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Original Article

The effect of self-management strategies on improving task performance in students with learning disabilities

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Abstract

Introduction: Behavioral self-management approach offers some promising implications for improving independent task performance in all students particularly ones with learning disabilities. The purpose of this study was to investigate the effects of self-management training on task performance in students diagnosed as learning disabled.

Methods: The participants were five students with learning disabilities attending in sub-specialty psychological clinics in Tabriz, Iran. Changing criterion design as a type of single-subject design applied, and data were gathered during each baseline and treatment sessions.

Results: Training in self-management strategies was conducted in 12 sessions of 45 minutes. The self-management training improved students' task performance and increased their academic productivity and accuracy.

Conclusion: Practical implications and recommendations for school psychologists, teachers, and clinicians for appropriate application of self-management strategies are discussed.

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Introduction

Learning disability (LD) refers to a lifelong disorder.[1] Results from impairments in one or several basic psychological processes. The difficulties are appeared in the areas of listening, thinking, speaking, reading, writing and/or math calculations but does not result from audiovisual-motor disabilities, mental retardation, or emotional disorders.[2] Low rates psychological processes in students with LD,[3] cause some problems in acquisition, assimilation, memorization, and retention of subject matter.[4] Based on low rates of processing there is a poor performance in academics than expected.[5]

The number of students with LD is increasing.[6] Researchers have estimated the prevalence of LD between 1 and 3%.[7] LD originates in genetic and environmental factors[8] but the underlying causes of LD has not been known yet.[9]

Although students' achievement has been attributed to aptitude, quality of teaching, home environment, researchers and teachers have also recognized that self-regulation strategies play an important role in academic

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achievement.[10] Students with LD have weak executive skills and thus difficulties with homework.[11,12] Similarly, they have problems managing practical and behavioral functions and using self-regulation strategies, especially planning, examining results, self-direction, and the use of cognitive and meta-cognitive processes and controlling thought. The students must receive special education to achieve academic and behavioral criteria.[10] Self-regulated learning is a conceptual model that can be utilized in designing and implementing individual learning strategies.[13]

Despite the importance of self-regulation or self-management strategies, there are limited research findings concerning the effects of these strategies on academic achievement in students with LD. In one study, Choi and Chung showed that self-regulation allows students with LD to manage their own behavior and improve their academic achievement.[14] Teaching self-management strategies to students with behavioral difficulties also improve academic accuracy and productivity.[15]

The most common applied self-management strategies in the past studies include self-evaluation, self-control, self-education, and self-reinforcement.[16] The self-management technique utilized in these studies were somewhat different. In addition, different components of academic performance (accuracy, task duration, and productivity) have been measured.

Regarding the importance of studying self-management techniques among LD students' academic performance and limited research findings in the field, the study aimed to examine the effects of teaching self-management on homework performance. The study hypothesis was as follows:

Teaching behavioral self-management strategies will improve homework performance (the number of correct accomplished tasks and attention in problem solving) in students with LD.

Methods

The participants included children and adolescents who were clients of sub-specialty psychological clinics in Tabriz, Iran. Table 1 shows the participants' demographic characteristics. After diagnosis and referral, five students with LD (1 female and 4 males) participated voluntarily in the study with their parents' written permission. Description of the participants/cases is as follows:

Case 1: Zahra

She was a 12-year-old girl, curious with high social interactions. She was distinguished with LD and introduced to researcher by a psychiatrist. Based on Raven's test, her general intelligence quotient (IQ) was estimated 102. She looks for an excuse when she is doing her assignments. She leaves a problem incomplete and inquires another problem. She is immediately involved in distraction due to the smallest change at environment. Her medical history shows that she has not had a special difficulty before birth. Zahra is the first child of a four-person family structure (she has a smaller brother). Her school history indicates that her performance has been appropriate in kindergarten but fails in her current grade. She has an average performance in reading and composition and poor performance in math.

Case 2: Alireza

He was an 8-year-old and shy, quiet and laconic boy. Her general IQ was estimated 112. The outcome resulted in childhood development history shows that he is effective and introvert behaviorally. When he deals with an assignment with little complexity, he is involved in stress and says with himself that the assignment is difficulty,

Table 1. Participants' demographic characteristics

Participant	Age	Gender	Primary school grade	Type of learning disorder
1	12	F	6	Mathematics disorder
2	8	M	2	Mathematics disorder
3	8	M	2	Anxiety and reading disorder
4	8	M	2	Math disorder
5	10	M	4	Writing and composition disorder

and I cannot do. Therefore, he easily encounters frustration. Alireza lives in a three-person family. His communication with peer indicates that this child is not interested in communicating with peer and has fewer tendencies to play with them. His school history indicates that his performance has been weak in kindergarten and is average in her current grade. He has failure in some subjects, like math.

Case 3: Amirreza

He was 8-year-old, quiet, compassionate boy, and draws others' attention. Based on Raven's test, his general IQ was estimated 123. He is the first child in a four-person family. His mother describes his temperament as a child who seems sad, is irregular in his homework, does not participate in group works, and hates new occupations. His medical history shows that he has not had any difficulty before and after birth. His school history indicates that he is not interested in memorizing and doing assignments. His performance is appropriate in math and spelling, but he experiences difficulties in reading and comprehension.

Case 4: Mohammad

He is 8-year-old, quiet, kind, shy and laconic. He is early tired of doing the assignment. He is not interested in schooling. He is immediately involved in distraction due to the smallest change at the environment. Mohammad is the first child in the four-person family (he has a smaller sister). His mother describes his behavior as a child who is very aggressive and nervous, hates going to school, and is not interested in schooling and does never do his assignments. Instead of paying attention to a teacher's speech and lesson, he considers around. His school history indicates that he is average in reading but poor in spelling and math.

Case 5: Amirhossein

He was 10-year-old with IQ nearly 106. He was compassionate and sociable but forgetful boy. He forgot most of the time what assignment he did. He was easily distracted. He was a single child in the three-person family structure. His development history showed that, except for telling alphabet and reading, he was normal in all skills. His school history indicates that he has been normal in kindergarten and is a low performance in her current grade. He has poor performance in reading and spelling.

Experimental design

A single-subject changing criterion design was utilized in the study. Two stages (baseline and intervention) of the single-subject experimental design were followed. The students' behavior was observed and recorded through baseline and intervention phases.

First, during baseline, the number of corrected tasks and duration of doing assignments were recorded for each student on the separated graphs as indicatives of the academic performance. In the intervention phase, initially, criteria for performance were accurately determined, and data points for student's performance recorded. The criteria for performance were gradually increased during the experimental sessions. The ultimate goal was to achieve the highest determined criterion. The sessions for each single subject design were about 12 on average.

Direct observation of behavior was used as the main measurement technique. The observation was conducted by a researcher twice a week. Academic performance was operationally defined in terms of corrected tasks (productivity) and duration of doing assignments (accuracy). Each session, the percentages of on-task and off-task behaviors were exactly recorded in behavior record sheet as an indicative of performance. The duration of students' off-task behaviors was subtracted from the duration of work on assignments.[17] Moreover, the number of corrected tasks has been recorded as another performance measure. Inter-observer reliability was obtained 83.33.

In addition, child history form and Raven's intelligence test were utilized for collecting information about participants and the important elements were included in the case descriptions.

Child history form was developed to collect the developmental, behavioral, social, and academic history for each child. Information was requested about the position of the child in the family, parents, and siblings; the child's difficulties; developmental stage; schooling history; relations with peers and behavior at home; interests; and academic achievement. General health information was gathered about difficulties during gestation, time of birth, after birth and childhood period.[18]

Raven's colored progressive matrices (36 items) were used. Research shows that Raven's progressive matrices have good validity and reliability.[19]

Instructional package

The instructional package was prepared based on available scientific resources and texts.[13,20-31] The content validity of the instructional package was checked by three clinicians with expertise in the field. The content of each instrumental session has been operationally detailed (Table 2).

First session: Goal behavior specification and its operational definition

In this phase, at first, the goal behavior is determined, expressed and operationally and understandably defined for a participant. The participant is motivated to execute the self-management strategy (the trainer was telling a story about a child who has difficulty doing assignments, but she/he could succeed with her/his efforts after applying self-management strategy).

Second session: Teaching self-monitoring

First, session is reminded and questions are asked about doing the assignment. To teach self-monitoring method, the child was initially taught on-task and off-task behaviors to separate these behaviors. After teaching, children answered questions to ensure learning the concepts.

Third session: Teaching self-evaluation

Self-evaluation is understandably defined for children (e.g., they look at their behaviors whether they pay attention to do assignment or not. When a teacher beats on a table, children must look at their behavior that is why they see whether they pay attention to it or not.)

After teaching self-evaluation, data recording was taught (well, we write down how to notice on a record sheet).

Fourth session: Teaching data record

In this phase, we showed a record sheet and table, the number of correctly done assignments to participants, and data record was taught.

Fifth session: Teaching how to draw graph for the behavior

After reminding, the child about the last session and asking questions about that an example of the drawn graph from participant's behaviors is shown. Then, the effectiveness of behavior graph is understandably provided. After drawing a graph for a goal behavior, participants are taught to draw their own graphs.

Sixth session: Self-reinforcement training

The child was provided with a definition of self-reinforcement. A criterion for the target behavior for her/his next performance level was determined and discussed. The child received a reward if the desired criterion was attained. These criteria were maintained through the last session.

Table 2. Summary of treatment sessions and phases

Session	Self-management session
Session 1	Target behavior identification and operational definition
Session 2	Self-monitoring training
Session 3	Self-assessment training
Session 4	Instruction of data recording
Session 5	Training for drawing a diagram for own behavior
Session 6	Self-reinforcement training

Results

Tables 3 and 4 were present means and standard deviations of productivity (the number of correctly performed tasks) and accuracy (on task behavior) in the baseline and treatment phases, effect size, and recovery percentage for each participant. As shown in the tables, a high percentage of on-task behaviors and correctly performed tasks were observed in the treatment phase in students with LD.

As shown in table 3, the effect size and recovery percentage were 1.72 (151.89) for S1, 1.58 (83.00) for S2, 1.85 (41.59) for S3, 1.78 (234.90) for S4, and 1.88 (154.41) for S5, respectively. S1, S4, and S5 had the most percentage of recovery, respectively. Thus, the accuracy in doing assignments (on-task behavior) in these participants has been improved.

Table 4 shows the data for the number of correctly performed tasks for each student as an indicative of productivity. The effect size and recovery percentage were 1.77 (183.33) for S1, 1.89 (200.00) for S2, 1.87 (60.00) for S3, 1.82 (128.57) for S4, and 1.68 (153.84) for S5, respectively. S2, S1, and S5 had the most percentage of recovery, respectively.

Figures 1-5 shows the percentage of on-task behaviors for students. In these diagrams, dashed lines indicated the criteria set for each set of sessions. On-task behavior in students was consistently higher than both baseline and criterion. Figures 6-10 represent the number of correctly performed tasks per participant. As indicated, in the treatment phase, the number of correctly performed tasks increased compared with the baseline phase.

According to figure 1, the highest percentage of on-task behavior was 50 at the baseline phase for 6, 7, and 8th sessions as criterion line. At 9, 10 and 11th sessions, on-task behavior placed higher than criterion line. At the sessions (14, 13, and 14), it was fairly higher than criterion line. At the final sessions (17, 16 and 15), it was less than criterion line.

According to figure 2, the oscillation was observed at on-task behavior at the sessions (6, 7 and 8) where it was placed lower than criterion line for the session 6, fairly higher than criterion line for the session 7, and higher than the session for the session 8 (87.0%). At the sessions (9 and 11), it was on criterion line and lower than criterion line at the session 10. At the sessions (12, 13 and 14), it was placed higher than criterion line. And at sessions (15, 16 and 17), it was placed on criterion line.

Table 3. The effect size of treatment for on-task behavior and recovery percentage

Subjects	Base line mean	Treatment line mean	Base line standard deviation	Treatment standard deviation	Total standard deviation	Effect size	Recovery percentage
S1	38.46	76.74	6.89	15.10	22.18	1.72	151.89
S2	53.17	83.62	15.45	12.35	19.21	1.58	83.00
S3	56.66	85.02	6.11	10.22	15.26	1.85	41.59
S4	26.72	80.21	7.64	15.56	28.50	1.78	234.90
S5	32.20	71.89	5.10	13.38	42.71	1.88	154.41

Table 4. The effect size of treatment for the correct answers and recovery percentage

Subjects	Base line mean	Treatment line mean	Base line standard deviation	Treatment standard deviation	Total standard deviation	Effect size	Recovery percentage
S1	23.00	70.41	8.36	16.98	26.67	1.77	183.33
S2	25.00	69.16	3.53	12.58	23.28	1.89	200.00
S3	49.00	74.16	6.51	6.68	13.45	1.87	60.00
S4	28.00	68.33	8.36	12.85	22.13	1.82	128.57
S5	30.70	71.73	5.68	17.76	24.42	1.68	153.84

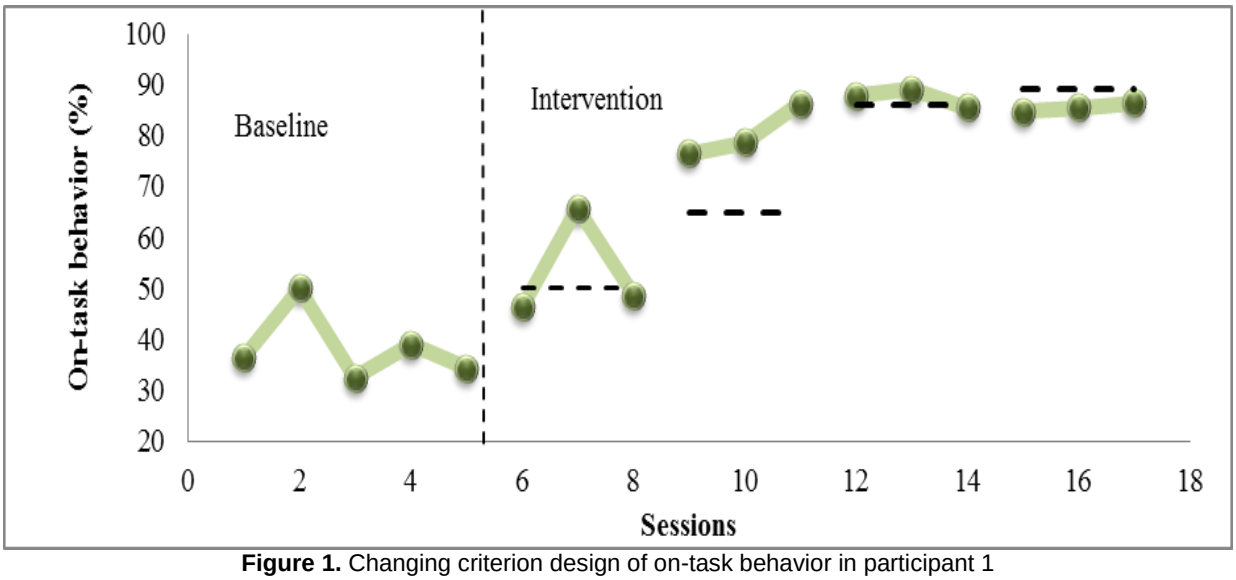

Figure 1. Changing criterion design of on-task behavior in participant 1

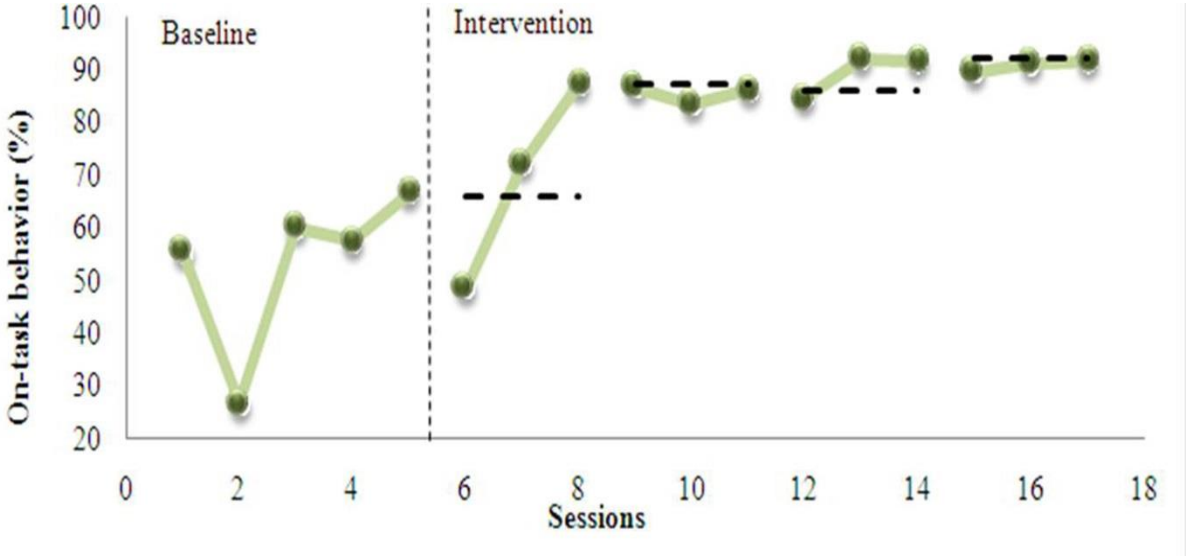

Figure 2. Changing criterion design of on-task behavior in participant 2

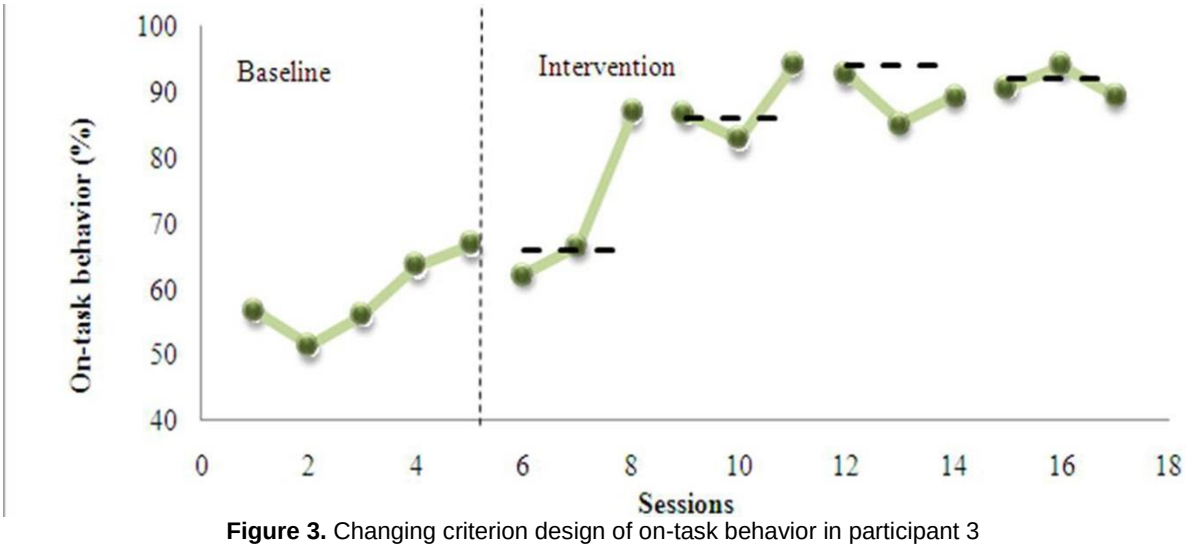

Figure 3. Changing criterion design of on-task behavior in participant 3

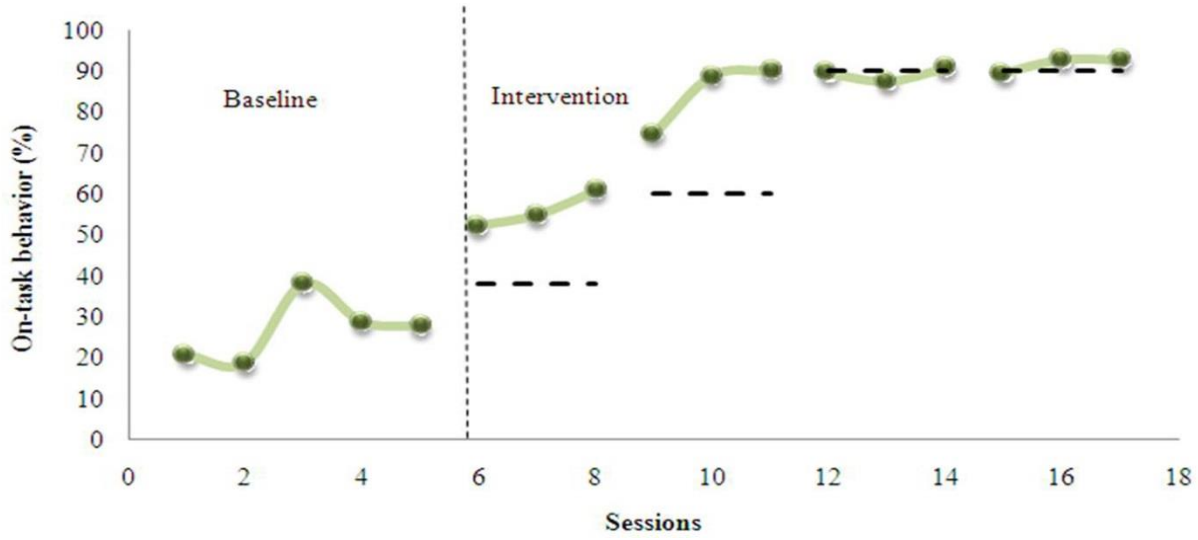

Figure 4. Changing criterion design of on-task behavior in participant 4

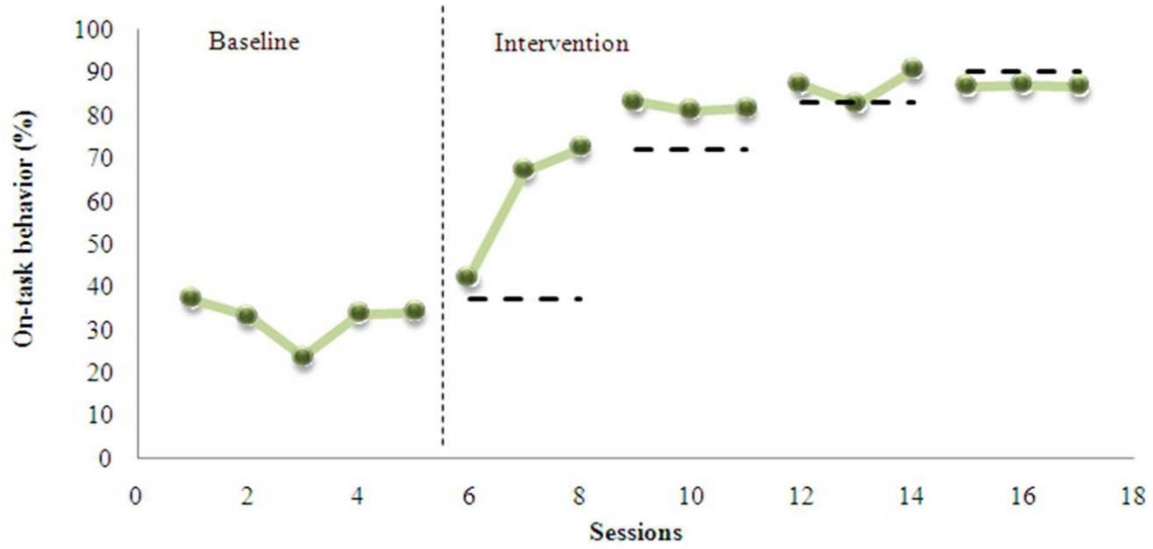

Figure 5. Changing criterion design of on-task behavior in participant 5

According to figure 3, the highest percentage of on-task behavior was 66 at the baseline phase for 6, 7, and 8th sessions as criterion line. At 9 and 10th sessions, on-task behavior placed rather higher than criterion line, but it was higher than criterion line for the session 11. At the sessions (12, 13, and 14), it was lower than criterion line. At the final sessions (15, 16 and 17), it was fairly on criterion line.

Based on figure 4, the highest percentage of on-task behavior was 66 at the baseline phase for 6, 7 and 8th sessions as criterion line. At 9, 10 and 11th sessions, on-task behavior placed much higher than criterion line. At the sessions (12, 13, and 14), it was on criterion line. At the final sessions (15, 16 and 17), it was fairly close to criterion line.

Based on figure 5, the highest percentage of on-task behavior was 37 at the baseline phase for 6, 7 and 8th sessions as criterion line. At 9, 10 and 11th sessions, on-task behavior placed higher than criterion line. At the sessions (12, 13, and 14), it was fairly close to criterion line. At the final sessions (15, 16 and 17), it was fairly lower than criterion line.

Based on figure 6, the highest percentage of correct answers was 30 at the baseline phase for 6, 7 and 8th sessions as criterion line. At 9, 10 and 11th sessions, correct answers were placed higher than criterion line. At the sessions (12 and 14), it was on

criterion line, but at the session 13, it was higher than criterion line. At the final sessions (15, 16 and 17), it was lower than criterion line.

Based on figure 7, the little oscillation was observed correct answers at the sessions (6, 7 and 8) where it was placed higher than criterion line. At 9, 10 and 11th sessions, correct answers were placed close to criterion line. At the sessions 12, it was lower than criterion line, but at the session 13, it was on criterion line, and at the session 14, it was placed higher than criterion line. At the final sessions (15, 16 and 17), it was higher than criterion line.

Based on figure 8, the little oscillation was observed correct answers higher than 50.0% at the sessions (6, 7 and 8) where it was placed higher than criterion line. At 9, 10 and 11th sessions, correct answers were placed rather higher than criterion line. At the sessions (12, 13 and 14), it was lower than criterion line; At the final sessions (15, 16 and 17), it was on criterion line.

Based on figure 9, the number of correct answers increased and at the sessions (6, 7 and 8) where it was placed higher than criterion line. At 9, 10 and 11th sessions, correct answers were placed much higher than criterion line. At the sessions (12, 13 and 14), it was rather higher than criterion line; At the final sessions (15, 16 and 17), it was fairly close to criterion line.

Based on figure 10, at the treatment phase, the number of correct answers was 38.0% and at the sessions (6, 7 and 8) where it was placed higher than criterion line. At 9, 10 and 11th sessions, the number of correct answers was 57.0% and its curve was placed higher than criterion line. At the sessions (12, 13 and 14), it was rather lower than criterion line; At the final sessions (15, 16 and 17), it was fairly lower than criterion line.

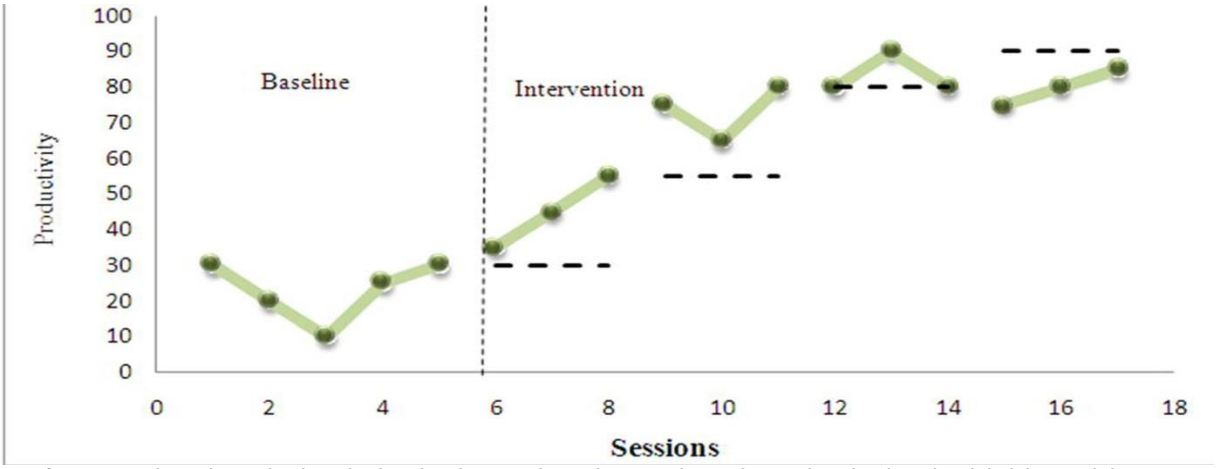

Figure 6. Changing criterion design for the number of correctly performed tasks (productivity) in participant 1

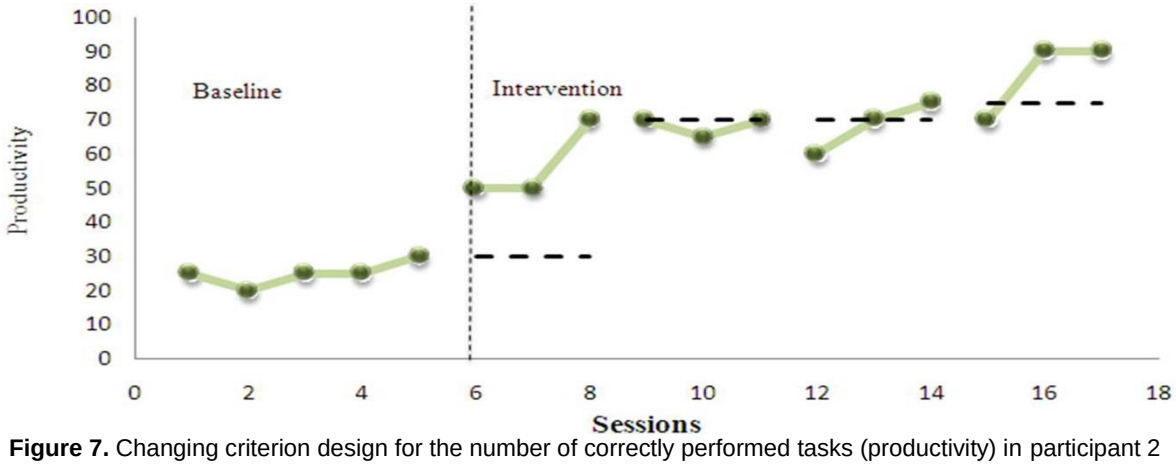

Figure 7. Changing criterion design for the number of correctly performed tasks (productivity) in participant 2

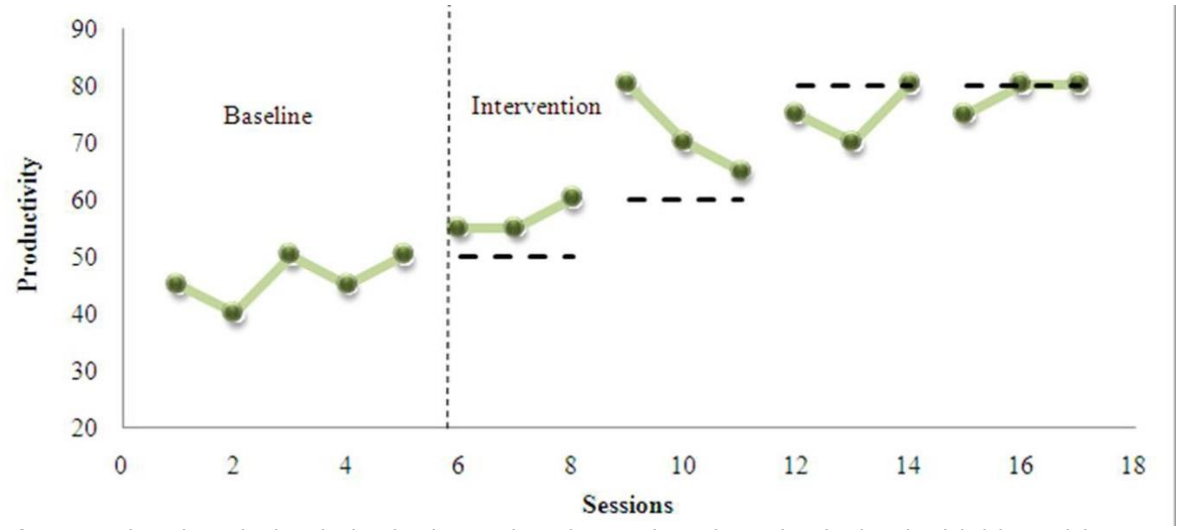

Figure 8. Changing criterion design for the number of correctly performed tasks (productivity) in participant 3

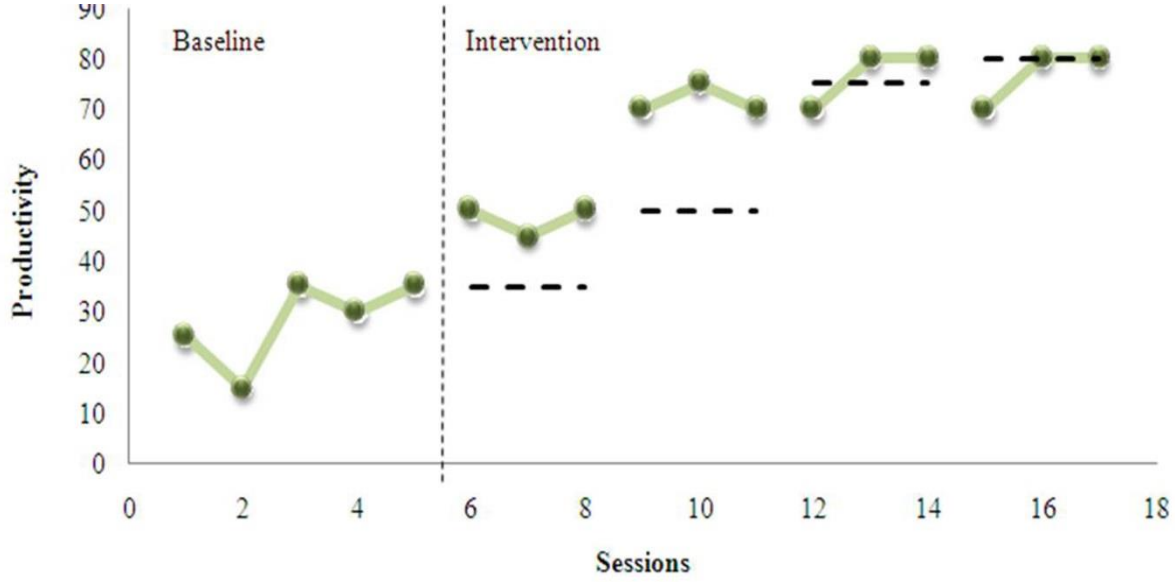

Figure 9. Changing criterion design for the number of correctly performed tasks (productivity) in participant 4

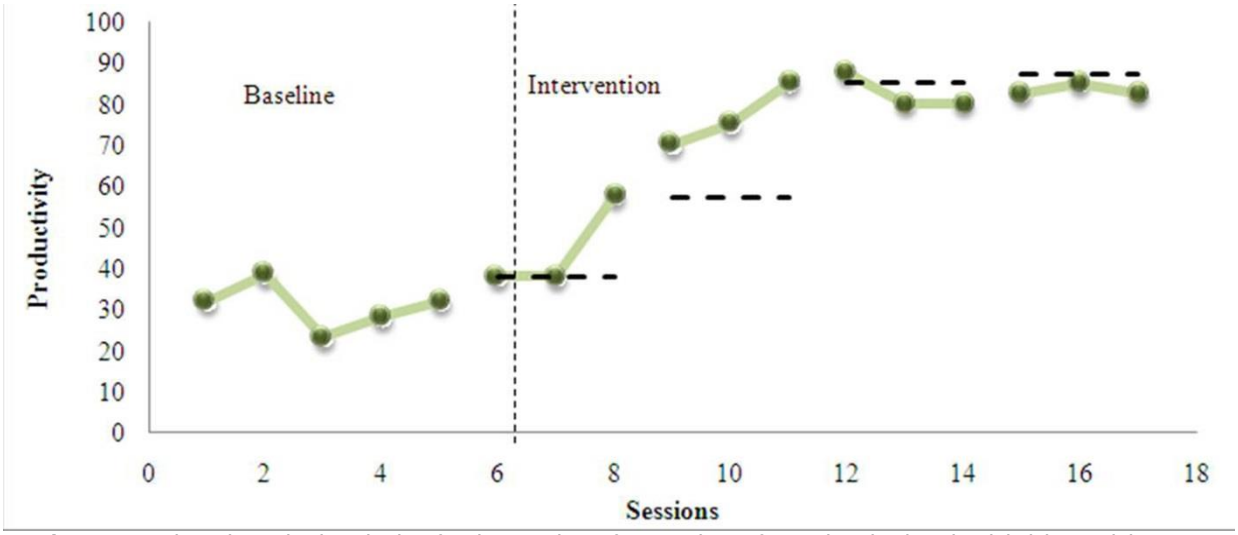

Figure 10. Changing criterion design for the number of correctly performed tasks (productivity) in participant 5

Discussion

The present study was designed to assess the effects of self-management strategy on the performance of doing assignments in students with LD. In general, the results showed that the training of self-management improved students' performance.

The improvements were observed in on-task behaviors and number of correctly performed tasks in each student as the indicators of accuracy and productivity respectively. This suggests that the self-management intervention is effective in improving doing assignments and is consistent with the results of previous research.[25,29-34] Thomas[31] studied the effect of self-assessment of accuracy on doing students' assignment using an ABAB design. Research results indicated the behavior of doing assignment has considerably augmented in self-management phases. Ramalho et al.[29] used a self-instructional strategy to regulate attention in attention deficit/hyperactivity disorder (ADHD) students. Their results showed that a self-instructional strategy enhances students' attention compared with ones without this instruction.

The present study was also consistent with other research on using self-monitoring as a cognitive method in participants. For instance, Rock and Thead[30] came to a conclusion that self-monitoring improved students' school performance and enhanced self-management in them.

Joseph and Eveleigh's[13] research findings suggested that students acted to fulfill task of reading when they monitored their behaviors. Maag et al.[25] showed that self-monitoring improved students' accuracy in doing assignments and enhanced their correctly performed responses. Zhang et al.[34] indicated that using a self-monitoring strategy had an effect on the students who had low achievement and improved their problems. Goddard and Sendi[33] investigated the effect of self-monitoring strategies on writing performance in students with writing disability and concluded that using a self-monitoring strategy effect the students and increase their interest in writing.

Four aspects are common to all self-regulation theories. First, learners actively participate in their own learning. Second, learners can control and regulate some aspects of cognition (such as goal setting, application, and control of cognitive strategies), motivation (similar to self-efficiency ideas, value of task, interests), behavior (like help-seeking, maintenance and control of attempts and time), learning environment characteristics (e.g., appraisal and control on modification of task conditions). Third, learners have criteria to assess and determine whether special processes must be continued or changed. Fourth, cognitive self-regulation, motivation and own behavior mediate the connection between a person and the particular situation.[35]

The application of self-management strategies in this study applied these four aspects of self-regulation for individuals who need to learn how to do homework assignments. Based on information processing theory, the first step to the improvement of task performance is attention to the task. Until attention is focused, no new information can be gathered. Hence, the application of the strategy improves the students' attention and allows them to process information at an individualized rate. As a result, the students can self-assess and monitor their own achievement.

Another explanation of the students' difficulties with homework assignments is that they are not aware of their lack of attention to problem solving and are easily distracted. Self-monitoring helps them assess and control attention, and be more involved in performing tasks. The time duration allocated to learning by these students with LD at baseline was very brief. Since there is a strong relationship between time allocated for doing assignments and successful problem solving, the more time is devoted to doing assignments, the higher the probability of good achievement. Application of this self-assessment strategy increases the time devoted to doing assignments.

Based on Conderman[10] studies, most

students with LD have difficulty managing academic and behavioral functions and self-management strategies, especially planning, examining results, self-direction, application of cognitive and meta-cognitive processes, and control of thoughts. The application of self-management strategies increases their awareness of the knowledge and ability needed for doing assignments and orders cognitive activities. A student needs to compare present behaviors with a criterion or standard.

According to Dowker[3] and Grant and Grant,[4] students with LD have a weakness in information processing, acquisition, assimilation, and retention of subject matters. The application of self-monitoring allows students to control their own information processing and correctly store information in long-term memory. Based on motivation, the factors that strengthen students' self-efficacy include prediction of consequences, observation of actions, and awareness of goals. Students with LD typically do not have a positive feeling about their abilities. Continuous failures and poor achievement may cause learned helplessness behaviors in these students. Hong et al.[36] indicated that the application of this strategy may augment success experiences and motivation to do assignments in students.

Goddard and Sendi[33] reported that most students with LD initially have no motivation to begin to do assignments. This problem is decomposed by self-monitoring and self-reinforcement, and the student's interest is heightened. When a student finds that she has the ability to accomplish as task, more self-confidence and self-efficacy is gained, leading to more goal-directed behaviors. The student begins to ascribe the outcome to specific behaviors, improving self-management, responsibility, power, and independence.

The limitations of this study are related to the use of a convenience sampling method. Generalization of the results should be made cautiously. It is suggested that such studies be conducted with more participants to investigate the precise effects of self-management strategy and define accurate and useful methods for data collection. The results may be helpful for teachers, parents, specialists of behavioral sciences who wish to teach self-management strategies in classrooms or at home.

Conclusion

The study revealed the determinant effect of self-management training strategy on improving the components of task performance in students who diagnosed as LD. Students' on-task behaviors (as the indicator of accuracy) and correctly performed tasks (as the indicator of productivity) gradually increased through the experimental phases of a single-participant changing criterion design. The implications of these finding are significant especially for applied settings. Educating self-management strategy to teachers, academic and educational counselors to teach the strategy to their students may boost general school achievement.

In addition, teaching this technique to parents in the context of the parent management training program could improve students' homework performance. However, considering the limitations of the study, conducting large-scale school-based research and follow-up studies could help generalization of the findings. In addition, self-management strategy as a potent behavioral modification technique may be applicable to other disability groups including students with ADHD, children with autism spectrum disorders, intellectually disabled students and other related groups. The effect of self-management technique to these relevant groups should be evaluated in the future research at educational and clinical conditions.

Conflict of Interests

Authors have no conflict of interest.

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