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EFFECT OF THE MANTLE OF THE EXPERT IN STUDENTS' GEOMETRY ACHIEVEMENT (ANGLES AND POLYGONS)

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ABSTRACT

Issues about poor achievement in mathematics (angles and polygons topics) among Palestinian students has led to the need for developing new effective strategies that can be used to improve mathematics achievement among Palestinian 7th grade students. The aim of study is to reveal the effect of employing the mantle of the expert on the achievement of angles and polygons topics among seventh grade students in Palestine. A quasi-experimental non-equivalent control group design using experimental and control groups with a pre and post-test was conducted. Data were collected using achievement test. The sample of study consisted of (76) students in the seventh grade that were divided into two groups, the experimental group (37) students and the control group (39) students. Data collected from the pre-test and post-test was analyzed using descriptive and inferential statistics. One-way MANOVA test was used to verify the differences of achievement between experimental and control groups. The research found that there is a significant impact of employing the mantle of the expert in increasing the achievement in geometry among seventh grade students. Students who are studied using mantle of the expert had better achievement than those who did not. This study recommended employing the mantle of the expert in teaching other topics in mathematics and in different study stages. This study too showed the necessity of paying attention to the use of classroom and extra-curricular activities in different academic subjects, particularly in mathematics, as well as indicated the necessity of holding courses and workshops to train teachers to use the mantle of the expert in the educational process.

Keywords: *Academic Achievement, Artistic Drama, Convenience sampling, Mathematics teachers, Quasi-experimental*

INTRODUCTION

The reality of education in Palestine is subject to a stifling system of creativity and thinking, which makes it possible to catch up to the difficult task of developing the world. Moreover, the creation of a digital society that connects everyone together regardless of distance, time or place, and individuals should be knowledgeable about the new environment. With the start of the Fourth Industrial Revolution, the entire social system will change, as well as the lifestyle will change to become more machine-reliant and programmatic, and accordingly the individuals (Pooworawan, 2015). In the age of the fourth revolution, education will be more than just an education. It will allow the learner to grow with his knowledge and skills to prepare for a full life, not only to learn to read and write but to be able to live in society and equipped with his best abilities (Sinlarat, 2016). Education should help the learner develop his or her abilities to apply new technology that helps them develop according to changes in society (Goldie, 2016). The researcher believes that to develop abilities of learners, they must create their motivation through strategies that encourage them to research and explore the world around them, which affects their achievement and acts as a measure of achieving the general and specific objectives of the educational process.

In the modern era, a large number of educational strategies dealt with the educational process in its strategic side puts the teacher and learner in a framed and organized environment where goals are achieved in a clear manner and makes the vision of education as well as delivery of the substance of scientific material studied to the target generation more clear and solid. In this context, we found a number of researchers who adopted a strategy for the educational process, called the mantle of the expert (MOE). Although this strategy is new, the researcher believes that it is feasible to be within the strategies that must be learned by the teacher because it proved useful for use in the field of education. It makes the educational process a participatory process that the teacher and the learner share in order to achieve the desired goal of the curriculum developers (Al-Kurdi, 2010).

The drama-based Mantle of the Experts (MOE) is an exciting way to teach and learn, and the basic idea is that students study the syllabus as if they were a fictional group of experts. In addition, it's about discovering your own learning, and learning by learning special responsibility. This approach yields cognitive and social development as well as consequent learning outcomes related to life skill acquisition (Heathcote, 2004). Al-Khaldi (2003) believes that education that aims only for knowledge does not achieve the goal of education, that knowledge is not valid to be the goal of education alone, and it is not important that the learner possesses only knowledge, but instead it should benefit from his knowledge. Different types of it determine the intellectual effectiveness. This is consistent with the goal of using MOE in education, as this strategy seeks to build the learner's knowledge by sharing and collaborating with his colleagues with the help of their teacher who provides them with the necessary assistance.

This is also consistent with Vygotsky's goal of learning through scaffolding, which he defines as the distance between his true level of growth that enables him to solve problems alone and from a level that enables him to solve problems when he is assisted by peer cooperation (Vygotsky, 1978). Vygotsky also emphasizes that the process of building knowledge and meanings of the individual must take place by discussing ideas and activities that exist between learners and talking to others, and this leads to social interaction. The process of building knowledge takes place through social context because knowledge is in his view a sociocultural process that guides students' thinking and helps them with composition of meaning (Zaytoon, 2007).

All that Vygotsky mentioned are important elements of learning, including adult support for the learner (Scaffolding), or support through cooperation between peers, including the social atmosphere that allows discussion of ideas and activities that exist between learners. These matters may fall within the context of the use of MOE.

MOE tends to regard knowledge as both subjective and social, and this is consistent with the relative school that sees knowledge as a human-social product and believes that access to the truth must be

influenced by the prevailing context, history and culture (Wahba, 2010). Thomas Kuhn, a pioneer of the school of relativity, considered that science, like all fields of knowledge, is driven by personal interests, intellectual and political ideology, as well as attitudes of scientists, and therefore it is not objective (Wahba, 2010).

The process of teaching and learning is one of the most important indicators of the progress of humanity, and the extent of the development of nations is measured by the amount of scientific knowledge obtained by its members, and its role in pushing the movement of society towards progress. Achievement measures the number of scientific concepts in a student and is one of the most important indicators that educational systems rely on to measure the extent of learning and thus the extent to which teaching and educational goals are achieved. The term achievement is indicated as "used to denote the degree or measure of success that a student has achieved in his or her field of study. It describes the acquisition of knowledge and skills and the ability to use them in current or future contexts. are available" (Allam, 2006).

The importance of achievement is not only related to educational institutions; it is closely related to the individual because of its role in its social and scientific evaluation. It provides him with scientific and social advancement, and achieves an important appreciation for himself, which drives him to more scientific knowledge that is the basis of the progress of nations and societies humanity. Mostafa (2001) indicates that "the academic delay is mainly due to the inadequacy of educational programs, and the nature of their implementation, linked to a number of human, material and environmental factors". Research results show a positive correlation between learning and achievement patterns, and it has been shown that the pattern used in learning influences achievement level. When the learner's learning style and the learning style used by the teacher are consistent, the achievement undoubtedly increases significantly, and the learner speeds up the acquisition and retention of information for a longer period of time and its impact and classification is effective (Zughoul et al., 2007).

Geometry is a major branch of mathematics concerning dimensions, properties, relationships, points, lines, angles, areas, and solids. It is interested in studying the properties of geometric shapes as stable (Webster, 2017). The importance of studying geometry and learning concepts is that it contributes to the development of problem-solving skills through the development of spatial thinking, as well as helping learners to understand different mathematics topics such as fractions, proportions, similarities and measurement. It works to develop the logical reasoning abilities of learners in all areas of thinking (Van de et al., 2014). Many researchers also stress the importance of geometry in the evolution of the world (Gafoor & Kurukkan, 2015). Learning geometry is not easy and many students do not have a good understanding of geometric concepts, geometric reasoning, and geometric problem-solving skills. Lack of understanding in learning geometry often leads to student discouragement and inevitably leads to poor geometry performance (Franke & Reinhold, 2016; Glasnović Gracin & Kuzle, 2018; Kuzle et al., 2018).

There are many literatures that studied angles and polygons for students in terms of their difficulty and the degree of student achievement in them (Özsoyi, Macit, Karataş, & Akkaya, 2018; Stathopoulou, Kotarinou, & Appelbaum, 2015; Arman 2019; Kaf & Uygungul Yilmaz, 2017; Duman & Özçelik, 2018; Bulut, 2016; Mauladaniyati & Kurniawan, 2018). Mulligan et al. (1997) noted that the idea of angle occupies a prominent position in the development of its knowledge of geometry. Past studies have proven successful the mantle of the expert in the high rate of their achievement in other subjects (Nasrallah, 2015; Qanoh, 2016; Saeed, 2016; Salha, 2014; Sagirli & Özturan, 2014). The researcher sees the necessity of testing this strategy in mathematics to help students and teachers to devise schemes that serve mathematics and break the deadlock in the classroom by using imagination and bringing the world to the classroom, which works to increase students' achievement on geometry. It appears from the literature reviewed that students 'achievement in geometry is weak because of the way it is taught, and from here the researcher sees the necessity of testing the mantle of the expert in geometry teaching and seeing the extent of its impact on students' achievement. Previous studies have examined the impact of using the mantle of the expert on various subjects such as languages and geography. This study focused on the effect of using the mantle of the expert on student geometry

achievement in mathematics. The study will contribute to the inclusion of a new method of teaching mathematics because it has proven its positive impact on students' achievement in mathematics. A new strategy will be added to the strategies that increase academic achievement. With a positive effect of the mantle of the expert on academic achievement in angles and polygons, the study will open the way for researchers to test it in other topics as well as on other branches of mathematics. The study will contribute to introducing teachers to the mantle of the expert and its impact on students' achievement, providing a theoretical material that contains information about the mantle of the expert and how to apply it in the classroom, and test its impact on students' achievement. As such, this study will be answering 2 research questions:

1. Is there any significant difference on academic achievement of angles and polygon topics 7th grade students that learn with Mantle of Expert and those who learn using the traditional method?
2. Is there any significant difference on academic achievement of angles and polygon topics 7th grade students before and after using the Mantle of Expert and traditional method?

LITERATURE REVIEW

The Mantle of the Expert (MOE)

This modern approach of education focuses on students to become independent learners and offer the freedom to learn according to their interest, needs and ability without the restrictions imposed in traditional learning. This will create a generation who can solve problems and think critically and creatively. The educators emphasize that the learning and teaching process is not a matter of transferring knowledge to the students to memorize and retrieve, but a process of thinking and activating the previous knowledge of students, and building, acquiring, understanding, retaining and using knowledge from the perspective of the students' mental, emotional and skill development, and the integration of their personality from various aspects (Zaytoon, 2007).

The process of employing MOE in education is one of the modern methods of employing arts in education created by Dorothy Heathcote at the end of the last century. Heathcote describes the MOE as a river fed by many tributaries and compares this to traditional education. Traditional education is like a monotonous road leading to a linear path, providing students with the necessary knowledge and integration and networking in the learning process, making skill development a daunting task. Heathcote also points out that MOE is a dramatic drama-based strategy in the teaching and learning process. The basic idea is that students study the curriculum as a fictional group of experts, discover their own learning content, and learn through specific responsibilities (Heathcote, 2004).

MOE has the potential to change the learning process by building a community within the classroom, providing an environment for independent students, and providing an atmosphere of fun in the learning process. It also provides students with the opportunity to apply a new and useful method of teaching or rediscover their talent with students in the learning process. It also allows opportunities to understand the real world through their role in working with a real sense and transforming conversation and debate into something concrete and applicable (Luke, 2010).

The teaching of MOE is compatible with humanization of mathematics as it provides opportunities for students to reflect on emotional, cognitive and skillful aspects of learning (Jabulani, 2008). This may be in line with the principle of mathematical communication that encourages the use of various mathematical expressions and greater representation of mathematics in the students' environment, feelings and emotions. To learn knowledge effectively, students need to feel what they are learning. Students need to be actively involved in the learning process; their feelings, fantasies and values need to be engaged in knowledge so that knowledge becomes personal. By nature, MOE provides the opportunity for students to have a new interactive learning experience (Boyle & Wahib, 2009).

MOE is performed in a context of dramatic and explicit components, where Heathcote and Bolton (2013) show that this approach consists of essential core elements in which the student's role is determined, including the following components:

1. Project: where students gradually take responsibility for a project in a fictional world (default).
2. Customer: where students are sufficiently interested in long-term goals related to the customer and carry out the activities necessary to achieve the goals, which encourages them to imagine the virtual fantasy world, here, the teacher can act as a customer, or a student may be assigned to do so.
3. Experts: students and teachers interact with each other and imagine that they act like they are experts working hard for the project and the task entrusted to them.
4. Tasks: what students do to accomplish the project, where students engage all the time in activities and tasks that are at the same time part of the requirements of the curriculum, and professional practices in the virtual world (virtual).
5. Location: The teacher must participate in the energy and support of the students (individually or collectively with the students) as a knowledgeable and professional colleague, in addition to ascertaining the locations of the students in the project and what is required in order to build their point of view with it.
6. Meditation Students should reflect on the production of knowledge and give the teacher time to think and plan before starting work.

Geometry Achievement

The importance of achievement is that it is one of the criteria for the success of educational institutions and their progress towards achieving their goals. In addition, it is important in determining the continuity of individual learning and determining their future job. It is an opportunity for the student that will not be repeated except at the expense of his age, and a mark in a permanent and indelible record. Rather, he can be held accountable for it on any occasion that may require that in the future. Achievement controls the type of the future of the individual in practical life. If his achievement is superior, then his future is bright and prosperous, and if his achievement is weak, his future will often be dark and difficult (Al-Astal, 2010).

Academic achievement "is a cognitive mental activity of a student that is inferred from the total marks obtained in his performance in school monitoring statements" (Al-Khaldi, 2003). Allam (2006) defined it as "the degree of acquisition achieved by the individual, or the level of success that he attains, or reaches in a subject or educational field". Al-Turiri (1997) defined it as ''Achievement is directly related to students 'academic performance to demonstrate the extent to which students' educational goals have been achieved. It is measured by achievement tests, which are tools for measuring the extent to which an individual has attained what he/she has acquired from a specific knowledge or skill as a result of learning or training''. ''Achievement is a mental activity through which information, knowledge; facts, values and trends are acquired related to the cognitive, social and motivational aspects, through organized mechanisms, whether it is a school or an educational institution. This learning is inferred by the degrees obtained by the result of standardized and achievement tests, or it is the final score that a student obtains from the school at the end of the school year based on his answers in the final exam, and as it is proven in the monitoring statements in the school''.

The educational experts divided the achievement into three types; the first type is academic achievement. Bloom explained in his classification of the cognitive or mental domain that it is divided into six different levels, the level of remembrance, the level of understanding, the level of application, the level of analysis, the level of composition, the level of evaluation (Afaneh & Lulu, 2004).

METHODOLOGY

Research Design

In this research, the researcher adopted the quasi-experimental non-equivalent control group design study using MOE to improve academic achievement for students. Quasi-experimental study is a form of research that involves therapy, measurement of results and units of experimentation. However, in the choice of comparison group members, it does not use random selection. Instead, the comparison is made of unequal organizations differentiated in many autonomous alien factors. As well as the variability of the handling variable (Cook & Campbell, 1979). The use of groups in their natural way contributes to reducing the arrangements used when creating groups, as individuals do not realize that they are part of the experience.

Sample of the Study

In this study, the study population includes all seventh graders in Ramallah and Al-Bireh government schools. Their total number are 5,634 students, including 2,793 males, 2,841 females, as mentioned in the records of the Directorate of Education in the Ramallah and Al-Bireh Governorate for the academic year 2019/2020. Convenience sampling (also called random sampling or random sampling) is the inclusion of members of a target population that meet certain practical criteria such as ease of access, geographical proximity, or availability at a particular time. A type of non-probabilistic or non-random sampling. or willingness to participate for research purposes (Dörnyei, 2007). The researcher works as a teacher, so the sample consisted of her 7th graders from the same school. The sample consisted of (76) 7th grade students who were divided into two groups, an experimental group (37) 7th grade students and a control group (39) 7th grade student. They were selected from Deir Abu Mishaal Girls' Secondary School, which has two of her 7th grade divisions.

Data Collection Tools

The Achievement Test in Geometry

The study tool is an adapted scale used for several scales in previous studies that was adapted to suit the characteristics and purpose of the current study sample. The test was presented to a group of arbitrators to express their views, and then make the necessary adjustments. The student obtains one degree for each question in the case of the correct answer, and the degree obtained by the student between (0 - 20). Based on the actions taken, the test consisted of (20) paragraphs of the type of multiple choice, so that (one score) was determined for the correct answer to the paragraph, so that the score of the sample on the scale between (0-20). The topic of angles contained 15 questions and the topic of polygons contained five questions. The pilot study was conducted to come out with the reliability and validity. In this study, the sample of the pilot study consisted of (36) female students from eighth grade. The coefficient of discrimination and difficulty were calculated, the difficulty coefficients were within the acceptable level of the coefficient of difficulty at a general mean (0.57), which is good in terms of difficulty, also all the discrimination coefficients included the acceptable level of the coefficient of discrimination at an average of 0.44. however, the value of the Alpha Cronbach coefficient was calculated for the test, total reliability coefficient (0.94) was obtained, which is a reassuring value for applying the test to the research sample. The second method is Kuder-Richardson formula (KR20) to find the reliability coefficient for the achievement test, A total reliability factor (0.93) was obtained, which is a reassuring value for applying the test to the sample.

Data Analysis

Data collected from pre-, and post-tests were analyzed and summarized in the form of descriptive statistics. Frequency means and standard deviations were calculated. One Way MANOVA was used to examine the differences between the two groups, experimental and control. In addition to the necessity of providing assumptions for the analysis of simple covariance, the following assumptions are assumed, the dependent variables have a multivariate normal distribution, each group has the same covariance-covariance matrix, and that the dependent variables are statistically related.

FINDINGS

Difference On Academic Achievement Of Angles And Polygon Topics 7th Grade Students That Between Mantle Of Expert And Traditional Method

The pre-test data obtained was subjected to data screening to determine whether the data satisfied the assumption for the use of inferential statistics such as One- Way MANOVA. Therefore, there is a need to check for normality and homogeneity of variances for academic achievement test.

Normal distribution of the academic achievement test score of Mantle of Expert and the traditional method was investigated to test the assumption of normality, and the result was presented numerically as well as graphically for each group. Skewness test and Kurtosis test was the numerical method employed. The result is as shown in Table 1.

Table 1

Skewness Test and Kurtosis Test for Mantle of Expert and Traditional Method

Variables	Mean	SD	Skewness	Kurtosis
Angle	7.68	2.423	-.220	.120
Polygon	2.50	1.238	.087	-.293
Overall	10.18	2.970	-.237	-.060

Table 1 indicates that the Skewness Test and Kurtosis Test for Mantle of Expert and traditional groups before treatment between -2 to +2 data was normally distribute (Pallant, 2016). which indicate the assumption of normality was not violated. The result showed that the observed distribution is approximately normal for academic achievement test for two groups the Skewness and Kurtosis value between -2 to +2 data was normally distribute (Pallant, 2016). Therefore, the assumption of normality was not violated; the data were analysed using inferential statistics to test the formulated hypotheses. However, homogeneity of variance in the pre-test score of academic achievement between the Mantle of Expert group and traditional method group was determined using Levene's test and the result is as presented in Table 2.

Table 2

Test Homogeneity of variance of pre- test in academic achievement dimensions between experimental and control

Dimensions	Levene Statistic	df1	df2	Sig.
Angle	2.63	1	74	.109
Polygon	0.00	1	74	.99
Overall	1.63	1	74	.206

The result in Table 2 clearly shows the findings of academic achievement dimensions of the Angle F (1, 74) = 2.63, P= (.109). The p-value is greater than 0.05, indicating no significant difference in the variance of Angle between Mantle of Expert group and traditional method group. Hence, the two groups score are approximately similar. The result of the Polygon shows F (1, 74) = 0.00, P= (0.99) > 0.05 which shows no significant difference between the Mantle of Expert group and traditional method group variance in the academic achievement dimension of polygon. Therefore, the two groups score are homogenous. The overall academic achievement score on Table 2 clearly shows that the academic achievement score homogeneity of variance for Mantle of Expert group and traditional method group was F (1, 74) = 1.63, P= (0.206), which is greater than 0.05. Indicating there no significant difference between the two groups variance in academic achievement. Therefore, the two group scores are approximately homogeneous.

To determine whether groups were equivalent or similar in academic achievement after the intervention, data were collected using an academic achievement pre-test. A One- way MANOVA was employed to determine whether the Mantle of Expert group and traditional method group were equivalent in all the dimensions and academic achievement after the intervention. The result is as presented in table 3 below.

Table 3

Wilks' lambda Tests for Academic achievement in post- test

	Value	F	Hypothesis df	Error df	Sig	Partial Eta Squared
Pillai's trace	.085	3.403	2	73	.039	.085
Wilks' lambda	.915	3.403	2	73	.039	.085
Hotelling's trace	.093	3.403	2	73	.039	.085
Roy's largest root	.093	3.403	2	73	.039	.085

Table 3 reveals MANOVA result of the post-test Academic achievement, using Wilk's Lambda test with 0.05 alpha level, the finding indicated there was a significant difference between the Mantle of Expert group and traditional method group in all academic achievement dimension: Angle and Polygon, *Wilk's ^ =0.915, F (2, 73) =3.403, P= (0.039) < 0.05.* Therefore, the test of between-subject effects was presented to buttress the results Table 4.

Table 4

Tests of Between-Subjects Effects for Mantle of Expert group and traditional method group in Academic achievement in post- test

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	Angle	8679.90	1	8679.90	1430.61	.000	.951
	Polygon	1063.57	1	1063.57	731.561	.000	.908
	Overall	15820.3	1	15820.3	1433.89	.000	.951
Group	Angle	41.798	1	41.798	6.89	.011	.085
	Polygon	3.153	1	3.153	2.17	.145	.028
	Overall	67.909	1	67.909	6.16	.015	.077
Error	Angle	448.979	74	6.067			
	Polygon	107.584	74	1.454			
	Overall	816.446	74	11.033			

Table 4 shows the between-subject effects of the academic achievement dimensions of angle, and Polygon of the Mantle of Expert group and traditional method group after treatment. There was a significant difference between the Mantle of Expert group and traditional method group in the academic achievement dimension of Angle F (1,74) = 6.89, P= (.011) < 0.05, partial = 0.085. There was no significant difference between the Mantle of Expert group and traditional method group in the academic achievement dimension of Polygon F (1,74) = 2.17, P= (.145) > 0.05, partial = 0.028. The overall score also indicated a significant difference; F (1,74) = 6.16, P= (.015) < 0.05, partial = 0.077. Therefore, the two groups were comparable in their academic achievement after the treatment in post- test score. The Mantle of Expert more effective than the traditional method to teach mathematics. However, the mean value for control and experimental group are presented in Table 5.

Table 5

Mean value results for control and experimental groups in post-test After Treatment

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Angle	Control group	9.95	.394	9.163	10.735
	Experimental group	11.43	.405	10.626	12.239
Polygon	Control group	3.54	.193	3.154	3.923
	Experimental group	3.95	.198	3.551	4.341
Total	Control group	13.49	.532	12.427	14.547
	experimental group	15.39	.546	14.290	16.466

Table 5 displays the mean value for Mantle of Expert group and traditional method group in academic achievement dimension of angle and polygon. The result shows an improvement of academic achievement from post-test in all dimensions of academic achievement, showing that the students gained from the treatment. The result in angle, dimension, the Mantle of Expert group post-test means (11.43). On the other hand, the traditional group post-test mean was (9.95). The result in polygon, dimension, the Mantle of Expert group post-test means (3.95). On the other hand, the traditional group post-test mean was (3.54). The result overall of academic achievement, dimension, the Mantle of Expert group post-test means (15.39) On the other hand, the traditional method group post-test mean was (13.49). The overall academic achievement estimated mean in post- test could be highlighted as presented in Figure 1.

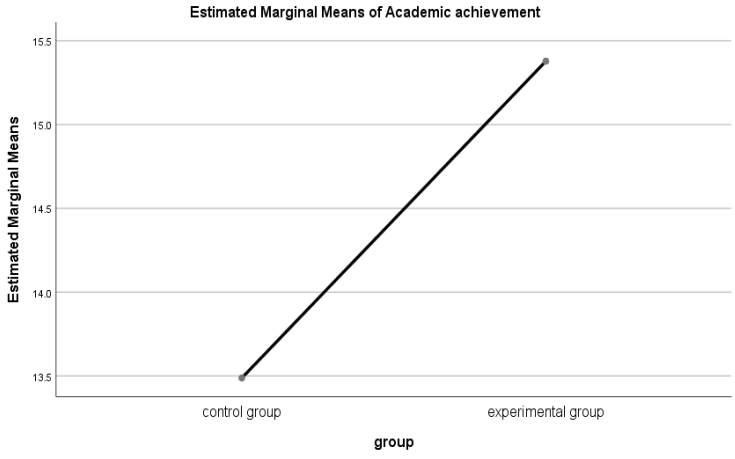

Figure 1. *Estimated mean of mental of expert and traditional method in post-test*

However, there is no difference on academic achievement of angles topic of 7th grade students that learn with Mantle of Expert and those who learn using the traditional method after treatment and pre-test as covariate was rejected. Also, there is no difference on academic achievement of polygon topic 7th grade students that learn with Mantle of Expert and those who learn using the traditional method after treatment and pre-test as covariate was rejected.

To answer research question 2, the researcher used paired sample T-Test to know if there is a significant difference in the mean scores of pre and post-tests of academic achievement on the experimental group students learn mathematics via mantle of expert.

Difference on academic achievement of angles and polygon topics 7th grade students before and after using the Mantle of Expert

A paired sample T-Test was conducted to compare the pre-academic achievement test in the experimental group who taught geometry by Mantle of Expert and post-academic achievement test in experimental groups who taught geometry by Mantle of Expert. The results obtained are shown in Table 6 below.

Table 6

Paired Sample Statistic For Academic Achievement Test In The Experimental Group

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Angle Post test	11.43	37	2.68	.441
	Angle Pre test	7.70	37	2.76	.453
Pair 2	Polygon Post test	3.95	37	1.15	.190
	Polygon Pre test	2.43	37	1.26	.207
Pair 3	Total Post test	15.38	37	3.60	.592
	Total Pre test	10.14	37	3.27	.537

Table 6 indicates the pre and post-test results for students in the experimental group learn geometry by the Mantle of Expert. The mean and the SD of the academic achievement post-test were (15.38) and (3.60). The mean for academic achievement pre-test was (10.14) with a standard deviation of (3.27). For angle pre and post-test results for students in experimental group taught geometry by Mantle of Expert, the mean and SD in post- test were (11.43) and (2.68). the mean for angle pre- test was (7.70) with a standard deviation of (2.76). For polygon pre and post-test results for students in experimental group taught geometry by Mantle of Expert, the mean and SD in post- test were (3.95) and (1.15). the mean for polygon pre- test was (2.43) with a standard deviation of (1.26). Therefore, the difference between pre and post-test for academic achievement test in the experimental group; the results obtained are shown in Table 7 below.

Table 7

Paired Sample T-Test for Academic Achievement Test in The Experimental Group

		Paired Differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	Angle Post test Angle Pre test	3.730	1.774	.292	12.79	36	.000

Pair 2	Polygon Post-test Polygon Pre test	1.514	1.261	.207	7.30	36	.000
Pair 3	Total Post test Total Pre test	5.243	1.517	.249	21.03	36	.000

The results in Table 7 indicate that there was a significant difference in the mean scores for academic achievement between pre- test and post- test (M = 5.243 and SD = 1.517), t (36) = 21.03, P = 0.000 < 0.05 in the experimental group who taught geometry by Mantle of Expert. However, for angle there were a significant difference in the mean scores difference between pre and post-test was (M = 3.73 and SD = 1.774), t (36) = 12.79, P = 0.000 < 0.05, polygon the mean difference between pre and post-test was (M = 1.514 and SD = 1.261), t (36) = 7.30, P = 0.000 < 0.05.

Difference On Academic Achievement Of Angles And Polygon Topics 7th Grade Students Before And After Using The Traditional Method

A paired sample T-Test was conducted to compare the pre-academic achievement test in the control group who taught geometry by traditional method and post-academic achievement test in control groups who taught geometry by traditional method. The results obtained are shown in Table 8 below.

Table 8

Paired Sample Statistic For Academic Achievement Test In The Control Group

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Angle Post test	9.95	39	2.235	.358
	Angle Pre test	7.67	39	2.094	.335
Pair 2	Polygon Post test	3.54	39	1.253	.201
	Polygon Pre test	2.56	39	1.231	.197
Pair 3	Total Post test	13.49	39	3.034	.486
	Total Pre test	10.23	39	2.70	.432

Table 8 indicates the pre and post-test results for students in the control group learn geometry by the traditional method. The mean and the SD of the academic achievement post-test were (13.49) and (3.034). The mean for academic achievement pre-test was (10.23) with a standard deviation of (2.7). For angle pre and post-test results for students in control group taught geometry by traditional method, the mean and SD in post- test were (9.95) and (2.235). the mean for angle pre- test was (7.67) with a standard deviation of (2.094). For polygon pre and post-test results for students in control group taught geometry by traditional method, the mean and SD in post- test were (3.54) and (1.253). the mean for polygon pre- test was (2.56) with a standard deviation of (1.231). Therefore, the difference between pre and post-test for academic achievement test in the control group; the results obtained are shown in Table 9 below.

Table 9

Paired Sample T-Test For Academic Achievement Test In The Control Group

		Paired Differences			t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean			
Pair 1	Angle Post test Angle Pre test	2.282	1.776	.284	8.023	38	.000
Pair 2	Polygon Post-test Polygon Pre test	.974	1.581	.253	3.849	38	.000
Pair 3	Total Post test Total Pre test	3.256	2.112	.338	9.631	38	.000

The results in Table 9 indicate that there was a significant difference in the mean scores for academic achievement between pre- test and post- test (M = 3.256 and SD = 2.112), t (38) = 9.631, P = 0.000 < 0.05 in the control group who taught geometry by traditional method. However, for angle there were a significant difference in the mean scores difference between pre and post-test was (M = 2.282 and SD = 1.774), t (38) = 8.023, P = 0.000 < 0.05, for polygon the mean difference between pre and post-test was (M = 0.974 and SD = 1.581), t (38) = 3.849, P = 0.000 < 0.05. However, there is no difference on academic achievement of angles topic 7th grade students that learn using the traditional method before and after treatment was rejected. Also, there is no difference on academic achievement of polygon topic 7th grade students that learn with Mantle of Expert before and after treatment was rejected.

DISCUSSION

The study proved that there were significant differences between the achievement of the students of the experimental and control groups after treatment. The researcher believes that the reason for this is that after conducting the study, the students trained to solve problems and deduced laws that enable them to solve problems in the post-test and acquired the necessary skills through the traditional method or the mantle of the expert. From here, it became clear that there are statistical differences in the achievement of students in the post-test. The control group learned the skills using the traditional method. While the students of the experimental group learned the skills using the mantle of the expert. The result of this research agrees with the result of Salha' study (2014) that findings showed that there were variations in the overall degree between the average scores of learners to address the issues between the pretest and the post-test in favour of the post-test. Arman' study (2019) agree with this study in there is a statistical difference after treatment with MANOVA Test. Batdı and Batdı (2015) Meta-analytic results showed that artistic drama had a major and optimistic impact on academic achievement, and the qualitative results showed that it had an overall impact on a number of domains which is consistent with the results of the current study. This study agrees with study of Batdı and Batdı (2015) in that there is a significant impact on education using the branches of drama in increasing academic achievement. This study also agrees with the results of Qanoh (2016) study on the effect of using the mantle of the expert on achievement and motivation to learn geometry for the benefit of the experimental group.

This result is in agreement with the results of the study of Saeed (2016), the research led in the achievement of the suggested program based on the MOE approach being very efficient in the growth of reflective methods among sample learners. In Salha' study (2014) the findings showed that there were variations in the overall degree between the average scores of learners to address the issues

between the pretest and the post-test in favour of the post-test. This also agrees with the results of this research.

CONCLUSION

In conclusion, teaching to increase achievement in geometry for students, works to provide the appropriate educational activities and situations that achieve this. The mantle of the expert approach, which achieved a good effect in increasing achievement in geometry in teaching the unit of geometry and measurement in other subjects of mathematics and in different academic stages, should be trained through holding courses and workshops to train teachers to use the mantle of the expert in the educational process for its effectiveness in increasing academic achievement, encouraging supervisors and administrators to take qualitative and relevant teacher initiatives using methods based on the use of arts in education, such as artistic drama and specifically the mantle of the expert. Using the mantle of the expert in geometry education increases students' achievement by arranging and organizing their information, making it easier for them to retrieve it. The mantle of the expert helped the students to choose the method and quality of the solution that the students followed, as the students were able to solve the test questions in order and not randomly. Teaching using the mantle of the expert provides a social context for learning that encourages the teaching and learning processes, a context that contains various forms of pillars that help students to rise and reach higher ranks and capabilities. Using the mantle of the expert in education provides the teacher with a new way to explain the curriculum and break the deadlock in the class. It also works to change the prevailing routine at work, which urges the teacher to create contexts to present the lesson and interact with it. This study draws the attention of the Ministry of Education to the mantle of the expert as a new strategy that has a positive impact on students' achievement, prompting them to adopt it and include it among the strategies enforced in the Ministry.

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