Journal of Applied Sports Science
September 2015, Volume 5, No. 3

Design of Some Educational Situations to Improving Skills Solving Problem and Making Decision in The Curriculum Material Practical Education of Student in The Faculty of Education Division of Physical Education Minia University.

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Abstract

The current research aims to design some educational situations and to design and validate problem solving test and decision making test in addition to providing female student teachers of the fourth year – curricula & methodology department – Faculty of Physical Education – Al-Minia University with the proper skills of decision making and problem solving. The researcher used the experimental approach (two-group design) with pre- and post-measurements. Research community (n=74) included female students of the fourth year – methodology and curricula department – Faculty of Physical Education – Al-Minia University. After excluding injured and non-punctual students, only (60) students were chosen for participation (81.08%). Participants were divided into two equivalent groups (30 students each). Results indicated that:

- *The recommended educational situations had positive effects on improving problem solving and decision making skills during field training.*
- *Training on these situations helps improving students' abilities and achieve various educational objectives.*

Key words: educational situations - problem solving - decision making - field training.

Introduction:

Ancient man lived a simple life through imitating his ancestors' methods of living and surrendering to problems he faced. Nowadays, life became more complicated and more competitive in all fields like education, industry, trade and politics (11: 36).

Today, education is directed to thinking, or we can say that thinking became the major objective of education to improve the learner's abilities to deal effectively with modern life's complicated problems at present and in the future. Thinking allows us to use what we learned from our perceptions and abilities to deal with things mentally. This helps us to solve problems easily (28: 159) (3: 31).

Problem solving is of major importance for us and this led many educators to try to understand how we solve problems. Problem solving depends on cognitive requirements. These requirements include information and procedures for processing information in addition to data entry, saving and recall for solving problems. These procedures should be accurate to be useful in solving problems (17: 4) (23: 55).

Decision making got serious attention from scholars who agreed that the clear meaning of decision making is that there are alternatives to choose from. Decision making takes various ways and styles like trial and error, imitation, simulation, previous experience and science-based decision making. This last method is the most accurate and targets rationalizing decisions (26: 159) (5: 20).

Field training is the criterion against which we can measure the effectiveness of teacher preparation programs at faculties of education and physical education as these programs aim to prepare well-educated and well-prepared teachers scientifically, professionally and psychologically to teach. For modern teachers, these programs are of major importance as they are closely related to the reality of teaching students. It is a logic and basic need to pay more attention to these programs to improve student teachers professionally (10: 261) (15: 23).

Magdy Habib (1997) aimed to identify decision making styles through character traits of students of secondary stage, university stage and post-graduate stage. A sample of (820) students of both sexes was used. Results revealed major variations in decision making styles for all stages and structural characteristics of decision making at the university stage (13)

Al-Sayed Boraik (2007) studied the effectiveness of a program for improving meta-cognitive strategies and its effects on improving problem solving skills for university students. The researcher prepared the meta-cognitive list and problem solving test. Results indicated positive effects for experimentation and measurement and their mutual interaction for both meta-cognitive strategies and problem solving skills. (9)

Sukhbir Durej (1996) compared self-confidence and decision making among physical education and psychology students. Sample included (80) students divided into two groups. Results indicated statistically significant differences in favor of physical education students. (30)

As a supervisor of field training, the researcher noticed that problem solving skills are very low among student teachers and they cannot take effective decisions.

According to the review of literature, the researcher noticed that none of the previous studies that dealt with problem-solving and decision making dealt with designing educational situations to improve problem solving and decision making skills for student teachers during field training.

This led the researcher to perform this study to improve problem solving and decision making skills for student teachers during field training.

Research Significance:

- This research contributes in changing the traditional way of faculty members in faculties of physical education
- This research contributes in using modern methods in teaching to improve the field training in physical education
- This research contributes in training student teachers on performing new roles through field applications that improve decision making and problem solving skills
- This research contributes in motivating learners through positive involvement in learning
- This research contributes in motivating learners to find out solutions

Aim:

The current research aims to:

1. Design some educational situations and to design and validate problem solving test and decision making test
2. Provide female student teachers of the fourth year – curricula & methodology department – Faculty of Physical Education – Al-Minia University with the proper skills of decision making and problem solving

Hypotheses:

1. There are statistically significant differences between the pre- and post-measurements of the control group on problem solving test in favor of the post-measurements
2. There are statistically significant differences between the pre- and post-measurements of the control group on decision making test in favor of the post-measurements
3. There are statistically significant differences between the pre- and post-measurements of the experimental group on problem solving test in favor of the post-measurements
4. There are statistically significant differences between the pre- and post-measurements of the experimental group on decision making test in favor of the post-measurements
5. There are statistically significant differences between the post-measurements of the control and experimental groups on problem solving test and decision making test in favor of the experimental group

Terminology:

1. ***Problem solving*** is the ability to coordinate previously learned principles and rules and to use them to fulfill the objective (29: 171)
2. ***Decision making*** is a complex process targeting the choice of best alternatives and solution available in a specific situation to fulfill the objective (8: 23)
3. ***Field training*** is the application of teaching principles and training future teachers on using these skills and acquiring professional ethics (21: 13)

Methods:

Approach:

The researcher used the experimental approach (two-group design) with pre- and post-measurements according to the following design:

Table (1): Experimental Design of the study

Group	Pre-measurement	Application	Post-measurement
Experimental	Problem solving test Decision making test	Recommended educational situations	Problem solving test Decision making test
Control	Problem solving test Decision making test	Regular teaching method	Problem solving test Decision making test

Participants:

Research community (n=74) included female students of the fourth year – methodology and curricula department – Faculty of Physical Education – Al-Minia University. After excluding injured and non-punctual students, only (60) students were chosen for participation (81.08%). Participants were divided into two equivalent groups (30 students each). Participants were female students of the fourth year – methodology and curricula department – Faculty of Physical Education – Al-Minia University. Those students spent three years of study and reached a suitable degree of understanding the tests.

Data Collection Tools:

- High IQ test (by: Al-Sayed Mohamed Khairy) (22)
- Problem-solving test (by the researcher)
- Decision making test (by the researcher)
- Students' work sheets including educational situations for teaching physical education (by the researcher)

High IQ test (by: Al-Sayed Mohamed Khairy) (22)

This test included (42) items to measure various mental functions like:

- Attention and focus through performing various instructions simultaneously
- Realizing relations among shapes through comparing shapes and identifying relations
- Verbal inference including logic judgments and mathematical logic
- Numeric inference including solving numeric chains and mathematical thinking questions
- Linguistic aptitude through questions of free expression and synonyms (20: 63)

This test was used in various studies and its validity reached (0.522) while its reliability reached (0.881).

Problem-solving test (by the researcher)

According to review of literature (18, 24 and 9) the researcher prepared the problem-solving test as follows:

A- Aim: This test is a measurement for problem-solving abilities during field training situations. It aims to measure the effectiveness of the recommended educational situations through comparing the experimental and control groups.

B- Target subjects: fourth year students of faculty of physical education – Al-Minia University

C- Description: The test includes (8) situations (problems) and each situation is followed by (4) questions (total number = 32). Each question represents one of the following skills: identification of problem – data collection and forming hypotheses – testing hypotheses – concluding results and generalizations

The researcher used multiple choice questions as they are consistent with the test aims. Kandeel (1996) indicated that this type of questions consists of two parts: introduction and answers. Students should choose only one answer consistent with the introduction. Only one answer is correct as the wrong answers distort students' attention. Questions are distributed on problems as follows:

Table (2): questions distributed on problem-solving skills

Skill	Questions	Number
Identification of problem	1-5-13-17-21-25-29	8
Data collection and forming hypotheses	2-6-10-14-18-25-26-30	8
Testing hypotheses	3-7-11-15-19-23-27-31	8
Concluding results and generalizations	4-8-12-16-20-24-28-32	8
Total		32

D- Correction: The researcher prepared an answer sheet separate from the questions sheet. The student should tick (✓) for the correct answer.

E- Scoring: each correct answer takes (1) point and if the answer is wrong the student takes (zero). The minimum score of the test is (zero) while the maximum score is (32).

F- Instructions: the researcher used clear and short instructions directing students towards reading items carefully before answering questions. All data spaces at the form are required to be filled including student's name and school of training.

G- Validity: the researcher used judges' validity through presenting the test to (5) experts in methodology and curricula to identify suitability and clarity of items in addition to relations of items to problem solving steps and clarity of instructions. Experts were asked to identify any recommended changes. The researcher accepted all items reaching 90% of agreement according to the following equation: agreements / (agreements + disagreements). (14: 82). Experts recommended several changes and the researcher considered them all. Table (2) presents agreement percentages of items:

Table (3): Agreement percentages for problem-solving test items

Item	Agreement	Item	Agreement	Item	Agreement	Item	Agreement
1	91%	9	94%	17	92%	25	93%
2	92%	10	95%	18	93%	26	94%
3	94%	11	93%	19	94%	27	95%
4	91%	12	92%	20	95%	28	91%
5	96%	13	97%	21	91%	29	92%
6	91%	14	91%	22	93%	30	95%
7	92%	15	92%	23	92%	31	96%
8	93%	16	93%	24	96%	32	97%

H- Reliability: The researcher used Cronbach's Alpha (6: 271) to calculate test reliability. Reliability reached (0.77). In addition, the researcher used test/retest procedure on a pilot sample with time interval of (3) weeks. Pearson's correlation coefficient was (0.78) and this indicated the test reliability.

I- Duration: the researcher calculated the mean duration of test ([duration of first student + duration of last student] / 2) and concluded that the mean duration was (45) minutes.

J- Easiness, Difficulty and Discrimination Coefficients: easiness (the ratio of correct answers to total score), difficulty (easiness coefficient – 1) and discrimination (easiness x difficulty) are calculated as seen in table (3).

Table (4): Easiness, Difficulty and Discrimination Coefficients

Item	Easiness	Difficulty	Discrimination	Item	Easiness	Difficulty	Discrimination
1	0.43	0.57	0.254	17	0.45	0.55	0.247
2	0.45	0.55	0.247	18	0.44	0.56	0.246
3	0.43	0.57	0.245	19	0.51	0.49	0.249
4	0.47	0.53	0.249	20	0.56	0.44	0.246
5	0.48	0.52	0.249	21	0.56	0.44	0.246
6	0.51	0.49	0.249	22	0.43	0.57	0.245
7	0.48	0.52	0.249	23	0.49	0.51	0.249
8	0.45	0.55	0.247	24	0.45	0.55	0.247
9	0.44	0.56	0.246	25	0.44	0.56	0.246
10	0.51	0.49	0.249	26	0.51	0.49	0.249
11	0.56	0.44	0.246	27	0.56	0.44	0.246
12	0.56	0.44	0.246	28	0.56	0.44	0.246
13	0.53	0.47	0.249	29	0.53	0.47	0.249
14	0.57	0.43	0.245	30	0.57	0.43	0.245
15	0.51	0.49	0.249	31	0.51	0.49	0.249
16	0.45	0.55	0.247	32	0.45	0.55	0.247

As seen in table (4) discrimination coefficient ranged between (0.245) and (0.249). This indicates that questions are not too easy or too difficult.

Decision making test (by the researcher)

The researcher prepared the decision making test as follows:

A- Aim: The test aims to improve and measure decision making skills of students

B- Axes: The test includes seven axes as follows: identifying and forming problem – identifying decision aim – data and information collection – improving alternatives – evaluating alternatives – choosing the best alternative – taking decision and follow-up.

C- Limitations: This test is limited to measuring decision making

E- Test Items: Test items were formulated considering the following:

- Each item is related to one of the test axes
- Test includes positive and negative items
- Each item has five answers beginning with "always" and ending with "never"
- Items are randomly distributed and the preliminary version included (35) items as seen in table (4).

Table (5): Distribution of decision making test items

Skill	Items		
	Positive	Negative	Number
identifying and forming problem	1-7	14-20-24	5
identifying decision aim	8-32-35	15-21	5
data and information collection	2-16-19	3-22	5
improving alternatives	11-23	10-23-27	5
evaluating alternatives	9-13-25	5-18	5
choosing the best alternative	26-29	6-17-34	5
taking decision and follow-up	24-30-31	12-28	5
Total	18	17	35

F- Scoring: The test is scored over f-point scale (always – often – sometimes – rarely – never). Positive items were scored as follows (4-3-2-1-0) while negative items were scored as follows (0-1-2-3-4).

G- Validity: the researcher presented the test to five judges who are experts in curricula and methodology. Experts were asked to express their opinions about: item formulation – suitability to students – relation of items to decision making skills – clarity of items. They were also asked to express any recommended changes. All items gaining more than 80% of agreement were included and all experts' recommendations were considered. Table (5) presents agreement percentages of experts.

Table (6): Agreement percentages for decision making test items

Item	Agreement	Item	Agreement	Item	Agreement
1	80%	13	85%	25	90%
2	80%	14	80%	26	90%
3	90%	15	90%	27	90%
4	80%	16	85%	28	90%
5	90%	17	85%	29	80%
6	90%	18	80%	30	80%
7	90%	19	85%	31	85%
8	90%	20	90%	32	90%
9	95%	21	95%	33	90%
10	80%	22	90%	34	85%
11	90%	23	85%	35	90%
12	80%	24	90%		

H- Reliability: The researcher used test/retest procedure on a pilot sample (n=10) with time interval of (3) weeks between applications. Pearson's correlation coefficient was (0.72) indicating that the test is highly reliable.

Pre-measurements:

Pre-tests were taken for both groups to assure equivalence. Table (7) presents values of means, SD, median and squewness.

Table (7): means, SD, median and squewness of pre-measurements for both groups (n=60)

Variable	Mean	SD	Median	Squewness
Age	22.31	3.74	23.42	-0.89
IQ	34.17	4.98	34.74	-0.34
Problem solving	14.84	3.98	16.73	-1.42
Decision making	72.17	4.94	74.87	-1.64

Table (7) indicated the lack of statistically significant differences between the two groups on all variables and this indicated the equivalence of the two groups.

Table (8): Difference significance between the pre-measurements of the two groups (n=60)

Variable	Experimental		Control		Means difference	(t)
	Mean	SD	Mean	SD		
Age	22.45	2.06	22.15	2.78	0.30	0.66
IQ	33.81	3.85	33.52	3.84	0.29	0.81
Problem solving	14.74	2.78	14.93	2.84	0.19	0.39
Decision making	72.48	4.28	71.85	4.06	0.63	0.81

Significance on P≤0.05 = 1.67

Table (8) indicated the lack of statistically significant differences between the two groups on all variables and this indicated the equivalence of the two groups.

Main application:

During the period from 29-9-2010 to 14-11-2010, the experimental group used the recommended educational situations while the control group used the regular teaching method.

Post-measurements:

The two tests were applied to both groups on 16-11-2010 and all answers were corrected and tabulated for statistical treatment.

Statistical treatment:

The researcher used SPSS software to calculate: mean – SD – median – squewness – Cronbach's alpha – Pearson's correlation coefficient – (t) value – improvement percentages.

Results:

Table (9): Difference significance between the pore- and post-measurements of the control group on all tests (n=30)

Variable	Pre-		Post-		Means difference	(t)
	Mean	SD	Mean	SD		
Problem solving	14.93	2.84	18.74	3.06	3.06	4.83*
Decision making	71.85	4.06	92.81	4.37	4.37	18.59*

Significance on P≤0.05 = 1.69

Table (9) indicated statistically significant differences between the pre- and post-measurements of the control group in favor of the post-measurement.

Table (10): Improvement percentage (%) between pre- and post-measurements of the control group

Variable	Mean		Means difference	Improvement percentage (%)
	Pre-	Post-		
Problem solving	14.93	18.74	3.81	25.52%
Decision making	71.85	92.81	20.96	29.17%

Table (10) indicated that improvement percentages between pre- and post-measurements were 25.52% for problem solving and 29.17% for decision making.

Table (11): Difference significance between the pore- and post-measurements of the experimental group on all tests (n=30)

Variable	Pre-		Post-		Means difference	(t)
	Mean	SD	Mean	SD		
Problem solving	14.74	4.28	27.64	3.87	12.9	14.33*
Decision making	72.48	2.78	128.85	6.85	56.37	53.15*

Significance on P≤0.05 = 1.69

Table (11) indicated statistically significant differences between the pre- and post-measurements of the experimental group in favor of the post-measurement.

Table (12): Improvement percentage (%) between pre- and post-measurements of the experimental group

Variable	Mean		Means difference	Improvement percentage (%)
	Pre-	Post-		
Problem solving	14.74	27.64	12.90	87.52%
Decision making	72.48	128.85	56.37	77.77%

Table (12) indicated that improvement percentages between pre- and post-measurements were 87.52% for problem solving and 77.77% for decision making.

Table (13): Difference significance between the post-measurements of the experimental and control group (n=60)

Variable	Experimental		Control		Means difference	(t)
	Mean	SD	Mean	SD		
Problem solving	27.64	3.87	18.74	3.06	8.90	13.74*
Decision making	128.85	6.85	92.81	4.37	36.04	33.78*

Significance on P≤0.05 = 1.67

Table (13) indicated statistically significant differences between the post-measurements of the experimental and control groups in favor of the experimental group.

Table (14): Differences in improvement percentages of the experimental and control groups on all research variables

Variable	Improvement percentage (%)		Difference in improvement percentage (%)
	Experimental	Control	
Problem solving	87.52%	25.52%	62%
Decision making	77.77%	29.17%	56.81%

Table (14) indicated that differences of improvement percentages between the experimental and control groups were 62% for problem solving and 56.81% for decision making. All differences came in favor of the experimental group.

Discussion:

Tables (9) and (10) indicate statistically significant differences between the pre- and post-measurements of the control group on problem solving and decision making tests in favor of the post-measurements. The researcher thinks that these differences are due to practicing problem solving and decision making through regular teaching as these skills can be improved through trial and error, imitation, simulation and previous experience.

This is consistent with Osama Ibrahim (2000), Saber & Al-Goraidy (2009) and Abd El-Hafiz Mohamed (2002) who indicated that student teachers' performance depends on the ability of supervisor to provide them with alternatives and previous experiences in addition to trial and error, imitation and simulation. (18, 4 and 19)

Tables (11) and (12) indicate statistically significant differences between the pre- and post-measurements of the experimental group on problem solving and decision making tests in favor of the post-measurements. The researcher thinks that this is due to the use of educational situations as student teachers became fully aware of the problem and understood it thoroughly. This enables students to hypothesize solutions depending on relations among available data and previous experiences. These hypotheses are tested and best solution is chosen through a positive involvement in the situation. This is done under supervision of the field training supervisor. This is consistent with Al-Shawadfy (2004) and Ishak (2004) (8 and 20).

The researcher also thinks that following specific steps to reach the best solution and training over multiple alternatives help students to improve their decision making skills as they gather data, formulate several alternatives for solution, compare these alternatives and then choose the best alternative. Decision making begins with brain storming where ideas and alternatives are randomly presented then alternative are discussed in a second stage to identify its strengths and weaknesses and finally comes the stage of choosing the best alternative. This is consistent with Al-Saieh & Anas (2000), Amal Salah (2001), Ali Abd El-Mageed (1996), Gardner (2003) and Armstrong (1994). (25, 27, 19, 1 and 32).

As seen in tables (13) and (14), the researcher thinks that the role of the supervisor is limited to presenting the problem to student teachers and helping them face it. After that student teachers gather information, formulate hypotheses, test these hypotheses and choose the best alternative. This makes student teachers more positive in their learning process and helps retaining experiences gathered through hand-on problem solving. This is consistent with Heba Said (2009) and Ahmed Abdo (2004) (2 and 16).

Conclusions:

In the light of this research aims, hypotheses, methods and results, the researcher concluded the following:

1. The recommended educational situations had positive effects on improving problem solving and decision making skills during field training.
2. Training on these situations helps improving students' abilities and achieve various educational objectives.

Recommendations:

The researcher recommends the following:

1. Using such educational situations as they help teachers to play their educational roles better than lecturing students
2. Improving learning styles to make learners more active through participating effectively in problem solving and decision making

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