ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS

The Effectiveness Of An Educational Program Based On The Pentagram Strategy On Cognitive Achievement And The Developing Of Creative Thinking Skills Among Second-Year Students At The College Of Physical Education And Sports Sciences, University Of Mosul

Jamal Shukri Basim[1], Salwan Khalid Mahmoud[2], Wael Dathar Ali[3], Dhul-Noon AbdulRazzaq Dhul-Noon[4]

[1,2,3] Faculty of Physical Education and Sports Sciences, University of Mosul

[4] Nineveh Education Directorate, Ministry of Education

jamal@uomosul.edu.iq

Abstract

This study aims to reveal effect of an educational program based on pentagram strategy, to enhance cognitive achievement and develop creative thinking skills among second-year students at faculty of Physical Education and Sports Sciences, University of Mosul. Study community consisted of second-year students at faculty of Physical Education and Sports Sciences, University of Mosul, for academic year 2024-2025, sample was randomly selected and comprised 50 students representing sections (B) and (C), experimental group consisted of section (B), while control group consisted of section (C). Equivalence and homogeneity were ensured between groups in several variables related to experimental control. The researchers used experimental method to address study problem, experimental design was a pre-test and post-test design with equivalent groups. The prepared educational program lasted 6 weeks and included several educational activities based on Pentagram strategy yielded following key findings: effect of teaching with Pentagram strategy on cognitive achievement of second-year students in faculty of Physical Education and Sports Sciences, effect of teaching with Pentagram strategy on developing creative thinking skills among sample.

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS

Keywords: Educational Program, Pentagram Strategy, Cognitive Achievement, Creative Thinking.

Introduction

Progress we have witnessed recently, which has led to develop of all sports levels and other scientific fields is due to advancements in modern teaching methods and strategies. Those who have practiced teaching at various educational levels have realized difficulty of adhering to a single teaching method due to changes in the subject matter, its specific characteristics, and varying traits of learners, we have recently observed a move away from outdated methods that reduce learners to mere recipients and listeners, preventing their active participation in educational process. These methods render learning process rigid and fail to consider characteristics of subject matter, learners' inclinations, attitudes, and thinking styles.

Educators have called for teachers to adopt modern teaching models, methods, and strategies that take into account students' interests and thinking styles , enabling them to play an active role in teaching and learning process. This ensures that learners are not merely passive recipients but also develop their thinking skills through cumulative experiences. This, in turn, empowers learners to build a foundation of knowledge that helps them understand relationships between new and existing concepts and ideas. (Al-Shu'aili) (Al-Ghafri , 2006, p. 120).

Strategies have diversified and interest in them has increased, and various and numerous strategies have emerged in presenting and delivering scientific material to students, teacher must continue to search for modern strategies that enable to convey scientific material to minds of students with high efficiency to achieve educational goals. Teaching strategies have developed from old strategies in which teacher is focus of educational process, student's role is limited to receiving ready-made information, memorizing and reciting it, to strategies in which student is focus of educational process, while teacher is a guide and facilitator. (Awad, 2006: 63-65)

One of modern teaching strategies that aligns with students' interests is Pentagram strategy, which is based on constructivist theory, because learner formulates main ideas and puts them in same form. (Ward & Wandersee, 2001: p.17-27)

This strategy makes learning responsibility of students, while teacher's role is to guide and mentor them to enhance knowledge among students who formulate the main ideas and put them in optimal form, linking new information to previous information, which helps them to be able to learn and remember knowledge. (Al-Mazrou, 2005: 23)

Through this strategy, teacher presents thinking aloud, gives feedback and evaluates everything does in front of students and involves them in this, talks about his own ideas, and then allows students to talk about their own thinking. (Saada, 43, 2005)

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)
Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS

Importance of this study through use of these strategies and identifying ability to bring about required learning for some concepts of teaching methods, and through providing student with information and translating it from its theoretical aspect to reality in knowledge, identifying extent of effectiveness of this strategy in developing cognitive achievement and creative thinking in subject of teaching methods.

Problem of current study emerged from what was observed by the researchers in preliminary study phase explored possibility of identifying methods and strategies used in teaching subject of teaching methods that focus on student's role and active participation in educational process, as well as their ability to help learners reach a good level of learning. This prompted the researchers to search for and explore modern methods and strategies through which educational and learning objectives could be achieved, to attempt to innovate and introduce new approaches to strategies used in teaching subject of teaching methods by preparing individuals capable of thinking critically and consciously in finding solutions to their educational problems. Because methods used in subject of teaching methods do not encourage creativity or develop thinking skills, but rather rely on presenting information to student ready-made without their participation in exploring it or practicing conscious thinking during its comprehension, this may be reason for limited achievement of educational and learning objectives of subject of teaching methods.

The researchers decided to use a strategy Pentagram in a serious attempt to uncover effectiveness of these strategies in cognitive achievement and creative thinking. To address this problem, the researchers posed following question: Does Pentagram strategy play an active role in developing cognitive achievement and creative thinking in subject of teaching methods ?

The current study aims to reveal effectiveness of using strategy Pentagram to develop creative thinking among students in experimental group and control group, who study according to method followed. Uncovering differences between strategies Pentagram method used to develop cognitive achievement in subject of teaching methods.

Research hypotheses there were no statistically significant differences in mean scores of pre-test and post-test among students in experimental group who used Pentagram strategy to develop creative thinking, there were no statistically significant differences in mean scores of pre-test and post-test among students in control group which used method followed to develop creative thinking, there are no statistically significant differences in average scores of post -test of creative thinking between students of experimental and control groups, there were no statistically significant differences in post-test between mean scores of students in experimental group who used Pentagram strategy control group used method employed to develop cognitive achievement in subject of teaching methods.

Research Methodology

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS

The researchers resorted to using experimental method because it was suitable for nature of study. One of things that must be considered in scientific research is choosing a sample that truly and accurately represents research community, the research community consisted of second year students from Faculty of Physical Education and Sports Sciences for academic year 2024-2025, number of students is 385 male and female students, distributed across twelve sections (A, B, C, D, E, F, G , H, T, J, K, L). Sections (A, B) were excluded to avoid effect of gender variable on research experience.

Sample was chosen randomly by lottery and consisted of sections (H, K) with a total of 70 students from research community, 10 students were excluded due to absence, failure to attend some exams, and deferral to academic year, sample was randomly divided into two groups by lottery, experimental group consisted of section (E), which was taught using Pentagram strategy, and comprised 30 students, control group consisted of section (K), which was not taught using aforementioned strategy and was taught using traditional method, also comprising (30) students, final sample size for application was 60 students, representing 15.58% of community as shown in Table (1).

Table 1. Distribution of sample into experimental and control groups

Group	Number before exclusion	Number of excluded students	Number after exclusion
Experimental group Pentagram strategy	35	5	30
Control group Lecture method	35	5	30
Total	70	10	60

Experimental Design

The researchers used an experimental design with two equivalent groups, with pre-test and post-test, (Alawi and Rateb, 1999, p. 232, as shown in Figure (1):

Group	Pre - tests	Independent variables	Post-tests

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS

Experimental group	Creative thinking	Pentagram strategy	Cognitive Achievement Creative thinking
Control group		Lecture method	

Figure 1. Experimental design

Equivalence and homogeneity of groups

One of requirements of experimental research is ensuring equivalence and homogeneity between two groups in all characteristics and variables relevant to study, in order to start from a single point of departure. (Attia, 2010, p. 99) The researchers performed multiple procedures to ensure equivalence of research t-test across several variables that could influence independent variable .

Chronological Age: Ages of all students in main sample were calculated in months from their date of birth up to 21/10/2024, using T-test to find differences between two groups. It was found that there were no statistically significant differences, and thus two groups are equivalent in this variable, as shown in Table (2).

Student's academic achievement in first academic year: One of the most important requirements for measuring suitability and efficiency of educational program is to determine a unified starting point for all students targeted in this study in order for the researchers to achieve efficiency of educational design used, they relied on student's grades in first academic year and for academic year 2023-2024, as shown in Table (2).

Raven's intelligence test: In order to establish equivalence between two groups in intelligence, the researchers used Raven's Intelligence Test, which was administered to both groups. Due to its suitability and nature of research, test consists of 60 items**,** and scientific procedures for test were carried out as shown below:

Validity: In order to ensure validity of scale for use in research, the researchers presented scale items to a group of specialists in fields of teaching methods and measurement and evaluation (Appendix 1) in order to ensure suitability of scale in measuring trait to be measured, percentage of agreement of experts regarding validity of scale was 86.38%, which is a high percentage of agreement that confirms validity of scale.

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811



JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS



Reliability: To extract reliability coefficient, the researchers used split halves method (odd and even), where the researchers applied Raven's test was administered to a group of second-year students in section (Y), noting that reliability sample size was 32 students, which is from research community outside sample. It was found that correlation coefficient between two tests was high and reached 0.84, which is a high correlation coefficient compared to tabulated value of correlation coefficient under a degree of freedom of 31 and a percentage of error of 0.05, which is 0.36. Since calculated correlation coefficient is higher than value of tabulated correlation coefficient, correlation is significant, meaning that scale is stable in measuring characteristic for which it was designed.
Objectivity: Since test is valid and reliable, it is possible to call it objective any valid and reliable measure or test can be relied upon for its objectivity in measuring quality for which it was designed.

Table 2. Equivalence of groups of means and standard deviations, calculated (t) value and significance level for variables

Variable	Experimental group		Control group		Calculated (T) value	Sig. level
	Mean	St.d	Mean	St.d		
Chronological age (in months)	265.65	13.29	270.12	11.37	0.79	0.84
Student achievement for first semester Grade out of (25)	67.37	7.83	69.52	8.29	0.82	0.62
Raven	87.65	15.76	85.63	12.96	0.987	0.54

* Significant at error rate ≤ (0.05).

Table (2) shows that calculated t-value for variables of chronological age in months, student achievement, and intelligence is (0.79 - 0.82 - 0.87), which are respectively at a significance level of (0.84 - 0.62) When comparing value of significance level adopted in research (0.05), it becomes clear that there are no statistically significant differences between experimental and control groups in variables of chronological age, students' achievement in first semester, and intelligence, groups are equivalent.

Creative thinking: The researchers used creative thinking scale designed by Bernstein in 1989, which consists of Originally consisting of 74 items, aim is to measure creative thinking of individuals, and answer is given through three alternatives are (Agree, Uncertain,

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811



JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS



Disagree), with total score on scale ranging from 74-222 points. (Nadia) Hayel Al-Surour translated aforementioned scale into Arabic, tested it in Jordan, and recommended its generalization to Arab environment, and it was implemented by Researcher Zahra Jamil Saleh, in her Master's thesis, 2006, University of Mosul College of Physical Education, after approval 10 experts have confirmed that it is applicable in sports field, with modifications and adaptations to sample, number remained constant at 74, and scale items were modified by the researcher (Hardan Aziz Salman) in a thesis. Master's thesis, 2008, after undergoing internal consistency testing and extreme groups method, resulting in its current form. Final 38 items, after it had been 74 items, where method of scoring scale is in relation to positive items (1, 2, 3) and negative items (3, 1, 2), score of scale was between 114-38, Table (3) shows items of Princeton Scale of Creative Thinking:

Table 3. Items of Princeton Creative Thinking Scale

Paragraph	Agree	Hesitant	Disagree
Follow correct and sometimes unfamiliar movements to prevent opposition from scoring goals.			
There are drills that interest me but don't interest other players.			
I can solve my problems if I follow a gradual approach to training.			
Players who seem unsure of their abilities lose my respect.			
I get very excited about competitions.			
I often get my best ideas when I'm not doing anything specific.			
I take my time in organizing information I collect in order to present it in best possible dynamic form.			
I am sometimes criticized for disobeying instructions.			
Deep thinking has helped me solve many of my problems.			
If I had to choose between being a goalkeeper or a player, I would choose to be a goalkeeper.			
Ability to perform creative moves by substitute goalkeeper is better than mine.			
I am confidently moving towards becoming best goalkeeper in league.			
I like players who are more confident in their conclusions.			
Inspiration has nothing to do with solving problems.			

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS

Paragraph	Agree	Hesitant	Disagree
Good but unusual ideas do not interest me.			
Enjoy thinking alone.			
I obtained the information from its source.			
I like players who follow their role model.			
Respect others have for me reflects my self-respect.			
I am not drawn to performances that please audience and capture their attention.			
I leave solution to many of my problems in life.			
I like there to be a place for everything and for everything to be in its place.			
I love reading modern, strange, and unfamiliar books.			
I don't like things that are new and unfamiliar.			
He cared a lot about what could be more than what already existed.			
I don't like to ask questions that generate interest.			
Sometimes I get into trouble because of trying to reconcile viewpoints of others.			
I express my feelings and emotions less than other players.			
Players who work with theories are less important than those who are practical.			
I gave up on some of my life goals because of difficulties I faced .			
We must be diplomatic in our dealings with public.			
I feel like I'm being polite to others when I analyze their mistakes.			
It is not wrong to show off a lot in front of others.			
When an attacker tries to stand in front of me, I do not feel his movements.			
Goalkeeping appeals to me and gives me most important role in team.			
When I sense a problem, I don't immediately work on solving it.			
Most creative works are result of chance encounters.			
I care little about being best player in match.			

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS

Pre-test for creative thinking was applied for purposes of equivalence to sample and answers were corrected, mean of both groups was calculated and t-test was used to compare two groups. It was found that there was no statistically significant difference between them. Two groups are equivalent in creative thinking variable, as shown in Table (4).

Table 4. The groups were equal in creative thinking variable.

Group	Mean	Standard deviation	Calculated value (t)	Tabular value (t)
Experimental group	74.63	36.85	0,373	1.57*
Control group	69.58	27.12		

Tabular value of (t) at a significance level of (0.05) and degrees of freedom of (58).

Defining and adjusting variables

Following are procedures the researchers took to try to control these variables so that they would not affect course of study included following variables:

Independent variables: Independent variables were represented by Pentagram strategy and usual method.

Dependent variables: Dependent variables were: Cognitive achievement, and Creative thinking.

Non-experimental (extraneous) variables: Some non-experimental (extraneous) variables that affect internal and external integrity of research are:

Experimental conditions: These are incidents that occurred during experiment, and despite circumstances that the researchers faced, they were able to control extraneous factors as much as possible so that these factors did not affect safety of experiment.

Equipment and tools used: This factor was controlled using tools on research t- test, and the researchers used a data projector with a calculator to display charts, images, video clips, worksheets, and activities related to Pentagram strategy.

Experimental (External) Variables: To ensure external safety, experiment must be free from following errors:

1- Interaction of effect of experimental (independent) variable with biases of test: It was found that there was no effect of this factor because selection of sample was random, and

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)
Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

equivalence was achieved between two groups in factors that may affect dependent variables represented by results of study.

2- Effect of experimental procedures: In order to reduce effect of this variable during experiment, factors related to experimental procedures were controlled to maintain integrity of experimental design. These factors are:

A- Research confidentiality: The researchers were keen to apply research confidentiality, by not informing members of experimental research group about existence of an experiment being conducted on them, and keeping away anyone who might be aware of experimental procedures carried out by the researchers. Physical Education Teaching Methods course for first semester have been determined, and they are part of curriculum for second academic year of academic year 2024-2025 and include following topics: Physical education lesson. Additional duties. Physical education studies under special circumstances. Formations in a physical education lesson. Mini games. Physical Education Program. Assessment in Physical Education.

C - Teacher: Two groups were taught by subject teacher after the researchers agreed with him and he was informed about how to teach using a Pentagram strategy for experimental group, and providing it with necessary equipment for research experiment.

for both research groups, as experiment began on 14/10/2024 and ended on 21/11/2024 for a period of 6 weeks and at a rate of 6 units for both experimental and control groups.

E- Location of experiment: Students in both experimental and control groups received lectures in one place, which is classrooms in branch Sports Sciences at College of Physical Education and Sports Sciences, University of Mosul.

Pentagram Strategy

It includes A strategy Pentagram**:** 6 educational units, and time of one educational unit was 90 minutes, with one educational unit per week. After identifying subject matter and behavioral objectives for each learning unit, the researchers presented one learning unit. A panel of experienced and specialized referees in field of teaching methods were consulted to gather their opinions and observations on educational unit in terms of: Ensuring validity of implementing steps of strategy Pentagram for second-year students At College of Physical Education and Sports Sciences, University of Mosul. Time-based division of learning unit's components: A Pentagram strategy. Strategic learning units were presented, first pentagram includes steps of a Pentagram strategy.

Preparing Lesson Plans

Teaching plans for strategy were prepared Pentagram was presented to experts and specialists in field of teaching methods, number of lesson plans for each subject in curriculum was determined based on subject's content, as shown in Table (5).

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)
Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS

Table 5. Dividing educational units according to content of educational material for each topic

Topics	Units number
1- Physical Education Lesson 2- Additional duties 3- Physical education studies under special circumstances 4- Formations in a physical education lesson 5- Mini games 6- Physical Education Program	1 1 1 1 1 1
Total	6

Pilot study

The researchers conducted a pilot study of a strategy model, pentagram was conducted on 7/10/2024 on a sample similar to sample. Experiment was carried out on second year students, specifically from section Y. Subject teacher taught students topic of educational objectives, and students interacted with strategy and were focus of their attention and activity throughout teaching period, which prompted the researchers to confirm validity of steps of Pentagram strategy. Aim of this exploratory experiment was to identify the most significant obstacles and observations that might hinder implementation of a Pentagram strategy.

Applying main experiment

After requirements of procedures were completed experiment involved preparing groups, ensuring their equivalence, and determining scientific material previously mentioned, main experiment was implemented on 14/10/2024, as teacher taught experimental group and continued to teach group throughout duration of experiment according to educational units using Pentagram strategy prepared for this purpose, and throughout first semester of academic year 2024-2025.

Experimental group that studied according to Pentagram strategy

Experimental group was studied according to following scientific steps:

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811



JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS



Pentagram Shape: Introduction or preface:
Subject teacher stimulates student motivation by embodying aspects of interconnectedness and continuity in previous and new lessons, we discussed additional assignments, and we mentioned importance these assignments. It is important in physical education classes because it increases students' physical capabilities and occupies time between exercises. The researchers seek, through use of Pentagram strategy aims to achieve several behavioral goals as outlined above, but it seeks to enable student to reach an important goal, which is for student to be able to deduce the most important benefits that resulted from additional assignments.
Teacher draws a circular disc on board, specifying main title of lesson, which is a physical education lesson under special circumstances, and places it inside disc, teacher asks one of students to draw five circles around circular disc on which main topic is identified, representing five main ideas about topic, teacher asks students to identify first main idea, teacher asks students to identify second main idea, teacher asks students to identify third main idea, teacher asks students to identify fourth main idea, teacher asks students to identify fifth main idea, teacher asks students to draw an icon around each of five titles, starting with first title.
Who will draw an icon or shape around it? One of students should say "I" and so on for rest of ideas, teacher then adds to those ideas that were put forward by filling each sector with other related ideas, teacher uses Pentagram shape adjustment model to consider construction requirements. After completing diagram, ask students to write about topic by applying diagram, teacher provides a focused explanation of the most important elements of lesson and poses questions during this time to determine extent to which students understand and comprehend lesson and extent to which behavioral objectives have been achieved.
Homework: teacher asks students of class to prepare topic of the next lesson, which is Formations in Physical Education.

Teaching control group according to usual method:
Lesson Introduction: 20 minutes: Teacher gives an introduction to topic of physical education in special circumstances, main part of lesson: 60 minutes, teacher explains concept of a physical education lesson in special circumstances, providing examples for each element of topic. Conclusion of lesson: 10 minutes. This part of lesson provides a summary of lesson topic and assigns tasks to students. Closing lesson.

Research tools
To achieve objectives and verify its hypotheses, it was necessary to use an achievement test tool for specific topics within curriculum of second-year teaching methods course.

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)
Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS

Achievement Test: Achievement test prepared by (Dhanoon, 2022) was used, consisting of 48 items that measure cognitive achievement of students for all subjects under study, which was built on students of College of Physical Education and Sports Sciences. With this construction, scale is considered standardized, and therefore the researchers were satisfied with not conducting scientific procedures on it.

Final Exam: After completing experimental procedures and implementing research experiment, the researchers, after agreement with course instructor, date for final exam was set for 4/5/2023.

Statistical methods

Mean, Standard deviation, Independent samples t-test, T-test for related samples, Ease and difficulty factor, Discrimination factor, Effectiveness coefficient of alternatives, Percentage.

Results and Discussing

Presenting and discussing results of creative thinking

To verify hypothesis, the researcher used a t -test to determine statistical differences between average scores of experimental group students who studied according to strategy Pentagram in creative thinking test, as shown in Table (6).

Table 6. Means and standard deviations of pre- and post-tests, and calculated t-value for experimental and control groups in creative thinking test

Groups	Pre-test		Post-test		Sig. level	Calculated (t) value
	Mean	St.d	Mean	St.d		
Experimental	74.63	0.831	115.38	1.264	0.000	10.985
Control	69.58	0.91	107.93	1.316	0.000	7.028

Table (6) shows that there are statistically significant differences between pre-test and post-test in creative thinking test for experimental and control groups, as calculated (t) value for two groups above reached (10.985 - 7.028) respectively. All of them are insignificant in terms

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS

of error ratio, which is (0.000) respectively, and all of them are smaller than error ratio adopted in educational research, which is (0.05).

Results of paired-samples t-test showed statistically significant differences between pre-test and post-test scores of experimental group, which studied using Pentagram strategy. and control group based on this result study conducted according to established method, rejects research hypothesis and accepts alternative hypothesis stating that there are statistically significant differences between pre-test and post-test for students in experimental and control groups in creative thinking, favoring post-test. This indicates effectiveness of Pentagram strategy and method used in developing creative thinking of sample.

The researchers attributes this result to Pentagram strategy for following reasons: With its steps, it met emotional needs of students because of teaching steps followed by this strategy, which was well received by most of students, and they were interactive and enjoyed lecture time, which positively affected development of creative thinking and their self-realization in this field. Ausubel emphasizes possibility of improving mental and emotional processes through use and construction of frameworks to organize and store information in a coherent, logical and meaningful way, as organizing and linking information within emotional structure protects new idea from being lost or quickly forgotten. Organized ideas are less prone to being forgotten (Al-Zayyat, 294, 2004-295). Same applies to control group teacher's style and interaction within classroom, dedication to delivering lecture and engagement with psychological and emotional needs of learners and mental processes led to this development that we see from result above.

Training students through teaching methods lessons on creative solution to any problem they may face through their work in using their creative skills in using appropriate formations and adding creative touches to equipment and tools used, which led to emergence of a link between their creativity and their achievement in the subject of teaching methods of physical education. In this regard, Sorour (1998) indicates that: "Providing appropriate educational climate for creative thinking in educational institutions by encouraging students to research, explore and learn continuously and providing capabilities leads to development of their academic achievement" (Sorour, 76, 1998).

Presenting and discussing results of cognitive achievement

The (t) test was used to identify statistical differences between average cognitive achievement of two groups, and Tables (7) show this.

Table 7. Significance of differences in post-test cognitive achievement for two groups is

Test	Experimental group		Control group		Calculated (t) value
	Mean	St.d	Mean	St.d	

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811



JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS



Cognitive achievement	37.76	7.76	27.86	9.03	2.883

Significant at error rate ≤ (0.05) and degrees of freedom (58). Tabulated t-value = 2.001

Table (7) shows that there are statistically significant differences between average scores of experimental and control groups, in favor of experimental group, in cognitive achievement, which used Pentagram strategy, calculated value of (t) was (37.76), which is greater than tabulated value of (t) with an error of ≤ (0.05) and degrees of freedom (58) amounting to (2.001).

According to Table (7), hypothesis is rejected, and alternative hypothesis, which states "There are statistically significant differences between experimental group and control group in cognitive achievement is accepted for benefit of experimental group.

The researchers attribute this to impact of Pentagram strategy in terms of its nature and teaching strategy, its characteristics and advantages, was reflected in availability of educational opportunities for each student. It also fostered students' ability to find best solutions to problems encountered during lesson, encouraging collaboration and cooperation to reach best information by creating a competitive environment with their classmates. This led to increased knowledge related to concepts to be learned, resulting in experimental group outperforming control group, which used Pentagram strategy. Through steps and under direct supervision and follow-up of subject teacher, this led to clear superiority that appeared in statistical results, as indicated by (Schmidt, 2000). that amount time that spends it learner in learning concepts only influential only in development learning, because we find that students in some sometimes they exert a great effort and for several hours in study not influential causes to them failure, or that type pain, its understanding and classification Layla aim student's understanding and perception for this teacher that places in mind that is persistent glory and organized to build structure for times study in an impactful way. (Schmidt, 2000, 232)

The researcher also attributes this result to Pentagram strategy through its educational steps, which students practiced and learned through it concepts of subject of teaching methods were distinguished by fact that they made way students learn concepts more engaging by teaching them through more than one educational method, as well as by gradually teaching concepts from easy levels to intermediate levels and ending with advanced levels. All of above helped facilitate learning process for students. This is consistent with what Al-Rahawi stated that "Material that is easy to learn and easy to memorize is more lasting and permanent than other types of material, logical benefit that is full of meaning and presented gradually is slower to be forgotten, and material that is memorized based on insight is more lasting and permanent in memory." (Al-Rahawi, 2006, p. 87)

Conclusions

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

JOURNAL OF EDUCATION AND SPORT SCIENCE (JESS)
http://publikasiilmiah.unwahas.ac.id/index.php/JESS

Effectiveness of Pentagram strategy in developing creative thinking among second-year students at Faculty of Physical Education and Sports Sciences, University of Mosul. Effectiveness of Pentagram strategy in cognitive achievement of teaching methods course among second-year students at Faculty of Physical Education and Sports Sciences, University of Mosul.

Recommendations

Paying attention to subject of teaching methods and proper planning of its curricula, due to its impact on developing creative talents and abilities of students of Faculty of Physical Education. Paying attention to teaching strategies, methods, and models and activating them in teaching various subjects of physical education, due to their importance in developing creative thinking and cognitive achievement among students of Faculty of Physical Education and Sports Sciences at University of Mosul. Raising awareness among students that they possess a great deal of creativity which qualifies them to lead society in future from an educational standpoint, and encouraging them to do so.

References

- Al-Shu'aili, Ali, Al-Ghafri, Ali son Salem (2006): Science social in Education, 1st ed., Journal Jordanian For publication Distribution , Sultanate Oman.
- Attia, Mohsen Ali. (2008) Strategies Modern in teaching Effective, t1 , house purity For publication And distribution, Amman – Jordan.
- Sa'ada, Jawdat Ahmed (2005): The Suitcase Educational As a strategy For education Individual , University Yarmouk , Arbid, Jordan.
- Awad, Youssef Dhiab (2006): Psychology delay Academic Freshness analytical Therapeutic, Home Curricula For publication Distribution, Amman, Jordan.
- Attia, Mohsen Ali (2010): Research Scientific in Education Sports and its methods Its tools, its methods Statistics , House Curricula For publication Distribution , Amman, Jordan.
- Alawi, Mohammed Hassan And salary, Osama Kamel (1999): Research Scientific in Education Sports And knowledge self The athlete, Cairo, Dar Al-Fikr Al-Arabi.
- Joy, Nadia Al-Hayel (1998): Education talented and the distinguished, Dar Al-Fikr, Oman.
- Al-Rahawi AbdulSalam AbdulJabbar (2006): The Impact strategy teaching peers in Acquisition Academic cognitive and retain With material Methods teaching of students college Education The athlete Message Master's, University Mosul.
- Al-Zayyat, Fathi (2004) Issues contemporary in difficulties Learning, house Easy For publication.

ISSN: 2798-7345 (online)
ISSN: 2830-2648 (print)

Vol (7) No (1)
doi: 10.31942/jess.v7i1.17811

- Schmidt A. Richard: (2000) "Motor Learning and Performance" Human Kinetics Books, champing, Ilion's.