Effects of problem solving education on thinking styles of Isfahan high school girl students

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ABSTRACT

The purpose of this study is the influence of problem solving education pattern on thinking styles of Isfahan high school girl students. This research is semi-experimental with scheming pretest-posttest and follow-up control. The studied statistical population was all of the high school students of Isfahan which among them 30 people were chosen by random cluster multistage method and randomly took part in two experimental groups and control equally. Thinking styles test were applied as pretest, posttest and follow-up. Problem solving teaching performed in 8 weeks for experimental group and evidence group did not take any teaching. Data were analyzed by variance analyzing method and repeating measurements. Average points of thinking styles in experimental group triables improved in the moment and two month after interference in comparison to evident group. Regarding to this educational pattern's effect and stableness, using problem solving education in several education and research categories of students is recommended.

Keywords: problem solving education, thinking styles

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INTRODUCTION

One of the bad habits in teaching-learning process in educational system is relying information and accumulating them on memory. In this view, successful student is someone who gains high grades in credits. Regarding to current world issues which is hard and simple, beside using identifying and fruitful thinks we should look for new ways to solve the problems in a scientific and genuine way. It seems that scrutinizing this important subject should be started from schools and universities. In a way that students having this though in their minds that hard problems can be solved correctly [1].

One of the obvious human factors and its life basis is his thinking power. Human has not been lack of thinking in his life and by thinking power, he solves its issues and problems and improve. So all the successes and improvements of human lies into his fruitful, effective and vigorous thinking. People think about the way of furthering works by their special style [2].

Thinking style is one of the important factors of human. Thinking styles are cognitive preferences which influence on type of behavior and emotions (Xang and Strenberg 2000). People don't have one special thinking style, but they have a side view of different thinking styles and if the preferred style can be matched in environment, needs and abilities he is successful. In the time when styles, abilities and environment demands connect correctly that people could do their task in a way that they could use their preferred style or changing it. In other words, styles can change or in special opportunities the style which is more useful is used. Strenberg has been named different styles of people in processing information as thinking style (Xang and Strenberg 2000).

In current era people should improve their thinking skills for appropriate decisions and solving complicated problems for facing amazing changes in third millennium. In current societies it is tried that all people reach self-blossoming and do his potential abilities [3].

In current 20 years, considerable changes have been created like accumulating knowledge quickly, technologic changes and wide inventions [4] on the other hand, commonplace education methods create people with lots of theoretical information. However, they still are weak for solving society problems in future. So for developing thinking skill and students' performance skill in thinking and reasoning must be improved instead of gaining and saving information [5].

Because of that in last decade solving problem has been developed as a pattern for providing services in special or general education [6]. In researching it is known that effects of problem solving skill education has been used in loss of negative emotions and improvement of social meriting, interrelations between people, creativity, self using, mind and social compatibility and criticizing thinking [7, 8, 9, 10].

By considering basic steps in problem solving skill and regarding to effects which this method have on memory and thinking skills, it seems that we can change thinking styles of students by problem solving education. Based on that, this research is for answering this question:

Is problem solving education effective for high school Isfahan girl student in the posttest a Follow-up stage?

MATERIALS AND METHODS

This study is a semi-experimental plan with pretest, posttest and follow up with evident group.

Statistical population, sample and sampling
In the high school Isfahan girl student which are educating during 1393-1394, sampling was furthered in cluster multilevel way. Among 5 parts of Isfahan the part 3 was chosen randomly, then among all schools in region 3, a school chosen and at last among all the classes of mentioned school a class were chosen randomly, finally 30 girl students in abovementioned class were chosen randomly and being put in two experimental (15) and evident (15).

Measurement tools
For collecting data needed, a questionnaire of thinking styles of Strenberg and Vagner (1991) were used for knowing students thinking which had 24 questions and evaluates three styles of performance thinking, legislation and judicial. In all the questionnaires have been reported 71%, 75%, 43% , 97% respectively.

Analyzing method
Analyzing was done by SPSS-22 software. In describing data average statistical index and standard deviation were used (in the pretest, posttest and follow up stages). Research data were analyzed by variance by measuring repeatedly.

RESULTS

Table 1. Results for Manoa analyzing for effects of membership in a group in 3, performing, legislating and judicial style testing judicial

potent	square	Sig	df error	df Hypothesis	F	amount		effect	variable
0.70	0.24	0.022	27	2	4.385	0.245	Pylayy effect	test	Administrative thinking style
0.70	0.24	0.022	27	2	4.385	0.755	lambda wilks		
0.70	0.24	0.022	27	2	4.385	0.325	hoteling		
0.70	0.24	0.022	27	2	4.385	0.325	The biggest ray root		
0.88	0.33	0.044	27	2	6.656	0.330	Pylayy effect	test and group balance	
0.88	0.33	0.044	27	2	6.656	0.670	Lambda wilks		
0.88	0.33	0.044	27	2	6.656	0.493	Hoteling effect		
0.88	0.33	0.044	27	2	6.656	0.493	The biggest ray root		

Is problem solving education of performing thinking, legislating and judicial styles in Isfahan high school girl student effective in posttest and follow up?

Table 2. Manoa analyze related to interactions between 3 administrative, legislating and judicial test

potent	square	Sig	df error	df hypothesis	F	amount		effect	variable
0.63	0.21	0.063	27	2	3.775	0.219	Pylayy effect		
0.63	0.21	0.063	27	2	3.775	0.781	Lambda wilks	test	
0.63	0.21	0.063	27	2	3.775	0.280	Hoteling effect		
0.63	0.21	0.063	27	2	3.775	0.280	The biggest ray root		Legislative style
0.72	0.25	0.01	27	2	4.585	0.254	Pylayy effect		
0.72	0.25	0.01	27	2	4.585	0.746	Lambda wilks	Test and groups interactions	
0.72	0.25	0.01	27	2	4.585	0.340	Hoteling effect		
0.72	0.25	0.01	27	2	4.585	0.340	The biggest ray root		
0.65	0.22	0.03	27	2	3.934	0.226	Pylayy effect		
0.65	0.22	0.03	27	2	3.934	0.774	Lambda wilds	test	
0.65	0.22	0.03	27	2	3.934	0.291	Hoteling effect		
0.65	0.22	0.03	27	2	3.934	0.291	The biggest ray root		Judicial style
0.64	0.21	0.03	27	2	3.785	0.291	Pylayy effect		
0.64	0.21	0.03	27	2	3.785	0.781	lambda wilks	Test and groups interactions	
0.64	0.21	0.03	27	2	3.785	0.280	Hoteling effect		
0.64	0.21	0.03	27	2	3.785	0.280	The biggest ray root		

As it can be seen in table 1, in three performances of test there are meaningful differences in all 3 variables. In the second section table 2 showed the interaction between groups and test and as table exhibits the findings of all 4 tests shows that the interaction between groups and 3 test performing is meaningful in all variables.

Table 3. Variance analyze results by measuring repeatedly for comparing the average of three styles' variables called administrative, legislative and judicial in 2 groups of experimental and evident in 3 stages called pretest, posttest and follow up

Statistical potential	Impact factor	Meaningful area	F	Total square	Freedom degree	Total squares	source	variable
0.82	0.245	0.005	9.07	2700.544	1	2700.544	Inter group factor	Administrative thinking styles
0.80	0.23	0.007	8.606	176.817	1	176.817	Intra group factor	
0.64	0.17	0.02	5.861	120.417	1	120.417	interaction	
0.12	0.02	0.041	0.682	173.611	1	173.611	Inter group factor	Legislative thinking styles
0.75	0.21	0.01	7.562	50.417	1	50.417	Intra group factor	
0.75	0.213	0.01	7.563	50.417	1	50.417	interaction	
0.09	0.01	0.049	0.442	88.011	1	88.011	Inter group factor	Judicial thinking styles
0.74	0.20	0.01	7.362	64.067	1	64.067	Intra group factor	
0.77	0.21	0.009	7.845	68.267	1	68.267	interaction	

Table 3 showed that differences between experimental and evident group was meaningful in all 3 factors of styles. Intra group differences were meaningful in all factors too. Interaction between two situations and changes in pretest, posttest and follow up was meaningful in 3 variables. In other words the average pretest of two groups in two variables was not meaningful different but in the posttest and follow up this difference was meaningful.

CONCLUSION

Results exhibited by analyzing variance by measuring repeatedly showed that problem solving education has had influence on administrative, legislative and judicial thinking style. In other words, problem solving education will cause an improvement in administrative, legislative and judicial in girl student.

Results showed that between pretest and posttest and also posttest and follow up in group there were meaningful differences. Problem solving education is efficient on administrative, legislative and judicial thinking styles and its effects has been stabled during the time.

In the principals section and research history in problem solving skill education field, there were not researches like current research. But however stability of problem solving education way stability has been reported. Hemati and Maslak pak researches, Orojlo and Khalkhali (1393), Ahmadi, Pashang and Salimi nia (1392), Kordi, Nasiri, Modares Gharvi and Ebrahimzade (1391), Yousefi, Gharazi and Gordanshekan (1391), Jabari (1390), Behnam Vashani et al (1390), Zenozian, Gharaee and Yeke yazdandust (1389), Omidvar (1389), Mardani (1388), Lindcy, Estein and Perkins(2014), Chang (2006) indirectly is matched with results of this research in effecting category.
The findings of this research show the positive effect of problem solving education pattern on thinking styles (administrative, legislative and judicial) of students. Problem solving method provides an appropriate base for reaching the best results as group activity and specially activities in small groups and causes the thinking skills in people. In teaching problem solving method, by group work, describing skills like observing, comparing, organizing information, determine and controlling variables, codification and experimental hypothesis, analyze, deduction, evaluation, legislation and judgment is fortified (Fog and How, 2013). In this study regarding to problem solving skill education, group discussion and talking and acting in small groups using organized and widespread Howton et al (2001) protocol were used. In this method students are put in real situations of educational, social and individual life using previous experiences.

So by teaching this skill, which its basic feature is applying problem solving, it can be expected problem solving skill to be fortified, because the first stage of this protocol is directing to the problem generally which emphasize human reaction controlling against problems and reasons cause releasing this emotions, then in a widespread way in the next stages, with having the idea of accepting the problem, with optimistic style about future and using logical thinking instead of impulsive and avoidance decisions, a final decision is made and by reviewing the path repeatedly, the shortage and strength of the problem is determined and in case of blocking, tries other ways .
In showing other results of this research it can be said that, one of the identical mechanisms of scientific thinking is using criticism thinking elements in problem solving process. Students get involved in problems actively using identical abilities like determination, understanding, decoding, evaluate and choosing. If they determine problems correctly, half of problem solving process path has been passed. Activity and group discussion cause improvements in scientific thinking in every stage of this process [11].

On the other hand, based on Yalkin, Karahan, Karadenizli and Sahin (2008) performing educational teaching based on troubleshooting and problem solving cause that students get involved in class discussions with hypothesizing, experimenting and evaluating. Questioning is the important factor in this method and help students for reaching this point. Also, in this method people create solutions for solving problems by using creation techniques like brain storm. The consequences of these activities are thinking growth of students. Finally due to the results achieved in effectiveness of problem solving education on thinking styles, this educational method is recommended to the teachers and educational consolers.

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