IMPACTS OF JIGSAW AND TEAMS-GAMES-TOURNAMENTS (TGT) ON SOCIAL STUDIES PRESERVİCE TEACHERS' EPISTEMOLOGICAL BELIEFS

Research Article

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Abstract

Classroom practices of teachers are affected by their personal epistemological beliefs and cooperative learning methods are taking a large place in today's education world. By implementing two different cooperative learning methods in a college of education course, this study examined the effects of jigsaw and teams games tournaments (TGT) on epistemological beliefs of social studies preservice teachers. 30 students participated in the research who attended 4th grade at Artvin Coruh University Social Studies Education department at 2015-2016 academic year. Data were collected with Schommer Epistemological Questionnaire and analyzed by independent groups t-test. The findings elicited that jigsaw is significantly more effective that TGT on social studies preservice teachers' epistemological beliefs in general and for two of the dimensions measured: "the belief that learning depends on effort", and "the belief that learning depends on ability". But for the dimension, "the belief that there is only one unchanging truth", there was no significant differences between two methods.

Keywords: cooperative learning, jigsaw, TGT, epistemological beliefs, teacher education.

1. Introduction

Researches regarding teacher education show that belief focused structures affect teachers' in class behaviors and activities; and teachers' epistemological beliefs affect their in-class activities and pedagogical applications (Chan, & Elliott, 2004; Hofer, 2001). Thus, preservice teachers' epistemological beliefs are important, because they affect teachers' learning to teach in class behaviors, teaching methods and applications (Aypay, 2010; Hofer & Pintrich, 1997; Schommer, Crouse, & Rhodes, 1992; Tanasa & Wang, 2010). "Epistemology is a philosophical concept concerned with the nature and justification of human knowledge" (Bakari, 2000, p.1). And epistemological beliefs could be explained as "individuals' thinking and beliefs about knowledge and knowing, which typically includes beliefs about the definition of knowledge, how knowledge is constructed, how knowledge is evaluated, where knowledge resides, and how knowing occurs" (Burr & Hofer, 2002, p. 201). Developmental approaches regarding beliefs on epistemology assert that epistemological development is unidimensional and occurs in an orderly manner. On the contrary, Marlene Schommer suggested a multidimensional classification as a system approach: In the first dimension, individual believes that structure of the knowledge is simple or complex. In the second

dimension, knowledge is certain or not, in the third dimension, learning occurs fast or in time, and in the fourth dimension, learning ability is inborn or can be developed in time (Schommer-Aikins, 2004). According this classification, it is assumed that individuals have multiple epistemological beliefs and rather than an ordinary process, they can skip contextual steps. The structures of personal epistemological beliefs are multi-dimensional and they develop simultaneously (Hofer, 2000; Hofer, 2001; Tanase & Wang, 2010). Studies related with teacher education indicate that epistemological beliefs of pre-service teachers show parallelism with their beliefs on teaching and their in-class applications (Chan & Elliot, 2004; Chai, 2010; Önen, 2011). Furthermore, these studies show that epistemological beliefs which affect teachers' in-class applications in such manner are affected preservice teachers' applications during the education they got as well. Zeichner and Tabachnick (as cited in Ng, Nicholas & Williams, 2010) stated that "preservice teachers' beliefs are shaped by the many hours they experienced as students and that these beliefs remain hidden while they are undergoing teacher education courses, but surface when they start teaching and have classes of their own."

In his study, Şimşek (2013) compared the effects of conventional method, jigsaw, and reading-writing-presenting (RWP) methods on of 193 students' epistemological beliefs in civic education course and he found that jigsaw and RWP are more effective than the conventional method. Again, Bergom, Wright, Brown, and Brooks (2011) measured the effects of a cooperative method named "hevruta" on college students' epistemological beliefs and founded positive results. Keen-Rocha (2008) determined positive effects of cooperative learning applied in chemistry course on epistemological beliefs of college students. And Bakari (2000) specified the improvement of college students' epistemological beliefs in campus life via cooperative experiences.

In cooperative learning, students simply work in small groups and actualize learning by helping each other's learning. Cooperative classrooms are places that students convene and interact in groups; and teacher strolls among the groups and helps who needs (Açıkgöz, 2003). Also, in cooperative learning these "five variables mediate the effectiveness of cooperation: positive interdependence, individual accountability, promotive interaction, the appropriate use of social skills, and group processing" (Johnson & Johnson, 2009, p. 366). And in cooperative learning "the role of the teacher as a facilitator, assisting students with small group and social skills and helping to solve any contentious issues that may arise is extremely important" (Ferguson-Patrick, 2018, p. 93).

Student teams achievement divisions (STAD) and jigsaw are "two well-researched and highly touted cooperative learning methods" (Zetty, 1992, p. 2) And teams games tournaments (TGT) are similar to STAD but in TGT student representatives compete between groups (Bayrakçeken, Doymuş & Doğan, 2013). That means it is different from not only STAD but also from the other cooperative methods; TGT has cooperation in groups but also competition between groups. Studies regarding TGT show that the method has positive effects on academic achievement (Salam, Hossain, & Rahman, 2015; Gonzales, Jennings & Manriquez, 2014); attitude towards mathematics (Salam, Hossain, & Rahman, 2015); anger control, coping with depression (Wodarski & Feit, 2011); satisfaction (Gonzales et al., 2014); working together, individual and social reliance (Şahin, 2011); effective learning, peer relations and satisfaction in classroom (Harmandar & Çil, 2008).

Jigsaw, on the other hand, is an appropriate method to be used especially in social studies course (Lie, 1992). It "was developed by Aronson" (Avşar & Alkış, 2007, p. 198). Studies regarding TGT show that the method has positive effects on academic achievement, self-confidence, social development (Johnson, Johnson, & Stanne, 2000), study habits and active

participations to the course (Şimşek, Örten, Topkaya, & Yılar, 2014), creativity (Demir, 2012), speech ability, construction positive learning environment, student-teacher interaction, and understanding ability (Lin, 2010).

It is an expected situation that these two methods which have several benefits in cognitive and affective domains to affect students' epistemological beliefs as well. Thus, the purpose of this study is to determine the effects of jigsaw and TGT on epistemological beliefs of social studies preservice teachers. Research questions were developed as following:

1. Is there any significant difference between jigsaw and TGT groups' pretest and posttest score means of epistemological beliefs?

2. Is there any significant difference between jigsaw and TGT groups' pretest and posttest score means of the sub-dimension "beliefs that pertain to learning depend on afford" of epistemological beliefs?

3. Is there any significant difference between jigsaw and TGT groups' pretest and posttest score means of the sub-dimension "beliefs that pertain to learning depends on ability" of epistemological beliefs?

4. Is there any significant difference between jigsaw and TGT groups' pretest and posttest score means of the sub-dimension "beliefs that pertain to single certain truth" of epistemological beliefs?

2. Method

The independent variables of the study were two cooperative learning methods, jigsaw and TGT. And the dependent variable of study was epistemological beliefs of social studies preservice teachers. To measure the effects of these two methods on independent variable without a control group a pretest posttest design was chosen.

2.1. Study Group

Thirty 4th graders who attended in Artvin Çoruh University Faculty of Education Social Studies department in 2015-2016 academic year participated in the study. The participants were divided into two homogenous groups: jigsaw (n=15) and TGT (n=15) implementation groups. The homogeneousness of two groups was determined according to the grade point averages of the previous year.

2.2. Data Collection Tool

The original form of the scale namely Schommer Epistemological Questionnaire (SEQ) that measure epistemological beliefs overall and four independent dimensions; "fixed ability," "simple knowledge," "certain knowledge," and "quick learning", is 5-Point Likert type scale and was developed by Schommer (1990). Deryakulu and Büyüköztürk (2002) translated and adapted the scale into Turkish. They did validity and reliability studies and determined that the Turkish version of the scale has three factors consisted of 34 items. Due to the difference in structure of the new scale from the original one, different names given to the factors (Deryakulu, 2004). The first factor "beliefs that pertain to learning depend on afford" includes 18 items, the second factor "beliefs that pertain to learning depends on ability" includes 9 items, and the third factor "beliefs that pertain to single certain truth" includes 7 items. First 17 items in the first factor are reverse, 18th item is straight coded. All the items in the second and the third factors are straight coded. Higher scores show immature, undeveloped, naïve beliefs and lower scores show mature, developed, sophisticated beliefs. Cronbach's Alpha values of the scale are found as 0.83 (1st factor), 0.62 (2nd factor), 0.59 (3rd factor), and 0,71 (overall scale).

2.3. Implementation

The SEQ was applied to jigsaw and the TOT groups as pretest, then "Developing Thinking Skills" course is taught both experimental groups for 12 weeks, two hours a week.

At the end of the implementation process the SEQ applied to both groups as posttest. Data were analyzed using SPSS 17.0. software (SPSS, Inc., Chicago, IL, USA). Implementation process of two methods in experimental groups are described as following.

2.3.1. Jigsaw

Students in jigsaw group were separated into five heterogeneous original groups according to the previous year's GPA". Each group has 3 members.

Tittles	1st OG	2nd OG	3rd OG	4th OG	5th OG
1st subtittle →	Apt1	Bpt1	Cpt1	Dpt1	Ept1
2nd subtittle →	Apt2	Bpt2	Cpt2	Dpt2	Ept2
3rd subtittle →	Apt3	Bpt3	Cpt3	Dpt3	Ept3

Figure 1. Jigsaw original groups and distribution of tittles

Creating the original groups, subtitles were distributed to each member of the original groups as in Figure 1. Then resources, materials and subtitles they were responsible of were given each member of the groups. After that, members left from the original groups and went the expert groups created as in Figure 2. Each expert group was responsible of one of the subtitles.

1st Expert group:	Apt1, Bpt1, Cpt1, Dpt1, Ept1
2nd Expert group:	Apt2, Bpt2, Cpt2, Dp2, Ep2
3rd Expert group:	Apt3, Bpt3, Cpt3, Dpt3, Ep3

Figure 2. Creating jigsaw expert groups

Members of each expert groups were prepared to their subtitle together. This preparation included individual and group studies in homes, dormitories and libraries. They took their materials to next class, studies on them together, discussed, put their studies together and reviewed in 30 minutes. After these studies, each expert group prepared reports regarding their subtitles. During the studies the researcher worked as a guide when required. Finishing their studies in expert groups, the participants returned to the original groups and made presentations about their expertise area. This part of the study took also 30 minutes. This included questions-answers and discussions. At the end of the process, all participants took a four-question multiple-choice quiz.

2.3.2. TGT

In TGT dividing participants into groups was like in jigsaw implementation. Classes started with researcher's 30-minute presentation. Then, getting ready for the tournaments participants worked on the work sheets that handed out for another 30 minutes. Again, during these studies the researcher worked as a guide when required. For the tournament stage by receiving one person from each group (like constructing expert groups jigsaw), tournament

tables were designed. Each participant represented her own group at these tables. Participants tried to gain points for their groups with answering the questions prepared by the researcher beforehand. Points gained were compared and groups were put in an order to their achievement level.

3. Findings

For the first problem of the research, scores that received from overall epistemological scale which was applied as pretest and posttest were compared. The independent t-test results were given in Table 1.

Table 1. *Independent t-test results of the overall SEQ scores*

Test type	Groups	N		t	p
Pretest	Jigsaw	15	127,47	,310	,207
	TGT	15	125,80		
Posttest	Jigsaw	15	150,87	4,963	,014
	TGT	15	130,47		

According to the data in Table 1, while there is no significant difference found between jigsaw and TGT pretest scores (t=3,1; p>0,05), there is a significant difference between the posttest scores (t=4,963; p<0,05).

For the second problem of the research, scores that received from "beliefs that pertain to learning depend on afford" sub-dimension of the scale which was applied as pretest and posttest were compared. The independent t-test results were given in Table 2.

Table 2. *Independent t-test results of the scores of the first sub-dimension of the SEQ*

Test type	Groups	N		t	p
Pretest	Jigsaw	15	72,13	-,632	,286
	TGT	15	73,93		
Posttest	Jigsaw	15	84,87	5,059	,006
	TGT	15	75,40		

According to the data in Table 2, for the first factor of the SEQ, while there is no significant difference found between jigsaw and TGT pretest scores (t= -0,632; p>0,05), there is a significant difference between the posttest scores (t=5,059; p<0,05).

For the third problem of the research, scores that received from "beliefs that pertain to learning depends on ability" sub-dimension of the scale which was applied as pretest and posttest were compared. The independent t-test results were given in Table 3.

Table 3. *Independent t-test results of the scores of the second sub-dimension of the SEQ*

Test type	Groups	N		t	p
Pretest	Jigsaw	15	35,13	1,219	,023
	TGT	15	32,60		
Posttest	Jigsaw	15	40,27	3,107	,000
	TGT	15	34,40		

According to the data in Table 3, for the second factor of the SEQ, there are significant differences found between jigsaw and TGT pretest (t=1,219; p<0,05) and posttest (t=3,107; p<0,05) scores.

For the fourth problem of the research, scores that received from "beliefs that pertain to single certain truth" sub-dimension of the scale which was applied as pretest and posttest were compared. The independent t-test results were given in Table 4.

Table 4. *Independent t-test results of the scores of the third sub-dimension of the SEQ*

Test type	Groups	N		t	p
Pretest	Jigsaw	15	20,20	,533	,373
	TGT	15	19,27		
Posttest	Jigsaw	15	25,73	3,213	,289
	TGT	15	20,67		

According to the data in Table 4, for the third factor of the SEQ, there is no significant difference found between jigsaw and TGT pretest (t=0,533; p>0,05) and posttest (t=3,213; p>0,05) scores.

4. Results, discussion and implications

As the result of this study which compares two cooperative learning methods, jigsaw and TGT regarding their impacts epistemological beliefs of social studies preservice teachers, it can be said that in overall epistemological beliefs and first two dimensions, which are "beliefs that pertain to learning depend on afford" and "beliefs that pertain to learning depends on ability", jigsaw is more effective than TGT. But, in the third dimension, "beliefs that pertain to single certain truth", a significant difference does not seem between the effects of two methods. With these results, the study supports Slavin's (as cited in Baydar & Şimşek, 2018, p. 66) opinions since "jigsaw contains more constructed peer tutoring and reading practices for meaning than TGT", it seems jigsaw is more appropriate than TGT for social studies teaching. This superiority of jigsaw and its convenience, especially for social studies courses, were expressed by different researchers as well. According to Ascher (1986, p. 3), jigsaw is useful for "social studies, and other subjects in which a subject can be divided into discrete areas of expertise." As it was explained in the implementation section, in jigsaw, each student was assigned to read a different text. Students who are responsible of the same texts were collected together in expert groups. They discussed in those groups and became experts of their parts. As Lee, Ng, and Jakops (1997, p. 11) stated "the expert team's job was

to learn, create, or discover concepts and information which they would later teach to the members of their home team." Finishing their job in expert groups, they returned to their original groups. The important thing in this part of the study is each member of the original groups understands the whole text. Each member is responsible of her part, her friends' success and their comprehensions. For this reason, jigsaw is suitable also for the processes such as cognitive awareness, critical and creative thinking, questioning, decision making, problem solving, and concept development (Alkaya, 2006). "Further, the use of heterogeneous groups improves the chances that students will encounter of range of perspectives, thus, hopefully improving their perspective-taking ability" (Lee et al., 1997, p. 11). With these characteristics, jigsaw's effects on students' beliefs about "what knowledge is, how knowledge is constructed and evaluated, where it resides, and how knowing occurs" (Burr & Hofer, 2002, p. 201), is an expected result.

The findings of the study show similarity with Baydar and Şimşek's (2018) study which measures the impacts of jigsaw and the STAD on epistemological beliefs of social studies preservice teachers. In the study, the same scale was used as in this study and for all three of the dimensions, jigsaw's effects are significantly higher. This study's findings overlap with the findings of Koç's (2013) study which shows significant difference between effects of jigsaw II and the conventional teaching method on epistemological attitude in science education course. The results of this study support findings of Şimşek's (2013) study, as well. In the study, Şimşek compared three cooperative learning methods, jigsaw, reading-writing-presentation, and the conventional teaching method in terms of their effects on college students' epistemological beliefs in civic education course.

This study is a concrete example of how jigsaw changes preservice teachers' epistemological beliefs in social studies teacher education and suggests studies with different cooperative methods that would serve for the same area.

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