Developing The Self-Direction Skill Through Science Teaching Using The Learning Contracts Method

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Abstract

The objective of this study was to explore the impact of utilizing the learning contracts strategy in teaching science to develop the self-direction skills of sixth-grade primary students. The study relied on the quasi-experimental approach to answer the research objectives. The study population was represented by sixth-grade students in Usayd bin Al Hudayr Primary School (boys) and Al Tahfidz Fourth Primary School. There were (120) male and female students in the study sample, and they were split into two groups for each category. The first group, which included 30 male and 30 female students, was an experimental group. The second group, which included 30 male and 30 female students, was a control group. A pre- and post-test measuring the self-direction abilities of the two groups was utilized as the study's instrument. According to the study's findings, there were variations between the two groups of students (male and female) on the post-test of the self-direction scale, favoring the experimental group. The findings also indicated that there were variations in the experimental group students' average scores on the self-direction ability scale in the post-test, with males doing better on average.

Keywords: learning contracts strategy, teachers, learners, teaching science, self-direction skill.

1. Introduction

Educational theories have recommended the use of teaching strategies that are concerned with individualizing education and developing the role of learners to be at the centre of the educational process. In the past, the teacher was a facilitator and director of educational processes, and his efficiency depended on the level of his ability to encourage students to learn, and his consideration of the students' needs, their learning methods, and developmental characteristics. The teacher also had the role of identifying weaknesses and identifying difficulties that students encounter in learning science (Abu Imran & Al-Sharaa, 2016).

The learning strategy is considered the most important modern teaching strategy that is based on the learner taking responsibility for the patterns and forms of his learning and making appropriate decisions to assist the teacher. These decisions are included in a written document that shows all the dimensions of the agreement between the teacher and the learner, and both parties must adhere to the terms of the agreement concluded during its application. In this learning experience, the learner performs educational tasks that require investigation, exploration, search for information, and the use of self-direction skills (Nasr, 2017).

In recent years, self-direction skills have received the attention of theorists, researchers, and educators. They also focused on building perceptions and models to measure the axes and dimensions of self-direction skills, studying them in the field, and focusing on how to make learners active in the learning process and support the process by using a set of supporting activities, in addition to carrying out appropriate modification processes. (Al-Otaibi, 2015). Self-direction skills bevame important skills of the twenty-first century, and they are concerned with the learner's ability to constantly develop and improve his abilities through self-reliance. They play an important role in this skill because of the self-service tools it provides in searching on the Internet. Moreover, it is considered a necessity for everyone in this era, as it is an individual's tool for developing skills, abilities, and knowledge so that the learner becomes able to develop and improve himself and continue learning throughout life (Al-Attas & Al-Saif, 2020).

1.1. Problem Statement

Science teaching methods are an essential and effective focus in the educational and pedagogical process in the science lesson. They are important to teach and raise the level of basic skills and deliver knowledge and information to students, and because of their importance in building the integrated personality of students, we see that interest in teaching methods by researchers and specialists has begun to increase greatly. It was noted during the teaching process that the interaction of students in the classroom depends on indoctrination and memorization mainly on the teacher in the educational process. This is what made this study important to make the students more positive and bear responsibility during their learning and develop their abilities to make decisions, increase their self-confidence, and help the teacher exercise his role as a mentor and guide.

1.2.Objectives of the study

The study is based on the main objective, which states: "Verifying the impact of using the learning contracts strategy in teaching science to develop the self-direction skill of sixth-grade students." The study aimed to:

1. Identify the presence of variation in the scores of students in the pre-self-direction skill test.
2. Verify the variations in the scores of female students of both groups in the pre-self-direction skill test.
3. Verify the variations in the scores of students in the post-self-direction skill test.
4. Verify the differences in the scores of female students in the post-application of the self-direction skill test.
5. Verify the differences between the scores of students in the post-self-direction skill test due to the gender variable.

1.3. Questions of the study

The main question of this study was "What is the impact of using the learning contracts strategy in teaching science to develop the self-direction skill of sixth-grade students?"

The following sub-questions branch out from the main question:

1. Are there variations in the scores of students in the pre-self-direction skill test?
2. Are there variations in the scores of students in the pre-self-direction skill test?
3. Are there variations in the scores of students in the post-self-direction skill test?
4. Are there variations in the scores of students in the post-self-direction skill test?
5. Are there variations in the scores of the experimental group in the post-self-direction skill test due to the gender variable?

1.4. Significance of the study

The study discusses the topic of learning contracts, which is one of the important teaching strategies, as it focuses on students' positivity, their effective and active role in learning, and their self-reliance in making decisions. It is useful to science curriculum designers and planners in developing, planning, and designing curricula for different stages in light of modern global trends. It focuses on developing self-direction skills, to prepare learners capable of assuming responsibilities and making decisions. The results will benefit science teachers to use strategies, methods, and teaching methods that encourage the development of self-direction skills away from the widely used method of indoctrination and memorization. The study will direct the attention of those interested and researchers in the field of education to conduct studies and research to develop self-direction skills using different strategies and various learning methods.

1.5. Limitations

The study included sixth-grade students at Usayd bin Al Hudayr Primary School for Boys in Abha, and sixth-grade students at Al Tahfidz Al Fourth Primary School for Girls in Abha. This study was applied during the second semester of the academic year 2023. This study was applied in the Usayd bin Al-Hudayr Primary School for Boys in Abha, and the Fourth Al-Tahfidz Primary School for Girls.

2. Literature Review

2.1. Learning Contracts

There are modern strategies that seek to give the student a sense of responsibility and commitment, the most important of which is the learning contracts strategy that enables students to participate in the educational process and express their commitment. The strategy holds students responsible for their learning, its forms, and patterns, to make appropriate decisions through cooperation with the teacher, and is carried out through a negotiation process. The students agree with the teacher on specific requirements and then a written document or contract is concluded that precisely explains the dimensions of the agreement between the students and the teacher. Both parties must adhere to all the elements contained in the agreement during the educational experience.

The learning contracts strategy is characterized by a set of features (Al-Faki, 2020). They are mandatory because the students bear the educational burdens, and direct them to achieve the goals they seek. The teacher must provide the means, materials, and assistance with which the students learn. Second, they have clarity of roles and define all the work that the students and the teacher want to do in a precise way and define each of them with the roles to achieve the required goals, and this is clarified in the contracts documented between the two parties. Learning contracts have Diverse learning methods, techniques, and sources. This refers to giving students the freedom to choose all the methods, methods, and sources of learning that contribute to achieving the desired educational goals. Finally, they are flexible, as students can change the methods, techniques, and sources of learning easily and conveniently, given their lack of complete awareness of all the sources and methods of learning and their characteristics.

The learning contracts strategy goes through three stages. First is the integration stage. It refers to the students' awareness of what is intended to be studied practically and what is required to be learned, that is, the students' awareness of the goals that they seek to achieve, and it includes students negotiating with each other. The second

stage is the exploration stage. This refers to students discovering the paths they will take through the components and subtopics, learning about different learning methods, sources, and methods, and identifying alternatives and steps they can take to accomplish what is required. The third is the contemplation stage. This indicates that students are sure that they have achieved the desired goals, that they have learned what is expected of them, and that they realize the aspects of benefiting from what they have learned. It also includes good challenges that can be raised for what has been learned, which leads to the growth of students' self-motivation and the consolidation of the principle of what's next (Khalaf & Rahim, 2015).

2.2. Self-direction Skills

Self-direction skills have become necessities created by the rapid transformations in the current era. They are meant to ensure that individuals employ all their abilities, skills, and potentials optimally. Self-direction is also one of the methods that have emerged for the use of purposeful educational strategies, and despite their different methods, they are consistent with their goals and objectives. Talak and Ibrahim (2021, p. 4) defined it as "taking initiative independently by individuals with or without the help of others to diagnose learning requirements, formulate educational objectives, determine the material and human resources required for learning, choose and implement appropriate learning strategies, and evaluate learning outcomes." Hassan (2019, p. 525) defined it as "learning in which the design, concepts, implementation, and evaluation of an educational project are developed through the guidance of the learner himself."

Bartholomew (2017) argued that there are basic goals for self-direction skills. They enhance learners' abilities for self-direction during their learning and promote transformative learning as a centre for self-directed learning. They also stimulate social action and emancipatory learning as an important part of self-direction. These skills assist administrators, teachers, and policymakers in making important decisions for student technology access and integration and they improve learning for learners to be able

to manage their needs in an organized way. They provide the learner with the opportunity to choose what he would learn and critically evaluate the learning materials that were chosen.

Plews (2017) confirmed that self-direction skills have a set of advantages. They monitor, plan, and evaluate learning through the use of technology as a main driver of an integrated learning process. These skills help in developing various skills among learners, such as self-confidence, love of reading, curiosity, creativity, organized work, and self-discipline. They provide the student a role from the start of the learning activity and are a crucial source for forecasting learners' academic progress in non-web-based distant learning. Self-direction skills involve goal-directed behaviour and active participation and enable the learner to exert more effort to implement strategies to find resources and persist when facing obstacles.

2.3. Previous studies

According to Ghanem (2022), adopting the electronic educational contract technique has a positive impact on the growth of psychological flow and metacognitive thinking. At Tanta University, the researcher used the quasi-experimental approach, and the sample size was (60) psychology students. The questionnaire served as a tool for data collection. The findings revealed that the experimental group's average student scores on the Psychological Flow Scale and the Metacognitive Thinking Scale after application differed from those of the control group.

Al-Otaibi (2021) investigated how the reflective reciprocal teaching technique affected the acquisition of self-directed learning and the ability to comprehend the Prophetic text. The study used a quasi-experimental methodology, and the sample size was 71 students who were split into two groups: the experimental group and the control group. Both the exam and the questionnaire were used to gauge participants' grasp of the Prophetic text and their aptitude for independent study. The study's findings indicated that the reflective reciprocal teaching approach had an impact on students' ability to comprehend prophetic texts. The results demonstrated that the reflective reciprocal teaching

technique had an impact on the acquisition of directed learning abilities.

Nasrallah (2021) looked on how the contracts method affected sixth-grade science students' academic performance and learning motivation. The sample consisted of 46 sixth-grade female students who were split into two experimental groups (23) and a control group. The researcher used a quasi-experimental methodology. A quiz was used to gauge motivation for learning science, and a test was utilized to gauge performance. The study's findings indicated that using the contract strategy improved academic performance among sixth-grade female students in favor of the experimental group and that there were differences in the average responses of the study sample regarding motivation to learn science.

The usefulness of the contract learning technique in fostering mathematical creativity was examined by Mahmoud et al. (2020). The study sample consisted of (70) female students in the second year of middle school in Sharkia Governorate, who were split into two groups: the first experimental and the second control. The researchers used a quasi-experimental methodology. After taking the test of creative thinking, the findings showed that female students in the experimental group performed better than those in the control group. Statistics show that the difference is considerable. The results also demonstrated a substantial change in the students in the experimental group's average scores between before and after they took the exam of creative thinking. After the test, the results were higher.

According to Mabad et al. (2020), the contract learning technique is beneficial for teaching social subjects to first-year middle school pupils in order to increase their cognitive accomplishment and build some basic geographic research abilities. 36 students made up the study sample, who were split into experimental and control groups by the researchers using a quasi-experimental methodology. The exam was used to evaluate geographic knowledge and cognitive ability. According to the study, pupils in the experimental group's average test results considerably

differed from those of the control group. In comparison to the average scores of the other students, the experimental group's pupils performed better on the geography test after applying their research skills.

Al-Jabbar (2020) investigated how contract learning techniques affected fifth-grade literary students' acquisition of moral principles in the context of Islamic education. Seventy-one (71) female students were separated into three groups for the study sample, which was conducted using a quasi-experimental methodology. The study's findings revealed that the average grades of the female students who used the technique to study were statistically different from those of the students who did not use the approach.

3. Methodology

To determine the impact of the independent variable (teaching science using the learning contracts strategy) on the dependent variable (self-direction skills), this study adopted the quasi-experimental methodology. There were two groups—one experimental and the other control—and the experimental group received instruction utilizing the contracts technique, whereas the control group received conventional instruction.

3.1. Sampling

The study population included of sixth-grade students in Aseed bin Al-Hudayr Primary School for Boys in the City of Abha, and Al-Tahfidz Al-Fourth Primary School for Girls in the City of Abha. Male students made up 60 students from the sample, who were split into two experimental groups (each with 30 students) and a control group (also with 30 students). The sample for female students was made up of (60) individuals, of which (30) were in the experimental group and (30) were in the control group. The table that follows shows the sample's distribution.

Table 1. Distribution of study participants

Sample	Group	Frequency	Percentage
Aseed bin Al-Hudayr Primary School for Boys	Experimental	30	%25
	Control	30	%25

Al-Tahfidz Al-Fourth Primary School for Girls	Experimental	30	%25
	Control	30	%25
Total		60	%100

3.2. Procedure

The study implemented the following procedures and steps to reach its objectives:

First: Preparing a list of self-direction skills necessary for sixth-grade students studying science in the primary stage. This is done through reviewing previous studies that focused on self-direction skills, the nature, and objectives of science for the sixth grade in the primary stage, and adjusting the list by presenting it to several arbitrators in the field of curricula and teaching methods.

Second: Reformulating the selected unit (land resources and their conservation) in light of the learning contracts strategy. This step was done by identifying the unit's objectives, formulating unit lessons based on the learning contracts strategy, testing educational methods, means, and activities that are appropriate for the unit, and designing different and varied methods to evaluate the unit.

Third: Preparing a test for the necessary self-direction skills in science for sixth-grade students.

Fourth: Measuring the effectiveness of the selected unit (Land Resources and Conservation) in developing self-direction skills. This step was done by selecting the research group from sixth-grade primary school students studying science. The self-direction test was applied beforehand to the control and experimental groups. Then the unit of the science subject (Earth Resources and their Conservation) was formulated using the learning contracts strategy for the experimental group, while the control group was instructed the same unit using the traditional method.

Fifth: Monitoring, discussing, analyzing, processing statistically, and interpreting the results.

Sixth: Setting recommendations based on the findings of the study.

3.3. Data Analysis

The following statistical methods were used to analyze the results:

1. Mean scores and standard deviations: to describe students' performance in the speaking skill test.

2. Independent Samples T-Test for differences between the means of two independent samples.

3. The square of the eta coefficient η2 to verify the effect size.

4. Results and Discussion

4.1. Results of the first question

The first question states: "Are there any differences between the average scores of students in the experimental and control groups in the pre-application of the self-direction skills test?" To answer this question, the T-test was used to reveal the significance of the differences between the means of the pre-test of self-direction skills for two independent samples (experimental and control), and the following table shows the results.

Table 2. Results of the T-test to determine if differences in the mean scores of male students on the pre-test of the self-direction skill are significant

Group	No.	Mean score	Standard deviation	T value	Sig.
Experimental	30	8.86	1.50	.617	.540
Control	30	8.63	1.42		

The table shows that the value of (T) reached (.617) for the answers of the students of Usayd bin Al-Hudayr Primary School in the pre-test. The value was not statistically significant at the level of significance (α≤0.05), where the level of significance reached (.540), and this confirms the equality of the two groups before experimenting.

4.2. Results of the second question

The second question states: "Are there any differences between the average scores of female students in the experimental and control groups in the pre-application of

the self-direction skill test?" To answer this question, the T-test was used to reveal the significance of the differences between the means of the pre-test of self-direction skills for two independent samples (experimental and control), and the following table shows the results.

Table 3. Results of the T-test to determine if differences in the mean scores of female students on the pre-test of the self-direction skill are significant.

Group	No.	Mean score	Standard deviation	T value	Sig.
Experimental	30	9.30	1.34	.201	.467
Control	30	9.06	1.11		

The table shows that the value of (T) reached (.201) for the answers of the fourth memorization primary school students in the pre-test, and it is not statistically significant at the level of significance (α≤0.05), where the level of significance reached (.467). This confirms the equality of the two groups before experimenting.

4.3. Results of the third question

The third question states: "Are there any differences between the average scores of students (boys) in the experimental and control groups in the post-application of the self-direction skill test?" To answer this question, the T-test was used to reveal the significance of the differences between the means of the self-direction skills posttest for two independent samples (experimental and control), and the following table shows the results.

Table 4. Results of the T-test to determine the significance of the variations in male students' average scores following the self-direction skill post-test

Group	No.	Mean score	Standard deviation	T value	Sig.	Effect size
Experimental	30	15.96	1.80	7.835	.000	.717
Control	30	12.83	1.23			

The table demonstrates that for the responses provided by the experimental and control groups of pupils at Usayd bin

Al-Hudayr Primary School during the post-test, the value of (T) reached (7.835). The results show that there were statistically significant differences between the average scores of students in the experimental and control groups on the post-test of the self-direction skill scale, in favor of the experimental group, with a large effect size. The value was statistically significant at the level of significance (0.05), where the level of significance reached (.000). This study is consistent with previous studies (Ghanem, 2022; Al-Otaibi, 2021; Nasrallah, 2021; Mahmoud et al., 2020; Mabad et al., 2020; Al-Jabbar, 2020).

These results can be explained by the fact that the students (boys) relied on themselves positively and interactively in different educational situations and that they were able to transform from a recipient of information to a maker of it and a main focus of the learning process. Students acquired and developed communication skills by increasing social relationships between each other and with the teacher. The learning contracts strategy also contributed to increasing students' intellectual and mental capabilities and enhanced their desire to research, learn, and learn.

4.4. Results of the fourth question

The fourth question states: "Are there any differences between the average scores of female students in the experimental and control groups in the post-application of the self-direction skill test?" The following table displays the results of the T-test, which was used to determine the significance of the differences between the means of the self-direction skills posttest for two independent samples (experimental and control).

Table 5. Results of the T-test for the differences between the average scores of female students in the experimental and control group in the post-test of self-direction skill.

Group	No.	Mean score	Standard deviation	T value	Sig.	Effect size
Experimental	30	15.03	1.47	7.393	.000	.697
Control	30	12.20	1.49			

The table demonstrates that the value of (T) for the post-test responses from the experimental and control groups of female students in the fourth primary memorization school reached a value of (7.835) and is statistically significant at the level of significance (0.05), where the level of significance reached (.000). The findings show that there are differences between the average scores of female students in the experimental and control groups on the post-test of the self-direction skill scale, favoring the experimental group, with a large effect size. These differences are statistically significant at the level of significance (0.05). This study is consistent with (Ghanem, 2022; Al-Otaibi, 2021; Nasrallah, 2021; Mahmoud et al., 2020; Mabad et al., 2020; Al-Jabbar, 2020).

These results can be explained by the fact that the female students have increased their confidence in themselves, their skills, and abilities, and this has made them able to make the right decisions to solve the problems they face during the learning process. The female students are also committed to performing the tasks to be accomplished and achieving the goals that have been set, and they use various learning sources represented by the Internet audio learning sources and different visuals that can be relied upon in the learning process.

4.5. Results of the fifth question

The fifth question states: “Are there any differences between the average scores of the experimental group students in the post-application of the self-direction skill test due to the gender variable?” To answer this question, the T-test was used to reveal the significance of the differences between the means of the self-direction skills posttest for two independent samples (experimental and control), and the following table shows the results.

Table 6. The results of the T-test for the differences between the average scores of the experimental group students in the post-test of the self-direction skill due to the gender variable.

	Group	No.	Mean score	Standard deviation	T value	Sig.	Effect size

Aseed bin Al-Hudayr Primary School for Boys	Experimental	30	15.96	1.80	2.191	.033	.276
Al-Tahfidz Al-Fourth Primary School for Girls	Experimental	30	15.03	1.47			

The table demonstrates that the value of (T) for the post-test responses from students in the experimental group reached (2.191), and at the level of significance (0.05), where the level of significance achieved (.033), it is statistically significant. The findings show that there are statistically significant differences in the mean scores of the experimental group students on the post-test of the self-direction ability scale, with a medium effect size favoring the students (boys).

These results indicate that students (boys) understand what will be studied in general and what must be learned, and they can determine the goals they seek better than female students. The male students also can discover all the educational paths that they will follow and determine the alternatives that they can use to accomplish the tasks and achieve goals compared to female students. Male students also can achieve the desired goals and learn what is expected better than female students, which increases their motivation to learn.

5. Recommendations

The study suggests the need to develop clear policies that contribute to integrating the learning of self-direction skills through the use of school curricula. The study recommends taking an interest in developing the science curriculum for the primary stage in light of the learning contracts strategy. It is also important to hold training courses and workshops for science teachers on how to use the learning contracts strategy to develop self-direction skills. Teachers should pay attention to providing activities and educational means to facilitate learning science and increase interest in developing self-direction skills among primary school students.

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