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Prospective Mathematics Teachers' Perceptions on and Adaptation of Student-Centred Approach to Teaching

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Abstract

The aim of this study was to investigate prospective secondary mathematics teachers' perceptions on and adaptation of student-centred approach to teaching. The study was conducted with 58 prospective secondary mathematics teachers who were the graduates from mathematics departments from different universities' Science and Literature faculties. They were educated to teach in secondary schools during their Pedagogical Formation Certificate Program at the Education Faculty in a western university in Turkey. In this study, Constructivist Learning Environment Survey (CLES) was administered to the participants, and reflection papers were collected to understand their perceptions towards student-centred approach to teaching. To understand whether and how they adapted student-centred curriculum into their teaching, the videos of micro-teaching experiences were examined. The findings suggested an improvement on prospective teachers' scores on CLES. It was also found that prospective teachers satisfied several expectations of the approach during microteaching.

Keywords: student centred approach to teaching; adaptation of curriculum; prospective mathematics teachers; pedagogical formation certificate program; videos of teaching

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Introduction

Teachers are the key factors in raising successful students. What is meant by being successful refers to that students are expected to be responsible of their own learning and actively construct their own knowledge (Wheatley, 1991) as constructivism suggests. Whether it is cognitive (Piaget), radical (von Glasersfeld), or socio-cultural (Vygotsky) constructivism, in constructivist learning environments, the responsibility of the teachers becomes being a guide and facilitator while the responsibility of the students is to be investigator and the constructor of knowledge (Singer & Moscovici, 2008; Eryaman &Riedler, 2010). Beswick (2007) explains this as "Learning is thus an active and purposeful process whereby individuals adapt their constructions in order to optimize their fit with experience" (p. 97). Constructivist approach refers to that there is no absolute reality, but only the learner can create it, and it is created from the learner's different experiences (von Glasersfeld, 1989). While the traditional instructional programs mainly see mathematics as facts or rules that are needed to be prescribed to students, and they focus on teaching merely procedural knowledge (Ball, Lubienski, & Mewborn, 2001; McTighe, Seif, & Wiggins, 2004; Talim Terbiye Kurulu Baskanligi [TTKB], 2006), the programs based on student-centred approach to teaching target meaningful and long-term learning through paying attention to students' cognitive levels (TTKB, 2006). They provide opportunities for investigation, questioning, inquiry, discovery, active participation, and group work. Fan and Zhang (2013) point that "…the major focus of teachers and educators should be showing students how to construct knowledge by teaching instead of just teaching students to memorise information" (p. 253).

In order to provide learners an effective system where they can learn through questioning and a more student-centred learning alike, in Turkey, constructivist approach became the center of the teacher training programs since 2004-2005. Accordingly, it is expected to create learning environments where students can learn conceptually and meaningfully, actively participate in learning activities, express themselves, question, discuss, communicate, and work together. Several studies have been conducted on the use and effects of constructivist approach since then (Ari & Bayram, 2011; Ayaz & Sekerci, 2015; Bogar, Kalender, & Sarikaya, 2012; Gul & Yesilyurt, 2011; Kim, 2005). Some of these studies focused on students' attitudes towards constructivist learning environments while some others investigated the effects of constructivist approach on their achievement and/or self-concept. Toraman and Demir's (2016) meta-analysis study provides detailed information on the academic studies conducted in Turkey related to the effect of the constructivist approach on lessons. Accordingly, 35 of the 43 studies investigated revealed that constructivist approach increases positive attitude toward lessons. Similarly, in a study by Liang and Gabel (2005), it was suggested that constructivist-based teaching approach had a potential to increase both conceptual understanding and positive attitude towards learning and teaching science especially for lower performers, and the participants preferred this approach over traditional lecture-based approach when they had a choice.

Student-Centred Approach to Teaching and Curriculum Adaptation by Teachers

Von Glasersfeld (1990) underlines that learning happens through constructing new knowledge on prior knowledge. At this point, the constructivist curriculum requires mathematics teachers to provide teaching where they create learning environments to let students construct mathematical concepts. Making the students the center of the learning environment, teachers are expected to provide space for students to discover mathematical concepts and abilities. In order to be able to solve problems, connect concepts, communicate through mathematics, and using multiple representations to understand mathematics; the students need environments where they do mathematics (National Council of Teachers of Mathematics [NCTM], 1989, 2000).

To be able to create effective learning environments, teachers should appropriately adapt the suggested curriculum into their teaching. Adaptation process differs on the teachers who see mathematics as changeable and believe that students can learn mathematics through constructing meaning for it (e.g., Remillard, 1999). Some research in the literature points that teaching is a multi-

dimensional activity and it requires deep analyses to understand the level of curriculum adaptation by teachers (Eryaman &Bruce 2015; Drake & Sherin, 2006; Orrill & Anthony, 2003; Remillard, 1999).

Teachers may not effectively evaluate how productively they adapt student-centred approach to teaching no matter how positive their perception towards constructivism is (Ocak, 2012; Savasci & Berlin, 2012). Frykholm's (1999) study on the secondary mathematics prospective teachers reveals that they could not apply their vision of reform into their own teaching practices. While some of the prospective teachers were willing to and confident in implementing reform in the classrooms, some had questions in their minds because of some limiting factors. This shows that being willing to implement reform may not be enough in putting it into the practice.

In their study investigating prospective teachers' instructional preferences for student-centred learning environments as well as the relation between their preferences and their approaches to learning, Baeten, Dochy, Struyven, Parmentier, and Vanderbruggen (2016) point that it is still a proactive research area to explore the interrelation between student teachers' instructional preferences and approaches to learning, since literature yield ambiguous results. They add that understanding prospective teachers' instructional preferences is important as they will be the teachers to apply student-centred teaching methods in their future practice.

The Motivation of the Study

Learners construct their own knowledge through building new knowledge on previous knowledge (Harrington, 1995). While doing that they experience disequilibrium, and then create equilibrium in order to construct new knowledge both individually and through social interaction. In a study by Mayo (2004), teachers learned through classroom interaction as they tried to find solutions to the problems together, and they created knowledge through integrating theory and practice as they reflected on the dilemmas of practice. Then, as suggested by sociocultural theory, learners can construct personal and social knowledge through communicating in learning communities (Arellano et al., 2001).

Pedagogical Formation Certificate Program students in the present study are the graduates from universities' mathematics departments. They represent a group of future teachers for whom teaching was not a first choice, but who decided to become teachers after graduating from Science and Literature faculties. In these faculties, they mainly take courses related to advanced mathematics without any emphasis on teaching competencies. During the 2 to 4 semester-formation programs, on the other hand, they take courses parallel to courses in Education Faculties, and are educated to teach 9-12th grade students in secondary schools.

Considering the requirements of current teacher training programs and secondary school mathematics curriculum, these future teachers are expected to give student-centred teaching, and create meaningful learning opportunities for students. At this point, it should be noted that they were educated through teacher-centred instruction until they were introduced to student-centred approach to teaching during formation program. Thus, they are expected to change their teacher-centred perceptions of teaching in a short period of time. In this study, the aim was to examine whether and how prospective teachers can create a new understanding of teaching and learning through constructing personal and social knowledge via communicating in a learning community (Arellano et al., 2001). When it is considered that teacher effectiveness is one of the factors that has an impact on student achievement (Cochran-Smith & Power, 2010; Darling-Hammond, 2000; Rockoff, 2004), it can easily be understood why it is important to provide places for future teachers to assess their own understanding of effective teaching and learning environments.

The findings are not only expected to shed light on pedagogical formation certificate program students' perceptions and adaptation levels, but also that of in-service and prospective teachers who need to provide student-centred instruction.

Purpose and Research Questions

In core of this discussion, in this research study, the aim was to investigate prospective secondary mathematics teachers' perceptions on and adaptation of student-centred approach to teaching in an environment where they had a chance to integrate theory and practice, and reflect on their practice. To do this, an environment where prospective mathematics teachers had an opportunity to undertake micro teaching experience and then held class discussions as a learning community was created. The study explored the following research questions:

1. What are the perceptions of the prospective secondary mathematics teachers towards student-centred approach to teaching after instruction?
2. To what extent the prospective secondary mathematics teachers adapt the student-centred approach to their teaching?
3. What is the relationship between the perceptions of teachers and their adaptation level?

Method

In order to benefit both from the advantages of quantitative and qualitative methodologies, in this study, a mixed-methods design that is the convergence model of Triangulation Design was employed (Creswell & Clark, 2007) for the first research question. Accordingly, it was aimed to obtain complementary qualitative data after collecting quantitative data in order to better understand the perceptions of the participants towards student-centred approach to teaching. For the second research question, an exploratory qualitative study using basic interpretive design (Merriam, 2009) was employed while the last research question was quantitative in nature having correlational design (Fraenkel & Wallen, 2009).

The study was conducted with prospective secondary mathematics teachers in 2014-2015 fall academic year in a university in western Turkey. The prospective teachers were the graduates from mathematics departments from different universities' Science and Literature faculties, and were educated to teach 9-12th grade students in secondary schools during their Pedagogical Formation Certificate Program at the Education Faculty. The participants were taking Teaching Methods course from the first researcher during the study. The participants were also taking School Experience course where they were practicing teaching in secondary schools.

During the Teaching Methods course, at the beginning of the semester, the prospective teachers received theoretical knowledge on student-centred approach to teaching, after that, they were divided into groups of two and were given their mathematics topics to undertake microteaching in the classroom. There were 31 groups in total, and the assigned mathematics topics were selected among three learning domains (numbers and algebra, geometry, and data and probability). In each lesson, 4-5 groups undertook their micro teaching, and after each teaching experience, class discussions were held. Each microteaching experience and related class discussion were video-taped with the permission of the participants.

Data Collection

To evaluate the perceptions of the prospective teachers towards student-centred approach to teaching, the Constructivist Learning Environment Survey (CLES) was administered at the beginning and at the end of the semester. Among 60, 58 participants were reached. The survey was consisted of 30 items on a 5-point Likert scale ranging from "not at all" to "very much". The scale was translated into Turkish by Fer and Cirik (2006) from Tenenbaum, Naidu, Jegede, and Austin (2001). CLES has 7 sub-dimensions that are: 1) Arguments, discussions, debates, 2) Conceptual conflicts and dilemmas, 3) Sharing ideas with others, 4) Materials and measures targeted toward solutions, 5) Reflections and

concept investigation, 6) Meeting student needs, and 7) Making meaning, real life examples. The Cronbach alpha value was .91, and the internal consistency among the seven factors in the scale ranged from .89 to .94. In the present study, the Cronbach alpha value was found .84 for pre-test and .87 for post-test.

In order to strengthen the findings of the quantitative data to answer the first research question, in the qualitative part of the study, after they completed their micro-teaching, participants were asked to answer 13 reflection questions prepared by the researchers. For the reflection questions, expert opinion was taken from an educator in the same faculty. In total, 56 participants were willing to answer the reflection questions. The questions were related to the main points of student-centred approach to teaching. Mainly, the prospective teachers were asked to reflect on teacher and student responsibilities during a lesson, how they would make their lessons meaningful for the students, how they would make the students active during the class, how an effective teaching and learning environment should be, and how they would maintain their classroom to be constructivist etc.

To collect data on the second research question, microteaching experiences of the prospective teachers were video-recorded. The content of the videos provided data on the extent that the prospective secondary mathematics teachers adapted the student-centred approach to teaching.

For the last research question on the relationship between the prospective teachers' perceptions on and adaptation level of student-centred approach to teaching, participants' post CLES scores and microteaching scores were the data sources.

Data Analysis

For the analysis of the quantitative data, SPSS 17 was used. To answer the first research question on prospective secondary mathematics teachers' perceptions towards student-centred approach to teaching after instruction, paired-sample t-test was employed to evaluate the impact of the intervention on participants' scores on CLES. This test was employed as the aim was to compare the mean score of pre and post-intervention on some continuous variable (Pallant, 2007), and also the normality assumptions were met. A Wilcoxon Signed Rank Test -being the non-parametric alternative of t-test- was used to analyze the sub-dimensions of CLES as the normality assumptions of the data were not met for the sub-dimensions.

For the qualitative data, in order to explore prospective secondary mathematics teachers' perception on student-centred approach to teaching, content analysis technique was utilized (Neuendorf, 2002). In creating the coding framework, we primarily draw upon from the book *Seven Goals for the Design of Constructivist Learning Environments* by Honebein (1996). We also used NCTM standards as our second framework. Accordingly, the codes were *student-centredness*, *connection*, *engagement*, *problem solving*, *communication*, *representations*, and *learning with understanding*. Two coders evaluated the reflection papers, and the codes were discussed until full percent of agreement was found among the raters. Selected videos of the class discussions were also analyzed for triangulation purposes.

In order to answer the second research question on the adaptation level of the prospective teachers, while analyzing their microteaching videos, we searched for the same codes we came up during the reflection analysis. To score the participants' microteaching performance in the videos, we evaluated their adaptation of the codes into their teaching. To do this, we ranked their adaptation levels for each code as 0-no adaptation, 1-low adaptation, 2-medium adaptation, and 3-high adaptation. The total scores for each code were calculated ranging between 0-93, and then related percentages were calculated.

For the last research question to investigate the relationship between the perceptions of teachers and their adaptation level, we looked for the relationship between participants' post CLES scores and microteaching scores. To score their micro-teaching performance, we evaluated their

adaptation of the codes into their teaching. A Spearman's (rho) test was used to investigate the relationship between CLES and microteaching scores, since microteaching scores were not normally distributed.

Findings

What are the perceptions of the prospective secondary mathematics teachers towards student-centred approach to teaching after instruction?

To answer this question, paired-samples t-test was conducted to evaluate the impact of the intervention on prospective teachers' scores on CLES. Paired-samples t-test results (see Table 1 below) revealed that there was a statistically significant increase in CLES scores from pre-test (M=108.86, SD=9.97) to post-test (M=116.53, SD=10.28), t(57)=-4.75, p<.0005 (two-tailed). The mean increase in CLES scores was -7.67 with a 95% confidence interval ranging from -10.91 to -4.43. The eta squared statistic (.28) indicated a large effect size (Cohen, 1988 as cited in Pallant, 2007).

Table 1. Paired Samples T test scores of Pre-test and Post-test of CLES scores

	Mean	N	Std. Deviation	sd	t	p
Pre-test	108,86	58	9,97	57	-4,75	,000
Post-test	116,53	58	10,28			

When the sub-dimensions of CLES were analyzed, it was found that on 6 of the 7 sub-dimensions (except for 4th sub-dimension-*materials and measures targeted toward solutions*) there was a statistically significant increase on CLES scores. Accordingly, a Wilcoxon Signed Rank Test for *arguments, discussions, debates* sub-dimension (see Table 2 below) revealed a statistically significant increase in CLES scores following intervention, z=-4.34, p<.001, with a medium effect size (r=.41) (Cohen, 1988 as cited in Pallant, 2007). The median score on this sub-dimension of CLES increased from pre-test (Md=19) to post-test (Md=21). The test for *conceptual conflicts and dilemmas* sub-dimension revealed a statistically significant increase in CLES scores following intervention, z=-2.48, p<.05, with a medium effect size (r=.33). The median score on this sub-dimension of CLES increased from pre-test (Md=7) to post-test (Md=8). For *sharing ideas with others* sub-dimension, the test revealed a statistically significant increase in CLES scores following intervention, z=-2.27, p<.05, with a medium effect size (r=.30). The median score on this sub-dimension of CLES increased from pre-test (Md=16) to post-test (Md=17). Similarly, a Wilcoxon Signed Rank Test for *reflections and concept investigation* sub-dimension revealed a statistically significant increase in CLES scores following intervention, z=-1.99, p<.05, with a medium effect size (r=.26). The median score on this sub-dimension of CLES increased from pre-test (Md=23) to post-test (Md=24). The Test for *meeting student needs* sub-dimension revealed a statistically significant increase in CLES scores following intervention, z=-4.11, p<.001, with a large effect size (r=.54). The median score on this sub-dimension of CLES increased from pre-test (Md=16) to post-test (Md=18). Finally, a Wilcoxon Signed Rank Test for *making meaning, real life examples* sub-dimension revealed a statistically significant increase in CLES scores following intervention, z=-3.03, p<.005, with a medium effect size (r=.40). The median score on this sub-dimension of CLES increased from pre-test (Md=15) to post-test (Md=17).

Table 2. Wilcoxon Signed Rank Test Results of the Sub-dimension of CLES

	ADD post - pre	CC post - pre	SI post - pre	MMTTS post - pre	RCI post - pre	MSN post - pre	MMRLE post - pre
Z	-4,343[a]	-2,484[a]	-2,274[a]	-,069[b]	-1,986[a]	-4,112[a]	-3,026[a]
Asymp. Sig. (2-tailed)	,000	,013	,023	,945	,047	,000	,002

Based on negative ranks.
Based on positive ranks.
Wilcoxon Signed Ranks Test

In order to strengthen the quantitative findings, examining prospective teachers' reflection papers through content analysis, we used the codes *student-centredness*, *connection*, *engagement*, *problem solving*, *communication*, *representations*, and *learning with understanding*. The data analysis using these codes indicated that the content of the reflection papers could be organized under the themes below:

Student-centredness was the most dominant element of prospective teachers' reflections with the frequency of 221; *connection* and *engagement* were the other issues mostly discussed (frequencies were 71 and 57 respectively); and the other issues were discussed rather in low frequencies where *communication* was discussed with the frequency of 42, *problem solving* was discussed with the frequency of 41, *representations* with 32, and *learning with understanding* with the frequency of 23.

To provide an example, in the reflection papers, we learned from the following quotation that a prospective teacher (p-17) focused on *student centredness* as well as *connection* together as the important requirements of a student-centred teaching environment:

For an effective teaching and learning environment, student should be active, they can raise questions freely, the teacher should be a guide and facilitator, and the concepts should be integrated into real life.

In another quotation, participant-21 reflected that *engagement*, *student-centredness*, and *communication* were the important requirements of a student-centred teaching environment:

The role of the teacher is to attract students' attention via developing their awareness about the concept. After that, the teacher should help students grasp the content through providing guidance and true interventions. Also (s)he should make students face the problem themselves, and be a facilitator during the problem solving process. The teacher should also let students interact and learn from each other.

In another reflection paper, participant-6 reflected on *connection* issue as a requirement of student-centred teaching:

Students should be informed about why they are learning the concept, and how the concept will be useful in the following lessons and in their daily lives.

Also, participant-27 reflected on *problem solving* issue as a requirement of student-centred teaching:

After a short review of previous lesson, I started the lesson with a problem. Instead of giving the rule and solving following exercises, I gave students enough time to think about the problem and I let them solve the problem themselves… I also forced them to think about different ways of solutions instead of getting only one solution.

The above quotations indicated that prospective secondary mathematics teachers were able to reflect on several dimensions of student-centred approach to teaching as their CLES scores increased after instruction.

To what extent the prospective secondary mathematics teachers adapt the student-centred approach to their teaching?

To answer this question, we examined prospective teachers' microteaching videos. For this, in the videos, we searched for the codes we came up during the reflection analysis. Accordingly, we came up with the findings below.

The prospective teachers were mostly able to fulfill the *connection* expectation of student-centred approach to teaching (90.3%). They were able to integrate their lessons into real life, able to integrate former knowledge to the present, and also able to connect subjects to each other as well as to other fields.

Their lessons also covered *representations* and *engagement* dimensions with high percentages respectively (80%). Accordingly, they used materials, technology, and modelling in their lessons; and they drew students' attention, and motivated them through addressing the history behind the subject, mentioning the usage of the area of the subject etc.

The prospective teachers were mostly able to fulfill the *student-centredness* expectation of student-centred approach to teaching (74.2%). During their lessons, the students were responsible of their own learning and the teachers were the facilitators of student learning.

They also mostly satisfied the *learning with understanding* expectation (73.1%). Accordingly, teachers guided students to learn the concepts meaningfully without memorization, and they let the students discover the concepts.

Their lessons also covered *problem solving* and *communication* dimensions (72%). Accordingly, they based their lessons on problem-based learning, let the students think about the problems, and asked them to find different ways of solutions. They also promoted classroom discussions and group work.

What is the relationship between the perceptions of teachers and their adaptation level of the student-centred approach to teaching?

To answer this question, we looked for the relationship between participants' post CLES scores and micro-teaching scores.

Table 3. Correlation between CLES and Micro-Teaching Scores of the Participants

Correlations				
			CLES	Micro-teaching
Spearman's rho	CLES scores	Correlation Coefficient	1,000	,212
		Sig. (2-tailed)	.	,117
		N	56	56
	Micro-teaching scores	Correlation Coefficient	,212	1,000
		Sig. (2-tailed)	,117	.
		N	56	56

Spearman's (rho) test investigating the relationship between CLES and micro-teaching scores revealed that there was no correlation between the two variables, r=.21, n=56, p>.05 (Cohen, 1988 as

cited in Pallant, 2007), indicating that high levels of CLES did not significantly associated with higher levels of microteaching scores.

Discussion and Conclusion

Aiming to understand prospective mathematics teachers' perceptions on and adaptation of student-centred approach to teaching, the findings of this study revealed that there was an improvement on prospective secondary mathematics teachers' scores on CLES indicating that the instruction they received helped them improve their perceptions towards student-centred approach to teaching. This finding is motivating, since some studies in the literature (i.e. Baeten et al., 2016) suggest that prospective teachers may prefer teacher-directed instruction over student-centred instruction and/or demand guidance and support in student-centred learning environments as they are mostly used to teacher-directed approach. On the other hand, there are also studies suggesting that when they had a choice, participants prefer constructivist-based teaching approach over traditional lecture-based approach (Gursoy & Karatepe, 2006; Liang & Gabel, 2005).

The findings also revealed that prospective teachers' perception towards student-centred approach to teaching was organized under the themes *student-centredness*, *connection*, *engagement*, *problem solving*, *communication*, *representations*, and *learning with understanding*; student centredness being the most dominant element, and connection and engagement being the mostly discussed elements. As stated before, these themes were driven from NCTM (2000) standards, and were pointing to the requirements of classrooms in which doing mathematics was targeted, and the students were the constructors of their own knowledge. In line with this finding, Ocak (2012) and Aglagul (2009) found that teachers considered their lessons constructivist as they let the students discuss and share ideas, they used materials for problem solving, and they connected their lessons to real life. In her study examining graduate students' perspectives on effective teaching, Hill (2014) also pointed that teaching competence, relationships with students, and teacher attitudes were the categories the data was organized into. Accordingly, effective teaching involved affective processes in learning as well as relationships with students beyond the content presentation and method use. In another study by Sural and Saritas (2015) on pedagogical formation certificate program students' competencies regarding teaching profession, it was stated that the prospective teachers mostly thought that *knowing students* was the most vital competency for a constructivist and effective teaching. From here, we can deduce that prospective mathematics teachers in the present study were able to grasp important aspects of constructivist teaching as they received instruction on student-centred approach to teaching.

Analyzing videos of the prospective teachers' microteaching performance also helped us validate their intentions through student-centred approach to teaching and to understand their adaptation levels. Accordingly, the participants adapted student-centred approach to their teaching in high level, and they were able to satisfy *connection, representation, engagement, student-centredness, learning with understanding, problem solving,* and *communication* expectations. As in Mayo's (2004) study, in the present study, prospective teachers were able to learn through classroom interaction. Experiencing micro-teaching opportunities and reflecting on them helped prospective teachers create new understanding of teaching. As Shirvani (2009) suggests, to create a constructivist environment, merely discussing the importance of the approach is not enough, instead implementation of the approach should be ensured. We believe that the microteaching experience with the following class discussions helped prospective teachers better internalize the structure of the student-centred approach to teaching. As stated before, no matter how positive their perception towards constructivism is, teachers may not be able to adapt student-centred approach into their teaching (Ocak, 2012; Savasci & Berlin, 2012) as in the Frykholm's (1999) study on the secondary mathematics prospective teachers' implementation process of reform in the classrooms. From here, in the present study, we can deduce that being exposed to student-centred approach to teaching during the course as well as trying to experience microteaching in line with student-centred approach to teaching helped participants satisfy several expectations of this approach.

Plourde and Alawiye (2003) suggest that when prospective teachers are exposed to constructivist learning, they generally can provide constructivist teaching during their lessons. Moreover, Pajares (1992) underlines that teachers' perceptions influence their behaviors in their classrooms. In the present study, we were expecting to find that prospective teachers' positive perceptions towards student-centred approach to teaching would have brought about higher adaptation levels of the approach. In a study by Uredi (2013), a significant relationship between in-service teachers' attitudes towards constructivist approach and the level of constructivist learning environment establishment was found. On the contrary, we did not find a significant relationship between prospective teachers' perceptions and adaptation levels. From here, we understand that higher/lower perceptions towards student-centred approach to teaching did not guarantee higher/ lower adaptation levels. At this point, Savasci and Berlin (2012) indicated that teachers' high embracement of constructivism did not ensure true implementation of constructivist approach. We believe that it should be further investigated how prospective teachers' perceptions on constructivism relate to their adaptation levels.

To conclude, since the prospective teachers are expected to provide student-centred instruction when they enter the profession, it was important to analyze how effective the Teaching Method course they received during their pedagogical formation certificate program was on influencing their perceptions towards student-centred approach to teaching with their adaptation levels. As a limitation, in the present study, we could not interview the participants face-to-face in order to understand their ideas on and concerns about the implementation of this approach more deeply. For future studies, we recommend to conduct interviews for a better understanding of their reflections about the implementation of the approach as well as the quality of the course.

For future studies, it is also recommended to conduct further studies on understanding the relationship between teachers' perceptions and adaptation levels with respect to student-centred approach to teaching. We also recommend researchers to investigate how prospective teachers' perceptions are reflected on their internship practicum, and to examine the long-term effects of intervention on their teaching when they enter the profession. When it is taken into account that prospective teachers may have different views of teaching when they enter the teaching programs as they carry the influence of several years of observation and instruction (Kagan, 1992; Pajares, 1992), and their constructed beliefs might be resistant to change in spite of training (Pajares, 1992; Tabachnick & Zeichner, 1984), it might be necessary to examine how they react to the training when they enter the profession.

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