Effect of Secondary School Students' Metaphorical Perceptions Regarding Mathematics Classes and Mathematics Teachers on Achievement

Erdogan Köse[1]

[1] Akdeniz University, Faculty of Education, Department of Educational Sciences, Antalya, Turkey.
ekose@akdeniz.edu.tr

Abstract

This study aimed to examine the effects of secondary school students' metaphorical perceptions regarding mathematics classes and lesson teachers on achievement. A mixed model was used. Positive and negative metaphors generated by students about mathematics classes and mathematics teachers were compared with their achievement in mathematics. After data analysis, the findings were interpreted. Students' metaphoric perceptions related to mathematics classes and mathematics teachers were found to be parallel. Also, negative or positive attitudes towards the lesson and teacher were found to directly influence achievement. Hence, student attitudes towards mathematics lesson and mathematics teachers highly predict their achievement in mathematics.

Keywords Achievement, mathematics, metaphor, secondary school students.

Introduction

Almost in all cultures and in each different expression, individuals express their feelings, ideas and thoughts in different manners. These expressions can take written or oral forms or use body language. Responses provided in written or oral forms or by using body language can be direct or indirect. Individuals can indirectly convey some feelings and thoughts that they cannot directly transmit. Indirect expressions or implications are more effective when direct expressions are hard to use in terms of human relations while explaining complex situations or abstract notions. Metaphors are one of these indirect expression methods and are often used to express emotions and thoughts in some situations.

In its general sense, a metaphor is the direct expression of a perception related to a concept. It means the individual reflects his or her thoughts on a concept in a different way. Through the use of metaphors, individuals attach new knowledge to an existing mental scheme to tie the new information with the previous one (Arslan and Bayrakci 2006). While metaphor is defined as a concept that combines associations, comparisons and approximations (Ahkemoglu 2011), it is also defined as tools of imitation that underlie an individual's awareness (Massengill-Shaw and Mahlios 2008). All these definitions show that metaphors are figurative expressions.

However, some of the explanations provided in literature show that metaphors are not only figurative speech. It is observed that metaphors also generate a basic thought mechanism (Lakoff and Johnson 2005; Martinez et al. 2001); they are perception tools (Arnett 1999) and are made sense as linguistic tools that link two objects or concepts (Palmquist 2001). It is also suggested that metaphors provide opportunities to "know" as tools to understand nature and the environment, to make sense of seemingly meaningless objective realities via specific interpretations and to bring meaning to experiences and practices (Yildirim and Simsek 2008).

The most important characteristic of metaphors is the active participation of the individual to understanding the metaphorical meaning during the individual's pursuit of meaning (Noyes 2006). Sense making especially related to abstract concepts is a process generated by active participation of individuals with their experiences. Metaphors do not only constitute figurative expressions but also generate mental structures. When the individual is inclined to think figuratively or use metaphorical expressions, the mind will move in that direction. Metaphorical relationships make up an important part of conceptual systems

(Martinez et al. 2001). Metaphorical manners of expression are important factors in presenting the dimensions of depths of concepts. When definitions of metaphors are examined, it is observed that they are powerful tools to present mental images and reflect individual's thought patterns.

Metaphors in education are primarily preferred in developing planning, development of instructional programs, fostering learning and enhancing creative (Aydin and Pehlivan 2010) and critical thinking as well as explaining complex concepts and facts (Semerci 2007). In recent years, metaphors are used more often in educational research. Due to several reasons, students have been found to prefer metaphorical expressions rather than direct expressions in studies. Individuals can better express their real thoughts using metaphorical expressions. Diverse teaching styles and program theories may reveal the relationship between abstract and concrete concepts with the use of metaphors in a simpler manner (Oxford 1998). Therefore, metaphors are important tools in educational research to comprehend educational problems and offer different viewpoints.

Literature review has presented many studies in which metaphorical analyses were conducted in teaching and training. These studies used metaphors to analyze the teaching process (Aykac 2012; Eren and Tekinarslan 2012; Leavy et al. 2007; Martinez et al. 2001; Tasdemir and Tasdemir 2011), the teaching profession (Celikten 2006; Cerit 2008; Ekiz and Kocyigit 2013; Eren and Tekinarslan 2012; Goldstein 2005; Nikitina and Furuoka 2008; Pektas and Kildan 2009; Saban et al. 2006), students (Eraslan-Capan 2010; Minas ve Gündoğdu, 2013; Saban 2009), development of teaching programs and program development (Gultekin 2013; Orten and Erginer 2010; Ozdemir 2012a; Semerci 2007), assessment and evaluation (Sadik and Sari 2012; Soydas and Guven 2009; Tatar and Murat 2011), educational management (Cerit 2008; Donmez 2008; Dos 2010; Ertan-Kantos 2011; Levine 2005; Orucu 2012; Yalcin and Erginer 2012) and school and classroom (Aydogdu 2008; Balci 1999; Cerit 2006; Gordon 2010; Nalcaci and Bektas, 2012; Ozdemir 2012b) concepts (Tasgin and Kose 2015). These studies mostly examined metaphors related to education in a qualitative manner and analyzed the meanings associated with these concepts in the form of themes.

Effective and successful undertaking of activities and tasks is the goal of training and education. Concrete success comes from presenting the effectiveness of the tasks by means of student development or student achievement. Everything attempted in education and training is designed with student achievement in mind. There are many factors that affect student achievement and in general, these factors may be related to students themselves, their families, schools, teachers or the environment. A myriad of studies exists about the factors that affect student achievement. Some studies emphasize that one of the factors that directly affect student achievement is the teacher (Akyuz 2006; Dede 2004; Dursun and Gunduz 2014; Igwebuike 2013; Rockoff 2003; Valli et al. 2003). These studies have generally concluded that teachers are among the most important factors that directly affect student achievement and students' lesson achievement is mostly related to their teachers.

In addition to cognitive factors, student achievement is immensely affected by affective factors. According to Bloom's (1979) Mastery Learning Theory, affective input behaviors such as interest, attitude and academic achievement are rather effective on student achievement in addition to cognitive input behaviors. In this sense, an affective commitment towards the lesson and lesson teacher will directly affect student achievement. It is thought that positive student perceptions towards the lesson positively affect perceptions towards the lesson teacher or vice versa. There are many studies that

examine the effects of attitudes towards a lesson or the lesson teacher on academic achievement. These studies have reported that in general, attitudes towards a lesson or the lesson teacher directly affect academic achievement (Ekizoglu and Tezer 2007; Erdogdu 2006; Kanjira 2008; Karasakaloglu and Saracaloglu 2009; Kazazoglu 2013; Yilmazer and Demir 2014).

Studies that investigate the effect of students' affective orientations towards a lesson or a lesson teacher on academic achievement with the help of metaphors are rather scarce. The study that examined the effect of metaphors relate to mathematics classes on achievement at high school level (Yalcin and Eren 2012) reported that metaphors relate to mathematic classes affected achievement. When it is remembered that student perceptions regarding teaching and training are created especially during primary and secondary school levels, it can be claimed that it is imperative to identify negative and positive student perceptions towards classes and teachers and to study whether these perceptions affect student achievement.

This study aimed to examine the effects of secondary school students' metaphorical perceptions related to mathematics classes and lesson teachers on achievement. With this aim in mind, answers were sough to the questions below:

Is there a relationship between student perceptions related to the lesson and their perceptions related to the lesson teacher?

Is there a relationship between student perceptions related to the lesson and their grades?

Is there a relationship between student perceptions related to the lesson teacher and their grades?

Method

The study utilized a mixed model in which qualitative and quantitative data were used in conjunction. Mixed research models consist of collecting qualitative and quantitative data related to the same basic concepts in a single study or in a series of studies for analysis an interpretation (Leech and Onwuegbuzie 2007). Mixed model studies are defined as the combination of qualitative and quantitative research techniques, methods and approaches in one study. Similarly, mixed model research is explained as collecting and analyzing qualitative and quantitative data together in a research process. It can be claimed that mixed model research progresses with qualitative and quantitative data collection, analysis and interpretation stages as in a single study or a series of studies that focus on the same basic topic (Balci 2009). Mixed model research can be defined as the type of research that combines qualitative and quantitative research approaches, methods and techniques to present more effective solutions to a problem. In the current study, both qualitative and quantitative data a findings were obtained. They were analyzed in combination in line with the goals of the study.

Research model

In order to collect qualitative data, phenomenological method was used in this study which examined 8th graders' perceptions towards the mathematics lesson and the mathematics teacher with the help of metaphors and investigated the effects of this perception on lesson achievement. Phenomenological design focuses on concepts that the individuals are aware of but do not have detailed an in-depth comprehension (Yildirim and Simsek 2008). Therefore, phenomenological design was selected as the study design to present students' metaphorical perceptions related to mathematics lesson and mathematics teacher. Content

analysis was used in analyzing quantitative data. Yildirim and Simsek (2008) state that the purpose of content analysis is to arrive at concepts and relationships to explain the collected data and the data summarized and interpreted in descriptive analysis will be processed more in depth via content analysis.

Document review method was used for analyzing the quantitative data. Average of the student grades for one semester was calculated and this grade was accepted as the year-end achievement score. This score was based on the system where the highest score is 100.

Participants

The study group of this study was composed of 120 randomly selected 8th graders from two secondary schools in Erzurum province central district in the spring term of 2013-2014 academic year. Metaphorical student perceptions related to mathematics lesson and mathematics teachers were collected along with students' end of term mathematics achievement. Table 1 presents participants' demographic information.

Table 1: *Participants' demographic characteristics*

Gender		f	%
Female		43	48.1
Male		45	51.1
	Total	88	100.0
Classroom		f	%
8/A		21	23.9
8/B		21	23.9
8/C		23	26.1
8/D		23	26.1
	Total	88	100.0
Lesson Teacher1		42	47.7
Lesson Teacher2		46	52.3
	Total	88	100.0

Table 1 shows that 43 of the participants were females and 45 were males. The participants belonged to four different 8th grades. The same mathematics teacher taught two of the classes (42 students) while another mathematics teacher taught the other two participating classes (46 students).

Data collection and analysis process

In order to reveal participating 8th graders' perceptions related to "mathematics lesson" and "mathematics teacher", students were presented with statements such as "mathematics lesson is like……, because….." and "mathematics teacher is like……, because….." . Students were asked to complete these sentences based on their perceptions. Students were informed of the research topic and its rationale and the forms were distributed and collected after 10-15 minutes.

Data related to the metaphors developed by the participants were analyzed in four steps: coding and extraction, development of categories and quantitative data analysis. In coding and extraction stage, the metaphors generated by students were first listed alphabetically and metaphors generated by each participant were coded by using a word. While metaphors were being analyzed, responses that were not in full or that did not have

metaphorical properties were eliminated. Although a total of 120 students from 4 classes were included in the study, 20 students were eliminated since their responses were not provided in full or they lacked metaphorical properties and metaphors of 12 students were also eliminated and as a result, data from 88 students were accepted as metaphors and analyzed.

In category development stage, the concepts generated by students for mathematic classes and mathematics teachers were separately reviewed and combined under two categories by taking common properties into consideration. These categories were: positive and negative metaphors related to mathematic classes and positive and negative metaphors related to mathematics teachers. A commission consisting of two educational sciences experts and one Turkish instructor made decisions about the status of negative and positive metaphorical meanings. This commission made its decisions by reviewing the metaphors generated by students for both mathematic classes and mathematics teachers one by one. The metaphors for which no decisions could be made and the metaphors for which unanimity was not established were eliminated. The metaphors identified in this manner were coded as "1" for positive metaphors and as "2" for negative metaphors and recorded.

The implementation to identify student perceptions was carried out at the beginning of the spring term of 2013-2014 academic year and at the end of the semester, student grades were obtained from the school administration. The grades pointed to the average of 4 separate grades for each student and composed of the scores for two compulsory written exams, one oral exam or applied exam and one performance work. The grades followed the scoring system out of 100. Without assigning any additional weights, the average of these four scores was taken and the obtained score was accepted as the end of term achievement score. These mathematics grades were recorded as they are. Students' quantified perceptions and average mathematics grades were compared. Interesting points in students' metaphorical perceptions were provided as "anecdotes". Statistical operations such as frequencies, percentages and chi-square were done and the results were interpreted.

Findings

In this specific study, the factors that could affect student achievement, perceptions regarding the lesson and perceptions regarding the teacher were gender, classroom and the teacher. Whether students' metaphorical perceptions and achievement differed according to gender was crucial, however, no significant differences were found based on gender which means there were no meaningful relationships between gender and metaphorical perception or gender and lesson achievement. Students' achievement, perceptions related to the lesson or the perceptions related to lesson teacher did not change according to gender. At class level, no significant changes were found in regards to metaphorical perceptions or lesson achievement. Thinking that lesson teachers might be effective in this regard, the effect of teachers on students' metaphorical perceptions and achievement was examined. However, no significant relationships were detected. It was concluded that demographical properties of the sample (gender, classroom and lesson teacher) did not affect metaphorical perceptions and achievement. This result was expected and desired by the researcher.

Examination of student metaphors related to mathematics classes presented 34 different metaphors. The most often expressed metaphors were puzzles, water, chocolate, nightmare, numbers and darkness. 15 of these metaphors were positive while 19 were negative. This shows that the ratio of students who liked mathematics was lower than

those who did not. This finding is parallel to the negative attitude towards mathematics observed in Turkish public.

Examination of student metaphors related to mathematics teachers presented 31 different metaphors. The most often expressed metaphors were lodestar, old sycamore, angel, a bag of nerves, volcano and disciplined. 14 of these metaphors were positive while 17 were negative.

Negative student perceptions were found to be higher than their positive perceptions. After the obtained metaphors were grouped as negative and positive, they were statistically analyzed by transforming them into quantitative data.

Table 2: *Effect of students' lesson perceptions on their teacher perceptions*

	Teacher Perception		
Lesson Perception	Pearson Correlation	N	Sig. (2-tailed)
	0.704	88	0.000

Table 2 points to significant relationships between students' metaphorical perceptions towards the mathematics lesson and their metaphorical perceptions towards the mathematics teacher. It shows the existence of a high level relationship between students' metaphorical perceptions towards the mathematics lesson and their metaphorical perceptions towards the mathematics teacher. Student perceptions towards the mathematics lesson and the mathematics teacher were parallel and similar. If student attitude towards the mathematics lesson was positive, student attitude towards the mathematics teacher was also positive and if student attitude towards the mathematics lesson was negative, student attitude towards the mathematics teacher was also negative.

Table 3: *Effect of students' perceptions towards the mathematics lesson on their achievement*

	Lesson Achievement Score		
Lesson Perception	Pearson Correlation	N	Sig. (2-tailed)
	0.495	88	0.000

Table 3 presents the statistical data analyzed to observe whether students' lesson perceptions affected their end of term achievement scores. Accordingly, a significant relationship was found at 0.01 level of significance between students' metaphorical perceptions related to mathematics lesson and their achievement. This finding points to direct relationships between positive and negative perceptions towards mathematics classes and high or low scores. It means that students with positive attitudes towards mathematics classes have high scores whereas students with negative attitudes towards mathematics classes have lower achievement scores.

Table 4: *Effect of students' perceptions towards the mathematics teachers on their achievement.*

	Lesson Achievement Score		
Teacher Perception	Pearson Correlation	N	Sig. (2-tailed)
	0.371	88	0.000

Table 4 presents the statistical data analyzed to observe whether students' perceptions towards their mathematics teachers affected their end of term achievement scores. Accordingly, a significant relationship was found at 0.01 level of significance between students' metaphorical perceptions related to mathematics teachers and their achievement. This finding points to direct relationships between positive and negative perceptions towards mathematics teachers and high or low scores. It means that students with positive attitudes towards mathematics teachers have high scores whereas students with negative attitudes towards mathematics teachers have lower achievement scores.

As a result of all these investigations into the relationships between perceptions and achievement, it was found that metaphorical perceptions towards both the mathematics classes and the mathematics teachers affected achievement. In general, students with positive metaphorical perceptions had higher achievement in mathematics and students with negative metaphorical perceptions had lower achievement in mathematics. This finding shows that students' lesson and teacher perceptions directly affect achievement in the specific lesson. It can also be claimed that students' attitudes towards the lesson and the lesson teacher predict their achievement in the lesson.

Results, Discussion and Suggestions

Students generated many metaphors for mathematics lesson and mathematics teachers. The fact that metaphors differed from one another was related to different experienced and perceptions on the part of students. The generated metaphors mostly reflected students' positive or negative perceptions and that was expected and desired by the researcher. The most usually generated positive metaphors for mathematics lesson included "puzzle", "numbers", "water", "chocolate" and "lodestar". The most usually generated negative metaphors for mathematics lesson included "a dark road", "lightning", "nightmare", "death" and "knotted hair". This result reflects the social perception in the society related to mathematics. Especially the negative metaphors reflect the negative attitudes towards mathematics lesson. Of course, the students who have negative attitudes towards the lesson and who do not like it cannot be expected to be successful in the lesson. One of the main foundations of success in a lesson comes from positive affective behaviors towards the lesson (Bloom 1979).

The most usually generated positive metaphors for mathematics teachers included "pretty", "sweet", "advisor", "an illuminating road" and "lodestar". The most usually generated negative metaphors for mathematics teachers included "cloud", "nervous", "boring", "darkness", "volcano" and "disciplined". Results are noteworthy both in qualitative and quantitative aspects. Students who have negative attitudes towards their teachers cannot be expected to achieve success in this lesson. There are no difficult lessons, only teachers who make these lessons harder an unbearable (Buyukkaragoz and Civi 1999).

The statistical analyses pointed to significant relationships between students' metaphorical perceptions related to the lesson and the lesson teacher. This result verifies researcher's hypothesis. Students' metaphorical perceptions were found to be consistent in themselves. Literature includes studies in which there are parallels between perceptions towards the lesson and perceptions towards the teachers (Dursun and Dede 2004; Koc 2014; Toluk et al. 2010; Wu 1999; Yilmazer and Demir 2014). When student perceptions related to lesson are positive, their perceptions related to teachers are also positive. Although rarely there

may be students who have different perceptions towards the lesson and the teacher, this differentiation is not significant.

The results of the statistical analysis employed in the study pointed to significant relationships between students' metaphorical perceptions towards the lesson and their achievement at the end of the term. This result verifies researcher's hypothesis. Studies in the field have pointed to perceptions and attitudes as important factors that affect student achievement (Dursun and Dede 2004; Ekizoglu and Tezer 2007; Igwebuike 2013; Karasakaloglu and Saracaloglu 2009; Kazazoglu 2013; Yalcin and Eren 2012; Yilmazer and Demir 2014). Students' metaphorical perceptions related to mathematics classes were found to be parallel to their achievement. This result shows that start of the term perceptions related to the lesson strongly predicts academic achievement.

The results of the statistical analysis employed in the study pointed to significant relationships between students' metaphorical perceptions towards the lesson teacher and their achievement at the end of the term. This result verifies researcher's hypothesis. Similar results have been obtained in other studies conducted in the field (Akyuz 2006; Ekiz and Kocyigit 2012; Igwebuike 2013; Karasakaloglu and Saracaloglu 2009; Kazazoglu 2013; Koc 2014; Oflaz 2011; Yalcin and Eren 2012; Yilmazer and Demir 2014). This results shows that students' affective perceptions related to lesson teacher strongly predicts academic achievement

As a result, it was found that 8th graders' metaphorical attitudes towards the mathematics lesson and the mathematics teacher directly affected achievement. When student attitudes towards the lesson and the teacher were positive, they had higher achievement and when student attitudes towards the lesson and the teacher were negative, they had lower achievement. Achievement in a lesson is highly related to positive affective behaviors towards the lesson and the teacher. The results of the current study confirm this view. Findings of the current study are parallel to the findings of previous studies (Igwebuike 2013; Lakoff 2009; Yalcin and Eren 2012; Yilmazer and Demir 2014). It was found that metaphorical student perceptions relate to mathematics lesson and the mathematics teacher directly affected achievement in mathematics lessons.

Based on the results of this study, it is suggested that teachers encourage their students to like the lesson and the lesson subjects. Taking the psychological conditions of secondary school students into consideration, teachers should make efforts to generate positive feelings between themselves and students. Metaphorical studies on factors that affect achievement should be conducted at different educational levels and in different classes.

References

Ahkemoglu H 2011. *A Study on Metaphorical Perceptions of Efl Learners Regarding Foreign Language Teacher.* Master Thesis, Unpublished. Adana: University of Cukurova .

Akyuz G 2006. Investigation of the effect of teacher and class characteristics on mathematics achievement in Turkey and European union countries. *Elementary Education Online,* 5(2): 75-86.

Arslan, ZM, Bayrakci M 2006. An examination of metaphorical thinking and learning from educational view. *Milli Egitim*, 171: 100-108.

Aydin İS, Pehlivan A 2010. The metaphors that Turkish teacher candidates use concerning "teacher" and "student" concepts. *Turkish Studies*, 5(3): 818-842.

Aydogdu E 2008. *İlkogretim okullarindaki ogrenci ve ogretmenlerin sahip olduklari okul algilari ile ideal okul algilarinin metaforlar yardimiyla analizi.* Master Thesis, Unpublished. Eskisehir: University of Osmangazi.

Aykac N 2012. Perceptions of the teacher and teaching process in the drawings of elementary school students. *Education and Science*, *37*(164): 298-315.

Balci A 1999. *Metaphorical images of school: School perceptions of students, teachers and parents from four selected schools (in Ankara).* PhD Thesis, Unpublished. Ankara: Middle East Technical University.

Balci A 2009. *Sosyal Bilimlerde Arastirma.* Ankara: Pegem Akademi Yayinevi.

Bloom BS 1979. *İnsan Nitelikleri ve Okulda Ogrenme.* Cev. D. A. Ozcelik. Ankara: MEB Yayinevi.

Buyukkaragoz SS, Civi C 1999. *Genel Ogretim Metotlari: Ogretimde Planlama Uygulama.* İstanbul: Beta Basim Yayin Dagitim.

Cerit Y 2008. Ogretmen kavrami ile ilgili metaforlara iliskin ogrenci, ogretmen ve yoneticilerin gorusleri. *Turk Egitim Bilimleri Dergisi,* *6*(4): 693-712.

Celikten M 2006. Kultur ve ogretmen metaforlari. *Erciyes Universitesi Sosyal Bilimler Enstitusu Dergisi*, *21*: 269-283.

Donmez O 2008. *Turk egitim sisteminde kullanilan yonetici metaforlari (Kayseri ili ornegi).* Master Thesis, Unpublished. Kayseri.: University of Erciyes.

Dos İ 2010. Aday ogretmenlerin mufettislik kavramina yonelik metafor algilari. *Gaziantep Universitesi Sosyal Bilimler Dergisi*, *9*(3): 607-629.

Dursun S, Dede Y 2004. Ogrencilerin matematikte basarisini etkileyen faktorler: Matematik ogretmenlerinin gorusleri bakimindan. *Gazi Egitim Fakultesi Dergisi*, *24*(2): 217-230.

Ekiz D, Kocyigit Z 2013. Sinif ogretmenlerinin "ogretmen" kavramina iliskin metaforlarinin tespit edilmesi. *Kastamonu Egitim Dergisi*, *21*(2): 439-458.

Ekizoglu N, Tezer M 2007. İlkogretim ogrencilerinin matematik dersine yonelik tutumlari ile matematik basari puanlari arasindaki iliski. *Cypriot Journal of Educational Sciences*, *2*(1): 43-57.

Eraslan-Capan B 2010. Ogretmen adaylarinin ustun yetenekli ogrencilere yonelik metaforik algilari. *Uluslararasi Sosyal Bilimler Dergisi*, *3*(12): 140-154.

Erdogdu YM 2006. Yaraticilik ile ogretmen davranislari ve akademik basari arasindaki iliskiler. *Sosyal Bilimler Dergisi*, *5*(17): 95-106.

Eren A, Tekinarslan E 2012, September. *Ogretmen, ogretme, ogrenme, ogretim materyali ve degerlendirmeye iliskin metaforlar: Yapisal bir analiz.* 2. Ulusal Egitim Programlari ve Ogretim Kongresi. Abant İzzet Baysal Universitesi, Bolu, Turkiye.

Ertan-Kantos Z 2011. Orgut metaforlarinda liderlik: Kavramsal bir cozumleme. *Egitim Bilimleri Arastirmalari Dergisi*, *1*(1): 135-158.

Goldstein LB 2005. Becoming a teacher as a hero's journey; using metaphor in preservice teacher education. *Teacher Education Quarterly*, *32*(1): 7-24.

Gordon T 2010. School is like an ant's nest: Spatiality and embodiment in schools. *Gender and Education*, *8*(3): 301-310.

Gultekin M 2013. The metaphors that primary education teacher candidates use regarding curriculum. *Education and Science*, *38*(169): 126-141.

Gunduz M 2014. Primary school students' thoughts about efficient teacher. *Yuzuncu Yil University Journal of Education Faculty*, *11*(1): 114-128.

Igwebuike TB 2013. Effects of conceptual change pedagogy on achievement by high ability integrated science students on energy concepts. *International Journal of Research Studies in Educational Technology*. 2(1): 3-14.

Kanjira TJ 2008. *Motivation and attitudes towards english as second language among learners in rural kwazulu-natal high schools.* Master Thesis, Unpublished. USA: *Michigan University.*

Karasakaloglu N, Saracaloglu AS 2009. The relationship between academic self-concept along with achievement, attitudes toward Turkish lesson of prospective elementary school teachers. *Yuzuncu Yil University Journal of Education, 6*(1): 343-362.

Kazazoglu S 2013. The effect of attitudes towards Turkish and English courses on academic achievement. *Education and Science*. *38*(170): 294-307.

Koc ES 2014. The metaphorical perceptions of classroom teacher candidates regarding teacher and teaching profession concepts. *Inonu University Journal of the Faculty of Education*, *15*(1): 47-72. doi:10.17679/iuefd.79408

Lakoff G 2009. *The Neural Theory of Metaphor. The Metaphor Handbook,* Cambridge University Press.

Lakoff G, Johnson M 2005. *Metaphors We Live By*. Chicago: University of Chicago Press.

Leavy AM, McSorley F, Boté LA 2007. An examination of what metaphor construction reveals about the evolution of preservice teachers' beliefs about teaching and learning. *Teaching and Teacher Education*, *23*(7): 1217-1233.

Leech NL., Onwuegbuzie AJ 2007. A typology of mixed methods research designs. *Qual Quant. 43*: 265–275

Levine PM 2005. Metaphors and images of classrooms. *Kappa Delta Pi Record*, *41*(4): 172-175.

Martinez MA, Sauleda N, Huber G 2001. Metaphors as blueprints of thinking about teaching and learning. *Teaching and Teacher Education*, *17*: 965-977.

Massengill-Shaw D, Mahlios M 2008. Pre-service teachers' metaphors of teaching and literacy. *Reading Psychology*, *29*(1): 31-60. doi:10.1080/02702711070156839

Minas, R. ve Gündoğdu, K. (2013). Ortaokul öğrencilerinin fen ve teknoloji dersine ait bazı kavramlara yönelik metaforik algılarının incelenmesi. *Adnan Menderes Üniversitesi Eğitim Fakültesi Eğitim Bilimleri Dergisi, 4(2), 67-77*

Nalcaci A, Bektas F 2012. Teacher candidates' perceptions regarding the concept of school. *Journal of Kirsehir Education Faculty, 13*(1): 239-258.

Nikitina L, Furuoka F 2008. "A language teacher is like…": Examining Malaysian students' perceptions of language teachers through metaphor analysis. *Electronic Journal of Foreign Language Teaching*, *5*(2): 192-205.

Noyes A 2006. Using metaphor in mathematics teacher preparation. *Teaching and Teacher Education*, *22*: 898-909. doi:10.1016/j.tate.2006.04.009

Oflaz G 2011, April. *İlkogretim ogrencilerinin matematik ve matematik ogretmeni kavramlarina iliskin metaforik algilari.* 2nd International Conference on New Trends in Education and Their Implications. Ankara, Turkey.

Oxford RL, Tomlinson S, Barcelos A, Harrington C, Lavine RZ, Saleh A, Longhini A 1998. Clashing metaphors about classroom teachers: Toward a systematic typology for the language teaching field. *System, 26*: 3-50.

Orten D, Erginer E 2010, May. *Turkiye'de egitimde program gelistirme alanındaki oncu akademisyenlerin egitimde program gelistirmeye iliskin metaforik algıları.* 1. Ulusal Egitim Programlari ve Ogretim Kongresi. Balikesir Universitesi Necatibey Egitim Fakultesi, Balikesir, Turkiye.

Orucu D 2012. Primary school teachers' metaphorical perspectives towards classroom and classroom management: A comparative case study. *Elementary Education Online, 11*(2): 342-352.

Ozdemir M 2012a. Examination of high school students' metaphorical school perceptions in terms of various variables. *Education and Science*, *37*(163): 96-109.

Ozdemir SM 2012b. Metaphoric perceptions of prospective teachers regarding the concept of curriculum. *Journal of Theoretical Educational Science, 5*(3): 369-393.

Palmquist RA 2001. Cognitive style and users' metaphors for the web: An exploratory study. *Journal of Academic Librarianship, 27*(1): 24-32.

Pektas M, Kildan AO 2009. A comparison of "teacher" metaphores generated by preservice teachers from different majors. *Erzincan Journal of Education Faculty, 11*(2): 271-287.

Rockoff JE 2003. *The Impact of Individual Teachers on Student Achievement: Evidence From Panel Data*. Harvard University, Cambridge, MA. Kennedy School of Government Pub.

Saban A 2009. Prospective teachers' mental images about the concept of student. *Turk Egitim Bilimleri Dergisi*, *7*(2): 281-326.

Saban A, Kocbeker BN, Saban A 2006. An investigation of the concept of the teacher among prospective teachers through metaphor analysis. *Educational Sciences: Theory & Practice, 6*(2): 461-522.

Sadik F, Sari M 2012. Child and democracy: Examination of elementary education school students' democracy perception by metaphors. *Cumhuriyet International Journal of Education*, *1*(1): 48-62.

Semerci C 2007. A view to the new primary school curricula with the metaphors relating to "curriculum development". *Cumhuriyet University Journal of Social Sciences*, *31*(1): 139-154.

Soydas S, Guven B 2009. Ogrencilerin hayat bilgisi dersinde demokrasi kavramı ile ilgili olusturduklari metaforlarin incelenmesi. *International Symposium on Democracy and Democracy Education in Europe*, Canakkale, Turkiye.

Tasdemir A, Tasdemir M 2011, April. *Metaphors on teaching process and teachers; produced by the teachers.* 2nd International Conference on New Trends in Education and Their Implications. Antalya-Turkey.

Tasgin A, Kose E 2015. Preservice classroom teachers' metaphors about objective and evaluation. *Hacettepe University Journal of Education*, *30*(3): 116-130.

Tatar N, Murat S 2011. Perceptions of the preservice teachers toward assessment. *E-International Journal of Educational Research, 2*(4): 70-88.

Toluk Ucar Z, Piskin M, Akkas EN, Tasci D 2010. Elementary students' beliefs about mathematics, mathematics' teachers and mathematicians. *Education and Science, 35*(155): 131-144.

Valli L, Reckase M, Raths J 2003. Tea*cher education, program outcomes, teaching practice, and pupil achievement on state tests.* Paper presented at the American Educational Research Association annual meeting. Chicago, IL.

Wu H 1999. Professional development of mathematics teachers. *Notices of the Ams*, *4*(5): 535-542.

Yalcin MO, Eren A 2012, September. *Lise ogrencilerinin matematik dersine iliskin metaforlari, tutumlari ve basarilari: İliskisel bir analiz.* 2. Ulusal Egitim Programlari ve Ogretim Kongresi, Bolu, Turkiye.

Yalcin M, Erginer A 2012. Metaphoric perception of principals in primary schools. *Journal of Teacher Education and Educators*, *1*(2): 229-256.

Yildirim A, Simsek H 2008. *Sosyal Bilimlerde Nitel Arastirma Yontemleri.* (7. ed.). Ankara: Seckin Yayincilik.

Yilmazer A, Demir SB 2014. An investigation into the relationship between learners' academic achievement and their attitudes towards social studies lesson and the teacher. *Turkish Studies, 9*(2): 1705-1718.