In the age of information, today’s society needs well-qualified individuals with good education background (Özoğlu, 2010). Because quality of education depends on quality of teacher, all countries in the world have constantly been searching alternative ways on how to train the teachers (Özer, 2008). In fact, such an effort may be more reasonable with idea “the teachers, who principally deploy the teaching and learning process, are even educated” (Gelen & Özer, 2008).

* This study is a part of Ayşe Aytar’s master thesis.

** Abstract **

The principal aim of this study is to determine what the extent of the prospective primary teachers’ (PPT) pedagogical content knowledge (PCK) is on “effect of human on environment” subject in grade 5 science and technology curriculum before and after “Teaching Practice” course. Within case study research methodology, the study sample consisted of 6 senior PPTs selected from 49 trainees who attended “Teaching Practice-II” course in spring semester of 2009-2010 schooling year in the programme of primary teacher education in Rize University. To collect data, lesson plans, observations, and semi-structured interviews were used. While the data obtained from lesson plans and observations were analyzed by means of rubrics developed, those from semi-structured interviews were analyzed using content analysis. It was found that the PPTs did not have sufficient idea of sub-components of the PCK, especially curriculum knowledge, and knowledge of students’ learning difficulties. Nevertheless, it was determined that the PPTs had adequate idea of pedagogical knowledge in context of the PCK. However, it was drawn out that although they had sufficient theoretical knowledge about instructional methods, techniques, strategies, measurement and assessment, they encountered some problems in transferring the theoretical knowledge into practicum. In the light of the results, it is suggested that the PPTs should be given more opportunities for practicing complementary measurement-assessment techniques. Furthermore, it is recommended that the PPTs with their own lesson plans ought to be given more opportunities to transfer their PCK into related subject matter one.

Key Words

Pedagogical Content Knowledge, Prospective Primary Teachers, Teaching Practice, and Effect of Human on Environment.
In recent years, a few studies of environmental education in teacher education have been conducted. Of these studies, the following perspectives as environmental awareness, environmental attitude, views of environmental problems, and environmental sensitivity have been investigated (Çalik, 2009; Čalik & Eames, 2012). However, only one study, Üşak et al. (2013), purpose to determine the prospective primary teachers’ PCK of “human and environment” subject. It is recommended that future studies should have been undertaken on how the PCK changed or improved during “Teaching Practice” course. This reveals a need for study concerning the prospective primary teachers (PPTs)’ PCK development in duration of the ‘Teaching Practice’ course. It is needless to say that a review study by Aydin and Boz (2012) also address that few studies are carried out about whole components of the PCK. Hence, this review study calls for a need for future study to investigate whole components of the PCK.

Purpose

The purpose of this study was to examine what the extent of the PPTs’ PCK is on “effect of human on environment” subject in grade 5 science and technology curriculum before and after the “Teaching Practice” course.

Method

Research Design

In this study, case study research methodology allowing the researchers to study a specific phenomenon or case in depth was employed. Furthermore, the case study research design was also selected because it gives an opportunity for the researcher to carry his/her study out with a small sample size (Ekiz, 2003).

The Study Group

The study sample consisted of 6 senior PPTs selected from 49 trainees who attended “Teaching Practice-II” course in spring semester of 2009-2010 schooling year in the programme of primary teacher education in Rize University. In selecting the sample, the PPTs were initially asked to draw a concept map of “effect of human on environment” subject in grade 5 science and technology course. Then, the researchers scored their concept maps using a rubric developed by them. Later on, taking the PPTs’ scores into account, six PPTs (two from each
level—TA1 and TA4—above average, TA2 and TA3—average, TA5 and TA6—under average) were drawn from the sample. By the way, TA means the PPT in the sample and each footnote number shows the PPT’s identity number in the present study.

Data Collection Instrument

Lesson Plan: In this study, lesson plan suggested by related literature of the PCK (Aydın et al., 2010; Faikhamta, Coll, & Roadrangka, 2009; Käpylä et al., 2009; Özden, 2008; Uşak, 2009; Uşak et al., 2013), measured the PPTs’ knowledge of instructional strategies and assessment before and after the teaching practice. In the current study, the PPTs were asked to prepare a lesson plan on “effect of human on environment” subject in grade 5 science and technology course within an hour.

Interview: In this study, given the related literature of the PCK (De Jong, Ahtee, Goodwin, Hatzinikita, & Koulaidis, 1999; Halim & Meerah, 2002; Kaya, 2009; Uşak, 2005), interviews were used to investigate the PPTs’ knowledge of curriculum, students’ learning difficulties, instructional strategies and assessment before and after the teaching practice. The second researcher, Aytar conducted each interview session by means of a 12-question interview protocol. Each interview session took about 20-50 minutes.

Observation: A 30-item rubric, named observation assessment rubric, was employed to assess the sample’s PCK performance in the “Teaching Practice” course. A three point scale (from one point to three points) was used to score their performances.

Results

The results of the observations indicated that TA1 got the highest scores in terms of “teaching process and classroom management”. TA4 showed an effective performance in the teaching practice on scheduled time. TA1,2 (from above average), TA3 (from average) and TA5,6 (from under average) had some problems concerning time management during the teaching practice. When TA3 accelerated his activities in rush, TA5–6 did not possess enough time for assessment. Also, TA6 (from under average) paid more attention to constitute a democratic learning environment with the following behaviors: equal contribution to the instruction, helping the students share their responsibility in group work, and feedbacks “very nice, well done, thank you” during the teaching practice. TA1 (from average) had some pitfalls in affording continuity of the lesson interest whilst TA2 (from above average) had deficiencies taking precautions against course interruption or classroom management.

In the pre- and post-interview results of curriculum, TA1 (from above average) mentioned that the curriculum was based on contemporary philosophy-approaches, i.e. first hand experience, student-centered learning whereas TA2 stated that the curriculum aimed to enable the students to gain higher-order skills, i.e. problem solving, and critical thinking. Also, for the pre- and post-interviews, TA3 (from average) addressed significance of inquiring knowledge rather than transmission of knowledge and knowledge that the students construct in mind. Furthermore, in the pre-interview, TA4 mentioned concise knowledge in the curriculum whereas in the post-interview he also referred to learning objectives in the curriculum. Similarly, in the pre- and post-interviews, TA5 depicted bases of contemporary philosophy/approaches and content visuality in the curriculum. Also, TA4 stated that the students constructed new knowledge on their pre-existing knowledge in the pre-interview while he referred such topics as learning fields and themes in the post-interview. For the pre- and post-interviews, TA6 (from under average) stressed knowledge that the students constructed in mind. In the pre-interview, TA4 addressed that the curriculum was attributed as contemporary education,
whilst he implied intra- and inter relations in the course for the post-interview. TA_b dealt with the learning fields, themes, intra- and inter-relations in the curriculum in the pre-interview, whereas he implied significance of inquiring knowledge rather than its transmission in the post-interview. For the teacher role in the curriculum, all PPTs depicted the teacher role as a mediator/guide in the post-interview. Furthermore, TA_a (from average) and TA_c (from under average) viewed the teacher role as an organizer of the learning environment. For the parent role in learning/teaching procedure, all PPTs stated that the parents had responsibility of learning. Also, TA_d and TA_e considered the parents as a guide in the pre- and post-interviews. Moreover, in the post-interview, TA_f thought the parents as an environment organizer for student learning.

For the PPTs’ views on students’ learning difficulties of environmental pollution, TA_a (from above average) stated “light pollution” in the pre- and post-interviews. Besides, TA_a referred to the student learning difficulties of “soil, sound pollution and radiation” concepts in the post-interview. TA_b (from above average) addressed that the students might find “effects of environmental pollution” difficult in the post-interview. TA_c (from average) depicted “sound pollution” in the pre- and post-interview and dealt with “extinction of animals” in the post-interview. TA_d (from average) implied that the students might find “soil pollution” tough. TA_e (from under average) addressed cleaning materials and radiation in the pre-interview and pointed out temporary/permanent pollution in the post-interview. TA_f (from under average) mentioned factory wastes in the pre-interview.

For the PPTs’ views of instructional strategies in teaching environmental problems, TA_a (from above average) depicted project based learning and field trip observation in the pre- and post-interviews. TA_b implied explanatory and inquiry teaching strategies, question-answer technique and brain storming in the pre-interview whilst he addressed drama, homework, picture drawing, poem/essay writing, poster/brochure/notice board techniques and visual teaching tools (picture/power point/video) in the post-interview. TA_c (from above average) dealt with the project based learning, discussion method, SE model and visual educational tools (picture/power point/video) in the pre-interview while TA_d stated investigation-examination strategies in the post-interview. Also, TA_e emphasized cooperative learning, brain storming, six thinking hats and homework in both pre- and post-interviews. TA_f (from average) addressed the question-answer technique and homework method in the pre-interview whereas referring to the explanatory method in the post-interview. Additionally, TA_g (from average) implied case-based learning and field trip methods in the pre- and post-interviews. TA_h (from average) stressed cooperative learning during the pre-interview and cited interviews during the pre-and post-interviews. In addition, TA_i (from under average) depicted the explanatory method in the pre-interview whilst stating concept mapping technique and guide book in the post-interview. TA_j referred to demonstration technique in the pre- and post-interviews. TA_k (from under average) mentioned the project based learning, drama, and homework in the pre-interview whilst TA_l implied cooperative learning, the explanatory method, the brain storming, and the six thinking hats in the post-interview.

Discussion

In light of the results, it could be deduced that the PPTs at different levels possessed some pitfalls in classroom management and in taking precautions against course interruptions, i.e. talking without permission, interrupting friends and the PPTs (Menteş, Sever, Yıldız, & Yıldız, 2010). Moreover, for the PPTs’ views of the curriculum knowledge, they were aware of the complementary measurement-assessment techniques depicting that the learning process was as important as the learning product. This might be seen as an indicator of the pre-service courses (e.g. “measurement and assessment”, “science and technology education” and “mathematics education” courses) in which the complementary measurement-assessment techniques were followed (Kazu, Eroğlu, & Şenol, 2010).

For the curriculum knowledge, the PPTs regarded the teachers as the guide/mediator or the organizer of learning environment. This may stem from effect of their experiences with 2005 Science and Technology Curriculum through the pre-service education. Also, the 2005 Science and Technology Curriculum released by MEB (2005) required the teacher to create a constructivist learning environment. The PPTs’ views of the teacher role in the curriculum were in a harmony with this demand. The PPTs also considered the parents as the guide. Likewise, in view of the PPTs, the parents had responsibility of learning and prepared a learning environment for student. This supports the idea “learning involves cooperation amongst the teacher, the student and the parents” (Shymansky, 1992; Umdu-Topsakal, Çalışık, & Çavuş, 2012). Also, this situation advocates the idea “con-
structivist learning, constructing philosophy of the 2005 science and technology curriculum, takes places indoor and outdoor of the school” (Akpınar, 2010). Thus, further cooperation with the parents should be undertaken (Ersoy, Gürdoğan Bayır, & Güvey, 2010; Güven, 2008). Furthermore, the PPTs’ views of the student learning difficulties is consistent with Seggin, Yalvac, and Çetin’s (2010) study in which the primary students did not complete learning or misconceptions concerning “air pollution, water pollution, soil pollution, extinction of animals” concepts. This may result from a lack of the PCK course of misconceptions (Kolomucu & Çalk, 2012).

Given the PPTs’ views of the instructional strategies, it could be concluded that they realized knowledge of contemporary teaching principles, methods and techniques. This is quite promising when Akçadağ’s (2010) study is taken into account. That is to say, Akçadağ determines that majority of primary teachers need an in-service education on “project, drama, demonstration and concept mapping” methods/techniques. Moreover, in view of the PPTs’ views, lecturers tended to use the traditional methods/techniques during the pre-service education. This may result from several reasons, i.e. lacks of interest, motivation, reluctance, capability and infrastructure or crowded classroom, technological incompetency or a PCK need (Evran Acar, Kilic, Ay, & Kuyumcu Vardar, 2010). Nevertheless, the fact that the PPTs frame their teaching practices on the contemporary methods/approaches fosters the idea “they teach as they were taught” (Aydin et al., 2010; Calik, 2011; Calik, 2013; Özyurt & Akdeniz, 2010). Because half of the PPTs stated that mentor teachers were apt to employ the traditional techniques/methods, it could be inferred that the teachers had difficulty understanding messages from the 2005 Science and Technology Curriculum and tended to be resistant to its demands/requirements (Akyol İnç, 2009).

The results of the PPTs’ lesson plans indicated some pitfalls on teaching and learning activities. For example, inappropriate lesson plan for the 5E model pointed out lacks of knowledge of the 5E model stages, of subject matter knowledge, or of linking theoretical knowledge with novel issues (Bozdoğan & Altunçekiç, 2007; Metin & Özmen, 2009). All things considered, it could be deduced that the PPTs had an idea on the complementary measurement-assessment techniques (Duban & Kıcıküylmaz, 2008). In fact, this knowledge claim is inconsistent with Birgin and Gürbüz’s (2008) one reporting that the PPTs were more familiar with traditional measurement-assessment techniques than the complementary ones. However, the PPTs had deficiencies in transferring these techniques into practicum. Based on the foregoing issues, it is suggested that the PPTs should be directed to more practical experiences with the complementary measurement-assessment techniques during their pre-service education. Furthermore, the PPTs with their designed lesson plans ought to be given more opportunities to transfer their PCK into related subject matter.

References/Kaynakça


