The Postgraduate Education of Teachers and its Effects on Their Instructional Activities

Selahattin Arslan[1]

Fatma Kara[2]

Abstract

This study investigates the contributions of the postgraduate education to in-service training of teachers and its reflections into classroom setting. For this purpose, volunteer teachers and courses mostly chosen by them were selected and skills these courses aim to provide were determined. The sampled teachers were also observed and interviewed.

The study highlighted coherence between the qualities that teachers supposed to have and the skills aimed to be gained via this education and therefore, confirmed that postgraduate education contributes to in-service training of teachers. Finally, although teachers do their best to put these skills into practice, some skills can not be applied properly due certain difficulties explained in this article.

Keywords: Postgraduate education, teachers training, classroom settings

1. Introduction

Since the educational process mainly occurs in school setting, three fundamental elements of educational system; curriculum, teacher and students become really important. Besides, teachers hold the important responsibilities of distributing curriculum to students and preparing them for life by improving their academic and vocational skills. So, teaching is a major profession requiring expertise and therefore teachers should be educated as individuals equipped with the skills of learning to learn, determining own weaknesses and relieving them (Şişman, 1999). This situation escalades the importance of teacher education and highlights the needs for specialization, practical applications and also; continuity and innovation in teacher education (Ersoy, 2002).

Teacher education supplied by education faculties in Turkey is managed by similar institutions in different countries. Arslan & Özpınar (2008) by reviewing recommended sourcebooks and interviewing with candidate teachers stated that future Turkish teachers

[1] Assit. Prof. Dr. Karadeniz Technical University, Fatih Faculty of Education, *selaharslan@yahoo.fr*
[2] Teacher, Rize Province National Education, *fatimiza@mynet.com*

are being educated in a way to have essential, fundamental skills and knowledge. Although candidate teachers are given sufficient pre-service education, certain studies put forward that teachers in charge have difficulties in lots of different issues. For example; reflective teaching skills (Gelbal & Kelecioğlu, 2007; Duban & Küçükyılmaz, 2008); applying renewed primary school curriculum (Dindar & Yangın, 2007; Şeker, 2007); teaching and learning processes (Kıncal, Ergül & Timur, 2007; Gök & Sılay, 2008) ; integrating ICT in instruction (Göktaş, Yıldırım & Yıldırım, 2008; Usluel, Mumcu & Demiraslan, 2007; Umay, 2004); assessment (Kayhan, 2008; Orbeyi & Güven, 2008, Duban & Küçükyılmaz, 2008; Yapıcı & Leblebiciler, 2007).

All those above show that teachers still have some weaknesses after pre-service education they got. On the other hand, even experienced teachers face unanticipated, extreme situations and problems that they seek ways to overcome. At the same time, in this age of fast technological and social advancements, student needs are diversifying continuously along with the fast propagating knowledge.

For the mentioned reasons above, among others; fundamental skills and knowledge of teaching profession, given at education faculties, can not be sufficient throughout teachers' whole professional career. This highlights the necessity of In-service Training (IST). Therefore with the help of IST, teachers will be able to harmonize themselves with the changes and developments in social life and other fields; they will be equipped with or remedy deficiencies in terms of their necessary skills and attributions (Semerci, 2005). Actually, at the end of IST, teachers are supposed to gain contemporary knowledge and skills, practice these skills and knowledge in their classrooms to affect student learning and disseminate them among other teachers to contribute school progress (Day, 1999).

Since IST is defined as educational activities teachers join to improve the quality of education, develop their knowledge, skills and attitudes (Bolam, 1982), postgraduate degrees of teachers can be accepted as IST and this education can be expected to have similar quality and effects.

Although there are studies mentioning gains from different IST courses and the effects of these gains in classroom settings (Harland & Kinder,1997; Somers & Sikorova, 2002), no such studies have carried out in Turkey (Ayas *et al.,* 2007; Miser, Yayla & Sayın, 2006). On the other hand, when we overview the studies focusing teachers' postgraduate education, it is seen that they have been clustered around certain issues: problems faced by teachers taking postgraduate degrees and their advisers and suggestions to solve them (Kuzu & Becit, 2007; Güven & Tunç, 2007; Aslan, 2007; Bakioğlu & Gürdal, 2001), efficiency of the postgraduate education supplied (Bümen, 2006), expectations of postgraduate students and actualization level of these expectations (Demir, 2007). In an exceptional study, Alhas (2006) with a questionnaire, tried to determine the opinions of teachers taking postgraduate degrees about skills they gained and function of postgraduate education.

Finally, it was observed that there have been no studies, at least in Turkey, inquiring efficiency of such education *i.e.* whether the gained knowledge and skills were put into practice. Alhas (2006) is the exception of what we have just mentioned but the data were questionnaire based; course contents were not investigated; and there were no classroom observations in that study. On the other hand, for teachers to put these knowledge and skills into practice, postgraduate education should be designed in order to satisfy teachers' needs, which makes content analyze necessary.

For these reasons, we believe that there is a need for a study; stating knowledge and skills that the postgraduate courses aim to provide to teachers, whether this education possess the aspects expected from IST, and investigating the effects of this education on teacher development and classroom practices. In this context, the present study aims at satisfying these objectives. Concerning the width of the aim, this study is restricted to postgraduate educations of mathematics teachers. The following research questions were chosen to orient the study:

A. What kinds of skills were aimed to be gained by mathematics teachers taking their postgraduate degrees?

B. Does the postgraduate education contribute to in-service training of teachers?

C. To which extend do mathematics teachers reflect their postgraduate education gains onto classroom setting?

2. Method

Since this study needs a deep and detailed analyze, it was conducted with case study method. To determine the sample, the courses aiming to attain observable learning gains in the classroom setting were primarily chosen (see. 3.1). Then the teachers were chosen from volunteers, the ones who have taken all or most of the determined courses and working for closer schools to the centre of Trabzon province (See Table 1). Thus, the sample of the study, which is performed in 2007-2008 school term, was composed of 4 mathematics teachers continuing their postgraduate educations at Karadeniz Technical University.

Table 1. Profiles of the teachers participating to the study

Teacher code	Gender	Professional experience	School	Postgraduate education	Phase of education
A	Male	6	Primary	Master's	Thesis
B	Female	5	Secondary	PHD	Thesis
C	Female	5	Primary	Master's	Taking Courses
D	Female	5	Primary	Master's	Thesis

2.1. Data Collecting Tools

Different data collecting methods were used and the procedure steps below were followed:

- Contents, lecture notes, sourcebooks of the chosen courses were analyzed and classified to determine the skills these courses aim to provide to teachers. To obtain elaborate information about these skills and to improve the classification, lecturers of the courses were interviewed.

- To determine the reflections of these skills onto classroom setting, unstructured observations were carried out in classrooms and teachers were interviewed with semi structured interviews.

By applying observation and interview tools together, we aimed to test the consistency between the answers to the interviews and behaviours in the classrooms, and also to enrich the data by determining some unobserved behaviours via interviews or *vice versa*.

Each teacher was observed for 6 classroom hours and distinctive points related to the determined skills were recorded. The observations were conducted according to the skills stated in section 3.2. The teachers were interviewed with questions inquiring the same aspects as the observation criteria. The aim of the interview was to reveal; whether the teachers gain the intended knowledge and skills of the courses; and whether they practice these gains in their instructions. Therefore in the interviews the teachers were asked questions like; whether they include Computer Assisted Instruction in the learning environments they prepare; how and with which tool they apply assessment; how they evaluate measurement results; whether they catch up with the innovations in a researches shoes *etc*. Then audio recordings of the interviews were scripted, printed and confirmed to participants for the sake of the reliability of the study.

2.2. Data analysis

After the documents of concern reviewed, the skills which are intended to be gained were determined. The criteria set by considering characteristics of the ideal teacher defined by the literature review and content analysis of the data of the document analysis. The criteria which are easy to be observed in the classroom were chosen (see 3.2). During observations, conditions like teacher's role in the classroom, student-teacher and student-student interaction, students' discussion process were evaluated distinctly. As the next step of the study, the data obtained from the interviews were objected to descriptive and content analyses. In descriptive analyze, the validity and significance of the interview data were considered.

3. Findings & Discussion

The findings of the study will be given under two titles:

3.1. Skills That Need To Be Gained During Postgraduate Education Courses

The findings obtained by document analysis to determine the skills are presented under the titles of the related courses. These findings were confirmed by related lecturers. Accordingly, skills that each lesson aims to provide and the teacher qualities relevant to these skills are given below:

3.1.1. Learning Environment Design (LED)

The course concerns theoretical knowledge about learning theories and the applications of this knowledge. Some of the skills that the course aims to provide are; preparing and implementing group work in learning activities of teachers, problem-solving based environment, environment suitable for constructivist learning theory, computer assisted environment *etc*.; preparing and using materials; determining and removing student misconceptions.

The course has two main parts. The first one contains theoretical knowledge like; teaching theories; requirements of the learning environments that are set up based on these theories; situations, restrictions, advantages and disadvantages of the implementation of the design. And in the second part, teachers are expected to design applicable learning environments regarding the theoretical knowledge provided during the first part of the course. The designed environments are shared with other postgraduates for correction and improvement. Then, they are applied in the teacher's classroom and results are shared with lecturer and other postgraduate students.

3.1.2. Computer Assisted Mathematics Instruction 1–2 (CAMI)

The aim of this course is to introduce and teach applying software used in mathematics instruction such as; Cabri, Derive *etc*. The teachers taking this course are expected to improve themselves both in learning the features and usage of the software and preparing and implementing activity sheets by using the related software.

The delivery of this course can be considered in two parts. In the first part, acquainted with the software, teachers are asked to solve some problems *via* the software. For the second part of the course, teachers are supposed to design computer assisted instruction environments, implement them in the classroom setting and share the results with their course-mates.

3.1.3. Diversity in Thinking Mathematics Instruction

The aim of this course is to introduce some important francophone mathematics teaching theories (Theory of Didactical Situations, Settings and Interplay between Settings, Theory of Semiotic Register of Representation *etc*.) and examine their applications. In order to

make teachers investigate the effects of these theories based applications on learning, they are expected to perform studies to put their course knowledge into practice.

Some of the skills teachers are expected to gain during this course are: to investigate and understand learning phenomena; to prepare and apply learning environments suitable for mentioned theories; to anticipate and relieve probable student misconceptions; to utilize different settings and representations and shifting between them.

3.1.4. Theories & Practices in Professional Development of Teachers

As a priority, this course aims to induce awareness towards teachers professional development. It also targets to teach professional development techniques and to develop reflective thinking skills. To fulfil them, teachers should inquire themselves with questions like "What do I not know? How much am I competent?" and they should convey their classroom experiences into the course. The course delivered in lecture setting with classroom discussions and the teachers are assigned to prepare and present a literature review.

Some of the skills that this course supplies with are: to get to know about the developments in educational field and increase competences by gaining the skills of participating in professional activities; to know about demands and expectations of families; to observe and cooperate with elite teachers practicing good things and improve human resources; to gain reflective teacher skills.

3.1.5. Alternative Assessment Approaches

This course, carried out mostly in lecture setting, aims to equip teachers with the skills of applying the alternative assessment approaches in classrooms. The participants are expected to conduct an elaborate literature review and obtain extensive knowledge about the application of the related methods.

Some of the skills teachers are expected to have at the end of the course are: to recognize alternative assessment approaches; to guide students and include them in assessment process; to give timely and effective feedback; to improve critical thinking skills of students.

3.1.6. Overall Classification of Skills

Before classifying the skills that the courses are intended to provide, it is good to remember the skills that an ideal teacher should possess. Studies on this issue classified these qualifications in different categories (YÖK 1998; Arslan & Özpınar, 2008; MoNE, 2006). Based upon related studies, qualifications that teachers should have can be grouped under three main titles: Personal and professional development related qualifications; Teaching–learning process related qualifications and Assessment related qualifications.

The document analyze presented above show that the first three courses are teaching-learning process related, the forth one is personal and professional development related, and the remaining one is assessment related.

The skills that the courses aim to provide were regrouped so that they could be observed more easily (see. 3.2). Day (1999) says that ISTs can be held for variety of reasons as; to improve knowledge of teachers, to prepare them for the new roles they are going to act, and to inform them about the alterations in curricula *etc*. As Section 3.2 shows, the gains of teachers from the postgraduate courses above are coherent with the gains from ISTs cited by Day (1999).

3.2. Projections of Experiences Gained on Classroom Setting

Considering the data obtained, the skills that the courses aim to provide are presented under nine subtitles below:

3.2.1. Reflective Thinking Skills

Reflective thinking is defined as; an individual's self assessment of his teaching-learning process and correcting determined mistakes to improve learning actions (Ersözlü, 2008). Various indicators should be checked to detect whether a teacher possesses this skill. Some indicators determined as attributing to reflective thinking skills and the states of the teachers in the sample are shown in Table 2.

Table 2. Characteristics of Reflective Thinking.

↓Characteristics\Teachers→	A	B	C	D
Being open to questions and reactions	x	x	x	x
Setting up discussion platform	x	-	x	x
Facilitating peer interaction	x	-	x	x
Preparing/applying activities and worksheets	-	-	x	x
Emphasizing group work	-	-	x	x
Making students keep diary	-	-	-	x

It was determined that, teacher A, C and D set up discussion platform and facilitate student-student interaction and moreover they use peer correction for determining and make student realize their own mistakes. On the other hand teacher C and D prepare activities and worksheets to support persistent learning and they put emphasis on group work and try to facilitate student interaction and discovery learning. Additionally, teacher D assesses both herself and her students by using the diaries kept by the students and even though teacher B's classroom is rather teacher centred, she always welcomes student questions and reactions, students freely express themselves and they can assert their solutions and meanings even when they are wrong.

On the other hand, all 4 teachers submitted affirmative answers to the questions; "Do you assess yourself?" and "Do you change your instruction according to assessment results?"

As it is seen, all teachers act positively towards student questions and reactions during instruction and build democratic classroom environments. So, they can be referred as having reflective thinking skills. This finding supports the result of Köksal & Demirel (2008) saying that candidate teachers taking reflective teaching training use reflective thinking skills in their lessons more frequently than candidate teachers who did not take such training.

3.2.2. New Approaches in Assessment

As it is known, portfolio, research and project tasks, observation, peer assessment, diary *etc*. can be referred as some of the alternative assessment methods. In the interviews the teachers were asked two questions like; "What kind of measurement tools do you use? How do you use that?" Answers given to these questions show that all the teachers use the compulsory assessment methods: classroom performance, written examination and project & performance assignments. This finding is similar to findings of Duban&Küçükyılmaz (2008). Based upon classroom observations it was determined that the teachers perform different applications related to alternative assessment methods. The findings can be summarized as; teacher B, who works at a secondary school, uses none of the alternative assessment methods except for the compulsory ones; among the primary school teachers, A uses self assessment form, presentation and activity dossier beside compulsory ones; C assesses classroom performances of students with puzzles, fill in the blanks or true/false exercises, and assigns performance tasks; whereas D uses portfolio and diary.

Combining observation and interview results, it can be seen that the assessment methods other than the compulsory ones are not regularly used and the teachers argue that crowded classrooms adversely affect the application of these methods. This finding complies with the findings of Yapıcı & Leblebiciler (2007).

3.2.3. Giving Effective Feedback

It is well known that contemporary assessment approaches accept giving feedback as a competence expected from an ideal teacher. The observation data and the data from the answers to the question "how and what kind of feedback do you give?" in the questionnaire are coherent; and they show that all the teachers give feedbacks; underline missing parts and misunderstandings and guide students. To do this, the teachers use the written examinations most. Teacher A reports that he gives feedback while answering examination questions with students and checking students activities in portfolios; teacher B; while answering exam questions and evaluating annual assignments; teacher C by writing notes on exam papers and performance tasks and by distributing them back; and teacher D while reading exam papers and diaries. While the feedbacks given by the teachers investigated, it is determined that they used clear and direct expressions.

3.2.4. Student Centred Approach

In student centred approach; students reach knowledge by actively participating (group-work, problem solving *etc*.) in a learning environment. The observations performed show that all students in each teachers' classrooms participate to the lessons actively. Besides, it was determined that primary school teachers A, C and D make students seek the truth by debates, present the topics by discovery learning, by using activities, in a very constructivist learning theory friendly way as the new curriculum expects, whereas teacher B applies a teacher based teaching approach. As excuses for this situation she puts forward National Student Selection Examination and that the concepts taught in secondary school are the extensions of the ones in primary school so students have already known these concepts.

3.2.5. Using Different Representations

As it is known each mathematical concept has different representations. For example; function concept can be expressed by one of different representations like algebraic, graphical, *etc*. Duval (1995) argues that a student can be accepted as comprehend a concept truly only when he recognizes these different representations of the same concept and associates the relations between them.

Data collected demonstrate that the teachers have different applications about using different representations in mathematics education, which is persistently mentioned in postgraduate courses. It is observed that while teacher D frequently includes shifting between representations, even the rest of the teachers sometimes use them, they do not recall them regularly.

3.2.6. Interplay between Settings

In a different point of view from Duval's, Douady (1986) stated that a group of related mathematical concepts come together in accordance with certain rules to form, what she calls, a mathematical settings. She affirms that interplays between settings should be used in order to assist student and increase their learning.

Concerning the interviews and observations, even though it depends on the features of the topic, it can be said that teachers use interplays between settings, however, it is not at adequate level. It was specified that teachers C and D sometimes and teachers A and B rarely apply associations between settings.

3.2.7. Designing and Applying Different Learning Theories Based Environments

The collective analyze of interviews and observations are summarized in Table 3 (**I** stands for interviews, **O** is for observations). About this issue the teachers were asked; "Do you design and apply environments based on different learning theories in your teaching-learning activities?"

Table 3. Learning theories used by sampled teachers

↓Theories\Teachers→	A	B	C	D
Cooperative learning	I		O	I-O
Problem based learning			I-O	I-O
Constructivist Learning theory	I	I-O	I-O	O
Discovery learning	I-O			I
Computer assisted learning			I	I-O
Multiple intelligence theory	I		O	I-O

The interviews show that teacher A primarily adopts discovery learning strategy; he facilitates group works based on cooperative learning and he guides classroom tasks by organizing working groups according to problem based learning. He remarked that he prepares computer assisted environments based on constructivist learning theory, however he does not apply them in the classroom. Nevertheless the observations of teacher A's lessons and interviews with him are not coherent. As a matter of fact, he only used discovery learning based environments during the observations. This can be explained by limited number of observations.

By interviews and observations, it was determined that teacher B does not prepare various learning environments based on different Learning Theories; she only uses teacher centred environments plus discovery learning based approach during instruction and she does not organize group works.

Teacher C was observed as frequently designing learning environments suitable for new Turkish constructivist curriculum and discovery learning and utilizing cooperative learning. Besides, although in the interview she noted that she puts importance on applying computer based environments, this has not been observed.

When the data about teacher D reveals that she tries to design and apply environments based on constructivist approach and discovery learning; she concerns multiple intelligence theory and attaches importance to group works.

The available data implies that teachers C and D design and apply environments based on different learning theories more frequently than teachers A and B do. Actually, the reasons for which teachers A and B include such different applications less (crowded classrooms, low student readiness level, dense curriculum) are similar as they are in Korkmaz&Gür (2006) and Cüre&Özdener (2008).

3.2.8. Using ICT in Instructional Activities

Although in the interviews about ICT usage teachers A and C reported that they use ICT and some of the classrooms have necessary infrastructure, none of the teachers used ICT

during the observed instructions as it can be seen in Table 3. During the observations, only teacher B used Cabri once in Geometry class. She tried to draw triangles in Cabri to find out the source of error when students and the teacher reached different results of a problem related to similarity in triangles. Then one of the triangles could not be drawn in Cabri so she realized that the question itself was wrong.

Teacher D put forward inadequacy of the computer laboratory and teacher B mentioned about time shortage as reasons for not using ICT. Thus, obtained data indicates that the participant teachers exploit little or no ICT in their classrooms, which agrees to previous literature (Umay, 2004; Usluel, Mumcu&Demiraslan, 2007; Göktaş, Yıldırım&Yıldırım, 2008).

3.2.9. Removing Student Misconceptions

The data show that the participant teachers give weight to identifying and removing student misconceptions. For example; with the observations it was determined that teacher B identifies student misconceptions by utilizing different resources and prepares and applies tests to remove them; teacher D determines misconceptions *via* assignments.

At the same time, all the teachers have different methods of remedy misconceptions: teachers A and B prefer removing misconceptions by solving questions while C and D do it with the help of activities. As an example; C made the students draw a circle with compasses and then asked them to draw the circular area inside to highlight the difference between circle and circular area surrounded by a circle.

In the interviews the teachers were asked the question: “What do you do to detect and remove misconceptions?” The answers tell that all the teachers orient their instructional activities considering misconceptions. Related to this issue teacher A reported that certain misconceptions exist among majority of the students and he devises and applies activities to remove these misconceptions; teacher B said that she adopted problem solving method. On the other hand, teacher C noted that she had applied some misconception identification tests from national and international literature in her classroom and tried to remedy them. Finally, teacher D mentioned that she uses diaries and examination papers to determine misconceptions and that she prepares materials to relieve them and sometimes she goes back and review the topic.

3.3. Skills That Can Be Observed Indirectly

In this part, skills that provide professional development for teachers but cannot be observed in the classroom are concerned. For this aim, the following three questions were asked in the interviews: “Do you follow the recent developments related to your field and allover education?”, “Do you share experiences and lesson plans with other teachers?”, and “Do you participate in IST seminars?”

For the first question it was revealed that all the teachers keep themselves update about their fields and education from the internet, by reading articles, newspapers and by

exchanging information with other teachers. The answers for the second question show that all the participant teachers share their experiences with other teachers; in one way or another. Besides the teachers also share their lesson plans, activities they prepared, examination question *etc*. Namely, teachers A, C and D share their experiences and lesson plans on the internet forums, however teacher B only shares with the teachers in her school. For the last question; teacher A and D said that they join ISTs as occasion serves; teacher C said quite a lot and teacher B said none but she was going to join this year. Taking into account the answers for this question, it can be said that the teachers have not participated in adequate number of ISTs. They gave their workloads and inefficiency of the ISTs as excuses.

Considering section 3.2 and its subtitles, in a general view teachers can be said to put the skills gained into practice. However their applications sound rather poor about; Using New Assessment Approaches, Interplay between Settings, Using ICT in Instructional Activities *etc.* The reasons for these inadequate applications are sometimes individual incompetence, in some cases lack of school infrastructure and some other reasons.

4. Conclusion

The principal results drawn from the obtained data of the present study, aiming to determine the skills which postgraduate education aims to provide to mathematics teachers and the reflections of these skills into the classroom setting, can be listed as follows:

There is a clear coherence between the qualities that teachers are supposed to have and the skills aimed to be gained to teachers by postgraduate education. In consideration of the courses investigated in the present study, it can be concluded that most of the personal and professional related, teaching-learning process related and assessment related basic skills of mathematics teachers are aimed to be gained or improved by postgraduate education. This study also states that teachers disseminate these gains by sharing. However, no particular kind of education is supplied with postgraduate education towards certain skills related to personal and professional development such as; to be an expert on social affairs, to fulfil his/her professional responsibilities and to follow the regulations.

So, does postgraduate education contribute to in-service training? Considering the agreement between the qualities that an ideal teacher should possess and the skills aimed to be provided by the postgraduate courses which were analyzed here, it can be said that postgraduate education contributes to IST. Harland&Kinder (1997) listed teacher gains by IST as; acquiring theoretical knowledge, change in thinking, emotional gains, motivation and change in attitude, gaining knowledge and skills, institutional effect (positive effect on other teachers and their applications) (cited by Ayas *et al*., 2007). As it is seen there is a distinctive similarity between skills that postgraduate education aim to provide and teacher gains at the end of IST as Harland&Kinder (1997) explained.

About one of the fundamental aims of the study; the state of teachers about reflecting these skills onto classroom setting, it can be deduced that these skills are put into practice to

a large extent. On the other hand, it can be said that sometimes and some skills can not be applied properly because of individual incompetence of teachers or school or classroom infrastructure or for some other reasons. For example; it was specified that classroom applications of the teachers are not at a satisfactory level about interplay between settings, which is an essential element of mathematics teaching, and of a contemporary must; ICT. When it comes to assessment it can be said that; teachers mention about giving effective feedback and they use assessment results not only for grading, but also for evaluating their own practices and they shape future instructions according to assessment results. Still, there are some non-teacher originated problems about using new approaches in education.

To sum up, postgraduate education provides teachers with opportunities of gaining new knowledge and skills, influencing student learning by practicing these knowledge and skills, contributing school development and change by affecting other teachers. These are what exactly teachers are supposed to have at the end of IST (Day, 1999).

References

Alhas, A., 2006. Lisansüstü eğitim yapmakta olan Milli Eğitim Bakanlığı öğretmenlerinin lisansüstü eğitime bakış açıları, Master's Dissertation, Institute of Educational Sciences, Gazi University, Ankara.

Arslan, S. & Özpınar, İ., 2008. Öğretmen nitelikleri: ilköğretim programlarının beklentileri ve eğitim fakültelerinin kazandırdıkları, Necatibey Eğitim Fakültesi Elektronik Fen ve Matematik Eğitimi Dergisi, 2, 38–63.

Aslan, G., 2007. Ankara Üniversitesi Eğitim Bilimleri Enstitüsüne kayıtlı doktora öğrencilerinin lisansüstü öğretime ilişkin sorunları, *Milli Eğitim Dergisi*, 174, 250-269.

Ayas, A., Akdeniz A. R., Çepni S., Baki A., Çimer A. & Odabaşı Çimer, S., 2007. A study of in-service education effectiveness. Ministry of National Education, Project Coordination Center, Final Report.

Bakioğlu, A. & Gürdal, A., 2001. Lisansüstü tezlerde danışman ve öğrencilerin rol algıları: yönetim için göstergeler, *Hacettepe University Journal of Education*, 21, 9–18.

Bolam, R., 1982. School focussed in-service training. London: Heineman Educational Books.

Bümen, N. T., 2006. Doktora eğitimi yapan öğrencilere yönelik yürütülen "Öğretimde Planlama ve Değerlendirme" ile "Gelişim ve Öğrenme" derslerinin değerlendirilmesi, *Journal of Theory and Practice in Education*, 6, 9–43.

Cüre, F. & Özdener, N., 2008. Öğretmenlerin Bilgi ve İletişim Teknolojileri (BİT) uygulama başarıları ve Bit'e yönelik tutumları, *Hacettepe University Journal of Education*, 34, 41–53.

Day, C., 1999. Developing teachers: the challenges of lifelong learning. London: Falmer Press.

Demir, C. (2007, October). Lisansüstü eğitim alan öğrencilerin eğitim-öğretim sürecinden beklentileri ve beklentilerinin gerçekleşme düzeyi. (Paper presented at the 3th Lisansüstü Eğitim Sempozyumu, Eskişehir).

Dindar, H. & Yangın, S., 2007. İlköğretim Fen Ve Teknoloji Dersi Öğretim Programına geçiş sürecinde öğretmenlerin bakış açılarının değerlendirilmesi, *Kastamonu University Education Journal*, 15, 185–198.

Douady, R. (1986), Jeux de cadres et dialectique outil-objet, *Recherche en didactique des mathématiques*, 7/2.

Duban, N. & Küçükyılmaz, A., 2008. Sınıf Öğretmeni Adaylarının alternatif ölçme-değerlendirme yöntem ve tekniklerinin uygulama okullarında kullanımına ilişkin görüşleri, *Elementary Education Online*, 7(3), 769–784.

Duval R. (1995). Sémiosis et pensée humaine. Bern: Peter Lang.

Ersoy, Y., 2002. Bilişim çağı eşiğinde sınıf ve matematik öğretmenlerinin yeni işlevler ve roller edinmeleri, *Elementary Education Online*, 1(2), 52–61.

Ersözlü, Z. N., 2008. Beceri öğretiminde yansıtıcı düşünme. *Elementary Education Online*, 19, 34–36.

Gelbal, S. & Kelecioğlu, H., 2007. Öğretmenlerin ölçme ve değerlendirme yöntemleri hakkındaki yeterlik algıları ve karşılaştıkları sorunlar, *Hacettepe University Journal of Education*, 33, 135–145.

Gök, T. & Sılay, İ., 2008. Fizik eğitiminde işbirlikli öğrenme gruplarında problem çözme stratejileri öğretiminin problem çözmeye yönelik tutum üzerindeki etkileri, *Journal of Theory and Practice in Education*, 4, 253–266.

Göktaş, Y., Yıldırım, Z. & Yıldırım, S., 2008. Bilişim Teknolojilerinin ilköğretim ve ortaöğretim ile bütünleştirilmesindeki anahtarlar: öğretmenlerin algıları ve kullanımları, *Hacettepe University Journal of Education*, 34, 127–139.

Güven, İ. & Tunç, B., 2007. Lisansüstü öğretim öğrencilerinin akademik sorunları (Ankara Üniversitesi Eğitim Bilimleri Enstitüsü Örneği), *Milli Eğitim Dergisi*, 173, 157–171.

Harland, J. & Kinder, K., 1997. Teachers' continuing professional development: framing a model of outcomes, *British Journal of In-service Education*, 23 (1): 71-84.

Kara, F., 2008. Matematik öğretmenlerinin lisansüstü eğitim deneyimleri ve okul yaşantılarına yansımaları, Unpublished Master's dissertation, Karadeniz Teknik Üniversitesi, , The Graduate School of Natural and Applied Sciences, Trabzon.

Kayhan, N., 2008. İlköğretim okulları I. kademede görev yapan sınıf öğretmenlerinin yeni ilköğretim programlarını kabullenmişlik düzeyleri ve mesleki doyumları arasındaki ilişkinin incelenmesi, Unpublished Master's Disseration, Çukurova University, Institute of Social Sciences, Adana.

Kıncal, R., Ergül, R. & Timur, S., 2007. Fen Bilgisi öğretiminde işbirlikli öğrenme yönteminin öğrenci başarısına etkisi, *Hacettepe University Journal of Education*, 32, 156–163.

Korkmaz, E. & Gür, H., 2006. Öğretmen adaylarının problem kurma becerilerinin belirlenmesi, *Journal of the Institute of Science and. Technology* of Balıkesir University, 8.

Köksal, N. & Demirel, Ö., 2008. Yansıtıcı düşünmenin öğretmen adaylarının öğretmenlik uygulamalarına katkıları, *Hacettepe University Journal of Education*, 34, 189–203.

Kuzu, A. & Becit, G. (2007, September). Öğretmenlerin lisansüstü eğitimde karşılaştıkları sorunlar ve çözüm önerileri. (Paper presented at the 3th Lisansüstü Eğitim Sempozyumu, Eskişehir).

MoNE. 2006. Öğretmenlik mesleği genel yeterlikleri. *2590 sayılı Tebliğler Dergisi*. Turkish Ministry of National Education, Ankara.

Miser, R., Yayla, D. & Sayın, M., 2006. Assessment of Ministry of Education In-service education activities. Milli Eğitim Bakanlığı, EARGED, Ankara

Orbeyi, S. & Güven, B., 2008. Yeni İlköğretim Matematik Dersi Öğretim Programı'nın değerlendirme öğesine ilişkin öğretmen görüşleri, *Journal of Theory and Practice in Education*, 4(1), 133–147.

Semerci, N. 2005. Problem temelli öğrenme ve öğretmen yetiştirme, *Milli Eğitim Dergisi*, 33.

Somers, J. & Sikorova, E., 2002. The effectiveness of one in service education of teachers course for influencing teachers' practice, *Journal of In service Education*, 28(1):95-114.

Şeker, S., 2007. Yeni İlköğretim Altıncı Sınıf Fen ve Teknoloji Dersi Öğretim Programının öğretmen görüşleri ışığında değerlendirilmesi (Gümüşhane İli örneği), Unpublished Master's Dissertation, Karadeniz Technical University, Institute of Educational Sciences, Trabzon.

Umay, A., 2004. İlköğretim Matematik Öğretmenleri ve Öğretmen Adaylarının öğretimde Bilişim Teknolojilerinin kullanımına ilişkin görüşleri, *Hacettepe University Journal of Education*, 26, 176–181.

Usluel, Y. K., Mumcu, F. K. & Demiraslan, Y., 2007. Öğrenme-öğretme sürecinde Bilgi ve İletişim Teknolojileri: öğretmenlerin entegrasyon süreci ve engelleriyle ilgili görüşleri, *Hacettepe University Journal of Education*, 32, 164–178.

Yapıcı, M. & Leblebiciler, N. H., 2007. Öğretmenlerin Yeni İlköğretim Programına ilişkin görüşleri, *Elementary Education Online*, 6(3),480–490.

YÖK & Dünya Bankası, 1998. Fakülte-okul işbirliği: Milli Eğitimi Geliştirme Projesi hizmet öncesi öğretmen eğitimi, Ankara: YÖK.