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The Effectiveness of a Training Program Using Differentiated Instruction to Improve the Reading Skill of Jordanian Third Graders With Learning Difficulties

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***Abstract*—This study aims to explore the effectiveness of a training reading program consisting of six units and multiple activities using the differentiated instruction strategy on the reading comprehension improvement of Jordanian third graders with learning difficulties. A total of 120 Jordanian third graders with learning difficulties from 17 governmental schools in Amman participated in the study. About 90 of them were categorized under an experimental group and taught using the differentiated strategy and were then divided into three groups based on their preferred learning styles: kinesthetic, auditory, and visual, while the remaining 30 students were categorized under a control group and taught using the traditional strategy of teaching. The findings showed an important impact of the differentiated instruction strategy on the improvement of the reading comprehension skill of Jordanian students with learning difficulties. Furthermore, the findings showed the importance of the use of the preferred learning styles of students in the teaching process.**

***Index Terms*—differentiated instruction, Jordanian children, learning difficulties, reading skill**

I. Introduction

Teaching is a precious mission that requires teachers to teach and convey different concepts, information, topic, etc. to students effectively. It involves the use of different learning styles and the concentration on different skills such as reading, writing, listening, and speaking. However, the different levels of students in terms of learning abilities, preferences, and styles may become barriers to achieving such a mission. Therefore, differentiated instruction has been considered an effective strategy to achieve the goals of teaching (Tomlinson, 2001, 2014; Al-Hulaisi, 2012; Sheerafa et al. 2019; Al-Badareen, 2021).

A. Differentiated Instruction

Sheerafa et al. (2019) defined differentiated instruction as an effective strategy used by teachers in which the students' diversity in a class is taken into the account. This diversity is represented in terms of the students' learning capacities, learning development, interests, attitudes, and readiness levels. Therefore, differentiated instruction is an effective approach which demonstrates that each student is taught by using a strategy that is suitable to his/her own level or learning needs (Sheerafa et al., 2019). Bob and Anderson (2007) stated that differentiated instruction is drawn basically from the teachers' awareness of the differences in learners' interests, styles, and preferences to motivate and engage students in addition to developing their academic growth. He added that teachers believe that every student is unique and needs his/her own learning strategies. Therefore, the teachers may differentiate on the basis of the student's readiness and the difficulty of the material being taught in class. However, the utmost goal of teachers is to include all students in the class environment without any exceptions. The Differentiated Instruction Model suggested by Tomlinson (2001), Tomlinson (2014), and Tomlinson and Imbeau (2010) indicated that such a model consists of four elements; content, process, product, and environment. The content refers to the material and the mechanisms used by the teacher and not all students should be given the same content. While the process or the instructional strategies refer to the different activities or methods that are used to teach the students on the basis of students' preferences and styles. The product, on the other hand, refers to the means used to see what the students have learned. Some of the students may

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prefer to express what have learned through written means while some may prefer technological or social means (Reis & Renzulli, 2018). Finally, the environment refers to the community of learning where the students and teacher grow in respect. It might be a classroom, a lab, or a trip field. According to this model, Santangelo and Tomlinson (2009) argued that teachers should take into account each student's level of learning and how each responds to the activities employed in the class. Therefore, teachers should use different strategies of instructions with varying degrees of complexity.

Chamberlin and Powers (2010) suggested seven guiding principles for the differentiated instruction which are: (1) Teachers inform students of what is important to learn about a particular subject, (2) Teachers respond to and accept students' differences, (3) All students are expected to be included in the teaching process with no exception, (4) The teaching process is collaborative; students and teacher work together, (5) Differentiated instruction is a proactive approach in that the lesson plans are adjusted according to the students' preferences variance, (6) Time, material, and space are applied to adjust to the students' various needs, and finally (7) Teachers are flexible to use groups and to thus divide students into groups based on their readiness, learning interests and profiles.

Rays et al. (2013) stated that differentiated instruction is characterized by considering the learning styles of students and presenting the skill in a manner suitable to the students' different learning styles and forms. Al-Makahleh (2018) argued that knowing the different learning styles helps teachers to acquire a variety of educational experiences to present the same information in different ways and strategies. He added that the most preferable learning styles among students with reading difficulties are the kinesthetic style, followed by the tactile style, then the auditory style, and finally the visual style. Jaber and Al-Quraan (2004) also indicated that knowing the different learning styles helps teachers to determine the activities, materials, content and evaluation tools given to students. However, the students' differences in learning styles or preferences are still ignored in the education process and thus resorting to differentiated instruction was a good choice to take into account the students' differences.

B. Learning Styles

From the psychological point of view, Jantan and Razali (2002) referred to learning style as the way through which the student obtains information, knowledge, or experience. From the cognitive perspective, Fleming and Baume (2006) referred to learning style as the multiple methods used to create perception and process information to create concepts and principles. Furthermore, Drago and Wagner (2004), referred to learning styles as the individuals' differences towards each learning technique. They added that teachers should be aware of the importance of the use of different learning styles to adhere to the demands of the students' learning styles. Duff (2000) referred to learning style as a cognitive-based, affective, and psychological indicator that demonstrates the way students interact and respond to the learning environment. According to what has been mentioned earlier, the learning style can be defined as the preferred learning strategy that is used by an individual to perceive or obtain knowledge in its different forms, and individuals usually varied in their learning style preferences and may have more than one preferred style.

Different models have been proposed for the learning style such as the Hill Model which focuses on the way information is received, processed, organized, and retrieved to realize and give meanings from the surrounding environment (Honey & Mumford, 2000). These mental patterns depend on personal or family experiences, and personal goals which in turn affect the student's preferred style of learning. Hill also developed a tool to diagnose the student's mental pattern including four basic dimensions that interact with each other to form the mental pattern of an individual, namely, symbols and their meanings, cultural determinants, forms of inference, and educational memory (Honey & Mumford, 2000). In addition to Fleming's VARK Model which focuses on the methods of how the information is received through sense and then processed and retrieved. It also focuses on the brain's representation of experience and methods of receiving stimuli in order to absorb them. This model consists of four preferred learning styles, the visual style, the auditory style, the reading/writing style, and the kinesthetic style (Fleming & Bonwell, 2002).

Reading skill is an essential skill that is considered the cornerstone of learning and its importance stems from its relation to academic achievement. It is also considered the basis of the learning process because it helps the student to recognize and understand the words and content of the text. For example, it is impossible to learn the study materials interactively and functionally without actual proficiency in the skill of reading. According to Al-Waqfi (2011), reading in its modern concept is an intellectual and communicative activity that includes many different and sequential skills such as recognizing letters and words and pronouncing them correctly, understanding, analyzing, criticizing, and interacting with the reader. Wong (2004) reported that reading has four components: phonetics, phonemic awareness, vocabulary, fluency, and reading comprehension. There are many students who have difficulties in reading skills due to a lack of proficiency in the aforementioned components. Those students are diagnosed with reading difficulties. It is worth noting that for students with reading difficulties, it is necessary to identify the appropriate learning styles to teach them and to identify the appropriate activities and methods through which the reading skill can also be taught.

C. Aims and Questions of the Study

The current study aims to investigate the effectiveness of a training program based on differentiated instruction in different learning styles to improve reading comprehension skill for third graders with learning difficulties in Jordan. Particularly, it aims to explore the effectiveness of differentiated instruction strategy i.e., the kinesthetic, auditory, and visual learning styles on the improvement of the reading skill in third graders with learning disabilities. Thus, it aims to answer the following questions:

1. To what extent does the use of the kinesthetic learning style affect statistically the improvement of the reading comprehension skill of third graders with learning difficulties?
2. To what extent does the use of the auditory learning style affect statistically the improvement of the reading comprehension skill of third graders with learning difficulties?
3. To what extent does the use of the visual learning style affect statistically the improvement of the reading comprehension skill of third graders with learning difficulties?
4. Are there any statistically significant differences between the learning styles: kinesthetic, auditory, and visual in improving the reading skill of third graders with learning difficulties?

II. Review of Related Literature

Reis et al. (2011) investigated the impact of the school-wide enrichment model-reading (SEM-R) with differentiated instruction on students' reading fluency and comprehension. A total of 63 teachers and 1,192 second- to- five graders who were enrolled in five elementary schools participated in the study. The findings revealed evident effects in favor of the SEM-R model. They also revealed significant differences in favor of reading fluency in two schools only and in an only high-poverty urban school in favor of reading comprehension. The results also indicated the effectiveness of the SEM-R model with the use of differentiated instruction is much more than the effectiveness of the traditional whole-group basal approach.

Scott (2012), further, explored the extent of improvement in mathematics based on differentiated instruction according to the variables of gender, and academic ability (outstanding and average achievers) based on a semi-experimental design. The sample consisted of three classes for the second grade taught by three teachers in the United States. The results indicated that the effectiveness of differentiated instruction was not comprehensive to a large extent, as the outstanding students benefited greatly, while the average students did not get a significant benefit, however, the gender variable has no statistically significant effects.

Meanwhile, Williams (2012) on the other hand, aimed to investigate the effect of differentiated learning on the performance of students in the seventh grade by assessing mathematics using a repeated measures design. Two different experiments were conducted to monitor the differences between the initial group with the results of the assessment of the University of Texas Test of Knowledge Skills (2011). The results showed differences between the students who were taught using the differentiated instruction and those who were taught using traditional education strategies. The study comprised different learning groups, including special education, the economically disadvantaged, English language learners, and gifted students. To figure out whether these strategies are also effective according to the basis of special learning needs, findings from classroom observations show some lack of effective delivery of educational content by differentiated teaching strategies, highlighting the need for a qualified continuing development and teacher assistance.

Further, Al-Hulaisi (2012) investigated the possible effects that appeared on the academic achievement of sixth graders in the English language using the differentiated instruction strategy at the three levels of Bloom's classification (remembering, understanding, and applying) in Saudi Arabia. About 25 students participated in the experimental group while 28 students participated in the control group. The results revealed statistically significant effective impacts on developing the students' academic achievement due to the use of the differentiated instruction strategy.

Moreover, Al-Mahdawy (2014) examined the impacts of the strategy of differentiated instruction on the academic achievement of second-year students in the biology course, at the levels of analysis, composition, and evaluation according to the levels of Bloom's pyramid of knowledge and total achievement in Saudi Arabia. About 50 students participated in the study who were then divided equally into two groups; experimental and control groups. The results showed evident impacts on the development of the students' educational level because of the use of the differentiated instruction in contrast to the use of the traditional strategy of teaching which was found to be less effective.

Chien (2015) also conducted a study which explored the effects of a differentiated instruction workshop on the activity design prepared by Taiwanese English teachers in elementary schools. The workshop discussed issues related to theoretical concepts, hands-on activities, and lesson demonstration using a differentiated instruction. The workshop revealed that English teachers were competent and skillful in designing options for classroom activities or home assignments using a differentiated instruction. However, the teachers were not competent enough in designing classroom activities for deeper learning objectives or using simple English to clarify choices or designing variant instructional strategies.

Meanwhile, Valiandes (2015) conducted a quasi-experimental study to evaluate the impact of the implementation of a differentiated instruction on students' learning enrolled in mixed-ability classrooms. The sample of the study comprised 24 teachers and 479 fourth graders. The findings showed that the students who were exposed to a differentiated instruction showed better performance and learning progress than students who were not exposed to such instruction. Furthermore, the findings revealed no significant differences in the students' achievements attributed to the socioeconomic status of the students' families. They also showed a significant impact of the quality of a differentiated teaching on the students' progress.

Furthermore, Al-Khatib (2017) attempted to identify the effects of employing the differentiated instruction approach on developing conceptual comprehension and learning processes in science among 74 fifth-grade female students who

were enrolled in Nuseirat Primary School in Gaza. The results revealed statistically significant effects on the post-application of the conceptual comprehension test and the learning processes test on the performance of the students' who were taught using the differentiated strategy.

Shareefa et al. (2019), on the other hand, observed the teachers' perspective on the conceptual definition of differentiated instruction and the challenges they have encountered through their application of such strategy. The sample of the study consisted of 400 teachers divided into 32 special education needs teachers and 368 mainstream teachers in Maldivian schools where inclusive education is implemented. The open-ended questionnaire and semi-instructed interviews were used. The findings showed that teachers' definitions of differentiated instruction depended upon three aspects; the types of strategies being used, the students' diversity, and the advancement of students' learning. On the other hand, the findings indicated that the main challenges that encountered the teachers were about time, number of students in the class, knowledge, available resources, amount of work and support.

Al-Shaqran (2019) also investigated the impact of differentiated instruction on the acquisition of scientific concepts, the skills of the learning process, and the attitude toward science among seventh-grade students in Jordan using a semi-experimental approach. Around 65 male and female students were randomly chosen and then were grouped into two groups. The first group consisted of 31 students who were taught using the differentiated instruction, while the second group consisted of 34 students who were taught by the traditional method. The results showed that differentiated instruction affected significantly the aspects of the acquisition of the scientific concepts and the skills of the learning process in those who were taught through this strategy.

Al-Badareen (2021) further identified the effects of applying the differentiated instruction strategy on developing some reading and writing skills in the Arabic language among third-grade students in Jordan based on a semi-experimental approach. The sample comprised 70 female and male students who were then grouped equally in an experimental group; teaching through the use of differentiated instruction strategy and in a control group; teaching through the traditional strategy. Similar to the previous literature, Al-Badareen (2021)'s results showed evident improvements in the writing and reading skills of the students who were taught by differentiated instruction.

It was quite clear that the previous literature has studied the effectiveness of the use of the differentiated instruction in different subjects such as Science, Arabic, and English languages for different classes in different countries. However, as far as the researchers know, it was only one study which investigated the skills of writing and reading. Furthermore, it was clear that the differentiated instruction has not been applied effectively in studies which investigated the students with learning difficulties, especially, in Jordan except Al-Natour and Siam (2016)'s study. Their study, focused on the challenges that faced teachers while teaching students with learning disabilities using differentiated instruction. Nothing has been mentioned regarding the use of such a strategy to affect any of the four skills i.e. reading, writing, listening, or speaking. Therefore, as far as the researchers know, this study is the first that explored the effectiveness of the differentiated instruction to improve the reading comprehension skill of students with learning difficulties in Jordan.

III. Methods

A. Research Design

This experimental research combines qualitative and quantitative research designs. That is, a total of 120 Jordanian third graders with learning difficulties were chosen randomly to apply an experiment including a training program for reading comprehension skill based on the differentiated instruction strategy in accordance with the students' preferred learning styles. To evaluate the effectiveness of the program, pre- and post- Arabic reading tests were applied with an interval of eight weeks. The data was then collected and analyzed statistically to find the means and standard deviations of the students' performances in both tests in addition to the use of ANCOVA test. After that, the data was then discussed quantitatively to find out the potential effects of the training program.

B. Sample of the Study

The sample of the study comprised 120 Jordanian third graders enrolled in 17 elementary schools in the capital city of Jordan; Amman. Those students were taught in the resource rooms in particular and were selected randomly. The students are officially diagnosed with learning difficulties, reading difficulties in particular, by Jordanian specialists and this is confirmed by the official documents kept in their school files. The students were then divided into two main groups; an experimental group and a control group. The experimental group consisted of 90 students to whom the reading training program based on the differentiated instruction strategy was implemented. They were then divided into three subgroups based on the learning style they preferred. That is, 30 students were taught using the kinesthetic learning style; 30 students were taught using the auditory learning style; and 30 students were taught using the visual learning style. On the other hand, the control group consisted of 30 students who were taught using the traditional teaching strategy.

C. Tools of the Study

(a). Training Reading Program

A training reading program was constructed by referring to the theory of differentiated instruction, and a panel of previous studies such as the studies of (Tomlinson, 2010; Al-Hulaisi, 2012; Sari & Senturk, 2018; and Al-Badareen, 2021). The focus of these studies was on the learning styles of students with learning difficulties and the nature of the activities that must be provided based on the preferred learning style for teaching the reading skill. The coefficient of agreement among the judges was (80%) and above.

The final version of the program consisted of six educational units, each unit contained five gradual activities for teaching the reading skill. The activities were suitable to the student's learning style and level of performance. The activities focused on the basic components of reading so as to cover the reading levels of students with learning difficulties. The units and the activities were presented in a manner that was appropriate to the student's learning style. For instance, for the auditory learners, the focus was on conversation and listening while for the visual learners, the activities were presented through the holistic and analytical methods. The sensory-kinesthetic learners, on the other hand, were taught in an interactive and flexible way in addition to the combination of holistic and analytical methods. The corners strategy was adopted in this study. A group of corners was provided that was compatible with the learning styles of the students. Thus, the resource rooms were provided with a reading corner, where the student went to the corner in a manner intended by the teacher to address certain learning difficulties. Those centers usually include a group of different activities varied in their degree of difficulty and ease. It is worth noting that the more the student was interactive and enjoyed the activities the more he/she got better learning and achieved much better performance.

(b). Learning Style Questionnaire

A valid and reliable questionnaire which was constructed previously by Al-Makahleh (2018) was also used in this study. The purpose of this questionnaire was to find the preferred learning styles of the sample of the study. The questionnaire included (36) items for the three learning styles: visual, auditory, and kinesthetic and each domain consists of 12 paragraphs. The questionnaire was presented to the student's teacher who has been teaching the student for more than a year. To test the validity of the questionnaire, it was presented to a panel of experts in this field. The reliability of the questionnaire was measured using the Cronbach alpha coefficient. For instance, the reliability coefficients for the visual, auditory, kinesthetic, and tactile learning styles were: (0.783), (0.792), (0.756), and (0.774), respectively. These values are considered appropriate and indicative of the reliability of the test.

(c). Arabic Reading Test

An Arabic reading test consisting of four components was constructed. The purpose of this test was to evaluate the effectiveness of the training reading program which was based on the differentiated instruction strategy and it was implemented twice i.e. pre-and post-tests with an interval of eight weeks. Ten paragraphs were provided under each component: phonetic, phonemic awareness, vocabulary, fluency, and reading comprehension. The validity of the test was measured by presenting it to ten Ph.D. holders of special education at The University of Jordan and Al-Balqa Applied University. The researchers took into account all the modifications provided by the experts. The difficulty and discrimination coefficients of the test were measured. The difficulty coefficient was measured based on the correct responses for the paragraphs while the discrimination coefficient was measured by applying the test's items to an exploratory sample from outside the study sample, which consisted of (25) male and female third graders who had learning difficulties in the reading skill. The difficulty coefficients for the test's paragraphs ranged from (38.0-87.0) while the difficulty coefficient for the test as a whole was (46.0). The discrimination coefficients for the test's paragraphs ranged from (39.0-72.3), while the discrimination coefficient for the test as a whole was (56.0). On the other hand, the reliability of the test was measured by applying the test twice to an exploratory sample consisting of 25 students with reading difficulties with an interval of two weeks. Pearson correlation coefficients were calculated for the results of the two implementations of the test, and the reliability coefficients for the test dimensions ranged from (78.0-89.0), and the overall value of the total reliability coefficient for the test was (92.0).

D. Procedure

After the random selection of the sample of the study, the learning style questionnaire was presented to the students' teachers to determine the preferred learning style for each student. After that, the students were divided into three subgroups based on their learning preferences: kinesthetic, auditory, and visual. Then, a training reading program was constructed suitable to the three learning styles and based on the instruction strategy. The teachers were trained to use the program for five days and presented with models for the classes based on the differentiated strategy and then began to apply it for eight weeks. An Arabic reading test was applied twice within an interval of eight weeks in order to evaluate the effectiveness of the training reading program. That is to say, the students were tested before the implementation of the program and then were retested after eight weeks of teaching. The data from the pre-and post-tests were collected and analyzed statistically.

IV. Results and Discussion

This section is devoted to presenting the statistical results and the comprehensive discussion of the data collected concerning the study's questions and objectives. Particularly speaking, the study aims to explore the effectiveness of the

use of the differentiated instruction strategy on the kinesthetic, auditory, and visual learning styles on the improvement of the reading comprehension skill in third graders with learning difficulties.

A. Results

This section presents the statistical results concerning the data collected from the performances of the third graders with learning difficulties on the pre-and post- Arabic reading tests on each learning style; kinesthetic, auditory, and visual after the implementation of the training reading program which is based on the differentiated strategy in separate three subsections. It also presents the results regarding the data collected from the performances of the third graders with learning difficulties who were taught using the traditional strategy of teaching on the pre-and post-Arabic reading tests. Then, the results of the performances of the third graders on each learning style are compared together in one subsection to find out the most effective learning style for the improvement of reading comprehension skill.

(a). Results of the Performance of Third Graders Using the Kinesthetic Learning Style

To figure out whether there are any statistically significant differences in improving the reading comprehension skill of third-grade students with learning difficulties in using the kinesthetic learning style based on the differentiated instruction, pre and post-Arabic reading tests were conducted. Table 1 shows the means and standard deviations of the performances of the experimental group (i.e. using kinesthetic style) and control group (traditional way of teaching) on the pre-and post- tests, respectively.

TABLE 1
MEANS AND STANDARD DEVIATIONS OF THE PERFORMANCES OF THE EXPERIMENTAL (I.E. USING KINESTHETIC STYLE) AND CONTROL GROUPS (TRADITIONAL WAY OF TEACHING) ON THE PRE- AND POST- TESTS

Group	N	Pre-test		Post- test		Adjusted averages	
		Mean	Std.	Mean	Std.	adjusted average	SE
Experimental group (using kinesthetic learning)	30	9.00	5.38	20.37	3.77	20.46	.561
Control group	30	9.40	5.95	13.53	4.26	13.44	.561
Total	60	9.20	5.63	16.95	5.27	16.95	.561

Table 1 reveals significant statistical differences in the means and standard deviations of the reading skill's test between the experimental group who was taught using the kinesthetic learning style based on the differentiated instruction (i.e. M=9.00, Std.= 5.38 and M= 20.37, Std.= 3.77) and the control group who was taught using the traditional strategy (i.e. M=9.40, Std.=5.95 and M= 13.53, Std.= 4.26) in the pre-and post- tests, respectively. Table 1 shows that the difference was in favor of the experimental group. Therefore, to determine whether these differences are statistically significant, ANCOVA analysis was conducted. See Table 2.

TABLE 2
RESULTS OF ANCOVA FOR THE DIFFERENCES BETWEEN THE EXPERIMENTAL AND CONTROL GROUPS USING THE KINESTHETIC LEARNING STYLE

Source of variance	**SS**	**DF**	**MS**	**F-Value**	**P-Value**	**Effect size**
Pre-test (total)	401.276	1	401.276	42.581	.000	.428
Group	737.998	1	737.998	78.312	.000*	.579
Error	537.157	57	9.424			
Total	1638.850	59				

* Statistically significant if ($\alpha \leq 0.05$).

Table 2 demonstrates that *F* value is (78.312), which indicates a statistically significant value. In other words, Table 2 shows statistically significant differences in the overall means in the reading skill's test of third-grade students between the experimental group who was taught using the kinesthetic learning style and the control group who was taught by the traditional strategy. Furthermore, to find out the effect size, an ETA square was conducted. Table 2 shows that the effect size is (0.579), indicating that (57.9%) of the variation in the improvement in the reading comprehension skill for the experimental group is attributed to the differentiated instruction strategy.

(b). Results of the Performance of Third Graders Using the Auditory Learning Style

To find out whether there are any statistically significant differences in improving the reading skill of third-grade students with learning difficulties in using the auditory learning style based on the differentiated instruction, pre-and post-tests of reading comprehension tests were conducted. Table 3 shows the means and standard deviations of the performances of the experimental group (i.e. using auditory learning style) and control group (traditional way of teaching) on the pre-and post- tests respectively.

TABLE 3
MEANS AND STANDARD DEVIATIONS OF THE PERFORMANCES OF THE EXPERIMENTAL GROUP (I.E. USING AUDITORY STYLE) AND CONTROL GROUP (TRADITIONAL WAY OF TEACHING) ON THE PRE- AND POST-TESTS

Group	N	Pre-test		Post- test		Adjusted averages	
		Mean	Std.	Mean	Std.	Adjusted averages	Std. error
Experimental group (auditory learning style)	30	10.33	5.75	22.0	3.67	21.752	.457
Control group	30	9.40	5.95	13.5	4.26	13.781	.457
Total	60	9.87	5.82	17.8	5.81	17.767	.457

Table 3 reveals statistically significant differences in the overall score of the means and standard deviations of the reading skill's test between the experimental group who was taught using the auditory learning style using the differentiated instruction strategy (i.e. M=10.3, Std. =5 .75 and M= 22.0, Std. = 3.67) and the control group who was taught using the traditional way (i.e. M=9.40, St.= 5.95 and M= 13.5, Std.= 4.26) in the pre-and post-tests, respectively. Table 3 also reveals that the difference is in favor of the experimental group. Thus, to determine the significance of these differences, the ANCOVA test was conducted. The results are shown in Table 4.

TABLE 4
RESULTS OF ANCOVA TEST FOR THE DIFFERENCES BETWEEN THE EXPERIMENTAL AND CONTROL GROUPS USING THE AUDITORY LEARNING STYLE

Source of variance	SS	DF	MS	F-Value	P-Value	Effect size
Pre-test (total)	560.048	1	560.048	89.817	.000	.612
Group	946.827	1	946.827	151.847	.000*	.727
Error	355.418	57	6.235			
Total	1990.733	59				

* Statistically significant if ($\alpha \leq 0.05$)

Table 4 shows that *F* value for the overall score of the reading skill's test for third graders with learning difficulties is (151.827), which means that there are statistically significant differences between the experimental group who was taught using an auditory learning style and control group who was taught by the traditional way. These differences are attributed to the differentiated instruction strategy. To determine the effect size, the ETA square of the total scores was extracted (i.e. = 0.727) and this value indicates that (72.7%) of the variation in the improvement in the reading skill of the experimental group is due to the differentiated instruction strategy.

(c). Results of the Performance of Third Graders Using the Visual Learning Style

To figure out whether there are any statistically significant differences in improving the reading comprehension skill of third-grade students with learning difficulties in using the visual learning style based on the differentiated instruction, pre and post- tests of reading comprehension tests were conducted. Table 5 shows the means and standard deviations of the performances of the experimental group (i.e. using visual style) and control group (traditional way of teaching) on the pre-and post-tests, respectively.

TABLE 5
MEANS AND STANDARD DEVIATIONS OF THE PERFORMANCES OF THE EXPERIMENTAL GROUP (I.E. USING VISUAL STYLE) AND CONTROL GROUP (TRADITIONAL WAY OF TEACHING) ON THE PRE- AND POST- TESTS

Group	N	Pre-test		Post-test		Adjusted average	
		Means	Std.	Means	Std.	Adjusted average	Std. error
experimental (visual learning style)	30	11.73	5.06	22.57	3.48	22.047	.561
Control	30	9.40	5.95	13.53	4.26	14.053	.561
Total	60	10.57	5.60	18.05	5.97	18.050	.561

Table 5 demonstrates statistically significant differences in the overall means and standard deviations of the reading skill test between the experimental group who was taught using the visual learning style based on the differentiated instruction strategy (i.e. M=11.73, Std.= 5.06 and M= 22.57, Std.= 3.48) and the control group who was taught using the traditional way (i.e. M=9.40, Std.=5.95 and M= 13.5, Std.= 4.26) in the pre-and post- tests, respectively. Table 4 also reveals that the difference is in favor of the experimental group. Thus, to determine the significance of these differences, the ANCOVA test was conducted. The results are shown in Table 6.

TABLE 6
RESULTS OF ANCOVA TEST FOR THE DIFFERENCES BETWEEN THE EXPERIMENTAL AND CONTROL GROUPS USING THE VISUAL LEARNING STYLE

Source of variance	SS	DF	MS	F-Value	P-Value	Effect size
Pre-test	351.614	1	351.614	38.159	.000	.401
Group	916.233	1	916.233	99.435	.000*	.636
Error	525.220	57	9.214			
Total	2100.850	59				

* Statistically significant if ($\alpha \leq 0.05$)

Table 6 shows that *F* value for the overall score of the reading skill's test for third graders with learning difficulties is (99.435), which means that there are statistically significant differences between the experimental group who was

taught using an auditory learning style and control group who was taught by the traditional way. These differences are attributed to the differentiated instruction strategy. To determine the effect size, the ETA square of the total scores was extracted (i.e. = .636) and this value indicates that (63.6%) of the variation in the improvement in the reading skill of the experimental group is due to the differentiated instruction strategy.

(d). Results of the Comparison of the Performances of Third Graders Using the Kinesthetic, Auditory, and Visual Learning Styles

To figure out the differences between the performances of the third graders with learning difficulties in kinesthetic, auditory, and visual learning styles based on the differentiated instruction in the pre-and post- tests of the reading skill test, Table 7 presents the means and standard deviations of the performances of the third graders on each learning style in the pre-and post-tests of the reading test, respectively.

TABLE 7
MEANS AND STANDARD DEVIATION OF THE PERFORMANCES OF THIRD GRADERS ON KINESTHETIC, AUDITORY, AND VISUAL LEARNING STYLES ON THE PRE- AND POST-TESTS

Groups	N	Pre-test		Post-test		Adjusted averages	
		Means	Std.	Means	Std.	Adjusted averages	Std, error
Group 1 using the kinesthetic learning style	30	9.00	5.38	20.37	3.77	20.84	.550
Group 2 using the auditory learning style	30	10.33	5.75	22.00	3.67	21.91	.547
Group 3 using the visual learning style	30	11.73	5.06	22.57	3.48	21.88	.553
Total	90	10.36	5.46	21.64	3.72	19.62	0.55

Table 7 shows statistically significant differences in the overall means and standard deviations of the reading skill's test for students with learning difficulties on the three types of learning styles in the pre-and post-tests, respectively (i.e. M=9.00, Std.=5.38 and M= 20.37, Std.= 3.77), (M=10.33, Std.=5.75 and M= 22.00, Std.= 3.67), and (M=11.73, Std.=5.06 and M= 22.57, Std.= 3.48) in favor of the visual learning styles. Therefore, ANCOVA test was conducted to find out whether these differences are statistically significant. The results are shown in Table 8.

TABLE 8
RESULTS OF ANCOVA TEST FOR THE DIFFERENCES BETWEEN THE PERFORMANCES OF THIRD GRADERS WITH LEARNING DIFFICULTIES IN EACH LEARNING STYLE

Source of variance	SS	DF	MS	F-Value	P-Value	Effect size
Pre-test	336.913	1	336.913	35.446	.000	.292
Group	26.825	2	13.413	1.411	.249	.032
Error	817.421	86	9.505			
Total	1232.622	89				

*Statistically significant if ($\alpha \leq 0.05$)

Table 8 shows that *F* value of the overall scores of the reading skill's test is (1.411), which is a non-statistically significant value at the significance level of 0.05. This means that the differences between the performances of the third graders on the kinesthetic, auditory, and visual learning styles were not statistically significant i.e. the students showed similar performances on the three learning styles based on the differentiated instruction strategy.

B. Discussion

The current study aimed at investigating the effectiveness of the differentiated instruction strategy in the improvement of the reading comprehension skill of Jordanian third graders with learning difficulties using three learning styles: kinaesthetic, auditory, and visual. About 90 Jordanian third graders with learning difficulties (experimental group) and 30 Jordanian third graders (control group) were tested using a reading comprehension test twice; in pre- and post-tests with an interval of eight weeks of the implementation of a training reading program based on the differentiated strategy. The experimental group was divided into three subgroups based on their learning style preferences.

The findings of the study revealed statistically significant differences in the performances of third graders with learning difficulties who were taught using the differentiated instruction and those who were taught using the traditional strategy. The differences were found in the performance of the experimental group in each learning style. For instance, those differences were apparent in the means and standard deviations in the kinesthetic, auditory, and visual learning styles in the pre-and post-tests, respectively, (i.e. M=9.00, Std.=5.38 and M= 20.37, Std.= 3.77) compared to (i.e. M=9.40, Std.=5.95 and M= 13.53, Std.= 4.26), (i.e. M=10.3, Std.=5.75 and M= 22.0, Std.= 3.67) compared to (i.e. M=9.40, St.=5.95 and M= 13.5, Std.= 4.26), and (i.e. M=11.73, Std.=5.06 and M= 22.57, Std.= 3.48) compared to (i.e. M=9.40, St.=5.95 and M= 13.5, Std.= 4.26).

These findings can be attributed to the distinctive features of the differentiated instruction strategy in that it is characterized by considering the students' individual differences in their learning style preferences and their educational level. Thus, teaching the reading comprehension skill through this strategy including the different activities that were suitable to the students' level had an impact on the development of their level of reading comprehension. The reading

program had also an effect because it consisted of different levels that enable the teachers to gradually move from one level to another.

The findings may also be attributed to the features of the differentiated instruction strategy that account for the individual performance differences among the students with learning difficulties. That is to say, the differentiated learning strategy also worked to guide students in a way that allows them to learn effectively and reach the maximum possible level of their abilities.

Therefore, these findings may highlight the importance of the effects of the differentiated strategy on the teaching process in general and on teaching students with learning difficulties in particular.

The current findings supported the findings of previous literature which encouraged the use of the differentiated strategy and its effectiveness in the teaching process for different types of courses in different languages (Tomlinson, 2001, 2014; Al-Hulaisi, 2012; Scott, 2012, William, 2012; Sheerafa et al., 2019; Al-Badareen, 2021).

Moreover, the findings of the study highlighted the role of the training program itself. That is to say, the elements of differentiation and variation in the training program played an effective role in the teaching process. For instance, each of the six educational units in the program's final version contained five progressive activities for teaching the reading skill and they were chosen carefully to be suitable to the student's learning preferences and appropriate to their skill level. The activities addressed the reading levels of the students with learning difficulties and concentrated on the fundamentals of reading. These findings were in line, particularly with Al-Badareen (2021)'s and Al-Khatib (2017)'s and Reis et al., (2011)'s findings.

Furthermore, the results of the study showed an interesting finding, in that, the overall means of the students' performances in the kinaesthetic, auditory, and visual learning styles, showed apparent differences in the pre-and post-tests (i.e. M=9.00, and M= 20.37; M=10.33 and M= 22.0; M=11.73, and M= 22.57, respectively) in favor of the visual learning style. However, ANCOVA analysis showed that these differences were not statistically significant i.e. *F* value is 1.411 i.e. > 0.005. This indicated that there were not any statistically significant differences in the performances of Jordanian third graders with learning difficulties due to the differences in their preferred learning styles. This means that all students showed similar performance in the reading comprehension test although they have taught using different learning styles. This finding may shed the light on the effectiveness of the differentiated instruction strategy despite the students' differences in their learning styles. This finding may also highlight the equal effectiveness of the activities that were used in the three different learning styles. In other words, although each learning style had its own particular activities, all these activities were as effective as required and to the same degree. The reading comprehension skill of the students with various learning styles was improved due to the combination of these activities and how they were presented to students with learning difficulties through a structured program based on the technique of differentiated instruction.

To conclude, the effectiveness of the use of the differentiated instruction strategy especially in teaching students with learning difficulties may encourage the schools' principals to adopt such a strategy at their schools. Furthermore, the effectiveness of the experienced training reading program may be used as a ready-made program including its activities to teach this group of students in different schools. The teachers who participated in this experiment benefited as well; they now have the experience of teaching using this strategy and this category of students.

V. Conclusion and Recommendations

The current study aimed to investigate the effectiveness of a training reading program consisting of six units and multiple activities based on the differentiated instruction strategy on the reading comprehension improvement of Jordanian third graders with learning difficulties. A total of 120 Jordanian third graders with learning difficulties from 17 governmental schools in Amman participated in the study. About 90 of them were taught using the differentiated strategy and were then divided into three groups based on their preferred learning styles: kinesthetic, auditory, and visual while 30 students were taught using the traditional strategy of teaching. The findings showed an important impact of the differentiated instruction strategy on the improvement of the reading comprehension skill of Jordanian students with learning difficulties. Furthermore, the findings showed the importance of the use of the preferred learning styles of students in the teaching process. Therefore, the present study recommends the intensive use of the differentiated instruction strategy at schools, especially for students with learning difficulties who need such a strategy the most. It also recommends further research on the use of differentiated instruction strategy on different skills such as writing in the Jordanian educational community.

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