the learning being carried out, as well as the importance of getting a good score in lectures (Sheldrake *et al*., 2022). The use of appropriate learning methods can also improve

students' critical thinking skills, self-confidence, and learning retention (Guerrero *et al*., 2022).

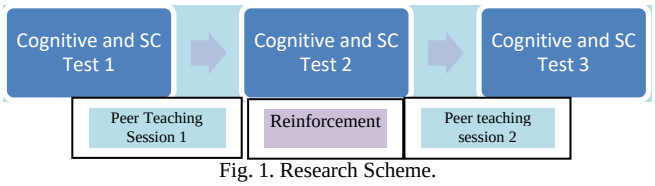

Fig. 1. Research Scheme.

III. Results

The sample data in this study are categorized in terms of the sample's gender and the level of self-confidence. In Table II below, the results of the descriptive analysis show the following points. The average value of the self-confidence scores of the Men (N=13) and Women (N=4) samples, respectively, was 3.53 and 3.7 with SD 0.326 and 0.302 while the mean value of the sample with low self-confidence was Men (N=16) and Women (N=5) were 2.89 and 2.91, respectively, with SDs of 0.292 and 0.212. The difference in the average score of the sample with high and low levels of self-confidence between men and women is 0.64 and 0.79. The minimum value for samples with low SC for men and women is 2.29 and 2.58 and the maximum value for SC for Men and Women samples is 3.24 and 3.24.

TABLE II (a): Data Description, Descriptive High SC

	Gender	Sc	Test1	Test2	Test3
N	Men	13	13	13	13
	Women	4	4	4	4
Mean	Men	3.53	31.3	33.8	50.8
	Women	3.7	33.5	31	39.5
Median	Men	3.34	33	33	47
	Women	3.83	35	30	39
Sd	Men	0.326	12.2	11.7	18.3
	Women	0.302	4.73	4.9	18.6
Min	Men	3.24	13	17	27
	Women	3.24	27	27	20
Max	Men	4	53	60	100
	Women	3.88	37	37	60

TABLE II (a): Data Description, Descriptive Low SC

	Gender	Sc	Test1	Test2	Test3
N	Men	16	16	16	16
	Women	5	5	5	5
Mean	Men	2.89	27.4	30.2	43.2
	Women	2.91	31.2	30	48
Median	Men	3	25	27	43
	Women	2.93	33	27	53
Sd	Men	0.292	12.6	10.5	14.8
	Women	0.212	6.5	9.7	8.89
Min	Men	2.29	10	17	20
	Women	2.58	23	20	37
Max	Men	3.19	50	53	73
	Women	3.1	40	43	57

In the Fig. 2 below we can draw some of the results from this study related to the differences in the results of the three different tests, where the sample of men with high SC levels is shown by the blue line, the sample of men with low SC is shown by the red line. Women with high SC are shown by green lines, and samples of women with low SCs are shown by purple lines.

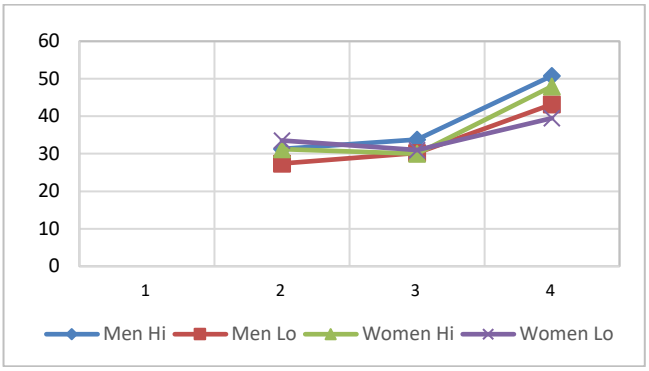

Fig. 2. Average test results.

The results of the mean difference test on the research data are shown in the Table III below, where the results of the significant difference test using the Wilcoxon test are indicated by the p-value in the overall Women sample category on Test 1-Test 2 (p=0.292), Test 2-Test 3 (p=0.028), Test 1-Test 3 (p=0.043). The result of the Wilcoxon test is the mean difference indicated by the p-value in the Women sample category with a high level of confidence on Test 1-Test 2 of p=NaN, Test 2-Test 3 shows a value of p=0.75, and Test 1-Test 3 of p=0.75. The results of the Wilcoxon test mean that the difference in the mean is indicated by the p-value in the women sample category with low self-confidence on test 1-test 2 of p=0.292, test 2-test 3 shows a value of p=0.031, and test 1-test 3 of p=0.036.

TABLE III: Test Results of Paired Sample T-Test

	Overall SC		Hi SC		Lo SC	
		p		p		p
Women						
T1-T2	16	0.292	0[a]	NaN	16	0.292
T2-T3	3.5	0.028*	2	0.75	0	0.031*
T3-T4	5	0.043*	2	0.75	0	0.036*
Men						
T1-T2	171.5	0.479	40.5	0.28	47	0.944
T2-T3	48.5	<0.001*	14.5	0.01*	11.5	0.011*
T1-T3	13.5	<0.001*	0[a]	0.001*	7.5	0.005*

The result of the Wilcoxon test is the mean difference indicated by the p-value in the overall Men sample category on Test 1-Test 2 of p=0.479, Test 2-Test 3 of p <0.001, Test 1-Test 3 of p<0.001. The results of the Wilcoxon test mean that the significance of the difference is indicated by the p-value in the Men sample category with a high level of confidence on Test 1-Test 2 of p=0.28, Test 2-Test 3 shows a value of p<0.01, and Test 1-Test 3 of p<0.001. The result of the Wilcoxon test is the mean difference indicated by the p-value in the Men sample category with low self-confidence on Test 1-Test 2 of p=0.944, Test 2-Test 3 shows a value of p=0.011, and Test 1-Test 3 is p=0.005.

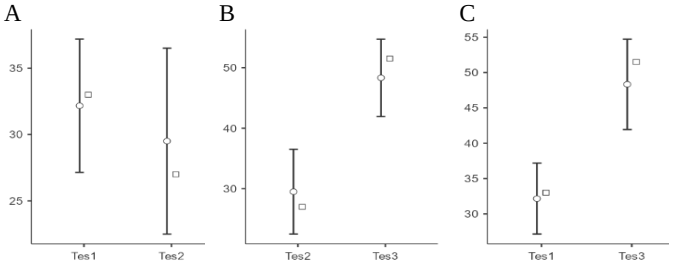

Fig. 3. Comparison of the average test results in a sample of Women with Lo SC.

Fig. 3 above describes visually the comparison of the average research data which is the object of the Wilcoxon paired sample T-test in each test period in this study. The mean score of the sample is indicated by a circle and the median value is indicated by a box on the figure.

Fig. 3 A, which is a visualization of the comparison of the results of Women's data samples with Lo SC, can be seen a decrease in the value of test samples 1 and 2, and in Fig. 3 B and 3 C, a significant increase in the sample score can be seen.

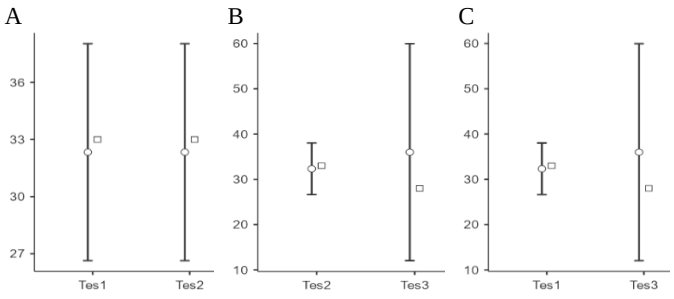

Fig. 4. Comparison of the average test results in a sample of Women with Hi SC.

The Fig. 4 above describes visually the comparison of the average research data that is the object of the Wilcoxon paired sample test, the score for the Women category with Hi SC. In Fig. 4 A. there is a slight decrease in scores in test samples 1 and 2 with the same distribution of data scores on both tests. Fig. 4 B and 4 C show an increase in the average value and a decrease in the median value compared to the average for each test. The spread of sample data scores on each test looks more spread out than the previous period's test.

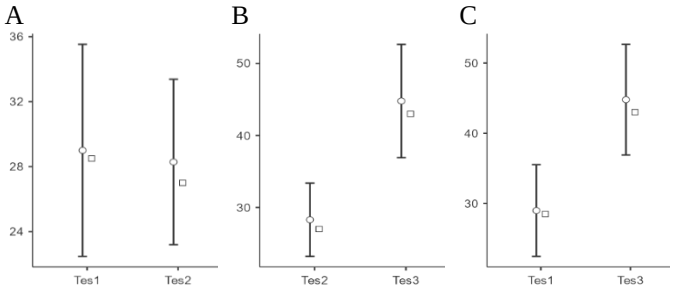

Figure 5. Comparison of the average test results in the Men sample with Lo SC.

In Fig. 5 A, which is a visualization of the comparison of the results of the Men data sample with Lo SC, the mean and median scores on the test sample scores 1 and 2 show a significant increase in the test sample scores, mean and median values.

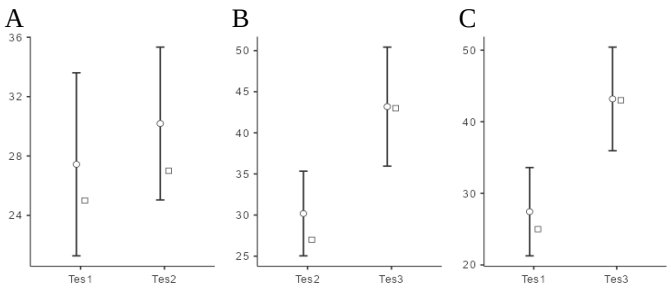

Fig. 6. Comparison of the average test results in the Men sample with Lo SC.

In Fig. 6 A, 6 B, and 6 C which are visualizations of the comparison of the results of the Men data sample with Low SC, there is a significant increase in the mean and median values in the scores of Test samples 1 and 2, Tests 2 and 3, and Tests 1 and 3. The results of the sample scores are seen to increase in Fig. 6 B and 6 C.

IV. Discussion

Several things that can be discussed related to the results of statistical analysis of the data of this study include the results of the significance test of the 1-2 comparison test in all sample categories showing insignificant results, then the comparison of the 2-3 and 1-3 significance tests showing a change which is significant in almost every category of the sample of this study, this can occur with the reinforcement of self-confidence at the time of taking the second cognitive test, except for the sample of Women with high self-confidence. The results of the mean difference test between the results of Test 1 and Test 3 itself experienced a significant increase in all sample categories, both men and women with high and low self-confidence conditions. If you look at the results of the paired Wilcoxon test regarding self-confidence by gender, it reveals that there is a difference in the level of significance, where the level of confidence in the Men sample has a more significant effect on increasing the cognitive ability of the Women sample after going through the entire first and second peer teaching phases. As revealed by the Table III of mean difference test results, the Women sample category looks interesting, where the sample with high self-confidence does not show a significant increase in cognitive ability ($p=0.75$), in contrast to the Women sample with low self-confidence. ($p=0.031$). (Sheldrake *et al*., 2022). The over-confidence condition itself is not good if it occurs to students and everyone within the academic scope of physical education in schools and sports achievements, where students or athletes find it easy to face challenges in learning situations, exams, or competitions they are facing. This is evident in the sample category of men who have low self-confidence where there is an increasingly significant increase in the quality of cognitive abilities after being given reinforcement in the middle of this study, with a significance comparison of $p=0.944$ to $p=0.011$, which confirms previous research where confidence self is a strong determinant of risky financial behavior and accounts for most of the gender gap (Cupák *et al*., 2021). There is a need for a program related to commitment to receiving materials that increase resilience, self-confidence, and emotional regulation to improve performance and achieve success (Oguntuase & Sun, 2022), simulation-based experience (Üzen Cura *et al*., 2020), (Fuglsang *et al*., 2022), peer assessment as a valuable learning experience as part of research methods training and critical skills development., proper planning and training with peer teaching to improve communication skills among students (Mohamad *et al*., 2012), Teacher-guided Peer Assisted Learning to be used as an independent teaching method (Veerabhadrappa *et al*., 2021), and the application of several learning styles simultaneously (Villadiego, 2022). In the end, the teacher must pay attention to every event that occurs in the room and in different teams to avoid loss of

motivation and self-confidence to keep students focused on the main goal of the activity goal, which is to raise enthusiasm (Macías-Guillén *et al*., 2021). Based on the discussion above, we can conclude several things including the influence of the confidence condition of the samples on the improvement of their learning and cognitive achievement, regardless of the level of confidence they have in both high and low categories. There is a positive effect of reinforcement in improving the quality of peer teaching-learning. The over-confidence condition has an unproductive effect on increasing the learning outcomes of the samples, and this can apply to other competitive aspects. The confidence possessed by the Men sample has a more consistent effect than the Women sample, both in peer teaching learning before and after reinforcement is carried out.

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2) Yudho, F. H. P. (2022). Self and Guided Discovery Learning and Their Influence on Learning Outcomes in Higher Education. *Jurnal Sinestesia*, 12(1), 28–36.
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