

Comparison of Epistemological Beliefs and Problem Solving among Gifted and Normal Female Students

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Abstract

The present study aimed to compare epistemological beliefs and problem solving styles among gifted and normal female students of Torbat-e Heydariyeh in 1397-98. Population included all female students of junior and senior high schools at Torbat-e Heydariyeh (N=647). Having used a single-stage cluster sampling and, then, a simple random sampling technique, the researchers selected 100 participants. Having used a descriptive method, these researchers collected the data by administering Schommer 's (1990) epistemological beliefs questionnaire, and problem solving skills questionnaire developed by Cassidy and Long (1996). Results of the study indicated a statistically significant difference between epistemological beliefs of gifted and normal female students (gifted: Mean=59.322; normal: Mean=49.678; $\alpha=.05$; $df=98$). Finally, although the normal group's mean score of confidence in problem-solving was less than that obtained by the other group, their mean score in approach style was higher.

Keywords: Epistemological Beliefs, Problem Solving Skills, Gifted and Normal Students

I. Statement of the problem

The role of people beliefs in nature of knowledge and learning something (i.e. one's beliefs) has received theorists' attention in recent years. Cognitive beliefs or epistemological beliefs⁴concerning nature of knowledge contain a variety of dimensions working independently from each other. Two dimensions of epistemological beliefs experimentally corroborated include: simple/absolute knowledge, and quick/consonant learning (Rezaei 1388).

Beliefs about knowledge may affect one's imaginations of academic processes and required activities for accomplishment of homework. In other words, beliefs can form academic behavior. Some studies show that epistemological beliefs serve as predictors of academic performance and problem solving. For instance, Schommer

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predicts quick learning (beliefs occurring immediately) simplified conclusions, weak performance and excessive confidence.

Beliefs in definitive knowledge (those which are not changed) would predict absolute results in accomplishable assignments incorrectly. Therefore, it is suggested that epistemological beliefs can put effects on learners' motivation and their problem solving (Dweek, 2014)⁵

Problem solving training is a method involving individuals' active participation in group discussion and encouraging critical, but constructive and creative, thinking to achieve solutions which help further present therapeutic health services.

Using different educational methods and providing realistic educational issues, creating deep-thinking and reflection along with discussion and exchange of views as well as providing feedbacks to perspectives, help improve education. On one hand, workshop on functional education has been introduced as an active educational method in which knowledge and skills are attained through brain storming and giving feedback.

A workshop on education is a common way in transmitting information and skills. The importance of learning via educational workshop includes learners' deep-thinking and reflection about new subjects for a deep learning which takes place in small groups (Modarres et al. 1396).

Cognitive procedural problem-solving is a coping behavior and skill which is correlated with an appropriate personal compatibility (Bell 2009).⁶ Troubleshooting and problem-solving are bases of coping process whose investigation and development are important; also, its training can affect one's behavior and enhance his/her self-efficacy. Concerning registration and employment White (2014)⁷ stresses on an appropriate attention to staff's effective communicational skills in addition to their ethical and professional principles.

Based on Gagne's theory, conditions of problem-solving skill include: learner's internal conditions and his/her learning status. Based on this theory, learner tries to shape higher-order regulations from those simple ones which in turn result in problem-solving. Accordingly, Gagne views problem-solving skill as one kind of principle learning or rule learning and believes that people need to integrate principles and rules already learned to form a higher-order principle (Seif 1391).

Shokoohi's (1390) study manifested that problem-solving training has alleviated the problems and reduced negative behaviors among people. According to D-Zurilla and Gold Fried, problem-solving stages include: *general orientation*, *problem definition and formulation*, *generating creative ways of decision-making*, *solution implementation and verification* (Shahbazi 1392). The present study mainly investigates whether there is a difference between epistemological beliefs and problem-solving skills among gifted female students compared to their normal counterparts.

⁵ Dweek

⁶ Bell

⁷ White

II. Research Methodology

The present study used a descriptive-comparative method. This kind of research method evaluates just some variables in normal conditions without any interventions and control (Delavar 1385, p. 113).

Population

Population included all normal and gifted female students of junior and senior high schools at Torbat-e Heydariyeh (1397-98). Based on the last statistics obtained from Torbat-e Heydariyeh Education Department, the population included 647 students.

Sample and Sampling Technique

The present study used a single-stage cluster sampling method followed by a random sampling technique. Based on Morgan Table, 242 participants were calculated. Due to problems concerning the completion of the questionnaires, 100 participants were selected.

Data Collection Instruments

Schommer 's Epistemological Beliefs Questionnaire

Schommer's 63-item questionnaire was developed in 1990 to measure a proposed five-dimensional epistemology. Three dimensions relate to knowledge itself (structure, certainty, and the source) and the two other dimensions (control and speed) relate to knowledge acquisition. Each dimension of the questionnaire contained a set of items which are grouped into 12 sub-scales of the questionnaire. Some epistemological dimensions refer to one sub-scale and others relate to two or three sub-scales. For instance, according to structure of knowledge the dimension "simple knowledge" was defined through sub-scales as "*seeking a single response*" and "*avoidance of information unification*". Having used a factor analysis on the sub-scales, Schommer (1990) proposed five factors: *simple knowledge, unique knowledge, certain knowledge, innate ability in learning, and quick learning.*

The rating of this 5-Likert scale questionnaire is as followings:

Option	Completely Disagree	Partly Disagree	No Idea	Partly Agree	Completely Agree
Score	1	2	3	4	5

Consider a reverse scoring for the followings:

1, 2, 4, 7, 14, 15, 18, 22, 23, 24, 25, 26, 27, 28, 30, 32, 39, 43, 45, 46, 48, 53, 54, 56, 60, 61;

In Rezaei's (1389) study, factor analysis was used to investigate construct validity in order to achieve factor structure. Prior to factor analysis of the data, internal consistency of 63 items was measured. Due to a negative consistency of total score, 11 items were eliminated; of the remaining items, 16 were, also, eliminated because the

total score showed a low consistency ($<.1$). Finally, a total number of 27 items were excluded from the original version.

Having used the principal component analysis (PCA), the researcher conducted factor analysis on remaining 36 items. Scree plot investigation showed a two-factor authentication (2FA). To achieve a two-factor structure, PCA was performed by using Promax rotation. Twenty items were eliminated due to load less than .35 or as a result of significant and equal load on more than one factor put into some rotations. Final analysis indicated a loading of remaining 16 items on two factors. Based on the covered items, the two factors were called "simple/certain knowledge" and "quick/constant learning".

The Cronbach's Alpha reliability coefficient for the questionnaire ranged from .54 to .71. Kadivar et al. (1391) estimated reliability of the sub-scales through Cronbach's Alpha as .65 to .75. Predictive validity of the instrument by Schommer (1993) has shown that *three out of four* beliefs of controlling for general intellectual ability could predict different aspects of learning like comprehension. The test-retest reliability Pearson correlation was .74 (Kadivar et al. 1391).

Cassidy & Long Problem Solving Styles (PSS) (1996)

The scales of problem solving styles were developed by Cassidy and Long (1996) in two stages. Composed of 24 items, the questionnaire measures six 4-item factors. These factors are as follows:

1. Helplessness and inability in problem-solving or orientation
2. Control over problem solving (reflects dimension of external-internal control in problematic situations)
3. Creative problem solving style (indicates planning and considering various solutions according to problematic situation)
4. Confidence in problem solving (indicates one's confidence in problem solving)
5. Avoidance style (indicates one's tendency to avoid problems instead of dealing with them)
6. Approach style (indicates one's positive attitude towards problems and his/her tendency to face them)

Therefore, helplessness, control, and avoidance skills are sub-scales of non-constructive problem solving; in addition, such skills as approach, creativity and confidence are sub-scales of constructive problem solving (Shateri, Ashkani, & Modarres 1388).

The questionnaire represents one's vulnerability to stress appropriately hence being effective in separation of normal and abnormal population. The items of the scale are answered by "yes" and "no". Respondents show their agreement or disagreement for each item expressing their response to a certain situation (Bakhshipour et al. 1387).

Questionnaire Components

1. Helplessness (items 1-4)
2. Control (items 5-8)
3. Creativity (items 9-12)
4. Confidence (items 13-16)

5. Avoidance (Items 17-20)

6. Approach (Items 21-24)

The questionnaire is scored by using 0 and 1. The option “I don’t know” receives .5. Total score is obtained through summing up the item scores. Therefore, minimum and maximum scores of each factor will be 0 and 4. Each factor with the highest score indicates ones’ use of that style when facing problems. Accordingly, maximum, minimum and average scores of problem-solving would be 24, 0, and 12.

The reliability index of each factor was estimated through Cronbach’s Alpha as .66, .66, .57, .71, .52, .65 for helplessness, control, creativity, confidence, avoidance, and approach, respectively (Cassidy & Long 1996). Cronbach’s Alpha coefficients computed by another study for the above factors were .88, .60, .66, .66, .51, and .53, respectively.

In Mohammadi’s study (1377), Cronbach’s Alpha coefficients were higher than .5, except for approach style. Mohammadi and Sahebi (1380) estimated internal reliability of the test through Cronbach’s Alpha as .6.

III. Results and Findings

Descriptive and inferential statistics are used to analyze the data. Descriptive statistics include percent, mean, and standard deviation. To analyze the data inferentially, relevant tests are run.

Table 1

Results of Normality

Variables	Groups	Kolmogrov-Smirnov		Result
		Statistic	Sig.	
Epistemological Beliefs	Normal	.175	.20	Normal
	Gifted	.184	.183	Normal
Problem Solving	Normal	2.833	.00	Normal
	Gifted	2.793	.00	Normal

As Table 1 shows, p-value is higher than .05 for epistemological beliefs in the two groups (p=.2 for Normal and .183 for Gifted), therefore, according to Kolmogrov-Smirnov test normal distribution is supported. Concerning

the other variable, problem solving, p-value is .00 for both groups thus indicating lack of a normal distribution of the data.

H1: There is a significant difference between normal and gifted female students with respect to their scores in epistemological beliefs.

Table 2

Results of independent samples t-test for epistemological beliefs between two groups

Variable	Groups	Number	Mean	Standard Deviation	Mean difference	Degree of freedom	T	Sig.
Epistemological Beliefs	Normal	50	49.678	11.008	-7.822	98	-3.613	.000
	Gifted	50	59.322	9.881				

As Table 2 shows, means of normal and gifted students are 49.678 and 59.322, respectively. Test of means comparison indicates that with the assumption of homogeneity of variances, p-value is .000 (<.05), thus, supporting the difference between the two groups with respect to epistemological beliefs.

H2: There is a significant difference between normal and gifted female students with respect to problem-solving styles.

Table 3

Results of Mann–Whitney U Test

Problem-solving styles	Group	Number	Mean	Sum
Helplessness	Normal	50	175.80	55024.0
	Gifted	50	173.0	6401.0
Control	Normal	50	174.84	54725.5
	Gifted	50	181.07	6699.5

Creativity	Normal	50	179.06	56047.0
	Gifted	50	145.35	3578.0
Confidence	Normal	50	171.18	53580.0
	Gifted	50	212.03	7845.0
Avoidance	Normal	50	179.07	56048.5
	Gifted	50	145.31	5376.5
Approach	Normal	50	179.21	56091.5
	Gifted	50	144.15	5333.5

Table 4:

Results of *Mann–Whitney U Test* for comparison of problem solving styles of two groups (normal vs. gifted students)

Variable	Control	Confidence	Approach
U statistic	5584.5	4439.0	4620.5
P-value	.817	.018	.043

Results of comparing means of normal and gifted female students in problem solving styles are displayed in above Tables.

According to the observed p-value for each variable, a confidence of 95% rejects the significant difference between the two groups (normal vs. gifted) with respect to their scores in such styles as helplessness, control, creativity, and avoidance. However, there is a significant difference between the two groups with respect to confidence and approach styles. Based on the present findings, although the normal group's mean score of confidence in problem-solving is less than that obtained by the other group, their mean score in approach style is higher.

IV. Discussion and Conclusion

Having compared means of epistemological beliefs between the two groups (gifted vs. normal students), the researchers found out the outperformance of gifted students over normal ones. The present finding makes sense in that such factors as the school atmosphere, students' attitudes and so on are effective in this regard.

As cited in Parvin and John (2001), the present finding is in line with those found by Hofer, Hochard, Prent and Lariva (1991), and Bandora (1989). In other words, people with higher scores in epistemological beliefs enjoy more cognitive sources, more flexible strategies, and more effective management thus encountering problems with a high level of confidence. Those people with lower level of epistemology avoid facing difficult responsibilities considering them as a threat.

Concerning comparison of problem-solving styles, findings indicate that such styles as helplessness in problem solving, control, creativity and avoidance were not significantly different between the two groups (gifted vs. normal students). However, there was a significant difference between the two groups with respect to confidence and approach. Gifted students prefer confidence style, and as the authors believe, feeling of trust in ability to face problems differs in terms of intelligence level, cultural and environmental circumstances of school which leads to an increased confidence among children educated in schools for gifted students.

In other words, people believing in themselves while encountering problems rely more on themselves, have a positive attitude towards life issues, are healthier, enjoy a higher level of personal well-being, and have a higher tendency to face problems. These people feel less lonely in problematic situations and take the most advantage of their own individual sources to solve the existing problem. Students of normal schools make use of approach style of problem solving.

A high mean in approach style at normal schools motivates students irrespective of the competitive conditions existing at schools for gifted students which increases anxiety and decreases performance due to a more concentration on the results, that is, they are less confident in their abilities and capabilities to solve the problems thus selecting the approach style. These students have a positive attitude towards problems and tend to face them. Findings of Park, More, Turner and Adler (1997) are in agreement with the present findings.

There are many factors which can affect one's problem-solving capability as well as his/her decision making ability. For example, one's capability in understanding a problem is correlated with several characteristics and specifications such as cognitive intelligence and intuition. Such factors are also related to one's ability in decision-making. They, in combination, explain individual and situational differences in decision-making ability.

Some people make better decisions compared to the others thus getting higher qualities of personal life and career (Ja'farpour, 1389). An increased personal efficiency decreases failure of fear, increases level of ambitions, and enhances problem-solving ability as well as analytical thinking (Schultz & Schultz; Seyyed Mohammadi, Trans.1387).

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