Prospective teachers' skills in planning and applying learning-teaching process

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Abstract: With the reconstruction of the curricula in Turkey, important changes have existed in the activities of education and teaching. That is why it has become an important case of research to determine how much student teachers know about the process of learning-teaching. This study aims to show how are student teachers capable are of planning and applying the process of learning-teaching effectively. Thus, eighteen senior student teachers from the Department of the Primary School Mathematics Teaching at the Education Faculty of a university in Turkey were interviewed in a semi-constructed way. At the end of the study, it was determined that the student teachers knew the activities in the new primary school mathematics curricula, most of them found themselves competent enough to prepare materials and apply them, but they were not competent enough to use mathematics software although they knew them and they were insufficient in the approaches which the new primary school curricula are based on. In light of the results acquired from the study, it is suggested that the student teachers should be taught to use worksheets at the different stages of the lessons through exercises and also they should be informed of how to use the computer programs and the approaches on which the new primary school curricula are based in the environment of learning-teaching.

Key words: student teachers; the process of learning-teaching; student teachers' knowledge and skills

1. Introduction

Education as an important constituent of economical and social development has been changing continuously everywhere on the world. Depending on this, the concept of "knowledge" and the understanding of "science" have also been changing rapidly. While technology has shown quick improvements on the one hand, problems related to converting from industrial society and globalization to knowledge society are seen, on the other hand. The globalization process with this rapid changes and developments process has been determinative not only on economy but also on social and cultural areas. These developments have also started the forming stage of "knowledge society". Naturally, there is a strong need for reflecting these movements to education and perceiving the requirements of the future world.

In addition, forces like "scientific and technological developments", "developments in teaching and learning approaches and educational sciences", "Turkey's dramatic results from PISA, TIMMS and PIRLS" drive renewal curriculum. Therefore, in Turkey, in the light of these developments, it has been aimed to renew primary and secondary education curriculum with a holistic approach.

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The new teaching programs take all changes and developments on the world as a reference. Recently, curriculum in North America, Far East Asia and EU Countries attempts to have a great value in this manner. Mathematics programmes in the United Kingdom, USA, Canada, Ireland, Singapore, France and Malaysia were examined carefully. Common characteristics in these programmes can be summarized as follows: (1) being student-centered; (2) requiring students to learn by discovering, investigating, observing and researching; (3) contextual teaching; (4) differentiating student needs; (5) emphasizing conceptual learning; (6) putting emphasis on the aesthetic and entertaining aspects of mathematics; and (7) stressing reasoning, relating and problem-solving rather than memorizing. It was necessary to adapt new Turkish programs to these programmes.

With the changing curricula, teachers and students can be said to take over some different roles. Some roles of students can be described as individuals who are active participants and are able to ask questions, interrogate, discuss, present problems and solve them, cooperate with others and make an evaluation. As for the teachers' roles, they can be described as individuals who are able to improve themselves, guide students, develop activities and also let students ask questions, discuss about something and think (Kıroğlu, K., 2006; MoNET, 2005, 2006a).

In the programme definitions such as the quickly and slowly learning, student are given instead of the well learning and poorly learning student. The former mathematics curricula usually adopted the teacher-centered methods and as a result of this, the rules were learnt by heart and only operational learning was achieved in classrooms. Learning environments and the changes in the process of learning-teaching are found on the basis of the new primary school curricula adopting the theory of constructivism. According to the new curricula, the teacher should come to class by preparing well-planned activities and should use equipment and materials such as worksheets, packaged software, overhead projectors and video recorders in the environment of learning (Bukova-Güzel, A. & Alkan, H., 2005). Qualified teachers of mathematics who can prepare such kinds of equipment, materials and use them all effectively should be trained so that students will fulfill the tasks they are in charge of (Ersoy, Y., 2002).

There are some important points for teachers to plan and apply the process of learning-teaching effectively. These can be summarized as follows: developing and applying the student-centered activities which consider the method of association in lessons and care about the student's interests, needs and motivation and offer technology effectively and support cooperation (Bukova-Güzel, A. & Alkan, H., 2005; Kıroğlu, K., 2006; MEB, 2006a; MEB, 2006b; Pesen, C., 2005).

There has been considerable research conducted on the process of learning-teaching. However, no study has been encountered in order to determine the knowledge of student teachers about the process of learning-teaching. Some researchers have studied the student teachers' perceptions of technology and developing materials (e.g., Yanpar Şahin, T., 2003), some have dealt with teachers' use of curriculum materials (e.g., Grossman, P. & Thompson, C., 2008; Remillard, J. T., 2005) and others have studied on how the process of learning-teaching should be and what the problems encountered in this process (e.g., Bukova-Güzel, A. & Alkan, H., 2005). In his study Ünver (2002) has reached a conclusion that student teachers who receive the student-centered teaching training quite differ from those not receiving it in terms of the skills in planning and applying the student-centered teaching. In his research, Pesen (2005) described and evaluated the process of learning-teaching in order to determine how suitable the new primary school mathematics (1st to 5th year classes) curricula were for the constructivist learning approach. Bukova-Güzel and Alkan (2005) conducted a study on how much the changes were followed in the reconstructed primary school curricula and what kinds of problems were encountered and they also reviewed the process of learning-teaching. Çakmak (2008) explored the student teachers' concerns about

the teaching profession, teaching methods, planning, instruction, evaluation and classroom management. In their study Wang, Odell and Schwille (2008) explored the effects of teacher induction on beginning teachers' teaching with using review of the literature.

In light of the above-mentioned explanations, with the changes made by the Ministry of National Education, it is inferred that student teachers' skills should be boosted in these subjects as well when they are in the pre-service training (http://www.yok.gov.tr/egitim/ogretmen/aciklamaprogram.doc). Because however carefully the programs are prepared, it is the teachers who will run the program effectively. That is why teacher training is very important to realize the desired education in schools and in this context education faculties undergo a heavy burden. In short, this study discusses "How skilled the final-year student teachers are in planning and applying the process of learning-teaching desired in the new primary school curricula".

2. Methods

The main aim in the study is to highlight how skilled the student teachers are in planning and managing the process of learning-teaching effectively and to make evaluations about it. Towards the aim of the study, the method of case study was used within the framework of the descriptive approach.

The sample selection was made randomly for the study. The study sample included 18 senior student teachers, eight of whom were men and ten of whom were women, studying at the Education Faculty of a university in Turkey in the 2006-2007 academic year.

In this study, semi-constructed interviews were used as a means of data collection. When the interview questions were prepared, the points below, which the student teachers were expected to have knowledge and skills about the process of learning-teaching, were taken into consideration:

(1) Preparing activities

Parallel to students' needs, teachers are expected to develop and perform activities in which students can build their knowledge and use this knowledge in different situations. For this purpose, it was aimed to show how competent the student teachers found themselves in preparing activities and what sources they used when preparing activities.

(2) Preparing and using materials

For students to understand especially abstract concepts better, teachers should be competent enough to prepare and use materials (audio-visual materials, reflectors, models, two and three dimensional visual learning materials etc.). For this purpose, the student teachers were asked some questions to determine how competent they found themselves in preparing and using materials and how much they knew about worksheets, one of the most frequently used materials in teaching.

(3) Using technology in teaching

Teachers should use new technologies in their lessons and in all education-related activities in order to attract students' attention to the lesson and to make learning easier etc. So, it was aimed to show for what purposes the student teachers used technology, what computer programs they knew and whether they could use them in the education-teaching environment or not.

(4) Having knowledge about the approaches that the new primary school curricula prioritize

Recently, a radical change has come into existence in the Turkish primary and secondary school teaching curricula. The approaches on which the process of learning-teaching is based are one of the most important factors

of the new reform of curricula. The student teachers were asked some questions to determine what they knew about the theory of constructivism and the theory of multiple intelligences, which the new primary school curricula cover.

Before the interview, the questions were prepared, evaluated by an expert and edited where necessary. The collected data were arranged and interpreted according to the research problem. The student teachers were encoded as ST1, ST2, … and parallel to the above-mentioned items, the answers they gave to the questions were written in order.

3. Findings and discussion

The analyses of the findings acquired from the interviewed student teachers are presented in this section.

3.1 The student teachers' knowledge and skills in preparing activities

The first question asked to the student teachers was as follows: "Do you find yourselves competent enough to prepare activities in any subject of mathematics?" Out of the student teachers, 16 people said yes and two said no.

Feeling incompetent in doing activities, ST8 and ST13 emphasized that they could easily perform the activities in the textbooks but it was difficult to prepare activities for 7th and 8th years students' subjects. This is probably because they developed activities only for the 6th year students' mathematics curricula in the lessons they attended.

Another question asked to the student teachers finding themselves competent was as follows: "What kind of activities would you prepare if you saw some students having difficulty in adding and subtracting negative and positive integers?" Most of the student teachers stated that they could use the activities in the textbooks on the market and the activities their classmates prepared. A large number of the student teachers gave the activity of "(+, -) number stamps" as an example (ST1, ST2, ST3, ST4, ST6, ST7, ST10, ST12 and ST18). Except for the activity of number stamps, ST2, ST4, ST11 and ST16 stated that the activities such as "elevations above or below the sea level, loan problems and reading the numbers on a thermometer" would help to understand the subject better.

The student teachers' views about this subject are as follows:

> There are activities we can do with the number stamps. … We know that one "-" number and one "+" number equals "0" …. If we drop one "-" number and one "+" number into the box, there will not be any value of number in the box and it equals "0". If we drop another "-" number and another "+" number into the box, it will not be any value of number in the box again and it equals "0". If we take "-" numbers out of the box, "+" numbers will be in the majority and vice versa. (ST1)
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> I read from some source that mentioned stairs to teach the negative and positive integers. Suppose that you were on the ground-floor, it would be a minus if you went downstairs and it would be a plus if you went upstairs. For example, I would prepare a worksheet. On the worksheet, I would draw a child standing by the stairs. Let's say I teach how to add "-" and "+" integers. Suppose that the child in the picture first took two steps down and then took three steps up, we would take it as "-" (minus) because he first went downstairs and then we would take it as "+" (plus) because he went upstairs. As a result, the child would be on the first floor above "0". The student himself can follow this process step by step on the worksheet. (ST3)
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> As far as we learned from the lesson of Special Teaching Methods, we can teach the students "-" and "+" numbers with the number stamps. Additionally, we can make the subject more concrete in the student's mind by giving examples from everyday life. For example, borrowing and lending money or going up and down the sea level, i.e., examples of the altitude. We can bring a thermometer to class and do activities with it. (ST4)

When these answers are considered, the student teachers can be said to know about the activities in the

curricula and textbook.

3.2 The student teachers' skills in preparing and using materials

In the interviews of the student teachers, except for ST5, ST10, ST13 and ST15, they stated that they found themselves competent enough to prepare and use materials. Of the student teachers feeling incompetent, ST5 and ST10 said that they believed preparing materials would get better with experience. ST13 and ST15, on the other hand, said that they found themselves incompetent because they could not find any opportunity for enough practice.

The views of some student teachers about this subject are as follows:

> We took the course of Teaching Technologies and Material Development and learned how to make PowerPoint presentations and prepare worksheets. We made carton cubes and prisms in order to prepare materials in our field in the course of Special Teaching Methods II. In short, we can prepare teaching materials easily. (ST14)
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> I feel inadequate to make PowerPoint presentations. I myself cannot prepare slides. If I get them photocopied on transparencies, I can use them with an overhead projector. I cannot make a PowerPoint presentation, though. We once had a homework assignment and we could not prepare and submit it to the teacher … (ST15)

The answers given by the student teachers were taken into consideration and some questions were asked about worksheets, one of the most frequently used materials in the process of teaching-learning too. Worksheets, which can be used at any stage of the lesson, can be applied for different purposes like attracting the student's attention to the lesson, telling the subject and making an evaluation. Students usually learn a subject through exploration thanks to such kinds of materials they can use in individual or group work.

The interviews show that the student teachers evaluate the worksheets differently. ST5 defines the worksheet as "A piece of paper used to make students understand a subject better", whereas ST8 sees the worksheet as "A means which facilitates the student's comprehension and sometimes strengthens it".

Some other student teachers see the role of the worksheet differently, for example, "The worksheet is a piece of paper helping to get feedback from the student. It shows where the student is inadequate, about what concepts he is mistaken or where he has difficulty in the applications", says ST1. "The worksheet is a piece of paper which the teacher prepares in order to correct the conceptual mistake of the student on a subject and strengthen the student's comprehension", says ST12. These students' remarks present this situation.

It concluded from the student teachers' answers that although the student teachers know about worksheets, most of them are seen not to have enough knowledge about worksheets. Most of the student teachers said that worksheets could be used only at the end of the lesson (ST1, ST2, ST4, ST5, ST6, ST7, ST15, ST16 and ST18), while some of them said that worksheets could be used at the beginning or at the end of the lesson (ST12, ST13 and ST14). The rest (ST8, ST9, ST10, ST11 and ST17) said that worksheets could be used at any stage of the lesson. In light of these findings, most of the student teachers can be said to see worksheets as a means of evaluation.

3.3 The student teachers' skills in using technology for teaching

The majority of the student teachers agreed that they could use technology in order to prepare materials and offer the computer-aided teaching and do research from the Internet. ST9 says, "To me, technology can be used in education in every way. For example, an overhead projector in class, a PowerPoint presentation on the computer, a documentary or a short film on the video recorder or an experiment can be used as a show". ST9's remarks support this situation.

But, it is concluded from the interviews that although the student teachers have general knowledge about at

least two pieces of mathematics software (Cabri, Logo, Coypu, gibi) and additionally Microsoft Office programs, the majority of them feel inadequate to use these programs (ST1, ST4, ST5, ST6, ST11, ST12, ST13, ST15, ST16, ST18). They said it was because they took the computer lesson for one semester and they could not practise it intensively.

Some of the student teachers (ST1, ST5, ST7, ST14, ST16 and ST18) expressed that they were worried about the application of the teaching technologies. ST14 said that the application of the teaching technologies would be difficult due to the fact that the technical infrastructure of schools was inconvenient:

> Teachers can run the lesson with PowerPoint presentations, projectors or transparencies. But, in my opinion, the feasibility of these is low. We learned these technologies at the faculty, but we saw that few of them could be used in the schools where we went for application. Schools cannot offer any projectors and computers. There are a few overhead projectors, whereas there are a lot of classrooms in schools. So, these technologies can be applied in schools offering good opportunities like colleges maybe.

On the other hand, there are also student teachers who feel inadequate in this field:

> It can be an economic burden on the teacher. Besides, student teachers should be trained in this field successfully and we are not adequate in this subject. (ST5)

Consequently, the student teachers feel inadequate in this field and they think that they will encounter difficulties in application due to the fact that schools are insufficient for the technical infrastructure.

3.4 The student teachers' skills in using the approaches the new primary school education curricula prioritize

In this section, the student teachers were asked some questions about the student-centered teaching, active learning and the theory of multiple intelligences. Most of the student teachers agree that the student-centered teaching is a teaching method in which the interests, needs and expectations of the student are in the center. About this subject, ST5 says, "The student should be in the center as well as his interests, needs and expectations. The student should be satisfied with necessary and sufficient information and he should say, 'I can do'. We should let him do it and we should guide him. Information should not be given directly. For example, the groupwork is student-centered and it is an approach in which active participation is higher and in short, it is completely student-centered". ST6 agrees with ST5 and says, "It is an education in which the student is in the center. That is to say everything should be arranged according to the student and his level of development should be considered. His interests, skills and individual differences should be considered as well".

As it can be concluded from the student teachers' answers, it is determined that the student teachers have inadequate knowledge about the student-centered education. Some of the student teachers used the expression of "active learning" in order to define the student-centered education (ST2, ST5, ST7, ST10, ST12, ST13 and ST17). Hereupon, the student teachers were asked to offer some activities for students to become more active. Some of the student teachers suggested that the question-and-answer method and groupwork for students become more active (ST3, ST8, ST10, ST11, ST16 and ST18). ST1, ST5, ST7, ST12 and ST14 said that they could do activities which can allow students to learn through exploration and make them involved in learning effectively. ST2, ST4 and ST9 said that they could make students associate the subjects in the lesson with everyday life so they could make students become more active. A few of the student teachers were seen to have completely wrong knowledge about this subject (ST6, ST13 and ST15).

The views of some of the student teachers are as follows:

> On entering the classroom, we should draw the attention of the students and we, for example, can do this by narrating a story. This story can be related to a recent event like a piece of news about the subject. Then, we should motivate the student. When all these things are done, the active participation is achieved. (ST2)
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> For students to become active, I try to do activities that will activate the students. Instead of the demonstration method, in which students watch their teacher doing activities in class, I would make the students do activities that will keep them busy and make them interested in the lesson and I would enable them to do the work by themselves. (ST7)
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> In my opinion, the groupwork is the most effective method. This is because nobody will stay passive in the name of the communication among themselves and everybody will be driven to do something in an active way. (ST16)

As it is concluded from the student teachers' answers, the student teachers have wrong and incomplete knowledge about "active learning". It was determined that none of the student teachers, using the concept of "active learning" when defining the student-centered education, had enough knowledge about this subject (ST2, ST5, ST7, ST10, ST12, ST13 and ST17).

From the interviews made with the student teachers, it was determined that the student teachers had knowledge about the theory of multiple intelligences and they were asked some questions about what to do in order to determine the different intelligence types of students. When the answers are examined, ST2, ST5, ST11 and ST16 agree that intelligence types can be determined through the guidance service and cooperation with other teachers in schools. ST3, ST4, ST8 and ST12 think that this job needs a process of time in which they can make observations. ST6, ST7, ST9, ST13 and ST17 stated that different intelligence types could be determined by doing activities towards different types of intelligence. ST1, ST10, ST14, ST15 and ST18 remained unclear and did not give clear answers about what to do.

The student teachers' answers about this subject are as follows:

> We cannot determine it at one time. So, we need a process of time for it. We first need to get to know the student. The rest falls to the teacher and he should be versatile when doing activities. (ST4)
>
> In my opinion, the basic way to determine these is to do activities with different features or give tests to students. Through the activities towards different intelligence types like naturalist intelligence, intrapersonal intelligence and musical intelligence, we can determine which student is more successful in which intelligence type in class. (ST9)
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> I can talk to students' previous teachers and apply to their guidance and psychological consultant in school. I can talk to their guardians and obtain information about their past. (ST11)

4. Conclusion and suggestions

In light of the data gathered from the interviews, it was concluded that the student teachers felt competent enough to prepare activities and they knew about the activities in the curricula. It was determined that although most of the student teachers felt competent enough to prepare and use materials, they were short of knowledge about the worksheet, which is one of the most frequently used materials in the process of learning-teaching. It was determined that the student teachers did not know where to use the worksheet during the course of the lesson and most of them saw the worksheet as a means of evaluation.

According to the results acquired from findings, the student teachers think that they can use technology to prepare materials, to do the computer-aided teaching and to do research from the Internet. It was concluded that although all the student teachers knew about at least two pieces of mathematics software and Microsoft Office programs, most of them did not feel competent enough to run the lessons by using these programs.

It was determined that they did not have sufficient knowledge about the student-centered education and active education, which the new curricula adopt. Furthermore, although the student teachers know about the

theory of multiple intelligences, some of them have inadequate knowledge about how to determine the intelligence types of students.

When the results are taken into consideration, the following suggestions can be made:

(1) The student teachers should be shown how to use worksheets, one of the most popular materials in the process of learning-teaching, at the different stages of the lesson;

(2) The student teachers should be given more detailed information about the student-centered education, active learning and the theory of multiple intelligences and should be provided with the environments where they can apply them;

(3) In addition to teaching the computer programs, the student teachers should be given information about how to use these programs in the environment of education and teaching and the hours of the computer lesson should be increased.

References:

Baki, A. (2006). *Mathematics education: Theory to practice (3rd ed)*. Trabzon: Derya Bookstore.

Bukova-Güzel, A. & Alkan, H. (2005). Evaluation of pilot implementation of restructured primary school curriculum. *Educational Sciences in Theory and Practice, 5*(2).

Çakmak, M. (2008). Concerns about teaching process: Student teachers' perspective. *Educational Research Quarterly, 31*(3), 57-77.

Ersoy, Y. (2002). The innovative functions and roles classroom and mathematics teachers undertake under the prism of information technologies. *Primary School-Online, 1*(2), 52-62. Retrieved May 13, 2009, from http://www.ilkogretim-online.org.tr.

Grossman, P. & Thompson, C. (2008). Learning from curriculum materials: Scaffolds for new teachers? *Teaching and Teacher Education, 24*, 2014-2026.

Kıroğlu, K. (2006). *Primary school new curricula with additional explanations for trainers and learners*. Ankara: Pegema Publishing.

Ministry of National Education Turkey (MoNET). (2005). *Primary school 1st-5th grades curriculum, Ministry of National Education Turkey board of education and discipline presidency*. Ankara: Government Books Printing Office.

MoNET. (2006a). *Board of education and discipline, primary school 6th-8th grades mathematics course curriculum*. Ankara.

MoNET. (2006b). *General directorate of teacher training Turkey, support to basic education project "Teacher Education Component" general competences of teaching profession*. Ankara.

Pesen, C. (2005). Evaluation of new curriculum of primary school mathematics course regarding to constructivist learning approach. *Reflections on Educaiton: 8th Symposium of Evaluating New Curricula*, Erciyes University Faculty of Education. Kayseri, Turkey.

Remillard, J. T. (2005). Examining key concepts in research on teachers' use of mathematics curricula. *Review of Educational Research, 75*(2), 211-246.

Ünver, G. (2002). *Development of planning, application and assessment skills of candidate teachers in student centered instruction.* (Unpublished Doctoral Dissertation, Hacettepe University)

Wang, J., Odell, S. J. & Schwille, S. A. (2008). Effects of teacher induction on beginning teachers' teaching: A critical review of the literature. *Journal of Teacher Education, 59*(2), 132-152.

Yanpar Şahin, T. (2003). Student teachers' perceptions of instructional technology: Developing materials based on a constructivist approach. *British Journal of Educational Technology, 34*(1), 67-74.

Retrieved Feb. 20, 2008, from www.yok.gov.tr/egitim/ogretmen/aciklama program.doc.

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