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## The Use of Cartoons in Developing Awareness of Environmental Protection from Pollution among Students with Learning Disabilities

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### Abstract

Environmental awareness has become an urgent and indispensable necessity to protect the environment from risks and threats. Therefore, this study aimed to reveal the effectiveness of using cartoons in developing awareness of protecting the environment from pollution among students with learning disabilities. The study adopted the true experimental method by taking a simple random sample consisting of 33 students with learning disabilities in the elementary stage in the age group (9-12) years in Najran region in the Kingdom of Saudi Arabia. The researchers prepared an attitude test, consisting of ten multiple-choice questions to measure the study sample's awareness of protecting the environment from pollution. The test was applied before and after the treatment on the control and experimental groups. Also, it was applied as a delayed test on the experimental group only. The results showed statistically significant differences in the post-test of awareness of environmental protection from pollution for the experimental group who studied using cartoons. In addition, there were no statistically significant differences between the post and delayed test of the scores of the experimental group on the environmental protection awareness test from pollution. The study recommended urging teachers of learning disabilities to use cartoons to deepen environmental knowledge among students with learning disabilities. Also, students with learning disabilities should be motivated to contribute and participate individually and collectively in protecting the environment, preserving its resources, and reducing potential environmental risks from environmentally unsound behaviors. Finally, the study suggests conducting more future studies examining the effectiveness of cartoons in developing different environmental education concepts.

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### Introduction

Environmental issues, preserving the environment, and solving environmental pollution problems have received widespread attention from countries, international organizations, and global public opinion (Al-Kabeer, 2015). These countries and organizations have sought to help governments rethink economic development and find ways

to stop environmental pollution on the planet. This pollution has resulted in a series of rapid economic, social, and political changes witnessed by human societies, such as industrialization, urbanization and construction, burning fossil fuels, service and production activities, cutting forests, improper exploitation of beaches and sea coasts, and accumulation of waste in agricultural areas or near residential areas (Holstein & Smith, 2020). Seminars and conferences have also increased to talk about environmental issues, their consequences, and appropriate ways to address those (Al-Refai & Al-Omari, 2020). It was stated at the International Conference on Environment held in Stockholm, Sweden, in 1972 that environmental education is an effective tool for addressing environmental problems (Saglam, 2016). In 1982, the Nairobi Conference was held and was concerned with addressing the problem of desertification and drought, and emphasizing the need for cooperation between countries in order to protect the environment (Pinto & Totti, 2020). The United Nations Climate Action Summit in 2019 was held at the United Nations headquarters in New York City in the United States of America. It came to help countries reduce climate change, achieve the goals of the Paris Agreement on renewable energy on issues such as environmental pollution, solve its problems, and promote a more sustainable world and prosperity to all.

At the local level, the Kingdom of Saudi Arabia has realized the danger of environmental pollution on natural life and its resources. Therefore, the government has paid great attention to preserving the environment and its natural resources from the danger of pollution. It issued a set of laws, legislations, and decisions to reduce the risks of environmental pollution, develop natural reserves, preserve their components, the natural environment, plant life, wildlife, and their reproduction and development, and reduce logging and unjust assault on natural green spaces. Also, sanctions were imposed on factories and companies that dump their residues and waste into water resources or valleys and streams of torrential rains (Saudi Arabia's Vision 2030 document, pp. 20-22). Many international organizations such as UNESCO have made great efforts to make education a fundamental solution to many environmental issues and problems (Sevim, 2020). Therefore, institutions of different activities and fields, including educational institutions, have paid attention to the importance of community members, including students to realizing the importance of preserving the environment and its components, preventing its pollution, rationalizing the use of its resources, and addressing the risks that it may be exposed to. Environment protection is an important matter for the safety and health of the individual and society to ensure the sustainability of development and a good life for present and future generations (Al-Turki & Al-Subaie, 2016).

Accordingly, the approach to environmental education appeared. It focused on the organized process of forming the values, attitudes, and skills necessary to understand the relationship that binds the student and his civilization to the environment. It also sought to generalize and deepen environmental knowledge among the student community and motivate them to contribute and participate individually and collectively in protecting the environment, preserving its resources, reducing potential environmental risks from environmentally unsound behaviors, taking the appropriate decision to solve existing environmental pollution problems, and working to prevent the emergence of new environmental problems (Sabawi, 2018). In addition, it aims to increase environmental awareness among school students in terms of developing preventive awareness, which aims to prevent the occurrence of environmental problems, and therapeutic awareness, which aims to help students confront environmental problems resulting from the misuse of various environmental elements and their risks that lead to environmental pollution (Awad, 2019). Furthermore, it aimed to raise awareness of protecting the

environment from pollution, which is represented in the student's awareness and knowledge of the causes of chemical pollution of water due to the presence of toxic chemicals, such as lead, arsenic, mercury, and phosphorous, as well as pesticides, fertilizers, and agricultural pest control compounds. Further, it focused on increasing knowledge of the causes of air pollution or air pollution because of oxides of nitrogen, sulfur, and ammonia, which are spread in the air and what causes great harm to the environment and humans, such as allergic diseases such as asthma and respiratory diseases such as rhinitis, laryngitis, and leukemia. Finally, this aspect is represented in the student's awareness of how to dispose of waste, waste, and sewage water in the correct ways (Abdel-Fattah, 2016).

Therefore, voluntary programs and activities began to appear in some schools that seek to educate school students about the problems of environmental pollution and increase their motivation for environmental awareness. Also, they targeted shaping rational behaviors and peaceful practices to preserve the environment and reduce the risks of environmental pollution (Schmitz & Da Rocha, 2018). The environmental approach, when developing curricula related to the environment, focused on employing modern and different teaching methods that have a direct and significant impact on exciting students. Also, it aimed at increasing their motivation to learn about environmental issues and environmental pollution (Aral et al., 2017). Additionally, it helps them understand this phenomenon in order to achieve the goals of environmental education and sustainable development (Sarhan, 2016). Among the most prominent of these ways and methods are cartoons that can work to attract students' attention and excite them, because of their effective role in improving the concepts of environmental education among students (Nasser, 2015).

Cartoons derive their importance and educational value from their great role in reviving the educational process and breaking the barrier of boredom among students. It draws their attention and urges them to think and express, issues and events related to them, especially environmental issues. In addition, it is an interesting method that attracts the attention of students of all ages and the different individual differences among them. It works to remove routine in educational situations and works to increase student achievement and the consistency of information that reaches them through displaying cartoons compared to using words or written text; the information stays fresh in their minds for long periods (Felmban, 2017). Cartoons are also purposeful; they include a brief and concise idea, provide an element of suspense and humor, and keep boredom away from the classroom. They play an important role in improving and developing concepts and knowledge and forming positive attitudes among students (Youssef, 2021).

Students with learning disabilities have a weakness in the ability to process information that affects their learning processes, which, in turn, affects their daily lives, environment, understanding of what negatively affects them, and attitudes towards it. Therefore, their awareness of some concepts and issues in their society differs from their ordinary peers (Alzahrani & Flynn-Wilson, 2021; Mafra, 2014; Nkomo, Dube, & Marucchi, 2020). Also, students with learning disabilities are characterized by poor concentration and attention on important stimuli, feeling bored, moving around the classroom a lot, and practicing some chaotic behaviors. As a result, they lose a lot of knowledge and facts related to their surrounding environment (Garvin & Krishnan, 2022). This necessitates training them to acquire appropriate life and social skills according to their capabilities and abilities according to organized and

thoughtful plans. Special programs and activities should be designed to bring them to the best academic levels and to prepare them for public life and integration into society by identifying the most important issues that society suffers from (Alhassan & Osei, 2022; Alshamry & Eldian, 2021; Braunwell, 2016). Therefore, it is important to teach students, including students with learning disabilities, who have less chance of acquiring appropriate skills to deal with the environment compared to their normal peers. The researchers used cartoons to teach students with learning disabilities to develop their awareness of protecting the environment from pollution by deepening their environmental knowledge using cartoons and motivating them to contribute and participate individually and collectively in protecting the environment and preserving its resources and reducing potential environmental risks from environmentally unsound behaviors. Awareness of protecting the environment from pollution enhances the understanding of students with learning disabilities in the causes of the environmental problem and its consequences and thus enables them to treat them and activate their ability to adapt to its effects.

### **Statement of the Problem**

The problem of this study emerged from the growing problem of environmental pollution at present. It has begun to threaten natural life on the planet and its sources of life, and the health of the individual and society. It led to a weak positive balance between human behavior and natural resources. Low to medium levels appeared with it among members of society in general, including students in particular, about awareness of the dangers of pollution on the environment. This caused great concern among the humanitarian community, in general, and the educational community, in particular (Gupta, 2017). This was confirmed by Dhanya and Pankajman (2017), which showed an average level of environmental awareness among school students. Also, Gupta (2017) and Al-Otaibi (2018) showed a low level of environmental awareness among school students. Based on Youssef (2021), it was shown that there are shortcomings in the school activities and programs regarding educating students and making them aware of the dangers of environmental pollution and the appropriate ways to protect the environment from pollution. Likewise, Rijthoven, et al. (2022) showed shortcomings in designing and implementing individual educational programs provided to students with learning disabilities in resource rooms; they focus on teaching academic skills without paying attention to life and social skills and introducing them to environmental issues and problems. In addition, Ojala (2015) pointed out that education affects students' environmental awareness and helps them develop their skills to obtain innovative and effective solutions to reduce environmental problems and risks facing their communities. Yesilyurt et al. (2020) emphasized the importance of developing environmental awareness among students at the elementary stage. Hence, this study sought to reveal the effectiveness of using cartoons in developing awareness of protecting the environment from pollution among students with learning disabilities. In specific, the problem of the study came to answer the following two questions:

1. Are there statistically significant differences at the ( $\alpha = 0.05$ ) level of significance between the average performance of the control group and the experimental group in developing the degrees of awareness of environmental protection from pollution in the post-test due to the teaching method?
2. Are there statistically significant differences at the ( $\alpha = 0.05$ ) level of significance in the average performance of the experimental group in the post and delayed test on the awareness test of protecting the environment from pollution due to the continuity of teaching using cartoons?

### **Objectives of the Study**

This study aimed to use cartoons and measure their effectiveness in developing awareness of environmental protection from pollution among a sample of students with learning disabilities in the elementary stage in the age group (9-12) years in Najran, Saudi Arabia.

### **Significance of the Study**

The study is significant due to the fact that it is a serious attempt to teach students with learning disabilities using cartoons and measure their effectiveness in developing awareness of protecting the environment from pollution. Consequently, the significance of the study comes from benefiting from the results of this study to be a new addition to the previous scientific research conducted in the field of teaching students with learning disabilities. Teaching using cartoons contributes to breaking the barrier of boredom and routine and motivating students with learning disabilities towards active participation in the educational process. The educational literature provided by this study and previous studies dealing with the study variables contributes to increasing the outcome of human knowledge about the use of cartoons in developing awareness of protecting the environment from pollution among students with learning disabilities. The study will become a pillar for those interested and researchers in the field of special education, specifically the field of learning disabilities. Hopefully, the results of this study and the knowledge contained will contribute to raising the level of knowledge awareness among teachers and those responsible for the educational process for people with learning disabilities by benefiting from the study procedures in using cartoons to develop an awareness of environmental protection from pollution among students with learning disabilities. This is reflected in its practical application in the educational field and enhances the student's role in preserving the local environment for future generations.

### **Delimitations of the Study**

This study was limited to investigating the issue of the effectiveness of using cartoons in developing awareness of protecting the environment from pollution among students with learning disabilities in Najran region in the south of the Kingdom of Saudi Arabia. The study was applied to a sample of (33) students with learning disabilities in the age group (9-12) years. They were selected from two public elementary schools with learning disabilities programs attached in the second semester of the academic year 2022/2023. The experimental treatment material "cartoons " was applied to the experimental group (n = 17), while the control group (n = 16) was taught traditionally. It also used one tool (test) to measure the awareness of protecting the environment from pollution. Therefore, the results of the study are determined by the extent of accuracy in deriving indications of validity and reliability for this test.

### **Methods**

In this study, the true Experimental Design method was used (pre-post design for two equal groups and a delayed test for the experimental group only). This design provides a pre-test with random selection and a control group

for all threats to internal validity. This design is based on the causal relationship between two variables, one of which is the independent variable and the other the dependent variable (Al-Mutawa & Al-Khalifa, 2014). This design was used in this study to measure the effect of the independent variable (cartoons) on the dependent variable (awareness of environmental protection from pollution) by forming two groups; the control group was not subjected to treatment and was taught traditionally, and the experimental group was taught using cartoons. A pre-and post- environmental protection awareness test was applied to the control and experimental groups, and a delayed test was applied to the experimental group only. Table 1 shows the study design.

Table 1. True Experimental Design with a Pre-post Design for Two Groups

Groups	No.	Pre-test	Treatment	Post-test	Delayed test
GR 1	16	O1	—	O2	
GR 2	17	O1	X	O2	O3

Mutawa and Al-Khalifa (2014) indicate that the previous symbols mentioned in Table 1 mean the following: GR 1: random assignment to the control group. GR 2: random assignment to the experimental group. O1: pre-test. O2: post-test. O: delayed test, —: without treatment, X: treatment.

### Participants

The study sample was selected by the simple random method from students with learning disabilities in the elementary stage after relying on the school as the unit of choice. The names of all elementary public schools that include learning disabilities programs in Najran region in the Kingdom of Saudi Arabia were written in the second semester of the academic year 2022/2023 on pieces of paper, then a colleague was asked to carry out the withdrawal and return process, and two schools were chosen. After that, one school was randomly selected for the control group and the other for the experimental group.

Later, the awareness test of protecting the environment from pollution was applied to all students with learning disabilities in both schools after obtaining the approval of the General Department of Education in Najran region, and the parents of the students to apply the test. The students' scores were calculated on the test, and the selection fell on the students who obtained the lowest scores on the study tool "Environmental Awareness Test of Preserving Life Resources", and their number reached (33) students in the age group (9-12) years, with a mean for their chronological age (10.62), and a standard deviation (0.244). The students' willingness and their parents to participate in the experiment was confirmed. The control group consisted of (16) students who did not undergo treatment, and the experimental group consisted of (17) students who underwent treatment (using cartoons).

### Instrument

In this study, an objective multi-alternative attitude test was prepared. It determines how students with learning disabilities interact with the situations they encounter in their daily lives. It measures their awareness of protecting the environment from pollution. This test was prepared based on previous studies related to the subject of the

study, such as Gupta (2017) and Dhanya and Pankajman (2017). The test consists of ten objective questions that determine the student's environmental knowledge, environmentally unsound behaviors, and how to deal with them. Each question has three alternatives, and the student chooses one to be the correct answer. Thus, the test scores ranged between (0-10) degrees. The evidence of the validity of the content of the test was verified by presenting it in its initial form to (10) experts from the teaching staff specializing in special education and science curricula and methods of teaching in Saudi universities. Their observations and amendments were taken into account in terms of rephrasing some questions to be clearer to students with learning disabilities and in line with their mental and cognitive abilities. In addition, the test reliability was verified by applying it to a sample of (30) students with learning disabilities who were chosen from two schools from the study community and outside its sample. Then, the internal consistency reliability coefficient (KR20) was calculated. The overall reliability coefficient for the test was (0.80) and was high, which is a suitable and appropriate reliability coefficient to achieve the study.

### **Treatment (Cartoons)**

a. Steps for preparing a guide for applying cartoons: For preparing this guide, theoretical literature related to cartoons has been reviewed to identify how to use cartoons in teaching students with learning disabilities to develop their awareness of protecting the environment from pollution. Then, a group of pictures (cartoons) that deal with current issues and events in the world and Saudi society about environmental pollution were selected by referring to science books in the elementary stage. A guide for using cartoons has been designed. It includes the following: an overview of cartoons, their types, functions, general objectives, teaching time plan, steps for teaching using cartoons, directions for the teacher when teaching using cartoons, and a roadmap for teaching cartoons. It also included the lesson title, the behavioral objectives for each lesson, the procedures for conducting the lesson (preparation, implementation, and evaluation), and the educational means and tools for implementing the lesson. Then, faculty members specialized in the field of special education and science curricula and methods of teaching judged the guide and verified its suitability in achieving the study objective. The experts' comments on the evidence were taken into account, and the guide was produced in the final version.

B. Implementation of teaching by cartoons: This guide targeted students with learning disabilities in the age group (9-12) years in Najran region in the Kingdom of Saudi Arabia who suffer from a decrease in the level of awareness of environmental protection from pollution in the academic year 2022-2023. The first researcher himself applied the guide and trained the members of the experimental group (n=17) students under his direct supervision, in cooperation with the learning disabilities teacher in the cooperating school (the school of application). The application process took two weeks. The guide consisted of (10) lessons, including an introductory and final session, and (8) teaching lessons based on cartoons, and the average of each lesson was (45) minutes. In addition, it used a range of different activities and exercises. The following methods and tools were used: Blackboard, cartoons, and a data show. The teaching sessions were carried out in a private hall at the cooperative school headquarters, equipped with chairs, tables, and atmospheres that suit the teaching environment for students with learning disabilities. Table 2 shows a practical example of applying the lesson.



Table 2. A practical Example of Applying a Lesson using Cartoons

Lesson objectives	Procedures and time		
	Orientation (5 m)	Execution (30 m)	Evaluation (10 m)
1. The student should acquire the skill of being able to formulate words in a sound Arabic language.	- The researcher welcomes the students and thanks them for their attendance and commitment to the meeting date.	a. The researcher shows three pictures that contain cartoons, each separately, in front of the students. B. After displaying each picture, the researcher asks the students to look at the picture, and then ask the following questions: What are the items in the picture? What does this picture refer to? Give an appropriate title to the picture.	The researcher asks the students to talk about situations they lived with that led to environmental pollution, and how they behaved.
2. The student expresses the cartoons in a sound artistic way.	- The researcher asks the students to sit in their seats in the shape of (U) facing the data show. Then, he says that you will be shown a set of pictures that are related to a phenomenon that leads to environmental pollution.	What is the lesson learned from the picture? How do we protect the environment from pollution?	
3. The student should put an appropriate title for the caricature.		c. The researcher manages the discussion and receives answers individually from each student.	
4. The student should express his own thoughts and feelings about preserving the environment and vegetation cover.			

## Results

In this section, the results of the study were presented according to the two study questions.

### **Results of the First Question: Are There Statistically Significant Differences at the ( $\alpha = 0.05$ ) Level of Significance Between the Average Performance of the Control Group and the Experimental Group in Developing the Degrees of Awareness of Environmental Protection from Pollution in the Post-Test due to the Teaching Method?**

To answer this question, the equivalence of the groups was verified by applying the t-test for independent samples to show the significance of the differences between the means between the control and experimental groups on the scores of the awareness test of protecting the environment from pollution in the pre-test, after verifying the natural distribution of scores. Table 3 shows the results.

Table 3. t-test for the Significance of the Differences between the Means of the Control and Experimental Groups on the Degrees of Awareness of Environmental Protection from Pollution in the Pre-test

	Group	No.	Means	Std. Dev.	t	df	Sig.
Total degree of the pre-test	Experimental	16	2.88	0.99	1.602	31	.119
	Control	17	2.81	0.91			

Table 3 shows no statistically significant differences at the level of (0.05) between the means of the control and experimental groups on the degrees of awareness of environmental protection from pollution in the pre-test. The calculated "t" value was (1.602), with a statistical significance of (.119). The result indicates that the groups are equal before teaching the control and experimental groups. The means and standard deviations of the scores of the study sample were calculated on the awareness test of protecting the environment from pollution in the pre- and post-tests, according to the group (control, experimental). Table 4 shows the results.

Table 4. Means and Standard Deviations of the Scores of the Study Sample on the Awareness Test of Protecting the Environment from Pollution for the Pre-and Post-tests according to the Group (Control, Experimental)

	Group	No.	Pre-test		Post-test	
			Means	Std. Dev.	Means	Std. Dev.
Total degree	Experimental	16	3.88	0.99	3.72	1.20
	Control	17	3.81	0.91	5.76	0.95

It is clear from Table 4 that there were apparent differences between the means of the study sample's scores on the awareness test of protecting the environment from pollution in the pre-and post-tests, according to the group (control, experimental). To find out whether these apparent differences are statistically significant, the analysis of variance associated with the post-measurement (ANCOVA) was used to test the awareness of protecting the environment from pollution according to the group (control, experimental) after neutralizing the effect of the pre-test for them. The following is a presentation of these results in Table 5.

Table 5. The results of the Analysis of Variance associated with the Post-test to for the Significance of the Differences between the Average Performance of the Control Group and the Experimental Group in the Post-test of the Study Sample's Scores on the Awareness Test of Protecting the Environment from Pollution due to the Teaching Method according to the Group after Neutralizing the Effect of the Pre-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	41.112	2	20.556	18.445	.000	.551
Intercept	14.239	1	14.239	12.777	.001	.299
Pretest	3.375	1	3.375	3.028	.092	.092
Group	29.112	1	29.112	26.122	.000	.465
Error	33.434	30	1.114			
Total	812.000	33				
Corrected Total	74.545	32				

Table 5 shows that there were statistically significant differences at the level of (0.05) according to the effect of the group (control, experimental) on awareness of environmental protection from pollution. To determine in favor of which of the two study groups the statistical differences were, adjusted means and standard errors were calculated according to the group. Table 6 presents the results.

Table 6. Adjusted Means and Standard Errors of the Post-test Scores on the Environmental Protection Awareness Test from Pollution according to the Group (Control and Experimental)

Dependent variable	Group	Adjusted means	Standard error
Total degree of the test	Experimental	3.72	.269
	Control	5.67	.261

It is clear from Table 6 that the adjusted mean of the control group was (3.72) with a standard error of (.269), whereas the adjusted mean of the experimental group was (5.67) with a standard error of (.261). The statistical differences between the adjusted means for the post-test on the scores of the awareness test of protecting the environment from pollution were in favor of the experimental group members who were exposed to the teaching strategy (cartoons) compared to the control group members who were taught the traditional way. The effect size was high (0.465).

#### **Results of the Second Question: Are There Statistically Significant Differences at the ( $\alpha = 0.05$ ) Level of Significance in the Average Performance of the Experimental Group in the Post- and Delayed Test on the Awareness Test of Protecting the Environment from Pollution due to the Continuity of Teaching Using Cartoons?**

To answer this question, the natural distribution of data for the two post- and delayed tests of the scores of the study sample (the experimental group) on the awareness test of protecting the environment from pollution was verified. Then, the t-test was used for correlated samples. Table 7 shows the results.

Table 7. t-test for related Samples for the Significance of the Differences between the Means among the Members of the Experimental Group on the Scores of the Awareness Test of Protecting the Environment from Pollution in the Post- and Delayed Tests

Test	Means	Standard deviation	t	df	Sig.
Post	5.76	1.20	.675	16	.509
Delayed	5.53	1.87			

Table 7 shows that the post-test on the environmental awareness test from pollution obtained an arithmetic mean (5.76) and a standard deviation (1.20), whereas the post-test on the awareness test on environmental protection from pollution obtained a mean of (5.53) and a standard deviation of (1.87). The calculated "t" value was (.675) and statistically significant (.509), which is not statistically significant at the level of (0.05). This result indicates that there were no statistically significant differences between the post- and delayed tests of the scores of the experimental group members on the awareness test of protecting the environment from pollution. This result

indicates the effectiveness of continuous teaching using cartoons in developing awareness of environmental protection from pollution among students with learning disabilities.

## **Discussion and Conclusion**

The results revealed that there were statistically significant differences in the awareness test of environmental protection from pollution in the post-test in favor of the experimental group members who were exposed to the teaching strategy (cartoons). This result indicates that the use of cartoons was effective in developing awareness of protecting the environment from pollution among students with learning disabilities. Perhaps, this result is due to the exposure of the experimental group to meaningful cartoons that include a brief and clear idea about the environment and the importance of preserving the environment from the danger of pollution. Cartoons have made them aware of the importance of achieving the safety and health of the individual and society to ensure the sustainability of development and a good life. In addition, the cartoons add some entertainment to the class, which is boring for some students with learning disabilities due to its long duration and poor concentration. The program has made them enjoy these drawings and understand the goal and purpose. Thus, this result demonstrates the results of previous experimental studies that confirmed the effectiveness of cartoons in developing different skills and attitudes among students, such as Yusef (2021), Al-Qurashi (2017), and Felemban (2017).

The results also showed no statistically significant differences between the post- and delayed tests of the scores of the experimental group members on the awareness test of protecting the environment from pollution. This result indicates the effectiveness of continuous teaching using cartoons in developing awareness of protecting the environment from pollution among students with learning disabilities. This result is due to the fact that students with learning disabilities watch cartoons in their daily lives on television, in newspapers, magazines, and websites, and they found showing them in the classroom a good practical application of the reality of their daily lives. Also, the cartoons, including their sarcasm and brief idea, helped them remember and understand the concepts, knowledge, and behaviors associated with protecting the environment from pollution and thus retained them over multiple periods. In addition, the cartoons attract students' attention and stimulate their thinking, and help them present and organize their ideas. They facilitate the process of keeping the information in their minds for a longer time and help them get out of the circle of memorization and indoctrination into creativity and innovation through freedom of thought and expression. Cartoons were reflected in their awareness of non-environmental practices and behaviors that affect the environment and its pollution.

The results showed the effectiveness of using cartoons in developing awareness of protecting the environment from pollution among students with learning disabilities in the elementary stage. In light of the results, it is recommended to urge teachers of learning disabilities to use cartoons to deepen environmental knowledge among students with learning disabilities and motivate them to contribute and participate individually and collectively in protecting the environment and preserving its resources, and reducing potential environmental risks from environmentally unsound behaviors. Also, the Ministry of Education and education departments in the various educational regions in the Kingdom of Saudi Arabia should work to raise teachers' awareness of using interesting methods, such as cartoons that enhance the concepts of environmental education among students with learning

disabilities. In addition, they must activate their positive behavior to deal with the elements of the environment properly. Furthermore, there is a need to strengthen the role of the Ministry of Education in the Kingdom of Saudi Arabia to educate students in general, including students with learning disabilities, and increase their environmental awareness by integrating environmental concepts into various school activities. Besides, the role of the school should be activated in participating in voluntary community activities and celebrating environmental events such as the Tree Day, the World Environment Day, and other occasions that develop an awareness of protecting the environment from pollution among students with learning disabilities. Finally, more future studies should be conducted that look at the effectiveness of cartoons in developing different environmental education concepts to give additional value to this field and to achieve knowledge diversity.

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