The Effect of Social and Token Economy Reinforcements on Academic Achievement of Students with Intellectual Disabilities

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Objective: This study investigates the effect of social and token economy reinforcements on academic achievement of 9th grade boy students with intellectual disabilities in an experimental science class in Tehran Province.

Method: The method used for this study was experimental by pre-test, post- test with a control group. The boy students with intellectual disabilities from three junior high schools participated in this study. The sample consisted of thirty, 9th grade boy students with intellectual disabilities in the selected schools; the schools were chosen by the multi-stage cluster method. To measure the progress of students in the science class, a teacher made test and the Wechsler intelligence test for matching the groups for IQ were used. To ensure validity, the content validity criteria depended tests calculated by the Lashe method and teachers' perspective were used. The reliability coefficient was obtained by the reliability coefficient of related tests; the percent agreement method and the obtained data were analyzed using one-way variance analysis and Shefe prosecution test.

Results: The results showed that there was a significant increase in academic achievement of students with intellectual disabilities when using token economy than using social reinforcements compared with the control group. Also, when using social reinforcements, the academic achievement of students was more than the control group.

Conclusion: Token economy and social reinforcements increased the academic achievement of students with intellectual disabilities in the science class; and also the effect of token economy reinforcements was more than social reinforcements on the subjects.

Key words: *Educational status, Intellectual disability, Reinforcements, Reward, Token economy*

Those with significant limitations in intellectual functioning and adaptive behavior whose problems are created before they reach 18, are categorized as having intellectual disability (1). This group form about 2 to 3 percent of the population of every society (2). Due to the fact that mentally retarded students have difficulty learning abstract material, objectivity should be emphasized in their training, and they must observe the outcome of their behavior immediately (3). Therefore, educational methods that emphasize the objectivity and outcome of behavior for mentally retarded students will have more occasions. In operant behaviorism, outcomes play an important role in learning a new behavior (4). In operant behaviorism, motivation comes in from understanding the relationship between behavior and outcome (5). In this approach, the outcome of behavior will be reinforcement that in general can be divided in two categories of internal

and external, and may be positive or negative. External reinforcement includes the types of phenomena, objects and events that are outside the individual, such as score, money, food, etc (4). They may also be called rewards (6). The positive reinforcements can be defined as social reinforcements and token economy reinforcements.

Social reinforcements (including attention, appreciation and encouragement), which are often rewarded by toys or food are more valuable. Other samples, fondling, and referring to the shoulder like to encourage students, encouraging words (fore others), to sign consent nod, or smile and smile with approval means a lot that can be (7). All teachers know when students appreciated because of their positive behavior; they tend less to search and considering inappropriate behavior. In contrast, when a student trying to be overlooked considering, the probability of learning disturbance increases (8). In exchange for giving the award to

achieve optimal activity and a strong tendency towards it has caused many researchers to think that instead of just the main stimulus causing extraneous stimulus to motivate the students to be (Weeks, 2006). If teachers give more attention and care to mentally retarded students, they will progress better in their class activities (9).

Token economy reinforcements can be a piece of paper, stars, chips, nuts (metal, wood or plastic) which are given to students after they have shown a desirable behavior; and later, they can exchange it for food, cookies or other favorite reinforcements (10). An example for the token economy system in schools for students with special needs can be as follows: the student receives a special sign or mark due to a favorable performance , and when he/she reaches a certain level of seals, he/she can change them with a prize, or cash are edible (11). If the students properly recognize the consequences of their various behaviors, reinforcements will be delightful to them, so the golden point is that teachers should make it clear for students how they can be admired or how to acquire the chips (12).

Thomson (2006) offered six key factors for successful economic system chips, and they are as follows: chips can be counted; the clear definition of target behavior; the need to strengthen supplement; a system for exchange of chips; systems for data entry and ability to perform by the staff. While that is used special class token economy system and to load has brought favorable results (13). One of the first uses of token economy was academic achievement for mentally retarded students that needed a comprehensive system designed for timing, use of continuous and appropriate related behavior because the chips should be easily accessible, can dispense and are related to try and make visible progress (14).

 Long ago, professionals were interested in education to strengthen the relationship between students' reinforcement and their academic achievement. Hardman et al (2007) studied 27 subjects with mental retardation and used chips which were interchangeable with candy, whistle or trinket. They found that this method had prominent effects on the academic skills of these students (15).

kord (2003) in a research which was conducted in Boukan city with a sample of 140 individuals, found that the results of feedback, in a variety of ways, including verbal, written, or combined, effected academic achievement. They further noted that written feedback is more effective compared with verbal feedback (16).

Abarqhuie (1998) in a research to determine the effectiveness of token reinforcement to reduce educational failure and increase motivation in a group of 40 guidance school students (20 male and 20 female), indicated that using the method of token reinforcement in which the cards are given by delayed is more effective than lack of using this method (17)

Haji Ali Mohammadi (1994) found that the application

of token reinforcements on academic achievement in social sciences was effective; also he found that token reinforcements will increase the academic achievement motivation of students who have problems in academic advancement (18).

Although Lipman and Goldberg (1973) had suggested that reinforcements are positive, (especially social reinforcements and token economy reinforcements are more important for mentally retarded children than normal children (19), no research was done to investigate the effect of social reinforcements on the academic achievement of students with mental retardation. In general, in previous studies, effectiveness of a positive token economy reinforcements on achievement have been documented, but no research was found on the effect of social reinforcements on academic achievement either on normal students or on mentally retarded. In addition, no study has been conducted about which group of reinforcements effect academic achievement more(especially academic achievement of mental retardation) In fact, the present study is going to answer the following question: whether the effectiveness of token economy reinforcement and social reinforcement on achievement is different for students with mental retardation in a science course ?

Materials and Method

This study is an experimental designed pre-test - post-test, with a control group.

Subjects

The population of the study included 98 mentally retarded male students in the third grade at guidance schools in Tehran province 2009-2010 school year. Students' selection was done through a multistage cluster; a sample of 30 mentally retarded students was selected. In the sampling process, three cities of Varamin, Rey and Karaj were randomly selected form cities of Tehran province. Then a school was selected from each city, and 10 students with the age range of 13 to 17 years whose IQ was between 60 to 70 were randomly selected from each school. The subjects did not have any disabilities other than mental retardation.

Instruments

The Wechsler Intelligence Scale for Children -Revised: This scale includes sub-tests that are conducted individually and offers three IQ scores: 1) verbal IQ; 2) non-verbal IQ; 3) general IQ. A Persian version of scale was prepared for normal children aged 6 to 13 years (original version for ages 6 to 16 years and 11 months). Reliability coefficient was calculated by two half way methods for sub-tests of non-verbal and verbal (other than numerical memory, which is made up of two different parts, and encoding which is a speed test), using Spearman Brown corrected correlation coefficient, which were from 0.42 to 0.98 with a median coefficients of 0.69. Reliability coefficient of the test was calculated through test retest

that ranged from 0.44 to 0.94, and only two cases (account sub-test and encoding) were below these values. The obtained reliability coefficient median was 0.73 (20).

To determine validity; Shahim et al., compared this scale with the Wechsler Preschool and Primary Scale intelligence and obtained correlation coefficients of verbal, non-verbal and global IQ to be 0.84, 0.74 and 0.85 respectively (20).

Achievement tests in science class: Chapter 3 of the science book for the 9th graders contains eight lessons. This chapter was selected ,and parallel tests were designed for each lesson that the questions were descriptive, and each test included 6 questions. A total of 16 teacher- made tests that were similar for all the three groups were used to evaluate students' progress in learning chapter 3 of the science book. To evaluate the validity of the tests, the content validity criterion-related tests and opinion of several teachers who taught this level were used. The Lashe method was used to calculate carcass content validity index. The validity coefficients for the eight tests of the first forms were: 0.94, 0.96, 0.92, 0.95, 0.92, 0.90, 0.89, 0.92, respectively; and for the eight tests of the second form they were: 0.93, 0.93, 0.95, 0.97, 0.91, 0.91, 0.91, 0.94. To determine the reliability criterion-related reliability coefficient tests, percent agreement method was used, because the tests used in this study were criterion-related. The reliability coefficient for the eight tests of the first form was: 0.89, 0.86, 0.91, 0.84, 0.87, 0.90, 0.89, 0.92; and the reliability coefficient for the eight tests of the second form was: 0.88, 0.94, 0. 93, 0.93, 0.89, 0.90, 0.87, and 0.91.

Procedure

To conduct the research, a referral was obtained from the management of special education department of districts of Tehran. Then, using multistage cluster sampling, three cities from Tehran province were chosen, and a school from each city was also selected. Finally, 10 students whose age range was from 13 to 17 and their IQ was between 60 to 70 were randomly selected. They did not have any disabilities other than mental retardation. Then, each student was assigned in one of the following three groups: token economy reinforcements; social reinforcements; and control group. Then, the third chapter of the science book for the ninth grade class that included eight lessons was selected. Then, the procedure of teaching the eight lessons of chapter3 was taught to the three selected teachers in two sessions. The three teachers were taught how to use the lecture method, talk to students about the course subjects, ask questions, conduct experiment for them, and to show them samples and models. In other words, integrated method was used for training (21). Before teachers start teaching the first evaluation of achievement in science course (it was mentioned in the instrument section) conducted in three days for all three groups of the students. It included eight tests for eight courses of the chapter. The mean

scores of the eight tests were calculated and considered as a pretest score. At the next step, it was explained to the students how and when they will receive reinforcement, and the conditions of receiving it. In addition, a list of reinforcements and how they will receive them was provided to students in the token economy and strengthen social reinforcements group. The type of token was determined for the token economy reinforcements group, and the procedure of exchanging the token to reinforcements was clearly explained. In order to determine which student and to what extent to be strengthened, an absolute criterion was used in which four grade of A, B, C, D, and E were given to students according to percentage of their correct answers. Grade "A" was given to those students who scored 90% or more; grade "B" to those who provided correct answers to 80 to 89% of the questions; grade "C" to students who provided correct answers to 70 to 79% of the questions; grade D to those who provided correct answers to 60 to 69% of the questions; and grade "E" was given to the students who provided correct answers to less than 60% of the test questions (4). In this study, reinforcement was provided only to students who have obtained grades A, B and C. In the next step of this research project, the lesson was taught and reinforcement was provided to the token economy and social reinforcement groups by trained teachers. The teachers in both groups of the token economy and social reinforcements taught each lesson in two sessions. At the beginning of the third session, the students were evaluated and then the new lesson was taught. The tests were checked and scores were given by three science teachers, and the mean of these scores was considered as the score of the student in that lesson. At the beginning of the next session, those students whose score was A, B or C were given a chance to choose a reinforcement from the list, and then the teaching continued. It should be mentioned that reinforcements were not provided to the control group. Of course, the token economy reinforcement group could keep their chips and replace them with their precious reinforcements (from their perspective). The teacher in the control group did not provide reinforcements to the students; however, the same method of teaching, number of training sessions and exams were provided for all the three groups of students. Table 1 and 2 provide more details about social and token economy reinforcements, respectively. Finally, the content of the eight lessons were taught to students in 16 sessions. At the end, the mean score of the students in three groups in eight tests of academic achievement was considered as posttest. The difference between the scores of pretest and posttest was calculated; and using one-way analysis of variance and Shefe prosecution test, the obtained data were analyzed.

Results

The age range of three groups is indicated in Table 3. The comparison of the mean scores of achievement in

Table 1. List of Social reinforcements

Score A	Score B	Score C
Appreciation with install photo in board	Appreciation on the whiteboard	Responsible for collecting work units
Appreciation in school web site	Designing a class or hall bulletin board	Responsible for the presence and present in class
Appreciation morning program	Encourage in class	Responsible assignments
Appreciation parent meeting	Educated in class	Responsible for bringing Class notebook
Latter sent home	Performed stunt in class	Going out first
Membering on group hymn of school	View game in class	First performed
Membering on sport team of school	View computer game in class	Reading books with high vocal
Working at the school store	Helping the teacher	Sitting at the teachers desk
Working at the library	Helping in another classroom	Writing or drawing on the blackboard
Hygiene assist	Reading the morning announcements	Using more library
Sport assist	Becoming representative of class	Give extra time out
Protects of school	Becoming moderators	Calling home
Trophy	Allowing a extra activity on class such as	Encouragement verbal with confirm
Plaque	birthday	Care plant class

Table 2. List of Token economy reinforcements

Gift	Token	Gift	Token	Gift	Token
Raisins	3	Stickers	9	Pencil chains	16
Peanuts	3	Notebook	10	Gloves	16
Hazelnut	4	Shoulder	1	Flaks single	17
Pistachio	5	Toothbrush	11	Jump Rope	17
Cake	5	Toothpaste	11	Cinema tickets	18
Cookie	5	Puzzles	11	Sunglasses	18
Biscuit	5	Socks	12	Wristwatch	19
Milk	5	Bubble pipe	12	Football goal	19
Fruit	6	Key chains	12	T-shirt	20
Water Fruit	6	Yoyo	13	Sneaker	20
Decal	6	Note pads	13	Tennis paddle	20
Whistle	6	Novel	13	Sport paddle	21
Pencil	7	Spray	14	Light reading	21
Lathe	7	Different films	14	Sports clothing	22
Eraser	7	Wallet	14	White board	22
Pens	8	Belt	15	Travel blanket	23
Ruler	8	Colored pencils	15	Field trip	23
Caddy	9	Boxes of crayons	16	Camera	24

Table 1. The age range of three groups

Group	No.	Minimum	Maximum	Mean	SD
Token	10	13	17	14.60	1.26
Social reinforcements	10	13	17	14.40	1.34
Control	10	13	16	14.70	1.15

Table 2. Comparison of pre-and post-test mean achievement test in science class experiment three groups; Token, Social reinforcements and control

group	test	No.	Mean	SD	Differences between Means	f	p-value
Token	pre	10	3.4	1.34	13.28		
	post	10	16.01	0.848			
Social reinforcements	pre	10	3.5	1.58	11.02	33.26	<0.001
	post	10	14.52	0.62			
Control	pre	10	3.4	1.42	10.21		
	post	10	13.61	1.27			

Table 3. Scheffe test results for comparison of mean achievement scores in science class experiment three groups; Token, Social reinforcements and control

Target group	Compared group	The mean difference	standard error	p-value
Token	Social reinforcements	2.26	0.841	0.002
	Control	3.07	0.841	<0.001
Social reinforcements	Control	0.81	0.841	0.021

science course between the three groups of the mentally retarded students (the token economy reinforcements, social reinforcements and control groups) are presented in Table 3.

In addition, because of differences between the groups, Shefe prosecution test was used, and the results are presented in the Table 4. According to Table 3, there is a significant difference in academic achievement between the three groups of the token economy reinforcements, social reinforcements and control (p<0.001). Table 4 demonstrates the difference between groups.

As demonstrated in Table 4, the mean scores of achievement in science course was significantly higher in the token economy reinforcement group than the social reinforcement group (p =0.002) and the control group (p<0.001). Furthermore, the mean scores of achievement in the science course was significantly higher in the social reinforcement group than the control group (p =0.021).

Discussion

This study aimed to compare the effectiveness of social reinforcements and token economy reinforcements on academic achievement of mentally retarded students in a science course. According to findings of this study, mentally retarded students in groups of token economy reinforcements and social reinforcements have indicated more academic achievement in the science course than the control group. Also, the token economy reinforcement group has indicated more academic achievement in science course than the social reinforcement group.

 The results of the first section of the present research (indicating token economy reinforcements group make more academic achievement) is consistent with previous research findings. Scott and Porter have investigated the effect of token reinforcement on behavioral discipline, active participation and academic achievement of normal students and mental retarded students in regular primary and secondary levels in a sample of 750 students. Based on the findings of their research, academic achievement in normal students and mentally retarded students increased significantly in regular primary and secondary levels (22). Keller in a research found that food as a token economy reinforcement has the most impact on academic achievement (23). Hardman et al., in a research study on 27 mentally retarded subjects used tokens that could be exchanged with sweets, whistles or costume jewellery. They found that the token economy reinforcement has a significant effect on academic skills (15).

Kord   investigated   the   effect   of   feedback reinforcements on academic achievement of a science course of 140 male students at the fifth grade of elementary level. He found that the feedback reinforcements in various forms, including verbal, written or a combination are more effective on academic achievement (16). Abarqhuie found that

token economy reinforcements were effective to decrease the educational failure and increase motivation of academic achievement of 20 boy and 20 girl students (17). Soltani in a study found that sport rewards were effective on academic achievement of 32 students of the fourth level of elementary school (24). Haji Ali Mohammadi, found that the token economy reinforcements were effective on academic achievement of a social science course; also he found that the token economy reinforcement method increased motivation of academic achievement of failed students (18).

The more effectiveness of token reinforcements on academic achievement in a science course of mentally retarded students may be justified by noting that mentally retarded students consider material reinforcements more important, and social reinforcements are less attractive to them.

Limitations

Small sample size is the most important limitation of the present research. Irregular presentation of students in class is another limitation of the present study. Also, only boys were included in this study. Future research could provide further enquieries regarding the relationship between different reinforces and academic achievement, particularly in mentally retarded boys and girls students.

Conclusion

Token economy and social reinforcements increase the academic achievement of students with intellectual disabilities in the science class; and also the effect of token economy reinforcements is more than social reinforcements on students. Appreciation and thanks We sincerely thank the respected management of exceptional training department of city of Tehran province and respected management of Noor-e Islam in Varamin, Taher in Ray ;and the Parsi Arbabi in Karaj exceptional schools helped us in implementation of the research.

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