WCES-2011

Change of students’ problem-solving appraisal in higher education according to gender

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Abstract

The purpose of this study is determining the effect of university education on students’ problem-solving appraisal, including its difference according to gender. For this aim, 130 students were tested in the beginning and at the end of their undergraduate years. Findings reveal that while there is no significant difference in students’ problem-solving appraisal points between their 1st and 4th years for the whole group and for the females, there is a significant positive difference for the males. This may be a result of the theory based instruction, variation of experiences, and differences in cognitive, physical, and social development.

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Keywords: Problem-solving, appraisal, undergraduate, education, gender.

1. Introduction

For many people, life is loaded with daily stressful events. Many of these stressors are relatively minor events like a noisy neighbor or losing a key, but some would be considered major events like important illnesses, divorce, loss of a job, or death of a loved one. It is well documented that both minor and major stressors can affect a person’s physical and psychological well-being (Heppner and Baker, 1997).

How people typically respond to life’s problems is of critical importance, particularly how they appraise their problem-solving skills and whether they generally approach or avoid problems. People respond to problems in different ways. Some tend to attack the source of the problem. Others become very anxious and try to regulate their negative emotions associated with the stress of a problem rather than to resolve the problem itself. Some people tend to solve problems in a very systematic and persistent fashion, while others tend to make limited and inconsistent attempts. In short, some people are more active in dealing with their problems, but others have significant problem-solving deficits (Heppner and Lee, 2002).

A personal critical strength or resource for dealing with life’s demands is one’s appraisal of his/her problem-solving skills and style (Heppner and Lee, 2002). Problem-solving is defined as the complex interplay of cognitive and behavioral processes for the purpose of adapting to internal or external demands or challenges (Heppner and Krauskopf, 1987), where the relevant appraisal refers to a person’s self-appraisal of his/her problem-solving abilities and attitudes (Heppner, He, Tsai, and Lin, 2008). A wide variety of research suggests that problem-solving and coping activities play an important role in physical and psychological well-being when people are confronted with...
negative or stressful events (D'Zurilla and Nezu, 1982; Snyder and Ford, 1987; Friedman, 1991; Heppner, Cook, Wright, and Johnson, 1995).

Problem-solving or how people solve their real-life problems has been of great relevance (Chan, 2001). Ever since John Dewey's influential 1933 publication of “How We Think”, there has been a strong focus in psychology on how people cope with their daily life problems and major life events, and applied problem-solving that focuses on real-life problems has received a great deal of attention in counseling psychology (Heppner, He, Tsai, and Lin, 2008). The early focus in the 1950s was on basic science and examined problem-solving in various conditions using laboratory problems, such as solving water jar and string problems (Wickelgren, 1974). In the 1960s, computer simulation approaches with conceptualizations of relatively discrete cognitive abilities and thought processes (Heppner and Lee, 2002), and in the 1970s, programmatic research in applied problem-solving, which focused directly on psychological adjustment (Heppner, Witty, and Dixon, 2004) were conducted in the area. In their milestone article, D'Zurilla and Goldfried (1971) reviewed applied problem-solving research with the goal of helping individuals become more effective applied problem solvers. They defined problem-solving as a behavioral process which makes available a variety of response alternatives for dealing with a problematic situation, and increases the probability of selecting the most effective response among these alternatives. The stages of problem-solving were stated as; general orientation, problem definition and formulation, generation of alternatives, decision making, and verification. In the 1980s, this stage sequential model led to the development of problem-solving training interventions (D'Zurilla and Nezu, 1982; D'Zurilla, 1986). Training in problem-solving was conceptualized as a form of self-control training, in other words, an individual learns how to solve problems and thus discovers the most effective way of responding. From the 1990s till today, applied problem-solving models and training is being in a further refinement.

Problem-solving is a dynamic expression of goal-directed cognition and provides evidence for the involvement of categorization in problem-solving processes (Chrysikou, 2006). In this context, developing high-level problem-solving skills and relevant appraisal is critical to successfully perform a variety of tasks in both formal (e.g., school and work) and informal (e.g., home and family) settings. One way to understand how people acquire these is to examine research on expertise in problem-solving (Nokes, Schunn, and Chi, 2010).

Examinations of individual cases show that each student's problem-solving performance is consistent across a range of problems, indicating a particular orientation towards naive, routine, or sophisticated problem-solving behaviours (Muir, Beswick, and Williamson, 2008). In addition, it is stated that single strategies (like schema based instruction in mathematics) can be more effective than instructions with multiple strategies in enhancing students' problem-solving skills (Jitendra, Griffin, Haria, Leh, Adams, and Kaduvettoor, 2007). It was also revealed that perceived problem solving predicted test-anxiety scores of students (Blankstein, 1992).

One of the most widely used instruments for assessing problem-solving appraisal in counseling and educational settings is the Problem-Solving Inventory, PSI, which was developed as a self report instrument for measuring one's perception of his/her problem-solving ability, style, behavior, and attitudes (Heppner and Petersen, 1982; Heppner, 1988). Applied researches show that ineffective and effective problem solvers encode information about themselves and their abilities differently, because their perceived reality is different. Specifically, ineffective individuals possess more depression, personal problems, physical symptoms, irrational beliefs, and dysfunctional thoughts. Moreover, they report less assertion and their behaviours are also less effective. Based on these, it seems that ineffective problem solvers have more negative perceptions of how they interact with the world (Larson, Allen, Imao, and Piersel, 1993).

Depending on heredity and environment, every individual’s achievement in learning differs from one to another. Since general health conditions are good enough, major factors that affect achievement can be listed as intelligence, motivation, social and cultural environment, age, and gender (Senemoğlu, 2001). In this study, the effect of higher education on students' problem-solving appraisal, which is another important factor for achievement, is investigated by pre-test post-test method. In addition, results are also analysed according to gender.
2. Method

For this developmental research, a longitudinal study is followed in order to determine the difference of students’ problem-solving appraisal. Longitudinal studies have the feature of measuring the same subjects in different time scales, and thus, have an important role in determining the effect for improvements at certain levels by enabling educators have an insight of the concept in a relatively longer period.

2.1. Subjects

In this study, rather than sampling, the design is conducted on a study group. The group consists of 130 students (82 male and 48 female) from Yıldız Technical University’s Engineering and Science Faculties, who took the required Calculus course from the Mathematics Department in their first year and wanted to participate the study. Students were enrolled in the university between 2005-2006 and 2009-2010 academic years, which were their 1st and 4th years in undergraduate education, respectively.

2.2. Instruments

For determining students’ problem-solving appraisal, Problem-Solving Inventory (PSI), developed by Heppner and Petersen (1982), renovated by Heppner (1988), and adapted to Turkish by Savaşır and Şahin (1997) is used. The PSI consists of 35 six-point Likert-type items, with a total score and three subscale scores, including problem-solving confidence, approach-avoidance style, and personal control. The inventory assesses students’ perception of their problem-solving capabilities, providing a single, general index of problem-solving appraisal using the total score, and scores on the three problem-solving dimensions. Here, individuals who perceive themselves to be effective problem solvers (low PSI scorers who approach problems with high-level confidence and personal control) differ significantly from those who perceive themselves to be ineffective problem solvers. Throughout the study, in the analysis of data, the software program SPSS is used and the significance value is taken as 0.05.

3. Results

For determining the difference between students’ 1st year and 4th year problem-solving appraisal, paired samples t-test analysis is conducted on the data. The statistics and findings are given in tables 1 and 2.

Table 1. Paired Samples Statistics for Students’ 1st Year and 4th Year Problem Solving Appraisal

|          | Mean  | N   | SD   |
|----------|-------|-----|------|
| 1st year | 86.977| 130 | 20.330|
| 4th year | 83.569| 130 | 17.477|

Table 2. Paired Samples Test for Students’ 1st Year and 4th Year Problem Solving Appraisal

|          | Mean | SD   | t     | Sig.  |
|----------|------|------|-------|-------|
| 1st – 4th year | 3.408| 22.756| 1.707 | .090  |

In table 1, problem solving appraisal of the whole group seems to increase, but in Table 2, it is revealed that the difference in the points between the 1st and the 4th years is not significant.

For determining the difference between male students’ 1st year and 4th year problem-solving appraisal, paired samples t-test analysis is conducted on the data. The statistics and findings are given in tables 3 and 4.
Table 3. Paired Samples Statistics for Male Students’ 1st Year and 4th Year Problem Solving Appraisal

|          | Mean | N  | SD  |
|----------|------|----|-----|
| 1st year | 87.90| 82 | 21.60|
| 4th year | 81.50| 82 | 17.41|

Table 4. Paired Samples Test for Male Students’ 1st Year and 4th Year Problem Solving Appraisal

|          | Mean | SD  | t    | Sig.  |
|----------|------|-----|------|-------|
| 1st - 4th year | 6.40 | 22.437 | 2.584 | .012  |

In Table 3, it can be seen that there is an increase in male students’ problem-solving appraisal points, and in table 4, it is revealed that the difference is significant between the 1st and the 4th years.

For determining the difference between female students’ 1st year and 4th year problem-solving appraisal, paired samples t-test analysis is conducted on the data. The statistics and findings are given in tables 5 and 6.

Table 5. Paired Samples Statistics for Female Students’ 1st Year and 4th Year Problem Solving Appraisal

|          | Mean | N  | SD  |
|----------|------|----|-----|
| 1st year | 85.39| 48 | 18.06|
| 4th year | 87.10| 48 | 17.18|

Table 6. Paired Samples Test for Female Students’ 1st Year and 4th Year Problem Solving Appraisal

|          | Mean | SD  | t    | Sig.  |
|----------|------|-----|------|-------|
| 1st - 4th year | -1.70 | 22.612 | -.523 | .603  |

In table 5, female students’ problem solving appraisal seems to decrease, but in table 6, it is revealed that the difference in the points between the 1st and the 4th years is not significant.

4. Conclusion

As a result, findings reveal that while there is not a significant difference in students’ problem-solving appraisal points between their 1st and 4th years for the whole group, and also for the females, there is a significant positive difference in the relevant points for the males (p<.05).

Based on these findings, it seems that higher education system could not succeed in developing problem solving appraisal of students through the academic years. At first sight, this result of the study can be linked to the type of education at schools which focuses on problem-solving as applications of numeric steps of theories, taking no notice of individual and psychological variables. The difference between male and female students may be an outcome of their experiences throughout their undergraduate years. Besides, genetic differences at cognitive, physical, and social developments may be other factors in explaining the case.

In discussing the importance of cognitive and metacognitive issues in education, the fact that learning skills do not appear and develop spontaneously should not be overestimated. According to the social cognitive theory, individuals shouldn’t be dependent on the outside control and must be able to manage their own behaviours effectively (Bandura, 1998). The skills seem to be easily acquired, but it is hard for the learners to learn using them by themselves. In his model, Kolb (1984) suggests that, to be an effective problem-solver, the learner must use the learning modes related to feeling, watching and listening, thinking, and doing. Based on this, Harb, Durrant, and Terry (1993) suggest that educators should teach learning styles in order to reach all students as a frame for their
lifelong learning. Besides, such an addition on the importance and effectiveness of strategy usage can make lectures more attractive and it will both serve for students’ appraisal and achievement in their courses and daily lives. Also, to make most of the learning opportunities in basic and continuing education beneficial, both students and their educators should be aware of individual learning styles and ability to solve problems (Wessel, Loomis, Rennie, Brook, Hoddinot, and Aherne, 1999).

In the studies according to gender, in general, results show that male and female students differ in achievement of educational skills. In Turkey, this difference may be a result of the dominance of internal motivation for the females versus the dominance of external motivation for the males (Canca and Erden, 2010). The difference in motivation between genders may be a result of both hereditary and environmental factors. In various cultures, starting from early childhood, while males are encouraged to struggle against problems, females are educated to keep away from them (Sternberg and Williams, 2002). In addition, differences in achievement according to gender may also be a result of differences in hormonal functions, biological structures, and the use of left and right sides of the brain (Halpern, 2000). Cultural variables such as living environments, social surroundings, family support, values and expectations in different cultures are also other factors that can lead to these differences (Stroh and Reilly, 1999). Another factor which makes difference between genders is males’ competitive attitude versus females’ cooperative approach (Eccles, Wigfield, Harold, and Blumenfeld, 1993). Also, it is stated that effective usage of skills varies according to gender in all learners, regardless of orientations and studies for increasing the achievement (Ben-Chaim, Lappan, and Houang, 1986). Thus, when all these variables are considered, it is obvious that further researches on these determinants would give a better picture of the subject.

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