PRIVATE SCHOOL ELEMENTARY SCIENCE TEACHERS’ REFLECTIONS ON NEW SCIENCE AND TECHNOLOGY CURRICULUM

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Abstract

The goal of the study is to explore private school elementary science teachers’ opinions and reflections on the new science and technology curriculum in Turkey. New curriculum includes different aspects compared to the previous one such as student-centered activities, multiple assessment techniques, and student-teacher roles. Semi-structured interviews with four private school science teachers were conducted to understand their opinions over the new curriculum. Interview schedule comprises 23 questions in 9 themes; personal information, structure of change, acceptance of change, ideas about the change, feelings about the change, personal accountability for the change, implementation of the change, teacher sufficiency in change, and effect of change on teachers. As preliminary results, the teachers reported the insufficiency of teacher training, unpreparedness of students to the student-centered education, and heavy load of project assignments. All the teachers reported that using multiple assessment techniques in the evaluation process is an advantage for pupils.

Keywords: Elementary Science and technology curriculum, curriculum evaluation, private school elementary science teachers

INTRODUCTION

The rapid developments and findings in science and technology ubiquitously raise debates over the aims and goals of the science education throughout the world. The swift change in science and technology coerce the change in educational systems to keep up with the needs of the society and global economy. Because of this advancements and changes in students’ needs, science curriculums are under pressure of all stakeholders.

Turkey is one of the countries which have been trying to catch this developmental process since the beginning of 1920s. John Dewey, who is a very famous educational reformer in America, participated in the design process of Turkish science curriculums in 1920s (Demirbas & Yagbasan, 2005). The most crucial turning point of science teaching is the application of new science programs in Ankara Science High School in 1964. At the same time, new developments emerged in science education curriculums in the USA which would further shape Turkish science curriculums (Unal, Costu, & Karatas, 2004). There were attempts for reform and improvement on the curriculum in the years of 1968, 1973, 1992, 1993, and 2005. In 1973, Turkey started to implement an integrated science curriculum which was more modern than previous one and tried to make radical changes in the teacher role. This curriculum avoided student memorization and defined the teachers’ role as “guide” in the classroom. In 1980s, this curriculum was abandoned by the Ministry of National Education (MONE). In 1993, MONE initiated a project named Development of National Education (Demirbas & Yagbasan, 2005). Within the scope of this project, a new science curriculum was designed and disseminated. This curriculum aimed to implement student-centered instruction and raised students as individuals who were more creative and critical and knew how to reach the information.

Ongoing emergent technologies and knowledge unveil the need for new skills and qualities for citizens. Science literacy, problem solving, creativity, and critical thinking are some of the famous examples of these skills. Science classes are vital places for developing these new skills. For the aim of developing these skills in Turkish elementary science students, a new curriculum was designed and disseminated in early 2005. With the new curriculum the name of the course was also changed from
science course to science and technology course. The most important skills emphasized by this curriculum were critical thinking, creative thinking, problem solving, communication skills and science literacy (ERG, 2007). In addition, the curriculum included the aim of transforming society having “passive citizens” to having “active citizens” (ERG, 2007). These were the ultimate goals of the new Elementary Science and Technology Curriculum defined by MONE.

Curriculum reform is an arduous process due to the existence of many stakeholders and layers affecting the outcome of the reform. Clarke (1997) listed factors affecting curriculum reform phase as the reform movement in general, the principal and school community, internal support personnel, the spirit of collegiality, collaboration and experimentation, the grade-level team of teachers, innovative curriculum materials, the in-service program, external support personnel, the researcher as audience and critical friend, outcomes valued by the teacher, day-to-day conditions under which teachers work, and teacher knowledge. The implementation of a new curriculum is succeeded with coordination of many components and stakeholders in all levels. There are three main levels in a curriculum reform process to penetrate macro (Nation/Society/Program), meso (School), and micro (Classroom) level (van den Akker, 2004). Teachers are especially the key factors in the meso and micro layer of the curriculum development process (Fernandes, Richie, & Barker, 2008).

Burkhardt, Fraser and Ridgway (1990) emphasize that if teachers have positive attitudes and ideas about the curriculum, implementation of it will be very effective or vice versa. According to Short (2006), the purpose of curriculum reform in science education is to improve student learning and the most effective strategy for improving student learning is to impact teaching practices. Therefore, teaching practices are critical in the success of the curriculum reform. In this regard, the ideas, beliefs, feelings, attitudes, thoughts and knowledge of the teachers are crucial in the curriculum reform. In order to attain a successful curricular reform, the goals of the curriculum reform should be compatible with teachers’ beliefs (Handal & Herrington, 2003). Therefore, there is an urgent need to figure out teachers’ beliefs and ideas in order to evaluate the success of the new curriculum. Hence, in this study, elementary science teachers’ beliefs, opinions and views of the new science and technology curriculum are investigated. There were some studies conducted to explore the public school teachers’ opinions and ideas (Savas, Elmas, & Ozturk, 2011; Elmas & Geban, 2010; Aydin & Cakiroglu, 2010) but private schools teachers were mostly neglected. In the literature, there are some studies dealing with the private school students’ academic achievement, classroom activities and other characteristics in comparison to public schools (Grogger & Neal, 2000; Figlio & Stone, 1999; Gamoran, A. 1996; Figlio, & Stone, 2001). This study would like to focus on private school elementary teachers’ opinions, ideas and experiences of new Elementary Science and Technology Curriculum in Turkey.

**Research Questions**

1. How do private elementary school science teachers perceive the new curriculum?
2. How do private elementary school science teachers transfer curriculum changes to their classrooms?
3. What are the private elementary science teachers’ concerns about implementing the new curriculum?

**METHOD**

This study tries to present the perceptions, experiences and concerns of elementary science teachers over new Elementary Science and Technology Curriculum in private elementary schools in Ankara. The sample of this study is 4 elementary science teachers who are working in private schools. Their experiences range from 4 years to 33 years. All teachers graduated from a science education department of a university and none of them have graduate degree. Only Teacher-2 who is 33 year-experienced teacher, has an additional diploma from the guidance and counseling department of a university. They all teach with the new curriculum for at least 4 years; however, teacher 1 did not teach with the former curriculum. Teacher-4 has a different experience form teaching. She was an administrator in a training center until 3 years ago when she become a science and technology teacher in her current school.
In accordance with the qualitative research principles, researchers would like to gather data about teacher experiences in depth. The study explored pros and cons of the new Elementary Science and Technology Curriculum over shared experiences, ideas, opinions, and incidents of private elementary school teachers. Exploring the shared experiences and the way we comprehend them to shape a new point of view is called Phenomenological research (Marshall & Rossman, 2006). In this phenomenological research design, we attempt to conceive several private elementary science teachers’ experiences about the new elementary science and technology curriculum. After the dissemination of the new science and technology curriculum, all schools including the private ones were obliged to implement new curriculum. The philosophy and preparation procedures were determined and planned by MONE. The curriculum was designed by MONE with the contribution of all stakeholders (TTKB Web Side, 2011). That is why, all private elementary school science teachers are the key informants in this research according to their experiences related to the new elementary science and technology curriculum. In this research typical case sampling were used as a sampling strategy. The aim of this choice was grasping the typical experiences of private school elementary science teachers related to the new curriculum and not to infer generalized statements about all private school elementary science teachers.

In order to allow elementary science teachers to reveal their experiences, ideas, and problems in depth, researchers preferred to use interviews instead of questionnaires. Semi structured interviews were used to collect valuable information about experiences, opinions, and ideas (Patton, 2002). Interviews are effective data collection method to have a better understanding of the research problem in detail (Yıldırım & Simsek, 2008). Interviews took 30 to 45 minutes and were conducted in two weeks time. Interview schedule was used as a blueprint in the interviews to ensure that the same style of query was pursued in each interview (Patton, 2002). All interviews were tape recorded with the permissions of teachers and transcribed verbatim. There are 9 themes and 23 questions in the interview schedule. Themes are personal information, structure of change, acceptance of change, ideas about change, feelings about change, personal accountability for the change, implementation of the change, teacher sufficiency in the change, and effect of change on teachers. In addition to main questions, there are some follow up questions for the sake of keeping the teachers focused on the issue.

All transcribes were coded and inductive content analysis was used to analyze the transcriptions of the interviews. Three researchers in the study separately coded all the transcriptions and several meetings were arranged to ensure inter-coder reliability. The aim of inductive content analysis is pattern recognition. All data were organized according to categories and themes and analyzed. As a last step researchers interpreted the data and generate results. Peer debriefings were conducted with experienced researchers to ensure the generating themes and categories (Miles & Huberman, 1994). In order to ensure transferability, thick and detailed descriptions were used. Researchers had small reflexive journals and used them to describe insights, perspectives and reactions of the teachers for providing dependability. Data triangulation was ensured by using data from interviews, reflexive journals and content analysis of the curriculum documents.

RESULTS

The results of the study were categorized into eight main themes which are nature of the change, acceptance of the change, opinions about the change, feeling about the change, personal responsibility about the change, implementation of the change, self-efficacy in change and the impact of change on teacher. Each theme were explained in depth according to the transcriptions of the four teachers participated in the study.

Structure of Change

Teachers stated “paradigm shift” as the most important change in the new curriculum. Student-
centered instruction, individual differences, teacher preparation, and different assessment techniques are the components of this paradigm shift. They described the role of teacher as a “facilitator” for instance Teacher-2 said that;

“Teacher should be a maestro in the classroom”

All of the teachers shared the idea that students are more active and willing to search for additional information and not only active listener but also discoverers. Teachers mentioned increase in the number of activities which motivates students in science.

Assessment is another crucial factor according to teachers. Formative assessment procedure is preferred instead of summative assessment. Assessment includes mostly projects, performance tasks and student portfolio. There is more opportunity to do these activities in the classes however, all of the teachers complained about the high school entrance exam (SBS) for seventh and eighth grades. According to teachers, this exam blocks the implementation of the learning activities, and force teachers to solve multiple choice problems for SBS. Since students worry about the SBS exam, they cannot really focused on projects or performance tasks.

In addition, teachers mentioned using various types of assessment techniques and formats in the classroom. Exam questions have shifted from essay and multiple choice types to a more variety of questions types such as matching, and true/false. Teacher-2 and Teacher-3 stated that they cooperate with measurement and evaluation specialists while preparing and deciding on the exam question types and for other assessment procedures.

Teachers-2 and Teacher-3 appreciated the usability of textbooks but they rarely use them in the classroom instruction because they often prepared activities with the curriculum development specialist in the school. Surprisingly, both schools have a measurement and evaluation specialist and curriculum development specialists within the school. All the teachers mentioned the usage of additional books in the course preparation process. Activities from these additional sources were also included in classroom practice.

Moreover, teachers faced some difficulties while adapting the new teaching styles. Especially the most experienced teacher, Teacher-2, mentioned how hard it was for her to get used to the new teaching styles. In order to be successful in this curriculum, teachers should be prepared very seriously.

“Teaching in the classroom is just like preparing a dinner for guests, it requires too much time and skills” (Teacher-2 and Teacher-3)

Supportive materials are also important for change. All the teachers emphasized that they have enough resources to make the classroom instruction more effective. For instance, they have an internet access and computer labs for activities. Teacher-4 especially mentioned the usage of documentaries and scientific movies as a classroom activity. Teacher-2, Teacher-3, and Teacher-4 have science classrooms designed as a science lab.

Acceptance of change

All the teachers downloaded the program book from the internet and perceived it as clear and understandable. Teacher-2 and Teacher-3 cooperated with curriculum development specialists in the school to understand the ultimate goals of the new curriculum. Teacher-4 perceived the program clear and understandable in general however, there are some vague objectives in it. She stated that:

"Some statements in the program are covert such as “feel”, “perceive”, and “recognize”. What is meant by these words is not clear and these objectives are not enough for student development."

Also, teachers admire the teacher book and they mostly used them for the preparation of classroom activities.
Ideas about change

Teacher-1 has a positive point of view for the implementation of the new curriculum. However Teacher-4 thought that the curriculum’s success depended on the teachers’ interpretation. There is a chance for a teacher to adapt the new curriculum for his/her previous teacher-centered teaching style. On the other side, Teacher-2 thought that this curriculum cannot be effectively implemented due to the excess content load. She stated that:

“So bad! It should be reduced to half of it. If it was four units, I would say it is wonderful. The excessive content load in the curriculum is an obstacle for us.”

Other teachers also mentioned the content load as an important factor to take into account for activity planning and classroom timing. Despite the content load Teacher-4 made extra out-door activity in the topic of speed with the students in the school garden. Teacher-1 is the only teacher who thought content load is very basic for future student career in the university. Teacher-1 emphasized that students should be pushed for the upper limits of their capacities in the school. Teacher-2, Teacher-3, and Teacher-4 mentioned the spiral structure of the curriculum and its advantages. Beside, Teacher-3 stated that sometimes she felt the curriculum is spiral only in terms of the headings but not the content.

All the teachers admired the daily life connection of activities and experiments in the curriculum and even mentioned it as a core objective. However, Teacher-3 thought that the curriculum activities and experiments were artificial and still far away from the students’ daily life in some units.

“Students mostly did not connect daily life with the course topics; for instance they did not connect what chemicals did the soap is composed of or why they learned serial or parallel connection of circuits.”

Teacher-3 thought that only students were easily connect biology topics with daily life.

Most important aspect, teachers mentioned in the new curriculum is the changing role of the student.

Feelings and Personal accountability for the change

After getting used to implementation of the new curriculum, teachers were more comfortable and joyful in the classroom now. Teacher-1 and Teacher-2 felt anxiety and stress at the beginning of the implementation process.

“It was very radical for me; I felt stress, and anxiety and I did not know what to do in the classroom. When I was in the classroom at the first time, I felt student centered teaching took all my authority and management skills from me, it was really depressing to feel like that after long years of teaching” (Teacher-2)

All the teachers participated in many in-service teacher training programs which were given by educational specialists and specialists from their schools. Nevertheless, Teacher-2 did not remember the topics of any of the in-service trainings surprisingly. Teacher-1 only attended one training program about “how to lead student projects”. She also mentioned the need for support from the school administration to contribute these trainings.

Implementation of the change

The preparation for the course hours were a burdensome issue for almost all teachers at the beginning because they were not experienced with the application of student centered activities. Initially, it was very formidable for them to control the classroom atmosphere. Beside students were
not accustomed to making so many student centered activities and being responsible for their learning.

Teacher-2 and Teacher-3 decided on their lesson strategies with curriculum development specialists and they improved their course designs according to the objectives of 6E teaching model which they generated by mixing 5E and 7E models.

"In the past I just aroused students’ curiosity at the beginning of the lesson and then started to teach directly but now it is not like that now”

Teachers usually used additional books while preparing the course design; Teacher-1 stated that she cooperated with more experienced teachers. Except with the Teacher-1, other teachers mentioned the support of the school administration for their needs and course design.

Teacher-1 and Teacher-4 reported that for parents it is not a problem whether their child understood scientific concepts meaningfully or not, high school entrance examination was the major aim for them. In addition to this they supported making test practices for the exam in the course hours. Teachers were under pressure from both sides, effective curriculum implementation and parent pleasure for high stake testing.

“Sometimes parents came to school and told that it did not matter whether their child understood the scientific concepts meaningfully or not, the major concern for them is the high stake testing and high school entrance examination. They thought that their child future was based on high stake testing and the most important goal is passing the exam with good points.”

Teacher-2 and Teacher-3 reported the extensive project works in the curriculum and they complained about parents because parents took the responsibility from the students about the project works. After this situation, they changed their point of view and students did all the project work in the school time.

**Teachers’ sufficiency in change**

Most of the teachers felt themselves insufficient in content load for some of the topics such as “light”, “heat and temperature”, “optics”, and “evolution”. The topics are unfamiliar for them due to the fact that either they did not learn the topics in their undergraduate years or they forgot these topics. Teacher-2 reported the insufficiency especially preparing activities for these topics. Then she mentioned the cooperation with other teachers such as science, chemistry, and physics. Only Teacher-3 felt herself fully sufficient in the implementation of the new curriculum.

“‘Yes, I absolutely believe that I use student-centered principles successfully. Students are independent, they really feel comfortable to express their ideas and feelings and ask any questions. When the science class is over most of them feel usually happy.’” (Teacher-3)

Teacher-4 taught that she is the most successful in 6th grade due the convenience of content load. She mentioned the difficulty of implementing student-centered education in higher levels due to the existence of high stake exam anxiety in students in these grades.

**Effect of change on teacher**

All teachers changed their teaching perspectives in four years of implementing this new curriculum in a certain level. Teacher-1 said that she gained awareness about the individual differences. The new curriculum enabled her to recognize her students more deeply and to adjust her lessons according to the individual differences. Nevertheless, teacher 4 stated that she often used similar activities before the new curriculum started to be disseminated. Teacher-4 got new training about the drama after the implementation of the new curriculum. Teacher-2 described the procedure that she got used to the new curriculum through as:
“It was very hard for me to become familiar with the new curriculum in the first two years. I even did not know some topics such as sound, optics, and heat. I studied hard, obtained a lot of different books, and used the internet. Everything in my teaching style has changed completely, I improved myself. I can say that I completely changed as a teacher.”

DISCUSSION AND CONCLUSION

In the light of the results, it was found that teachers did not take effective training regarding the curriculum ideas and approaches. Although all teachers reported that they participated in seminars and in service training, they had too many problems while they were organizing the classroom instruction. All the teachers mentioned that they have sufficient physical conditions, materials and sources needed for student centered instruction. This reveals that private schools probably do not have any restriction regarding the supplementary sources and materials for implementing the new curriculum. One of the concerns for private school elementary science teachers is the over load of content comparing to time duration given. High school entrance examination is one of the most important obstacles for the effective curriculum implementation. Parents overvaluing of high stakes examination is another problem for teachers in private schools because parent pleasure is really a big concern for the school management. However, most of the teachers stated that they cannot use performance and project works for assessment due to the existence of SBS in 7th and 8th grades. Therefore the main issue that teachers complain is the inconsistency of the curriculum goals with the high-stake exams. Teachers list the positive sides of the curriculum as daily life connection, student-centered instruction, and multiple assessment techniques. All the teachers admire the change in assessment and using various types of techniques for measuring the students.

REFERENCES


