



THE OPINIONS OF PRE-SERVICE SCIENCE TEACHERS ON SCHOOL PRACTICE

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Abstract:

The aim of this research is to identify the problems faced by the pre-service science teachers in the process of school practice, and to determine possible solutions. School practice is very important in establishing theory-practice relationships for the candidate teachers. A qualitative design was employed for this research study. The participants of this study were 14 pre-service science teachers who pursued in their studies in the academic year period of 2016-2017. A semi-structured interview form was used as a data collection tool. In the research findings, it was revealed that the teachers had problems in planning the teaching during its practice. During the application of teaching, in addition, deficiencies in teaching methods, techniques and measurement and evaluation methods used by candidate teachers were observed. It was found that the pre-service teachers used most likely experimental pre-service science teachers used more traditional assessment tools.

Keywords: science, pre-service science teachers, school practice

1. Introduction

Teacher is one of the most important factors in the teaching process. Effective teacher is the one who responds to the needs of the students and provides suitable feedback in their work. It is also the other task of the teacher to reveal the individual differences and learning styles of the students. One of the first steps the teacher should take is to determine the appropriate teaching strategy for the purpose of the course. The teaching method to be used must actively involve all students in the teaching process.

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Teaching practice is very important in terms of establishing theory-practice relationships for candidate teachers. The success of the teaching process is, largely, the result of planning with a high degree of teaching quality. The training program consists of the dimensions of acquisition, content, teaching-learning process and evaluation. These theoretically prepared program dimensions are applied in the classroom by the shaper of the teaching process, the teacher. An effective and lasting learning depends on the effective planning and implementation of the program's dimensions. Therefore, the prospective teachers find the opportunity to apply the theoretical knowledge they acquired during their undergraduate education in the course of the application of the program in teaching practice. In this respect, this practice contributes to the professional development of the candidate teachers before they start their career.

While preparing the lesson plans in the course of teaching application process, the candidate teachers also find the opportunity to observe how to consider and incorporate the environmental conditions, student characteristics, subject characteristics, physical conditions, and the tools and materials situation of the school. In other words, during trainee application period the candidate teachers find an opportunity to practice teaching planning, choose appropriate content, determine the appropriate teaching methods and techniques and how to organize the educational environment in order to realize their aimed achievements. Furthermore, they get the opportunity to learn what tools, resources and materials to use in the teaching-learning process and how to make an assessment in reality.

The first step in planning the learning-teaching process is to determine purpose, goals and strategies. This process constitutes the source of the regulation of many activities, including class management as well as the selection of methods, techniques and tools (Fidan, 1985). Another important step is to determine student characteristics. Determining the cognitive, affective and psychomotor characteristics of students is a necessity for teaching to be successful. Academic achievement increases when students' learning styles are reflected in the teaching-learning process (Cushner, McClelland & Safford, 2008). Learning style is a useful tool for differentiating teaching (Sprenger, 2008). Therefore, it is very important to plan the learning-teaching process accordingly by revealing the individual differences and special needs of the students.

The choice of teaching method and technique is made depending on the characteristics; at this stage, the level of the student also need be considered. The success of students increases when different teaching methods match with the strengths and needs of students (Tomlison, McTighe, 2006). Since, in selecting a method, the main variable is the quality of the aims, determining the level of taxonomic level of the aim among the learning areas constitutes the main problem (Gökçe, 2014). Whether or not

the learning outcomes are realized or how much they are realized reveals in the evaluation process.

The foundation of teaching is the communication between teacher and student. Unless this communication is normal, no matter how well the purpose, subject, environment and other teaching materials are prepared, an efficient education does not materialize (Binbaşıoğlu, 1994). Therefore, classroom management is very important for achieving the goals. Even if the most effective teaching program is implemented, or the latest model tools and materials are used a teacher whose classroom management is weak cannot be successful. A healthy communication between the teacher and the students in the classroom will make it easier for the teacher to manage the class. Students see the teachers they love and respect as leaders (Levine, 2009). For this reason, prospective teachers have the opportunity to observe and practice the application of all the stages of the teaching-learning process thanks to the teaching practice they have done in schools.

2. Aim of the Research

The aim of this research is to identify the problems faced by the prospective science teachers in the teaching-learning process during the teaching practice and to determine the possible solutions. Towards this aim, the answers to the following questions are sought:

1. How are the prospective teachers planning teaching in their classes?
2. Which methods and techniques do the prospective teachers use in the processing of the topics?
3. Which tools and equipment do the prospective teachers use during the teaching-learning period?
4. What measurement tools does the prospective teacher use to assess whether the goals have been achieved?

3. Method

Qualitative research case scientific design method has been used descriptive study with a phenomenological design is used in this research to find out the problems that science teacher candidates have experienced in the course of teaching practice and to find solutions. In qualitative research, patterns are natural in the context of making them in everyday living spaces, and the researcher does not try to change the phenomenon (group, event, community). Observations are made in real-world settings, with open-

ended questions in the interviewees' own environments (Patton, 2002). The advantages of qualitative data are that they are derived from everyday events that take place naturally, giving us a real life situation. In addition, qualitative data helps us to present complex situations with rich and holistic content (Miles, Huberman, Saldana, 2014). While attempting to determine statistical relations between variables in quantitative analysis, it is tried to reveal themes and codes among descriptive data in qualitative analysis (Johnson, Christensen, 2012). In qualitative research, qualitative data collection methods such as observation, interview and document analysis are used and inherent perceptions and events are revealed in a realistic and holistic view (Yildirim & Simsek, 2013).

A teacher candidate for the qualitative data of the study was determined. I selected 14 candidate science teachers among the senior students of Muğla Sıtkı Koçman University selected 14 science teachers who were studying in the fourth spring semester by using the objective sampling method. Purposive / purposeful sampling allows researchers to conduct research in depth by selecting rich situations in terms of information. (Büyüköztürk et al., 2011).

3.1 Tools of Data Collection

The interview form for the qualitative data of the study was prepared as a semi-structured draft. In qualitative research, it is aimed to examine in depth the feelings and thoughts of the interviewees. (Tanrıöğen, 2009) In four education programs, the program development and measurement evaluation expert, four science teachers' views were taken as expert opinions, two science teachers were interviewed about whether the questions were understandable and the answers were appropriate for the research questions. At the end of this process, the scope of the interview form was re-examined, adjusted and prepared for implementation.

3.2 Analysis of Data

After the interviews were coded by the researcher, the transcripts of interviews were read separately by the other investigator and the necessary arrangements were made by discussing the issues of "opinion association" and "opinion separation". The records of the teacher interview were coded by another science educator and the coefficient of correspondence was calculated. For this purpose, the reliability formula of Miles and Huberman (1994) was used.

$P = Na \text{ (Vision Alliance)} / Na \text{ (Vision Alliance)} + Nd \text{ (Vision Separation)} \times 100$ (Miles and Huberman, 1994).

In that case, the percentage of complaints is 87.43%. Values with a compliance percentage of 80% or greater are acceptable (Neuendorf and Yürük, 2005). The percentage of code points for this study is acceptable, however. While qualitative analysis was conducted, direct quotations were made from participating teachers to support comments. The personal information of the teacher candidates participating in the interview is kept and the teacher candidates are coded as T1, T2, T3 ... T14. For example, T1 shows the first teacher candidate who participated in the interview, T6 shows the sixth teacher candidate.

Table 1: Working Groups

	Frequency	%
Woman	8	57
Man	6	43
Graduated High School Type		
Normal High School	6	43
Anatolian High School	8	57
Science High School	-	
General Academic Average		
1.00-1.99	-	
2.00-2.49	4	29
2.50-2.99	8	57
3.00-3.49	2	14
3.50-400	-	

4. Results

Table 2: Codes for responses to the question "*How did you plan teaching in your lessons?*"

	Frequency	%
Lesson Plan	7	2,4,5,7,9,11,12
Earnings	4	3,4,6,8
Tools	4	1,3,5,8
Evaluation	3	4,6,13
Teaching Methods	1	7

Half of the prospective teachers (7) stated that they would plan teaching by making a lesson plan, taking into account the achievements, providing the instrumental material and specifying what kind of evaluation process would be done. Teacher candidates expressed their views as follows:

"We need to have a lesson plan. We get caught unprepared if we go to class unplanned. Otherwise we will be surprised at what we will do for a lesson" (T5)

"I start teaching by presentation. When it comes to the place, I want to add the students with the other methods. If I always apply the same method, the students shift their message from one point to another. "(T7)

Table 3: Codes for answers to the question *"Which method, technique do you use in the processing of topics"* directed to the teacher candidates?

	Frequency	Teacher Candidates
Presentation Method	8	1,3,5,7,9,11,13,14
Inventive Method	7	2,4,6,8,9,11,12
Question and Answer Method	5	2,3,6,8,11
Brainstorm Technique	3	3,7,10
Discussion Method	3	4,5,9
Six-Hat Thinking Method	2	5,7
Trip and Observation Method	1	6

As shown in Table 3, half of the prospective teachers indicated that they would use brainstorming technique, six hat thinking techniques, by means of presenting by way of half, by way of invention, question-answer method, They expressed their views as follows.

"I was using the presentation for a long time. I prefer to use the brainstorming technique, students are a bit hesitant. I cannot say that it is very productive for this reason. In the meantime, we also use the classical question-and-answer method. There is another one I use more, but it does not come to mind right now" (T3)

Table 4: Which teaching materials do you use in the *"learning-teaching process"* directed towards the candidate teachers? Code responses to the question.

	Frequency	Teacher Candidates
Test Material	10	1,3,4,5,7,9,11,12,13,14
Textbook	7	3,4,6,7,9,11,12
Internet	4	1,2,4,6
Computer	4	2,4,6,9
Smart Board	2	2,8
Poster	1	9

As seen in Table 4, most of the prospective teachers indicated that they use the materials of experiment; half of them used the internet and computers in the course book, and the most of them. Teacher candidates expressed their views as follows.

"We use experimental materials that exist at our disposal. Sometimes, however, there is no experimental material or it is too old. That's why there's so many experiments we cannot do. We can actually experiment with very simple materials, but sometimes we do not show this effort." (T7)

Table 5: Codes of responses to the question "Which measurement tools do you use to evaluate whether the achievements are attained" directed to the teacher candidates?

	Frequency	Teacher Candidates
Test	10	1,3,5,6,7,9,11,12,13,14
Gap-Filling	7	2,3,5,7,8,9,11
Question-Answer Method	7	3,5,6,8,11,12,14
Portfolios	3	5,7,11
Peer Review	2	7,11

As can be seen in Table 5, most of the prospective teachers indicated that they used measurement assessment tools such as test, half-space filling and question-answer assessment, portraits and peer evaluation at very high. They expressed their views as follows:

"We use classical methods, such as testing. We also use methods like portfolio, but it takes a lot of time to use it." (T7)

"I am trying to use measurement assessment tools such as peer assessment, but this requires a lot of work. This sometimes causes anxiety." (T11).

5. Discussion and Conclusion

Planning is necessary to be effective in teaching. This allows the teachers to be prepared for the class. It can be said that half of the teacher candidates are positive to be prepared to emphasize the lesson plan. Due to the fact that the other half of the teacher candidates do not plan, it can be said that the candidates will not be able to perform effective teaching because they will be unprepared for the classes.

Activities should be determined in advance according to the level of the students, and what teaching objectives the students' subjects will achieve. In this way, it can be said that what will be taught in teaching activities will be realized efficiently and effectively. But half of the teacher candidates never mentioned this plan. The success of the teaching process depends on planning large scale teaching. Therefore, it can be said that the teacher candidates are unplanned about what, why and how to do in the learning-teaching process.

Planning in teaching is the pre-design of which teaching activities will be chosen to reach the determined educational goals, why and how to make them available to the students, what kind of ancillary and complementary resources and tools will be used and how the achievement will be assessed (Demirel, 2004). Only three of the teacher candidates mentioned the tools and evaluation process. In the classroom, however, the tools provide convenience for presenting contents while helping students to understand the facts and events by simplifying them. In addition to providing a rich learning environment (Yalin, 2012), tools and equipment used on-time and on-site provide a multi-learning environment, help students meet their individual needs, attract attention, and make it easy to remember. They provide concrete details, save time, enable safe observation, provide consistent content at different times, they can be used over and over again, simplify their content and simplify their understanding. Despite these are many benefits, most of the prospective teachers did not mention the tools in the plan.

When planning, the subjects should take place in accordance with the gains. It is also necessary to take into account the level of the students and their individual differences. Which teaching method, technique and tools should be used according to the subjects? Teacher candidates mentioned only three tools and teaching methods. Therefore, it can be said that most of the prospective teachers ignore certain principles when planning the teaching, so that the prospective teachers will be unprepared for the classes.

In order for the learning process to be efficient, appropriate methods, techniques and strategies should be selected for this purpose (Açıkgöz-Ün, 2007). In choosing a method, it is very important to establish the nature of the objectives first. It is also very important to choose the learning styles of my students and to take this into account when choosing a method. It is important that the learning styles of the students are known by both themselves and their teachers (Çelik, 2012).

One of the most important points in the learning teaching process is to identify and apply the appropriate method and technique that takes into consideration the differences, subject, student level and individual differences. In addition, a single

method alone may not suffice to realize all achievements (Gözütok, 2000). Teaching strategies are directly related to student achievement (Marzano, Pickering & Pollock, 2010). In short, the teacher should know how to teach as much as what to teach. Teacher candidates have indicated that they use teaching strategies by way of presentation and invention. In presentation strategy, the teacher is mostly at the center of the teaching process. Since more teachers will be active in the course of instructional strategy through teaching, the teaching process will not be used for a long time and if it is necessary to use it, other methods and techniques will be beneficial for an efficient learning process. Recently, it is recommended that teachers use a lot of teaching methods and techniques in science curricula. It is suggested to use a teaching strategy by presentation as little as possible. Thus, the learning environment can be made more active by adding the students to the learning-teaching process.

Very few of the prospective teachers talked about the brainstorming technique, the method of discussion, and the technique of thinking with six hats. The discussion method can provide active participation of the whole class in the teaching process. Similarly, the brainstorming technique can produce creative thoughts and many ideas in a short time. But the rapid application of the brainstorming technique can make it difficult for some students to participate. It may be difficult for low-level students to generate ideas. In this case, the teacher can provide student participation by creating a warm, engaging atmosphere away from criticizing his or her ideas. Despite these limitations, the discussion method and the brainstorming technique have many positive contributions to the learning-teaching process. The fact that very few of the prospective teachers include discussion method and brainstorming technique which are among the active teaching methods and techniques can be considered as negativity.

The six-hat thinking technique can allow students to look at a subject from many different angles. This technique can also help problem-solving skills by providing students with effective participation in the learning process. In short, it can allow students to think multi-faceted. Sometimes it is not possible to apply your technique to every subject. The fact that few teacher candidates are involved in six-hat thinking techniques, an active teaching technique that allows pupils to look at the subject from different angles, can be viewed as a negative.

Effective learning can be achieved with many different methods and techniques that activate the student during the learning-teaching process. In this process, it is necessary to choose the teaching methods according to the aims to be gained. The teaching method that will be used in accordance with the aims of the course and its subject will positively affect learning. Placing many teaching methods and techniques without knowing how to use the teacher unnecessarily can also adversely affect

learning. For this reason, while using the methods and techniques, the teacher should be very aware of what should be considered according to the subject, the characteristics of the students, the content of the lesson, and the appropriateness of teaching materials. There are many active teaching methods and techniques that can be used by teachers such as vision improvement technique, case study method, project method, experiment method, sightseeing and observation method, creative drama method and station method. But teacher candidates did not mention any of these teaching methods and techniques that they could be active in the learning process. It can be said that either the teacher candidates are not aware of these teaching method techniques or do not know how to use these teaching methods and techniques.

In the course of science, constructing the concepts of science in mind by analyzing and interpreting with the help of tools and equipment has a great importance. In this context, it can be said that in case of problems in the lack of equipment, students will not be able to develop their practical skills and scientific; creative thinking and problem solving skills will not be developed. The use of tools improves the learner's skills of motivation, interest, reading and writing as well as imagination, critical thinking and problem solving skills (Ogle and Beers, 2009). Technology and education are two important concepts that are closely related to each other (Downing, 2001; Rennie, 2001). The use of computers in the classroom environment has been shown in many studies to be successful (Siva and Tung, 2001; Chang, 2001; Tsai and Chou, 2002). Therefore, it can be said that the use of computers in the process of teaching and learning of teacher candidates is positive. In order for knowledge to be permanent, in addition to using technology effectively in the learning-teaching process, it is quite effective to use visual-appealing materials such as banners and posters in the learning-teaching process. Especially in the course of teaching science in science class, banners, auxiliary resources, and model could be very effective, but research findings reveal that models, banners and posters that develop visuality are rarely used. In the light of these findings, it can be said that the teacher candidates are not sufficient in terms of tools and materials.

The evaluation process is very important to determine whether the achievements are realized at the end of the learning process. In this process, there are alternative measurement tools such as performance evaluation, diagnostic branching tree as well as traditional measurement evaluation tools such as tests. While the traditional assessment approach is more cognitive domain and success, the alternative assessment approach considers the cognitive, emotional and psychomotor domain achievements as well as the development process. In other words, both traditional assessment and product evaluation are performed in the alternative assessment and evaluation of the product

and process. In the process of self-evaluation and peer evaluation, the student can actively participate in the evaluation process as a speaker. Therefore, the prospective teachers indicated that they use more traditional assessment tools. At present, it is revealed that only the achievement evaluation is done at the end of the learning teaching process and the process is not evaluated besides the success. It also turns out that there are no processes in which the student is active, such as peer review. However, there are many alternative assessment tools such as project, concept map, structured grid, self-assessment, and teachers have never mentioned them. According to these results, it can be said that the teacher candidates are not aware of these measurement methods and techniques or do not know how to use them.

6. Recommendations

The mentor application teachers should lead science teachers by actively taking part in the preparation of the science teacher candidates' science courses. In particular, an instructional plan should be made, including taking into consideration the individual characteristics of the students in order to be able to realize the achievements. Teaching methods and techniques should be appropriately selected appropriate to the topic and purpose. Well-designed tools and equipment should be included in the on-site and on-the-time learning-teaching processes. The learning-teaching processes should also use alternative assessment tools as well as traditional assessment tools to check whether the goals are achieved at the end of the process.

About the Author

Ulas Kubat, PhD, Lecturer. He has been working as a teacher for a number of years. Dr. Kubat's research interests are in the area of science education, teaching-learning process, assessments. His research interests are focused on the relation between teaching-learning and knowledge-science curriculum practice in secondary education.

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