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The Impact of a Problem-Solving Strategy to Develop Reflective Thinking in Physical Education Among Pre-Service Teachers

Suha Simreen[a], Bassam Mismar[b], [a]Department of Physical Education School of Arts Al-Quds University Abu Dis-Palestine, [b]Professor, Department of physical education, School of sports science, University of Jordan Amman-Jordan, Email: [a]b.mismar@ju.edu.jo, [b]ssimreen@staff.alaqds.edu

The aim of this study was to examine the effectiveness of an instructional program based on a problem-solving strategy to improve reflective thinking among field training students at Al-Quds University. The study sample consisted of 40 male and female students from the Department of Physical Education who were officially enrolled in the field training course (1). They were distributed in two equal groups, the experimental and the control groups. In order to achieve the objectives of the study, the researchers used the experimental method. Data were gathered and treated by using the SPSS program with appropriate statistical methods. The results of the study showed that the problem solving-based instructional program had a positive effect upon the experimental group in reflective thinking skills when comparing the results of the post-measurement of the two groups (experimental and control). Also, results showed that there were statistically significant differences between the experimental and control groups relative to the skills of reflective thinking attributed to the instructional program for the benefit of the experimental group. It also showed that there were no statistical differences in any of the skills of reflective thinking due to some variables (gender, level of study, and accumulative grade point average). In the light of the results of the study, the researchers recommended using a problem- solving based strategy to teach the field training course, to enhance the thinking processes in teaching practical and theoretical courses and training the students in this field because of their impact on the development of reflective thinking among students at AlQuds University.

Key words: *Problem-Solving Strategy, Reflective Thinking, Physical Education, Pre-Service Teachers*

1. Introduction:

Preparing student teachers to be active members at schools is one of the most important issues that have occupied and are still occupying the educator's interests as it is one of the most important issues around the globe. Numerous efforts from researchers have been made to explore the concept of reflective practices of teachers and exemplify its role in the process of professionalising student teachers in their careers (Mererdrik,2016; Beetham & Sharpe,2013). Future teachers need to be most qualified in dealing with teaching-learning processes at schools; Benade (2015) asserted that teachers must prepare young pupils to let them engage in "a complex and dynamic world", it requires to have them engaged in "globalization and digital technology revolution". In preparation, processes of teacher education in general and physical education teachers in particular, Mererdrik (2016) indicated that an examination must be given high attention relative to reflective teaching practices in order to meet the requirements and become qualified teachers in all imperative decisions that could be taken in the school setting.

Benade (2015) pointed out to the main competency in the teacher preparation program, where the principles of reflective practices in teaching are among them. Reflective practices must focus on teaching behaviour that may occur before as well as during and after incidents, in addition to the extent of reflective practices in enhancing the end results of the whole process. Therefore, the problem still existed regarding the recognition of decision-makers about the empirical approach of reflective practices of teaching. The diversity may be apparent in this regard, that is why there is need for specific definitions for the concept in initial programs for student teacher's preparation.

The importance of developing the different thinking skills of students to keep up with the requirements of modern times and the accompanying developments in an accelerated manner in all aspects of life, is one of the tasks of the curriculum and teaching methods; the educational institutions are required to train and qualify students to use them, especially that reliance on the teaching and knowledge memorising has become unacceptable as a basis for the process of teaching and learning. The subject of thinking and teaching is necessary because it has a significant impact on the progress of knowledge and increases the intellectual credit of learners, so that they can face problems and difficulties in their academic and normal life. The previous literature indicates that there are many types of thinking that need attention: visual thinking, critical thinking, reasoning, reflective thinking, and creative thinking (Alhayek,2004).

Basol & Gencel (2013) emphasise the importance of learning and using reflective thinking as one of the main results and outcomes of education, and one of the main goals of Dewey's pragmatism philosophy who described it as: It is an effective, continuous, careful consideration of any position or issue, or any assumed form of knowledge in the light of the foundations, the solutions and conclusions that it tends to. He also pointed out that reflective thinking adds a good concept to experience by reorganising, arranging, and reconstructing it. While emphasis

has been placed on the need for meditation as a key part of learning for the sake of learning, through meditation students are not expected to practise reflective thinking skills as part of their subject-based studies only, but also they are expected to reflect them on their learning to develop their knowledge, skills and ability to make careful judgments about any situation they face (Lucas & Tan, 2006).

1.1 The Problem of the study

The universities in general and the Palestinian universities in particular, are witnessing continuous efforts in the comprehensive and continuous development of the educational process for learning enhancements, in order to promote the outputs of the educational process, consistent with the scientific progress achieved to raise the quality and attention to improve the various thinking processes. However, the meditator and follower of the situation of teachers of physical education finds that there is almost an inherent correlation between teachers and the use of strategies and methods of traditional teaching in a way that does not help the interaction with the learner and does not involve students in learning as required. Also, he finds that traditional strategies and methods are the most fortunate in the field of teaching physical education. Although they achieve some goals, they are not in line with the plan of educational development in the preparation of student teachers, and that the educational outputs did not reach the acceptable level, interspersed with so many problems that make the student teacher somehow confused.

In viewing the importance of the field training course in preparing the student teachers professionally and educationally in the development and improvement of the skills necessary for their educational and the future of profession, and in accordance with the experience of researchers in the field, this preparation won't be enough unless the field training performs the basic role assumed in preparing the student teacher in total. The researchers, through their work as full-time teachers and supervisors of field training students, noted for several years that they have difficulty in connecting what they know, what they read and what they feel (reflective thinking). The researchers therefore decided to tackle this problem by utilising the strategy of problem solving to improve thinking skills. This study attempts to identify the effectiveness of an instructional program based on a problem-solving strategy to improve the skills of reflective thinking and its impact on the field training pertaining to student teachers in the Department of Physical Education at Al-Quds University.

1.2 The importance of the study:

The importance and significance of the study may be summarised in the following**:**

1. It addressed the problem-solving strategy focusing on self-learning, linking it to the reflective thinking process in line with the scientific and educational development of the field training students at Al-Quds University.

2- Training the student teacher in the specialisation of physical Education/Al-Quds University in a modern strategy that was not pre-approved in the course of field training, to improve the teaching process so that the student teacher becomes more effective, caring and participates positively in the educational process.

3- Designing an instructional program based on the strategy of problem-solving in the field of sports and discover its impact on improving the reflective thinking of student teachers.

4- This study may help to draw the attention of university education planners to the need to focus on providing a problem-solving strategy-based instructional programs and courses to improve the reflective thinking of student's teachers.

5- This study is considered, within the knowledge of the researchers, from the few studies dealing with the problem-solving strategy and linking it to the reflective thinking skills of field training students in the specialisation of physical education in Palestine.

1.3 Study Hypotheses:

1- There were statistically significant differences at the level of $\alpha \leq 0.05$ in the post-measurements mean in the ability to engage in reflective thinking between the experimental and control groups due to the instructional program for the benefit of the experimental group.

2- There were statistically significant differences at the level of significance ($\alpha \leq 0.05$) in the pre- and post-measurements mean in the ability to engage in reflective thinking of the experimental group due to the instructional program for the benefit of post-measurements.

3- There were no statistically significant differences at the level of significance ($\alpha \leq 0.05$) in the post-measurements means in the ability to engage in reflective thinking in the experimental group according to independent study variables (gender, educational level, and accumulative grade point average).

1.4 Definitions of terms:

Problem-Solving Strategy: An indirect method of teaching, which places the learner in a state of cognitive imbalance, so that the learner faces many problems in new educational situations that he/she hasn't experienced before, raised by the teacher, then he/she is asked to find

solutions after a process of thinking in which the student is engaged in analysing the situation in order to choose solutions and discover the most effective alternatives to solve that problem.

Reflective thinking: A mental, conscious, evolutionary, attentive and active inquiry based on the reflection of the situation in all its aspects, where the thinker depends on his/her beliefs, experience and conceptual and procedural knowledge to describe the situation; also, the ability to analyse and derive inferences to enable him/her to solve scientific problems through employing reflective thinking skills such as, visual observation, detecting fallacies, reaching conclusions, providing convincing explanations, and developing suggested solutions to problems.

Field training: A course within the curriculum of physical education that helps to refine the student's abilities and readiness in the light of personal and professional controls. It is a compulsory course for students of the fourth year in the Department of Physical Education at Al-Quds University, where the student applies his/her knowledge and information obtained during his/her academic studies to get new practical experiences in the field of teaching physical education, supervised by professors with experience in the field.

The student teacher: The student who is officially registered in the pre-service course (1) in the field of physical education, where the student applies the information, knowledge and experience he/she obtained during his/her academic studies practically on the ground.

2. Literature Review:

2.1 Studies dealing with the problem-solving strategy:

Shdeifat (2015) conducted a study that aimed at the role of a problem-solving strategy in teaching football, basketball, creative thinking, critical thinking and psychological characteristics of students from the point of view of teachers, in light of the variables (stage, gender, experience, educational level, type of school, and the governorate). The study sample consisted of (124) female and male teachers of physical education teachers in the Ministry of Education from Jordanian Cities “Al Mafraq, Irbid” in both public and private sectors. In order to achieve the objective of the study, the researcher designed three measurements to assess the level of creative thinking, the level of critical thinking, and the level of psychological characteristics. The results of the study showed that the members of the sample obtained a high level of creative and critical thinking and psychological characteristics on the scale. The results showed that there were no statistically significant differences in the level of creative and critical thinking and psychological characteristics in all study variables. The results also showed that there were statistically significant differences in the level of psychological characteristics of the gender variable and was in favour of females. Also, there were differences for the variable of the scientific qualification and was for the benefit of the bachelor’s degree, while the

researcher recommended the need to use the standards of creative and critical thinking and psychological characteristics of students in other subject matter courses.

Kalliopi & Spiridon (2007) conducted a study that aimed at recognising the effect of teaching creatively on improving the ability to compose and form new movements; the researchers used the experimental approach. The study sample reached (25) female students from the Faculty of Physical Education for the first year. The sample was divided into two groups, an experimental group which has received ten dynamic lessons in the creation and improvisation of movements accompanying the music and was using the problem-solving method, within the dance curriculum. As for the control group, it did not receive anything and remained in the usual way. The results of the study showed an improvement in the performance of the experimental group in the post-measurements, through a measurement that included ten variables: Agility (Movement in the air and change of direction), flexibility (ripple movements), balance, rotations, flight, change of speed and intensity, change of level, rhythm, variety of movements, where the variables are measured in a triple scale (good, very good, excellent).

The results also showed improved rotations, change of direction, speed, motor intensity, and body control in experimental group performance.

Alhayek (2004) conducted a study aimed at identifying the impact of using the cooperative problem-solving learning strategy on developing students' thinking and social behaviour. The study sample consisted of 42 students of the Faculty of Physical Education at the University of Jordan who were enrolled in the course of methods of teaching physical education. The results of the study showed a development in the thinking and social behaviour of students after the analysis of the pre- and post-tests and in favour of the post-test, while there were no statistically significant differences in the post-test in the level of ability of thinking and social behaviour according to the gender and the academic level.

2.2 Studies dealing with reflective thinking and practices:

Phan (2009) conducted a study aimed at exploring student practices in reflective thinking, deep processing and effort strategies. The study included a theoretical model to test deep processing and effort strategies, goals of mastering tasks, meditation, and critical thinking. The researcher used the causal approach to explore the direct effects of these theoretical directives on students' achievement of academic and educational goals and improving the performance of the judging abilities of volleyball.

The study included a sample of university students which consisted of 347 male and female students who completed their second year of study. The researcher used a reflective thinking questionnaire to collect the data. The results showed the direct effects of meditation and critical thinking on educational achievement and learning and showed that both the goals of task

performance and mastery had direct effects on meditation, while deep processing strategies were influenced by the mastery of goals and effort between them. Meditation and effort were variables with a significant impact on the study experience. The results of the study did not show statistically significant differences between boys and girls in these theoretical frameworks.

Mark (2009) carried out a study aimed at examining teacher movements within the classroom and their impact and influence on both cognition and thinking processes among students. The study was conducted on primary school students in Atlanta. To achieve the objectives of the study, he trained two groups of teachers on 18 models of teaching, then he chose 18 teachers and did not train them. The training of teachers has been about the subjects of social studies for students. The first group teachers were selected as an experimental group, and the second was as a control group. The experiment was applied for three months on the experimental group and then he applied a test to measure cognition and thinking processes on both (experimental and control) groups. The results of the study showed that there were statistically significant differences in favour of the experimental group in the results of the post-test. The methods of teachers who were trained were significantly better than teachers who were not trained, and males' responses on the test were better than females'. Also, there was interaction between the students' cognitive and thinking processes within the experimental group. The study recommended the need to train teachers and students on cognitive and thinking processes.

Mahardale et al.(2007) conducted a study that aimed to identify differences in the levels of reflective thinking among students studying in traditional learning environments and students studying in problem-solving based learning environments. In order to achieve the objectives of the study, the researcher and his colleagues applied a reflective thinking measurement to a sample consisting of 56 students of primary stage students who study in traditional learning environments and this was the control group. The experimental group was formed of 54 male and female students who studied according to the problem-solving program. The results of the study showed that the responses of the control group on the reflective thinking scale reached the level of understanding in the first place and the level of meditation came in the last place. As for the experimental group the results showed that the level of understanding came in the first place, and in the last place came the standard level of work. The results showed statistically significant differences between the two groups at all levels for the benefit of the experimental group in the levels of understanding, meditation, critical reflection, while the results were for the benefit of the control group at the standard level of work.

Lie (2006) conducted a study that aimed to identify students' reflective thinking levels in problem-solving based learning environments. To achieve the objectives of the study, the researcher used a questionnaire that was applied to a sample of 391 male and female students aged between 16-26 years and distributed into four stages. The results of the study showed that the means of the responses of students at the levels of the reflective thinking scale came in the

following order: understanding came in the first place, followed by the level of meditation, then the critical meditation and in the last place came the standard level of work. The results also showed that there were statistically significant differences between the students at standard work levels, meditation and critical meditation, depending on the stage.

3. Methods and Procedures:

3.1 Research Design:

The researchers used the experimental approach in designing the (pre and post) measurements due to the nature of the study procedures.

3.2 Study Population:

The study population consisted of all students who are officially enrolled in the pre-service course (1) for the second semester 2016-2017. The total number of students was 74 male and female students.

3.3 Study Sample:

The sample of the study consisted of 40 students who were selected in a deliberate manner and distributed into two groups (control and experimental); each group consisted of 20 male and female students as shown in table (1). The instructional program was applied to the experimental group only; as for the control group they studied the course in the usual methods according to the course description adopted by the Department of Physical Education.

Table (1)

Description of the members of the study sample

	Category	Experimental		Control		Sample	
		Number	Ratio	Number	Ratio	Number	Ratio
Gender	Males	14	0.70	12	0.60	26	0.65
	Females	6	0.30	8	0.40	14	0.35
	Total	20	0.100	20	0.100	40	0.100
Educational level	Third Grade	15	62.5	9	37.5	24	0.60
	Fourth grade and up	5	31.3	11	68.8	16	0.40
	Total	20	0.100	20	0.100	40	0.100
Accumulative average	Good and under	16	55.2	13	44.8	29	72.5
	Very good and up	4	36.4	7	63.6	11	27.5
	Total	20	0.100	20	0.100	40	0.100

Table (2)

The coherence of the members of the experimental and the control groups in reflective thinking skills:

Reflective thinking skills	Experimental				Control			
	Arithmetic mean	Standard deviation	Skewness coefficient	Variation coefficient	Arithmetic mean	Standard deviation	Skewness coefficient	Variation coefficient
Meditative observation skill	2.25	1.29	0.78	0.57	1.90	1.07	0.50	0.56
Detection of fallacies' Skill	3.50	1.36	-0.69	0.39	3.25	1.52	-0.52	0.47
Reach conclusion skill	3.10	1.07	-0.50	0.35	2.90	1.02	-0.11	0.35
Giving convincing explanations ' skill	1.35	0.33	1.35	0.24	1.30	0.08	0.99	0.06
Developing suggested solutions' skill	2.70	1.08	-1.09	0.40	2.65	1.09	-0.97	0.41
Reflective thinking total	12.90	2.79	-0.51	0.22	12.00	3.84	0.00	0.32

Table (2) refers to the values of the arithmetic mean, standard deviations, variation coefficient, and coherence of the reflective thinking skills of the student teachers of the experimental and control groups. It is noted that all the values of the skewness coefficient are included within the normal range, which expresses the acceptable degree of skewness for the distribution of the data of the study sample, which is usually accepted within -3 to +3.

In a review of all the values of the variation coefficients, it was found to be within the acceptable range of variation coefficients, the largest among them was in the meditative observation skill of the experimental group where it reached 0.57. The maximum value of the variation coefficients for the control group reached 0.56 in meditative observation. It is noted that these values exceeded 0.50 (the acceptable range of the standard deviation from the arithmetic mean) which usually expresses acceptable coherence among the study sample members. However, in some cases these values can be accepted considering that the difference between the calculated values and the desired values, in other words, the extent to which the values are acceptable, is not significant (0.06 and 0.07 respectively).

Hence, this value can be considered acceptable, especially if the nature of the variable can be different and the 0.50 specified value does not represent a break point but rather a preferred value for accepting the values of the variation coefficients in light of many variables such as the nature of the variable. Therefore, based on these values, the members of each group are considered coherent in these skills.

3.4 Equivalence of the two groups in the reflective thinking skills.

The equivalence of the two groups of study (experimental and control) was verified on the reflective thinking scale with its various skills (meditated observation, detection of fallacies, reach conclusions, giving convincing explanations, developing suggested solutions). Table 3 illustrates this.

Table 3
Equivalence of the members of the experimental and control groups in reflective thinking skills in the pre-measurement

Reflective thinking skills	Experimental		Control		T value	Level of significance
	Arithmetic means	Standard deviation	Arithmetic means	Standard deviation		
Meditative observation skill	2.25	1.29	1.90	1.07	0.93	0.357
Detection of fallacies' skill	3.50	1.36	3.25	1.52	0.54	0.586
Reach conclusion skill	3.10	1.07	2.90	1.02	0.60	0.549
Giving convincing explanations' skill	1.35	0.33	1.30	0.08	0.15	0.876
Developing suggested solutions' skill	2.70	1.08	2.65	1.09	0.14	0.885
Reflective thinking total	12.90	2.79	12.00	3.84	0.84	0.402

Table (3) shows the results of the t-test between the experimental and control groups in reflective thinking skills in pre-measurement. It was noted from the table that the calculated value of the significance of the t-test in the meditative observation skill was 0.357, in the detection of fallacies skill it was 0.586, in reaching the conclusions skill it reached 0.549, in giving convincing explanations skill it was 0.876. It also reached in the total degree of reflective thinking skills (0.402). All these values are not statistically significant because the values of the significance level were greater than 0.05, which means that there was no statistically significant difference between the two groups in reflective thinking skills. Thus, the conclusion is that the values of the two groups' means converge (their equivalence).

3.5 Survey sample:

A survey was conducted to ascertain the appropriateness and suitability of the study tools used (the scale of teaching competencies). The survey sample consisted of 34 students other than students from the basic sample of the study, in order to determine the degree of clarity and

suitability of the scales, the time required to implement the standards, and remove any ambiguity that arises through the inquiry of the survey sample and to note any problems that may arise during the implementation of the study tests.

3.6 Study tools, program and method of development:

To verify the hypotheses of the study, the researchers developed and formed the following study tools:

1 - Reflective thinking skills test.
2- Proposed instructional program.

3.6.1 First: reflective thinking skills' measuring tool.

After reviewing previous studies and literature related to reflective thinking, such as, Phan (2009), Mark (2009), Darwish (2005), the researchers designed a tool to measure the skills of reflective thinking in the form of an objective test of multiple-choice type; this type of test reduces the probability of guessing and is free of self-corrected intervention. It also covers the largest part of the article.

The test consists of 30 paragraphs in the form of multiple choice, divided into five skills of reflective thinking, as clarified by the Al-Khader (2016) as follows:

- The meditative observation skill: This is intended to reflect the aspects of the problem and identify its components through the nature of the subject so that the relationship is determined visually.
- The Detection of fallacies' skill: the ability to determine the incorrect or irrational relationship or misconceptions in the completion of tasks.
- The ability to reach conclusions: the ability to reach a logical relationship between existing contents and the results obtained.
- The ability to give convincing explanations: the ability to give definition and interpretation based on the logic of the results, as the definition should be based on previous information or related to the characteristics and nature of the subject.
- Developing suggested solutions skill: the ability to find a logical solution for a subject with predictable mental images and steps.

3.6.1.a Validity of the test:

The arbitrators validity: to confirm the credibility of the test through the honesty of the arbitrators, the test was presented to number of specialists in the field of sports and education, to consult them and let them express their opinions and consider the test to make any change, amendment or addition to output the scale in its final form, where some of the paragraphs were

modified according to the suggestions of the arbitrators. The scale remained with 30 questions, and the scale was in its final form.

To confirm the validity of the test, the difficulty and discrimination coefficient for reflective thinking skills was calculated to distinguish between sample responses and to distinguish between their levels. Table 7 illustrates this.

Table 4
Difficulty and discrimination coefficients for each of the questions of the reflective thinking skills test (n = 34)

Question	Difficulty coefficient	Discrimination coefficient
x1	0.654	0.767
x2	0.568	0.820
x3	0.629	0.897
x4	0.392	0.609
x5	0.608	0.766
x6	0.546	0.718
x7	0.686	0.709
x8	0.611	0.843
x9	0.613	0.714
x10	0.642	0.619
x11	0.502	0.701
x12	0.632	0.844
x13	0.366	0.652
x14	0.700	0.620
x15	0.677	0.741
x16	0.458	0.503
x17	0.719	0.769
x18	0.458	0.666
x19	0.437	0.540
x20	0.686	0.722
x21	0.522	0.643
x22	0.611	0.728
x23	0.645	0.619
x24	0.582	0.800
x25	0.703	0.629
x26	0.687	0.709
x27	0.700	0.777
x28	0.640	0.715
x29	0.698	0.643
x30	0.701	0.734

The results of the table show that the values of the difficulty coefficients for the test questions allocated for the detection of reflective thinking skills were limited between 0.366 for question (13) and 0.719 for question (17); these values fall within the acceptable range of difficulty coefficients, which most studies indicate that it is between 0.30 - 0.70, indicating the credibility of the test questions in the identification and diagnosis of reflective thinking skills. Also, the results showed that the discrimination credibility coefficient of the test questions ranged between 0.503 for question number (16) and 0.897 for question number (3). It is also noted that these values also fall within the acceptable range of discrimination coefficients which are usually accepted between 0.30 - 0.90, reflecting the credibility of the test questions in the ability to distinguish between their responses and thus the ability of the test to distinguish between their levels.

3.6.1.b Reliability of the Test:

The researchers used the method of application and reapplication of the test in order to ensure the stability of reflective thinking skills. The following table shows the results of this test.

Table (5)
Results of the stability of reflective thinking skills in the method of application and re-application of the test (n = 34)

Reflective thinking skills	First application		Second application		Correlation coefficient	Level of significance
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
Meditative observation skill	1.76	0.89	1.88	0.98	0.769	***0.000**
Detection of fallacies' Skill	3.65	1.30	3.59	1.28	0.819	*0.000
Reach conclusion skill	2.76	1.02	2.79	1.15	0.813	*0.000
Giving convincing explanations' skill	1.59	0.99	1.62	1.07	0.847	*0.000
Developing suggested solutions' skill	3.35	1.25	3.50	1.42	0.937	***0.000**
Reflective thinking total	13.12	3.28	13.38	3.49	0.856	***0.000**

The results of the table indicated that the stability value of the method of applying the test to the meditative observation skill was 0.769, the detecting fallacies' skill was 0.819, the reaching conclusions' skill was 0.813, giving convincing explanations' skill was 0.847, developing suggested solutions' skill was (0.937) and the total score of reflective thinking skills was 0.856. Such values are high and reflect enough stability values.

These values show that the members in the study sample had close responses in two extended periods of the test, where the values obtained are high and reflect high stability values (where stability values are usually greater than or equal to 0.70 minimum for this method of stability). The values of the level of significance of all these values are statistically significant because they are less than 0.05 indicating that there is a strong correlation between the two application results in each field. Thus, the areas of cognitive testing used for the detection of reflective thinking skills are stable and valid for application.

3.6.2 Second: The proposed instructional program:

The instructional program for student teachers in the field of physical education was formed according to the problem-solving strategy. The aim of the strategy is to develop the students' ability to reflective thinking through problem analysis, abstraction and resolution. This requires the student to collect as much information and knowledge as possible about the problem by analysing it into sub-problems and then identifying the main problem. The strategy also aimed to develop the students' ability to generate ideas, to gather them and to think in different ways to solve the problem. In addition to developing the hypotheses, experience them and select them, the educational material was formed considering the steps to solve the problem through the following:

Step 1: Identify and understand the problem correctly
Step 2 of the problem- solving is to develop a solution plan by testing its idea and developing alternatives and assumptions.
Step 3 of the problem-solving steps: Start implementing the solution plan, after reviewing the plan and the solutions reached.
Final step: Review and verify the solution or the performance.

After reviewing the previous literature related to the construction of the proposed instructional program and its design, and through similar studies and research to take advantage of the strategies of teaching and reflective thinking, the researchers identified the components of the proposed instructional program based on the relevant scientific references, such as the study of Shdeifat (2015) and Kalliopi & Spiridon (2007), in addition to the Internet. The researchers then designed the program within educational units so that the program consisted of 8 educational units distributed over 8 weeks, the duration of the meeting was an hour and a half, three hours a week (two lectures per week). During the week, an integrated unit was

implemented. The program was divided into two sections (the first section was related to cognitive domain and the second was related to practical implementations).

The program was based on the following principles:

- To employ the technological potentials in the educational process.
- To meet the needs of the educational labour market, which focuses on sports competencies.
- To continuously keep up to date with everything new in the sports' field.

3.6.3 Determine the educational outputs of the program:

The researchers identified the specific outputs of the proposed program, as follows:

* At the end of the application of the program and after the acquisition of reflective thinking skills; the student will be able to:

- Improve the skill of meditative observation.
- Detect fallacies in different educational situations.
- Reach logical conclusions and suitable results.
- Give a logical definition to the results in accordance with the nature of the educational situation and its characteristics.
- Develop logical steps to resolve the given subject.
- Get a proper cognitive knowledge of teaching competencies (planning, implementation, evaluation).
- Make suitable decisions.

The program was then presented to specialists in the field of sports and education to express their opinion, and then make amendments according to the views of the specialists to present the program in its final form.

3.7 Study variables:

3.7.1 Independent variable: - A proposed instructional program based on a problem-solving strategy - the two groups (experimental and control) according to the variables of the study, gender, accumulative rate, and educational level.

3.7.2 Dependent variable: reflective thinking skills.

4. Presentation and discussion of results

The researchers gathered the data and then treated, analysed it statistically by using the SPSS program to obtain the results according to the hypotheses of the study, which can be illustrated as follows:

4.1 The first hypothesis states:

- There were statistically significant differences at the level of significance ($\alpha \leq 0.05$) in the post-measurements mean in the ability to engage in reflective thinking between the experimental and control groups due to the instructional program for the benefit of the experimental group.

To verify this hypothesis, the researchers used t-test for independent samples in the variables of reflective thinking. Table (6) shows the results of this test.

Differences in reflective thinking skills:

Table 6
Differences between experimental and control groups in the means of reflective thinking skills for post-measurements

Reflective thinking skills	Experimental		Control		T value	Level of significance
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
Meditative observation skill	3.30	0.66	2.05	0.89	5.06	0.001
Detection of fallacies' Skill	3.85	1.31	2.05	1.32	4.33	0.002
Reach conclusion skill	4.05	1.00	2.90	1.21	3.27	0.002
Giving convincing explanations' skill	2.10	0.97	1.20	1.01	2.88	0.006
Developing suggested solutions' skill	4.30	0.66	3.10	1.07	4.27	0.010
Reflective thinking total	17.60	2.85	11.30	2.15	7.87	0.010

Table (6) shows the results of the t-test between the experimental and the control groups in the means of reflective thinking skills in post-measurements. It is noted from the table that the calculated value of significance of the t-test for the skill of the meditative observation reached 0.001; in the detection of fallacies' skill, it reached 0.002, in the reaching conclusions' skill, it reached 0.002, in the giving convincing explanations' skill, it reached 0.006 in the developing suggested solutions' skill it reached 0.000 and the total score of the reflective thinking skills it reached 0.010. All of these values are statistically significant because the values of the significance level were less than 0.05, which means that there are statistically significant differences between the two groups in the reflective thinking skills, as the significance of these differences was for the benefit of the experimental group members with the best arithmetic mean as shown in the table, which reflects the importance of the instructional program.

Table (6) shows statistically significant differences at the level of $\alpha \leq 0.05$ in the post-measurement means in the reflective thinking skills in favour of the experimental group with the highest arithmetical mean in all reflective thinking skills (meditated observation, detection of fallacies, reaching conclusions, giving convincing explanations, developing suggested solutions) compared to the control group's arithmetical mean, as the significance of these differences was in favour of the experimental group with the best arithmetic mean, which reflects the importance of the instructional program.

The researchers attributed these results to the fact that the instructional program contained effective educational situations that contributed to the development and improvement of the reflective thinking of the sample (the experimental group) on different reflective thinking skills (meditated observation, detection of fallacies, reaching conclusions, giving convincing explanations, developing suggested solutions), as the instructional program gave the student teachers a vital role in the educational process, which in turn helped the learners to understand the problem and be able to analyse it, where the students became the main theme of the educational process. The strategy also contributed to raising the motivation of student teachers, where motivation is one of the conditions of learning, as well as motivating them to work collectively and cooperatively in facing problems and meditate all their aspects in order to reach suitable solutions, such as teaching situations and asking open questions that aim to stimulate the thinking of students teachers in order to reach suitable solutions according to their knowledge and abilities. The acquisition of skills and knowledge related to instructional competencies has played an important role in the absorption of students to the problem-solving strategy and the application of its steps in a positive manner. The strategy also helped the student teachers to connect their ideas with previous, current and future experiences in their professional field.

This in turn enhanced and improved the intellectual processes of the experimental group compared to the control group that used the usual methods of teaching, which showed

improvement but remained less than the results of the experimental group. This was demonstrated by the results of this study, which agreed with many studies that dealt with the instructional program based on the strategy of problem-solving in the development of different types of thinking in general and reflective thinking in particular, and exceeded the strategies, ways and traditional methods used in teaching, including: The study of Shdeifat (2016) on the role of problem-solving strategy in teaching football and basketball curricula in improving different types of thinking.

4.2 Second hypothesis:

There were statistically significant differences at the level of $\alpha \leq 0.05$ in the mean of reflective thinking ability between the pre- and post-measurements of the experimental group due to the instructional program for the benefit of the post-measurement.

To verify this hypothesis, the researchers used a t-test for independent samples in reflective thinking. Table (7) shows the results.

Table (7) The differences between the pre- and post-measurements in the means of reflective thinking skills of the experimental group via a t test

Reflective thinking skills	Experimental		Control		T value	Level of significance
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
Meditative observation skill	2.25	1.29	3.30	0.66	3.80	0.001
Detection of fallacies' Skill	3.50	1.36	3.85	1.31	1.02	0.320
Reach conclusion skill	3.10	1.07	4.05	1.00	2.76	0.012
Giving convincing explanations' skill	1.35	0.33	2.10	0.97	2.26	0.036
Developing suggested solutions' skill	2.70	1.08	4.30	0.66	7.94	0.001
Reflective thinking total	12.90	2.79	17.60	2.85	7.03	0.001

Table (7) shows the results of the t-test of the differences between the pre- and post-measurements in the means of reflective thinking skills of the experimental group. It is noted from the table that the calculated value of significance of the t-test for the meditative observation skill was 0.001; in the detection of fallacies' skill, it reached 0.320, in the reaching conclusions' skill, it reached 0.012, in the giving convincing explanations, skill, it reached 0.036, in the developing suggested solutions' skill it reached 0.001 and the total score of the reflective thinking skills reached 0.001. All these values are statistically significant because the calculated values of the level of significance were less than 0.05, which means that there were statistically significant differences between the two groups in the reflective thinking skills, as the significance of these differences was in favour of the post-measurement with the best arithmetic mean, as shown in the table; this reflects the importance of the instructional program (except that there were no statistically significant differences in the skill of detecting fallacies, as the value of the significance level was 0.320, which is greater than 0.05. Therefore, the differences in the means of this skill were not statistically significant.) Thus, the partially-guided hypothesis was adopted since it is based on the existence of significant differences in the mean of pre- and post-measurements of the experimental group and in favour of the post-measurement.

4.3 Third hypothesis:

Which states:

- There were no statistically significant differences at the level of significance ($\alpha \leq 0.05$) in the post-measurement means in the ability to reflective thinking in the experimental group according to the independent study variables (gender, educational level, accumulative rate).

To verify this hypothesis, the researchers used the analysis of the associated variance, the following table shows these results:

Table (8): Analysis of variance associated with meditative thinking in post-measurement according to independent variables of the experimental group.

Reflective thinking skills	Variation source	Total squares	Freedom degrees	Mean squares	F value	Level of significance
Meditated observation	**Pre**	1.38	1	1.38	3.49	0.081
	Gender	0.17	1	0.17	0.42	0.524
	Level	0.70	1	0.70	1.77	0.204
	Rate	1.18	1	1.18	2.96	0.106
	Error	5.95	15	0.40		
	Total	8.20	19			
Detecting fallacies	**Pre**	4.02	1	4.02	2.36	.145
	Gender	2.60	1	2.60	1.53	.236
	Level	1.03	1	1.03	0.60	.450
	Rate	0.21	1	0.21	0.12	.730
	Error	25.53	15	1.70		
	Total	32.55	19			
Reaching conclusions	**Pre**	0.02	1	0.02	0.02	0.894
	Gender	0.55	1	0.55	0.48	0.497
	Level	1.18	1	1.18	1.03	0.326
	Rate	0.41	1	0.41	0.36	0.557
	Error	17.12	15	1.14		
	Total	18.95	19			
Giving convincing explanations	**Pre**	0.68	1	0.68	0.63	0.441
	Gender	0.01	1	0.01	0.01	0.917
	Level	0.64	1	0.64	0.60	0.451
	Rate	0.80	1	0.80	0.74	0.402
	Error	16.16	15	1.08		
	Total	17.80	19			
Developing suggested solutions	**Pre**	0.85	1	0.85	1.90	.189
	Gender	0.06	1	0.06	0.14	.715
	Level	0.74	1	0.74	1.65	.218
	Rate	0.88	1	0.88	1.97	.181
	Error	6.73	15	0.45		
	Total	8.20	19			
Reflective thinking total	**Pre**	29.17	1	29.17	4.07	.062
	Gender	2.52	1	2.52	0.35	.562
	Level	26.56	1	26.56	3.70	.073
	Rate	14.09	1	14.09	1.97	.181
	Error	107.56	15	7.17		
	Total	154.80	19			

Table (8) presents the results of the analysis of variance associated with the reflective thinking skills in post-measurement according to the gender, educational level and accumulative rate variables. The significance level values indicate that there were no statistically significant differences in any skills according to gender, educational level or accumulative average, where all the values of significance level were greater than 0.05 as shown in table 8. Therefore, the null hypothesis was adopted as it indicates that there were no significant differences in the post-measurement means in the experimental group members in all indicators of dependent variables (teaching competencies and reflective thinking skills), due to the regular program adopted in the department of physical education where the same instructors gave the same instructions within the same study plan and syllabus regardless of gender, educational level and accumulative rate variables or grade points' average.

5. Study Conclusions:

5.1 Considering the findings of the study, the following conclusions were drawn:

- The experimental group outperformed the control group in all reflective thinking skills, through the instructional program and the skill of developing suggested solutions.
- Improvement in the skill of detecting fallacies among members of the experimental group was the lowest among the reflective thinking skills, where it became apparently insignificant.
- The problem solving-based instructional program has achieved a change in the ratios in the pre- and post-measurements in improving the reflective thinking skills of the experimental group among pre-service students in the Department of Physical Education at Al-Quds University.
- The use of a problem-solving strategy in the instructional programs helped to improve the skills of reflective thinking without being influenced by any of the independent variables of the study.

6. Recommendations:

6.1 Considering the foregoing conclusions, the researchers recommend the following:

- To use a problem-solving strategy in teaching the field training course to enable student teachers to get the necessary teaching competencies.
- To use reflective thinking skills in various courses of physical education whether (practical and theoretical) because of their significant role in the development of mental abilities in various sports activities.
- To change the description of the study plan of field training courses in the universities to include materials and situations that enrich the development of reflective thinking skills among students.

- To focus on the skills of reflective thinking in the program of preparing teachers of physical education specialty at Al-Quds University, that is, detecting a fallacies' skill within the reflective thinking components.
- To conduct similar studies dealing with problem-solving strategy in teaching various sports courses.

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