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Research paper

Improving the reading skills of Jordanian students with auditory discrimination problems

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Abstract

Background: Some of the developmental problems facing students with difficulties in learning are those related to auditory perception which, in turn, can negatively affect the individual's learning process.
Aim: Evaluating a training program prepared to develop the auditory discrimination skills of students who suffer from auditory discrimination problems.
Design: A quasi-experimental research design was used in this study. The study sample was divided into two equal groups: experimental and control.
Participants and setting: The population of the study consists of students with learning difficulties from the second, third and fourth grades, whose ages range between 7-9 years old. Also involved were those enrolled in the resource rooms affiliated to the Jordanian Ministry of Education in Irbid province, amounting to (120) boy and girl students for the school year 2013- 2014.
Results: The study showed that there was a significant difference in favor of the experimental group which indicated that the training program was effective. It helped the students with auditory discrimination problems to improve their reading skills. The results also showed a significant difference in favor of the students of older age in the experimental group. At the same time there were no significant differences in reading performance changes concerning gender.

Keywords: *Auditory Discrimination; Jordan; Learning Disability; Reading Skills; Special Education; Training Program.*

1. Introduction

Healthcare providers (HCPs) caring for children with auditory discrimination problems are faced with the challenges of what is right or wrong in their daily work (Gill and Fazil, 2013; Batiha, 2014). Their children may need specific learning situations, special instruments, or individually adapted daily activities. Children and their families might have little awareness of their actual health problems (Brown et al 2003; ALBashtawy et al. 2014). Thus, HCPs might experience being stuck between family and child or between legal activities and what they consider best for their child.
Some of the developmental difficulties facing students with problems in learning are difficulties related to auditory perception, which can negatively affect their learning performance (Boliek et al., 2010).
Deficiency in auditory perception is considered more visible among children with difficulties in learning than average students with no learning problems (Batiha & AL Bashtawy 2013; Alais et al., 2015). Therefore, it is necessary to use appropriate therapeutic methods in order to reduce these problems, which appear in the form of disturbances in the interpretation of the auditory stimuli that accompanies learning difficulties (Alais et al. 2015).
Auditory perception affects the success of the reading process, as the ability to analyze, sequence and remember auditory stimuli is considered essential in reading skill. The more efficient the child indistinguishing among different sounds and syllables of a word, the better becomes his or her level of reading. Usually students with difficulties in reading fail to perceive the acoustic structure of the spoken language, whether at the level of the word or at the level of the sentence (Ahmmed et al., 2014).
The United States Department of Education in 1977 defined 'learning difficulty' as disorders in one or more aspects of the basic psychological processes related to the understanding and use of spoken and written language. Its symptoms include inability to listen or think or speak or read or perform arithmetic calculations. Learning difficulty may result from perceptual or brain impairment or mild cerebral insufficiency or language difficulties, verbal aphasia or dyslexia; so such difficulties are not resulting from other disabilities, such as mental or emotional retardation or cultural deprivation (Kass, & Maddux, 2005).

1.1. The characteristics of children with learning difficulties

1.1.1. Perception disorders

Perceptual disorders include auditory, visual or physical disorders. A child with a visual perception disorder may face difficulties in writing letters correctly or distinguishing between pentacle and hexagon shapes. A child with an auditory perception disorder cannot distinguish between sounds; for example s/he may not be able to differentiate between a bus bell and the ringing tone of the telephone (Moossavi et al., 2014; Tawalbeh et al., 2013).
A child with auditory perception difficulties also suffers from auditory remembering and auditory distinguishing difficulties, a matter which may lead to lack of attention during the lesson. Such a child finds difficulty in remembering sounds of letters which

form words, as well as in remembering information and information sequences (Moossavi et al., 2014).

1.1.2. Deficit of attention

Some students with learning difficulties suffer from deficit of attention accompanied by excessive activity. Estimates show that around 20% of pupils who are identified as pupils with learning difficulties suffer from attention disorders accompanied by excessive physical activity (Andersen et al., 2013).

1.1.3. Auditory/optical synergy difficulties

Some cases of learning difficulties suffer with problems from large and precise physical skills or physical auditory/ optical synergy (Apola-Piokowska, 2011).

1.1.4. Memory disorders

Students with learning difficulties show problems in remembering things, and that includes auditory and visual memory disorders (Andersen et al., 2013).

1.1.5. Writing difficulties

Some cases of learning difficulties cause individuals to suffer from writing difficulties, such as lack of mastering the shape and size of a letter and lack of control over spaces between letters; as well as making spelling errors (Datchuk & Kubina, 2013).

1.1.6. Low academic achievement

Low academic achievement is one of the aspects/features associated with students with learning difficulties. Such aspects are not common in all subjects but are found in some subjects (Scheffler et al., 2009).

1.1.7. Low self-concept

Lerner (2000) states that according to research, children with learning difficulties have negative self-images as they feel unsafe and adopt a negative self-vision that they are incompetent to deal with life. The low levels of self-esteem and self-respect of students with learning difficulties may well be due to low levels of academic achievement and their failure in building social relations, combined with feelings of failure and depression. It also appears that therapeutic/ remedial teaching requires the building of a strong positive and supportive relationship between teacher and student.

1.1.8. Social difficulties

Merser (1997) noted that students with learning difficulties are weak in social skills, compared with normal students, as students with learning difficulties suffer from difficulty in building, developing and maintaining personal relations with others; hence they tend to perceive social situations negatively. Such students feel they are unlikeable or unliked by their fellow students, and that they are often forgotten by the people in their community.

The suffering of students with learning difficulties appears in their perceptions; in order to address these difficulties, it is necessary to develop special auditory training programs for them, as they perceive things differently. It is wrong to put pressure on them because it makes them feel that they have failed and are unable to perceive and discriminate, as they are in need of special means to help them with their learning (Filippini, et al. 2013). Perceptual processes are considered prerequisites to learning to read, because developmental learning difficulties represented in the synthesis of sounds (auditory perception) are one of the main reasons that prevent a child from learning to read (Herrmann, 2012; Al-Bashtawy et al., 2014).

The aim of this present study is to help students with auditory discrimination problems to improve their reading skills. This will be attempted through the following objectives:

1) To decide if there are any significant differences in the auditory discrimination between the experimental group and the control group attributed to the effect/impact of the training program which was employed with the experimental group for the academic year 2013/2014.
2) To know if there are any significant differences in the auditory discrimination skills in the experimental groups attributed to the effect of age.
3) To know if there are any significant differences in the auditory discrimination skills in the experimental groups attributed to the effect of gender/ sex.

2. Method

2.1. Design

A quasi-experimental research design was used in this study. The study sample was divided into two equal groups: experimental and control. The experimental group received training on a program that was developed by the researcher to improve the reading skills of students who suffer from auditory discrimination problems. After one academic year of training, both groups went through a test that was designed to measure the effect of the training program on the experimental group and to consider the effect of the difference in age and gender on the development process.

2.2. Ethical issues

The Institutional Review Board (IRB) at University of Granada, Spain, and Philadelphia University, Jordan approved the present study. The researchers informed students of the study's purpose and its outcomes. Informed consent was attained through the provision of an information cover letter which outlined the confidentiality of the data. Participants were assured that participation in the study was voluntary, and would in no way affect their grades. The researchers had no conflict of interest.

2.3. Study tools

The auditory discrimination test is an evaluation tool which aims to identify the ability of a child to discriminate between sounds of letters and words in the Arabic language. Auditory discrimination is considered as one of the important perceptual abilities associated with children's development of language and pronunciation. The purpose of the test is:

- To detect any auditory discrimination difficulties and their resulting pronunciation difficulties.
- To investigate developmental aspects of acquiring language.
- To evaluate the perceptual and auditory problems for children.
- To provide diagnostic information to teachers who design treatment/ remedial programs for speech and language problems.

The test consists of 40 pairs of words and is individually applied. The test has two forms and the maximum possible mark of the test is 30, as the number of paragraphs is 40. Thirty paragraphs fall under a different column and 10 fall under a symmetrical column; only the 30 paragraphs which fall under the different column are corrected. The other 10 paragraphs, which fall under the symmetrical column, are intended to ensure an honest answer by the tested individual. The meaning of the raw mark/ tag is extracted from the standard mark and mean equivalences for each age category (Al Waqfi, & Al Keylani. 1998).

3. Results

The population of the study consists of 120 students with learning difficulties from the second, third and fourth grades whose ages range between 7-9 years old, and those enrolled in the resource rooms affiliated to the Jordanian Ministry of Education in Irbid province for the school academic year 2013- 2014 (Table 1).

Table 1: Distribution of the Sample Individuals

	Number	Categories
Group	60	Experimental
	60	Control
Gender	50	Male
	70	Female
Age	38	7 years
	40	8 years
	42	9 years

The results of this study have been presented through answering the following study questions:

3.1. The first question: are there any significant differences in the auditory discrimination between the experimental group and the control group attributed to the effect/impact of the training program?

To answer this question, arithmetic means and standard deviations have been extracted for auditory discrimination skills as per the group variable. To explain statistical differences between arithmetic means, a't' test has been used, as explained in table 2:

Table 2: The Post (T) Test, the Arithmetic Means and Standard Deviation According to the Variable of Group (Experimental Vs. Control) on the Auditory Discrimination Skills

	Group	N	Mean	Std. Deviation	T	Df	Sig. (2-tailed)
Pre discrimination	Experimental	60	27.33	2.297	1.077	118	.283
	Control	60	26.60	4.745			
Post discrimination	Experimental	60	29.33	.774	3.388	118	.001
	Control	60	27.50	4.119			

It appears from table 2 that there are differences of statistical significance ($\alpha = 0.05$) attributed to the effect of the group on all sub-skills and in the overall marks and the differences were in favor of the experimental group.

3.2. The second question: are there any significant differences in the auditory discrimination skills in the experimental groups attributed to the effect of age?

To answer this question, arithmetic means and standard deviations for auditory discrimination skills have been extracted from the experimental group, as per age variable; see table 3 below.

Table 3: Arithmetic Means and Standard Deviations for Auditory Discrimination Skills of the Experimental Group as Per Age Variable

	Age	N	Mean	Std. Deviation
Post discrimination	7	19	29.05	.911
	8	20	29.25	.786
	9	21	29.67	.483
	Total	60	29.33	.774

Table 3 shows apparent correlation in the arithmetic means and standard deviations for auditory discrimination skills for the experimental group due to the differences in the categories of age variable. To explain the significance of statistical differences between arithmetic means, unilateral contrast analysis has been used as per table 4.

Table 4: Unilateral Contrast Analysis of the Effect of Age on the Auditory Discrimination for the Experimental Group

		Sum of Squares	Df	Mean Square	F	Sig.
Post discrimination	Between Groups	3.969	2	1.985	3.607	.034
	Within Groups	31.364	57	.550		
	Total	35.333	59			

It appears from table 4 that there are differences of statistical significance at the 0.05 level, attributed to age in discrimination and achievement. To explain the paired statistical significant differences between arithmetic means, dimensional comparisons are used in a verbal manner, as stated in table 5, while there appear no differences of statistical significance in the remaining skills and in the total marks.

Table 5: Post Hoc Tests, Age Multiple Comparisons, Scheffe

Dependent Variable	Age (I)	Age (J)	Mean Difference (I-J)	Std. Error	Sig.
Post discrimination	7	8	-.20	.238	.710
		9	-.61(*)	.235	.040
	8	7	.20	.238	.710
		9	-.42	.232	.208
	9	7	.61(*)	.235	.040
		8	.42	.232	.208

* The mean difference is significant at the .05 level.

It appears from table 5:

- The existence of differences of statistical significance ($\alpha = 0.05$) between the age groups 7 and 9, and the differences have been in favor of the age category 9 in discrimination.
- The existence of differences of statistical significance ($\alpha = 0.05$) between the age group 9 on the one hand and age groups 7 and 8 on the other hand, and the differences have been in favor of the age category 9 in achievement.

3.3. The third question: are there any significant differences in the auditory discrimination skills in the experimental groups attributed to the effect of gender/ sex?

To answer this question, arithmetic means and standard deviations for auditory discrimination skills have been extracted for the experimental group as a gender variable. To explain statistical differences between arithmetic means, a "t" test has been used. Table 6 below sets out the data.

Table 6: Arithmetic Means and Standard Deviations and "T" Test for the Experimental Group as Per Gender Variable Effect on the Auditory Discrimination Skills

	Gender	N	Mean	Std. Deviation	T	Df	Sig. (2-tailed)
Post discrimination	Male	25	29.24	.879	-.787	58	.434
	Female	35	29.40	.695			

It appears from table 6 that there are no differences of statistical significance ($\alpha = 0.05$) attributed to the effect of gender in all sub-skills and the total marks.

To summarise the results of the study; it appears that there was a significant correlation in favor of the experimental group as a result of the training they got, which means the students benefited from the training program and their achievements in auditory discrimination were better than their scores before the training. The age also proved to have a significant correlation in the auditory discrimination in favor of the older students (age 9) who achieved better results than the younger students (age 7 and 8). Finally, the study showed that there was no significant correlation in the auditory discrimination, when it comes to the gender factor. Both male

and female students in the experimental group achieved almost the same results in auditory discrimination posttest.

4. Discussion

The study aims at building a training program for the development of auditory discrimination skills and explaining its effect on reading achievement for students with learning difficulties in Jordan.

4.1. Discussion of results related to the first question: "are there any significant differences in auditory discrimination between the experimental group and the control group attributed to the effect/impact of the training program?"

Results have revealed the existence of differences of statistical significance at the 0.05 level attributed to the effect of the program in all skills and in the overall marks, as the differences have been in favor of the experimental group which was exposed to the training program.
The previous results agree with the results of the study conducted by Dietrich (1994) which revealed the existence of improvement in the skills of decoding and comprehension of reading for the individuals in the experimental group, the members of which received training.

4.2. Discussion of results related to the second question: "are there any significant differences in the auditory discrimination skills in the experimental groups attributed to the effect of age?"

Results related to this question have revealed the existence of differences of statistical significance at the 0.05 level in the auditory discrimination skills in the experimental group, attributed to the effect of age, as the differences have been in favor of the age group of 9 years.
The result agrees with the conclusions of a study conducted by Cherry & Kruger (1983) which indicated that the performance of children at the age of 8 years was significantly better than the performance of children at the age of 7 years in listening skills.

4.3. Discussion of results related to the third question: "are there any significant differences in the auditory discrimination skills in the experimental groups attributed to the effect of gender/ sex?"

Results related to this question revealed the existence of differences of statistical significance at the 0.05 level in the auditory discrimination skills in the experimental group attributed to sex.
The previous result agrees with the conclusions of a study conducted by Othman (2010) which revealed the non-existence of differences of statistical significance (at the level of $\alpha = 0.05$) in the characteristics of reading between male and female students with learning difficulties. The result of the current study also differs from the conclusions of a study conducted by Al-Natour et al. (2008) which revealed existence of differences of statistical significance on the memory scale attributed to sex variable.
The researcher has been precise in providing training opportunities to all students of the experimental group. Training sessions were conducted individually or in groups all of which contributed to a large extent to creating similar educational environment; therefore, there have been no differences attributed to sex variable.

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