The Impact of Teaching Science Through Self-Regulated Learning in Achieving and Developing Self-Management Skills Among Students with Hyperactivity and Attention Deficit Disorder

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Abstract

The study aimed to identify the effectiveness of teaching science using self-regulated learning in achieving and developing self-management skills for students who suffer from hyperactivity and attention deficit hyperactivity disorder. The semi-experimental approach was implemented, where two tests were prepared, one for biology subjects and another for self-management skills. The study covered (80) students who were divided into (40) students with hyperactivity and (40) students with attention deficit disorder. The results showed that there were evident differences between the experimental group's and the control group's scores on the achievement test for hyperactive persons, with the experimental group's scores being higher. The results also suggested that the experimental group appeared to differ from the control group on the accomplishment test. Additionally, among those with hyperactivity, there were statistically significant differences between the mean estimates of the experimental group and the control group on the dimensional scale for the self-management skills test and its branches.

Keywords: *Self-Regulated Learning, Science, Achievement, Self-Management Skills.*

Introduction

Sciences have a dual nature (method and matter), represented by how scientific knowledge is formed and acquired. The scientific method does not necessarily depend on fixed, monotonous steps represented by the scientific method of thinking, but rather it extends to many different methods far from hypotheses and testing them, and the topics of science are intertwined. It is branched and linked to many variables, which makes the learner during educational situations feel bored and dissatisfied, if they are not presented in a manner that suits their nature, and enhances the students' motivation to learn it by giving them positive attitudes towards it. This requires finding teaching methods that remove the routine and boredom of the learner and move on from the role of the recipient to the role of the researcher. This will only be possible by searching for educational methods, techniques, and models that stimulate students' thinking, motivate them, and involve them in various learning activities (Al-Duwairi & Al-Adili, 2020).

Self-regulated learning has several advantages and research and studies in education have proven that it is one of the most effective teaching methods in providing the learner with the various aspects (motor, cognitive, emotional). It is appropriate for both the information and communication revolution and the cognitive explosion. Additionally, it is appropriate for the students' propensities and tendencies toward self-reliance and independence, fostering possibilities for fruitful interaction among students and between students and professors while also preparing them for scientific study. It saves the teacher's

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time in directing and supervising students and increases the self-management skills of the learners. It is also considered a trend in recent research in the field of education, which calls for transferring attention to the student while not neglecting academic courses (Hindawi, 2020).

Students' self-management skills are one of the important foundations for determining the level of achievement, motivation, psychological health, and ability to achieve personal and academic achievement. They also affect the type of tasks and activities that students choose, and even the length of the resistance that students show in front of the obstacles that stand in their way, and vice versa. Self-management comes from life experiences and from the individuals whom we take as role models. Some students fail as they start learning because of their low self-management skills. This made it necessary to find an integrated type between the different research directions that relate to the motivational, cognitive, emotional, and metacognitive aspects, which is represented in paying attention to self-controlled learning and providing the opportunity for students to learn lifelong, as well as their exceed in academic achievement (Al-Kandari, 2022).

Problem Statement

The study surveyed the opinions of some teachers and supervisors in the basic education stage about the reality of teaching science and the most common problems that students face during their study of science. The majority of teachers use the traditional method, which emphasizes the teacher as the center of the educational process. Additionally, there are numerous issues that students encounter while studying science, such as their low academic achievement in the subject and their inability to manage themselves. This became clear through classroom visits to some science teachers in the basic stage. They did not use self-regulated learning or self-management skills during teaching. science. The increase in educational development procedures carried out by the Ministry of Education calls for the need to pay attention to experimenting with approaches, methods, and teaching strategies that would achieve the learner's positivity, elevation of abilities, self-control, and organization. The low academic achievement in science among school students urged researchers to identify the effectiveness of teaching science using self-regulated learning in achievement and developing self-management skills for students who suffer from hyperactivity and attention deficit disorder.

Questions of the Study

The main question of this study was: "What is the effectiveness of teaching science using self-regulated learning on achievement and developing self-management skills among students with hyperactivity and attention deficit disorder?"

The following sub-questions emerge from this question:
1. Are there any significant variations in the scores of students with hyperactivity and attention deficit disorder on the pre-academic achievement test?
2. Are there any significant variations in the scores of students with hyperactivity and attention deficit disorder on the pre-self-management skills test?
3. Are there any significant variations in the scores of students with hyperactivity and attention deficit disorder on the post-academic achievement test?
4. Are there any significant variations in the scores of students with hyperactivity and attention deficit disorder on the post-self-management skills test?

Objectives the Study

The main objective of this study was "to identify the effectiveness of teaching science using self-regulated learning in achieving and developing self-management skills among students who suffer from hyperactivity and attention deficit disorder."

The following sub-goals emerge from this goal:

1. To identify significant variations in the scores of students with hyperactivity and attention deficit disorder on the pre-academic achievement test.
2. To identify significant variations in the scores of students with hyperactivity and attention deficit disorder on the pre-self-management skills test.
3. To identify significant variations in the scores of students with hyperactivity and attention deficit disorder on the post-academic achievement test.
4. To identify significant variations in the scores of students with hyperactivity and attention deficit disorder on the post-self-management skills test.

Significance of the Study

This study is consistent with modern educational trends that focus on studying self-regulated learning and its ability to increase achievement and develop self-management skills that contribute to improving the quality of educational outcomes. The study directs teachers' attention to teaching science using self-regulated learning to increase academic achievement and develop self-management skills among basic-stage students. The results will open the way for researchers to conduct more studies and research related to self-regulated learning, achievement, and self-management skills at different stages of education.

Study Limitations

The study included eighth-grade students at Abu Bakr Al Siddiq Basic School. This study was applied during the second semester of the 2022/2023 academic year. This study was applied in Abu Bakr Al-Siddiq Basic School in Irbid Governorate.

Literature Review

Self-Regulated Learning

The concept of self-regulated learning appeared with the emergence of developments that reflected major and profound changes in the interests of researchers with their various theoretical and educational affiliations during the second half of the last century. The most prominent of these transformations were those that affected behavioural psychology to cognitive psychology, which in turn affected the change in the outlook on learning and the learner as a result of what various theories and models in this field have concluded (Mishri, 2014).

Anakreh (2022, p. 30) defined self-regulated learning as "a cognitive mental process in which the learner activates and invests his performance until the goal is achieved regularly and as a set of multiple strategies that the learner can apply and his abilities to control his learning and performance." Irfan (2022, p. 28) defined self-regulated learning as "a set of processes that the individual uses effectively and actively in managing and organizing his learning, and it includes setting the learner's goals for his learning, and choosing and implementing a set of knowledge strategies and strategies for managing learning resources that will It helps achieve those goals and evaluates and monitors progress in achieving those goals." In addition, Abu Ghazal and Al-Nawwal (2019, p. 148) defined self-regulated learning as "cognitive strategies represented by expansion and repetition, metacognitive strategies represented by monitoring, planning, and self-evaluation, and resource management strategies represented by organizing the learning environment, organizing effort, and asking for help."

Several studies have indicated that self-regulated learning includes a set of components (Al-Raddadi, 2019). The cognitive component alludes to the learner's understanding of his information framework, as the more the learner knows approximately a circumstance, the more noteworthy the victory

accomplished. It emphasizes information that bolsters the learner's capacity to utilize cognitive techniques in his learning preparation. This enables him to understand the duties and tasks presented and set goals, forming expectations and predictions of results, enhancing mental cognitive activity, and achieving a high degree of academic achievement. The metacognitive component refers to the individual's knowledge related to cognitive processes and their outcomes, his knowledge of his cognitive strengths and weaknesses, and his awareness of all factors related to these processes, as it is concerned with the individual's interest and adoption of his cognitive processes and strategies. The motivational component refers to the drive and energy that aims to enable the individual to choose specific goals and work to achieve them. They are internal processes that direct the individual's activity towards a goal in his environment. It is used to describe the degree of management of self-organized students to continue practising or studying in the absence of external control by parents or teachers.

Academic Achievement

One of the most important and fundamental pillars of the educational framework is student performance. It might be a significant part of the instructional planning process and is used in numerous levels since teachers frequently evaluate students using exams as a benchmark. Academic success often shows students' accomplishments and aids in level assessment and observation by highlighting the educator's effective role. The value of evaluation and its advantages are evident in several sections within the student's identity (Al-Hayek, 2022). It is the result of the progress pupils make in a number of academic fields. The success of the previous phase of education determines how well the pupils adjust to the current phase (Ben Qasima, 2021). Academic progress is defined as "everything students do in academic subjects to achieve a level of capability that matters and resolve the problems they may encounter in their lives in light of the school educational modules and its outcomes" (Al-Khawaldeh, 2021). Academic progress is typically assessed through school examinations. Execution in academic courses speaks to the student's cognitive outcome, which is evaluated by test scores at the end of the semester or school year (Ghbari et al., 2014).

Students' abilities in academic achievement are represented on three levels: (Sassy, 2017). High academic achievement is when the student exceeds the expected level in light of his preparations and special abilities, meaning that the student exceeds all his colleagues in achievement compared to those of his age and mind. The average academic achievement is when the student obtains average grades due to using half of the capabilities he has. Finally, poor academic achievement is a failure of the learner's performance to match what is expected and what is achieved in his academic achievement, where the average level of the learner is lower than that of his peers.

Academic achievement is important for the student and society (Al-Fakhoury, 2018): The student needs to obtain an educational certificate that enables him to obtain a job and to help the student's self-realization. It contributes to the student's self-adaptation and the student feels satisfied because he obtained high grades in his studies. It also satisfies the student's psychological and social needs such as security, success, appreciation, and respect. Academic achievement is important to society because it increases flow and production rates in the educational system and manages and ensures a greater return on educational expenses, which is an important indicator of the efficiency of the educational system. It meets society's needs for qualified and trained human resources to achieve compatibility between the outcomes of the educational process and the actual needs of society for these capacities.

Self-Management Skill

The concept of self-management began to be used at the beginning of the nineties of the last century. Its emergence was accompanied by a development in the terminology explaining it. It was initially used

under the term self-control of behaviour to express self-management, and then it gradually developed in the late eighties and became known as behavioural self-management. Then the term Self-identification was used in the mid-nineties. Despite this development and difference in the term, it remains one of the widespread terms in the field of educational and psychological sciences (Al-Naqeeb et al., 2018). Al-Sarhani (2021, p. 264) defined self-management as "a set of means and methods that help the individual benefit from his abilities and potentials in a way that helps him achieve his goals and find a balance in his life between duties, desires, and goals." Hassan (2020, p. 1838) defined self-management as "the individual's ability to be aware of his own capabilities, monitor the self, direct it towards achieving the goal, evaluate it on an ongoing basis, and strengthen it in the event of success or failure in achieving the goal." Moreover, Mustafa (2020, p. 420) defined self-management as "the individual's ability to direct himself, control and control his emotions, and confront the pressures he suffers from with the aim of achieving balance with himself and then achieving the desired goals through time management, effective communication, and decision-making." Al-Salmi (2019, p. 188) also defined self-management as "the ability of individuals to organize, monitor, and control their behaviors, feelings, emotions, and reactions."

Self-management consists of several mechanisms and skills that the individual adopts in different situations in improving behaviour, identifying needs, and achieving goals (Al-Kandari, 2022). Time management refers to the ability of individuals to make rational use by identifying needs, setting goals to achieve them, and prioritizing the required tasks through planning, analysis, commitment, follow-up, and making agendas, in addition to estimating the length of time each task takes. Emotion management refers to the individual's ability to deal with different emotions, get out of bad moods, calm oneself, and show appropriate emotions in different situations. Social relationship management refers to the individual's ability to form a network of positive social relationships with others and invest in them by communicating with them, resolving conflicts, influencing them, possessing the skill of persuasion, supporting and encouraging the abilities of others through guidance and feedback, the comprehensiveness of his vision, in addition to cooperation and striving to achieve goals by working in a team.

Previous Studies

Al-Qahtani (2023) identified the degree to which female students practiced self-management skills among a student at Princess Nourah bint Abdulrahman University. The descriptive survey method was implemented, and the questionnaire was relied upon as an instrument for collecting data, which was administered to (325) female students. The findings showed that female students' practice of skills Self-management was at a high level, and the difficulties that might prevent female students from practicing self-management skills were at a moderate level. The results also showed the presence of apparent differences attributed to the academic stage variable and the specialization variable.

Hussein et al. (2022) explored the use of self-regulated learning strategies to develop cognitive achievement and attitude toward chemistry. The quasi-experimental approach was used, and the sample included (66) female students, divided into two groups. The study used an achievement test and an attitude towards the subject scale, as instruments. The results demonstrated that, in terms of achievement and attitude toward the subject, female students who studied using self-regulated learning strategies outperformed female students who studied normally. This illustrates the efficacy of some organized learning strategies for the self-directed development of cognitive achievement and attitude toward chemistry.

Al-Ghamdi (2022) investigated how effectively a teaching strategy that emphasizes self-regulated learning aids students in developing their mathematical abilities. The study employed the quasi-experimental approach and included 70 students as its sample, including both males and girls. After the study, the experimental group performed higher on the math test, according to the research. The results of the posttest mathematical power test in the dimension of mathematical operations at their levels (mathematical

communication, mathematical coherence, and mathematical reasoning) likewise revealed statistically significant differences in favor of the experimental group. The mathematical power test results on the post scale favor the experimental group with statistically significant differences and a large effect size.

According to Muhammad et al. (2022), a training program might aid kindergarten instructors in becoming more effective time managers. We conducted a quasi-experimental sort of investigation. They covered two groups of the fifty female instructors that made up the group. According to the study, teachers who utilized the self-management note card received much higher grades than those who did not. The findings also showed that the experimental group's instructors' average scores on the self-management note card pre- and post-applications were significantly different, favoring the post-application.

Al-Sharif et al. (2021) conducted research on how certain learning techniques that students can choose for themselves might enhance their chemistry performance and critical-thinking abilities. They concentrated on secondary school kids. Using a quasi-experimental methodology, they collected information from 60 girls who were in their first year of secondary school. The study discovered that when it came to reflective thinking abilities following the use of certain learning methodologies, the scores of the female students in the experimental group were considerably different from those in the control group. After using some learning methods to aid their own learning, the girls in the experimental group outperformed the girls in the control group in terms of test scores. These variations were significant and not accidental.

Abdul Wahid (2021) developed a curriculum to assist students in becoming better self-managers and examined how it may increase mental toughness in a group of College of Education students. There were 22 male and female students in the group they analyzed. The pupils were divided into two groups. 12 male and female pupils made up the first group, while 10 females made up the second. According to the study, the program had a significant influence on promoting mental health as well as being good at teaching individuals how to take care of themselves.

Abdul Basit (2020) studied how using different teaching methods helps high school students become better at controlling their own learning. The study used the experimental design. The research included 62 students, and a test was created to achieve the goals of the study. The study found that the students in the experimental group had higher scores on a test about self-regulated learning skills compared to the students in the control group.

Methodology

Research Design

The method used in this study was an quasi-experimental design, which is consistent with the research objectives of testing the effectiveness of teaching science using self-regulated learning in achievement and developing self-management skills. It was based on two groups: the experimental group, which was taught using self-regulated learning, and the control group, which was taught in the traditional method.

Sampling

The study population consisted of eighth-grade students at Abu Bakr Al-Siddiq Basic School in Irbid Governorate. Eighty kids made up the research sample, and they were split into two groups based on the type of condition. Twenty children made up the first group, which was an experiment, while twenty hyperactive students made up the control group. There were (40) kids in total who had attention deficit disorder, and they were split into two groups. The first group, which included 20 female students, was experimental, while the second, which included 20 female students, was a control group.

Table 1: Distribution of Study Sample Members.

Category	Group	Frequency	Percentage
Hyperactivity disorder	experimental	20	25
	control	20	25
attention deficit disorder	experimental	20	25
	control	20	25
	Total	40	100

Instrument of the Study

First: Academic Achievement Test

The first unit of science for the second semester, which is the unit (the human body and its health), was assigned to students in Jordan's eighth grade of basic education. In order to address the questions of the study and accomplish its goals, the study prepared an achievement test to measure the academic achievement of topics. 50 questions from the unit that was chosen during the search made up the test.

The test was presented firstly to a group of judges specialized in science curricula and methods, and a group of science teachers and mentors, and based on their opinions and suggestions, the test was modified. Using the (SPSS) application, the test reliability parameters were determined using Cronbach's alpha reliability coefficient. The test has a good level of reliability, as seen by the (0.82) Cronbach's alpha coefficient..

Second: Self-Management Skills Test

The objective of the test and its sub-skills were determined, which were the self-awareness skill, which consisted of (17) questions, the self-monitoring skill, which consisted of (17) questions, and the self-direction skill, which consisted of (16) questions.

The test was presented in its initial form to a group of judges specialized in science curricula and methods, and a group of science teachers and mentors, and based on their opinions and suggestions, the test was modified. The test reliability parameters were calculated using Cronbach's alpha reliability coefficient through the use of the (SPSS) program. The Cronbach's alpha coefficient in the self-awareness skill was (0.79), the Cronbach's alpha coefficient in the self-monitoring skill (0.84), and the Cronbach's alpha coefficient in the guidance skill. The subjective test was (0.87), and the Cronbach's alpha coefficient for the test as a whole was (0.85), which indicates that the test has a high degree of reliability.

Data Analysis

To conduct statistical analysis after experimenting in the current study, the SPSS program was used to process the data statistically to answer the study questions. The mean scores, standard deviations, and the independent Samples T-test were used to compare the means of two independent groups.

Results and Discussion

Results of the first Question

To evaluate the differences between the average scores of the experimental and control groups for the achievement test on the pre-scale, the mean scores, standard deviations, and a T-test for two independent samples were employed.

Table 2: Results of the Differences Between the Average Scores of the Experimental and Control

Groups for the Achievement Test on the Pre-Test.

	Type of disorder	Group	No.	Mean score	Standard deviation	T value	Sig.
Academic achievement test in science	Hyperactivity disorder	experimental	20	29.50	3.50	.987	.330
		control	20	28.10	5.29		
	attention deficit disorder	experimental	20	29.20	3.25	1.009	.319
		control	20	27.85	5.01		

It is clear from the table that the value of (T) for the two types of disorder is not statistically significant for the pre-application of the achievement test, which indicates the equality of the two groups in achievement before the study experiment.

Results of the Second Question

The average achievement test scores of the experimental and control groups were compared using the mean scores, standard deviations, and a T-test for two separate samples.

Table 3: Results of Differences Between the Average Scores of the Experimental and Control Groups for Choosing Self-Management Skills on the Pre-Test.

Skill	Type of disorder	Group	No.	Mean score	Standard deviation	T value
Self-awareness	Hyperactivity disorder	experimental	29.65	3.06	.474	.638
		control	29.10	4.19		
	attention deficit disorder	experimental	30.55	3.28	1.110	.274
		control	29.05	5.07		
Self-monitoring	Hyperactivity disorder	experimental	30.40	2.72	1.381	.175
		control	28.90	4.02		
	attention deficit disorder	experimental	31.05	2.74	1.292	.204
		control	29.70	3.78		
Self-direction	Hyperactivity disorder	experimental	29.50	1.73	1.063	.294
		control	28.70	2.88		
	attention deficit disorder	experimental	29.80	1.28	1.040	.305
		control	29.20	2.23		
Total	Hyperactivity disorder	experimental	29.85	2.50	.979	.468
		control	28.90	3.69		
	attention deficit disorder	experimental	30.26	2.43	1.169	.109
		control	29.31	3.69		

It is clear from the table that the value of (T) for the two types of disorder is not statistically significant for the pre-application of the self-management skills test, which indicates the equality of the two groups in self-management skills before the study experiment.

Results of the Third Question

Table 4: Results of the Differences Between the Average Scores of the Experimental and Control Groups for the Achievement test on the Post-Test.

	Type of disorder	Group	No.	Mean score	Standard deviation	T value	Sig.
Academic achievement test in science	Hyperactivity disorder	experimental	20	37.95	2.37	11.997	.000
		control	20	28.10	5.29		
	attention deficit disorder	experimental	20	39.05	2.06	14.467	.000
		control	20	27.85	5.01		

The table shows that the value of (T) was statistically significant in the post-application for students with hyperactivity disorder, reaching (11.977) and a significance level of (.000) in favour of the experimental

group. This indicates that the use of self-regulated education in science contributes to improving the achievement of students with hyperactivity disorder. The table also shows that the value of (T) is statistically significant in the post-application for students with attention-deficit disorder, reaching (14.467) and a significance level of (.000) in favour of the experimental group. This indicates that the use of self-regulated education in science contributes to improving the achievement of students with attention-deficit disorder.

These results are in consensus with previous studies (Hussein et al., 2022; Al-Ghamdi, 2022; Al-Sharif et al., 2021; Abdul Basit, 2020). The self-regulated learning strategy develops students' preparations and abilities to self-regulate motivational processes and behaviors. The cognitive and environmental aspects are appropriate to the requirements of educational situations. Self-regulated learning helps students gradually develop their various skills and strategies so that students increasingly bear responsibility. This makes students carry out a process of control and organization that adapts to educational goals and tasks to improve their level of skills and performance. The self-regulated learning strategy also allows students to carry out basic roles, activities, and tasks during the learning process.

Results of the Fourth Question

Table 5: Results of the Differences Between the Average Scores of the Experimental and Control Groups for Choosing Self-Management Skills According to the Post-Test.

Skill	Type of disorder	Group	No.	Mean score	Standard deviation	T value
Self-awareness	Hyperactivity disorder	experimental	39.65	1.53	16.232	.000
		control	29.10	4.19		
	attention deficit disorder	experimental	39.95	1.19	18.190	.000
		control	29.05	5.07		
Self-monitoring	Hyperactivity disorder	experimental	38.50	1.93	14.064	.000
		control	28.90	4.02		
	attention deficit disorder	experimental	38.00	1.12	13.712	.000
		control	29.70	3.78		
Self-direction	Hyperactivity disorder	experimental	38.80	1.43	16.142	.000
		control	28.70	2.88		
	attention deficit disorder	experimental	39.45	1.66	16.416	.000
		control	29.20	2.23		
Total	Hyperactivity disorder	experimental	35.65	1.63	9.108	.000
		control	28.90	3.69		
	attention deficit disorder	experimental	39.13	1.32	16.252	.000
		control	29.31	3.69		

The table shows that the value of (T) is statistically significant in the post-application for students with hyperactivity disorder, reaching (9.108) and a significance level of (.000) in favour of the experimental group. This indicates that the use of self-regulated education in science contributes to improving self-management skills among students. Students who have hyperactivity. The table also shows that all self-management sub-skills are statistically significant after applying the test and in favour of the experimental group. The value of (T) is statistically significant in the post-application for students with attention-deficit disorder, reaching (16.252) and a significance level of (.000) in favour of the experimental group. This indicates that the use of self-regulated education in science contributes to improving self-management skills among students. Students who have distracted attention. The table also shows that all self-management sub-skills are statistically significant after applying the test and in favour of the experimental group.

This result is consistent with other studies (Mohamed et al., 2022; Abdel-Wahed, 2021). This result can

be explained by the fact that self-regulated learning allows students to pay attention to how they think and feel, and makes them use diverse and different thinking methods to reach appropriate solutions for performing academic tasks. Self-regulated learning also increases students' sense of responsibility and monitors their behaviours and actions to perform tasks perfectly without anyone's help. This increases students' motivation toward learning, knowledge, and self-reliance, in addition to students' ability to adapt and organize behaviour with the requirements of different academic situations to achieve the desired academic tasks.

Recommendations

The study recommends directing teachers to the importance of using self-regulated learning strategies, and the necessity of training students to employ these strategies in learning and studying. It is also important to diagnose the extent to which students with attention-deficit/hyperactivity disorder employ self-regulated learning strategies and hold the necessary courses and training programs to develop the skills of using these strategies in learning and studying. It is vital to include self-regulated learning strategies in the school curricula to ensure that students employ them and gradually transform them into desirable behavioural habits. The study also recommends holding training courses for science teachers in general and for teachers of other curricula to teach their curricula using self-regulated learning, provide them with its skills, develop their abilities to manage it and determine the role of both the teacher and the student when implementing it in developing achievement and self-management.

Acknowledgment

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