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How mathematics teachers’ concerns changed within the context of curriculum reform?

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Abstract

This study describes teacher change using the background of a reformed mathematics curriculum for 6th grades and provides teachers’ concerns profiles who were involved in the implementation over the last two years. For this aim, The Stages of Concern Questionnaire (SoCQ) based on CBAM was administered to three mathematics teachers selected from the city located on the north coast of Turkey. Those teachers filled out the SoCQ at the end of 1st and 2nd year of curriculum implementation. The results illustrated that selected teachers’ concern profiles were differentiated based on the stages. The study concluded with possible reasons of the intensive concerns and made suggestions for curriculum developers and teacher education institutions.

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1. Introduction

An extensive research on curriculum development was started in Turkey since 2004. After the development of elementary mathematics curriculum (1-5th grades), mathematics curriculum (6-8th grades) prepared by Curriculum Specialization Commission was accepted to be developed in June 2005. First, 6th grade curriculum was started to be applied beginning from 2006-2007 instructional year. Since new 6th grade curriculum has been implemented for two years, several issues surface at the beginning. The most important one is that understanding the teachers’ adoption to the program and their’ concerns about it. Because the new curriculum offer quite different approaches than previous ones such as multiple intelligence theory, collaborative learning, project-based learning, problem-based learning which are involved in constructivist understanding (Özdağ etc., 2005).

The curriculum was based on the conceptual approach in which students aimed to construct mathematical meanings with the help of their concrete experiences and intuitions. With this approach, students can gain the ability of problem solving, reasoning, communication, connections in addition to developing mathematical concepts. Thus, reformed curriculum intends to create a learning environment where students are mentally and physically active. Besides, new curriculum gave teachers a responsibility for designing learning environments, facilitating and guiding students during activities rather than solely being “an instructor”. In other words, curriculum expects teachers not to transfer knowledge directly to students; but help them to construct their own knowledge (MEB, 2005; Baki, 2006). This view of mathematics teaching and learning stands in sharp contrast to the more traditional view, where memorization and imitation are the primary goals and the teacher is seen as the source of knowledge and intellectual authority. In short, the mathematics classroom is significantly changed by the introduction of the new curriculum; both teachers and students have challenges in adapting to these changes.

There have been many efforts to implement mathematics education reform during the last 15 years. Some of these efforts have been quite successful at changing practices in selected classrooms and schools, but few have been able to change classroom practices on a large scale (Ball, 2001). One reason for less-than-satisfactory outcomes may be that teachers do not see themselves as formal agents of curriculum reform. Yet, teachers actually have ultimate control over implementation of new curricula into
their classrooms (Crawford et al., 1998). Just as reformers talk about the critical role of students in their own learning of mathematical content, teachers must be considered as critical agents in their own learning from and implementation of curriculum (Craig, 2001).

The fact that many in-service teachers have not adopted the goals and assumptions of the reform movement in mathematics education is not surprising when viewed within the context of the research literature on teacher change (Frykholm, 1999). Current literature on teacher change emphasizes that change is not a single event (Friel & Gann, 1993; Fullan, 1991; Hall & Hord, 1987). Teacher change does not occur simply because there are curriculum materials in the classroom that contain information and ideas that are new to the teacher (Remillard, 2000; Remillard & Bryans, 2004). Furthermore, the relationships between teachers and curricula have often been filled with significant tensions and challenges (Ben-Peretz, 1990; Remillard, 2000). As a consequence of calls for reform, teachers are likely to take on roles and responsibilities in mathematics teaching that may not match their current teaching practices, their educational experiences or their own experiences as students. As a result, dilemmas are likely to arise when old experiences and new pedagogy suggest different, sometimes conflicting, courses of action. Because of the mentioned reasons above, we feel that exploring the change of teachers’ patterns of adaptation when using the new curriculum can provide interesting insights into the ways in which teachers incorporate reform principles into their instructional practices.

2. Theoretical Framework (The Concern Based Adoption Model)

In this study, Concerns Based Adoption Model (CBAM) provides a developmental framework for the role of teacher concerns in the change process based upon the progression of teacher concerns through seven hierarchical stages during implementation of an innovation. By identifying the stages of concern of teachers, staff developers and administrators can address these concerns to further facilitate change.

Hall (1979) developed the Concern Based Adoption Model to assess teachers concerns throughout the change process. It assumes that change is a process accomplished by individuals and sets forth seven Stages of Concern (Hall, Hord, & Griffin, 1980). The Stages of Concern (SoC) about an innovation is a key component of the CBAM which was the model used to track the growth of teachers as they became more aware of the middle school curriculum, gradually attempted to implement it, and became increasingly more confident in its use and effectiveness (Gray, 2005). SoC uses a standard set of stages to describe teachers’ concerns about the innovation. The seven stages of concern include: Unconcerned, Informational, Personal, Management, Consequences, Collaboration, and Refocusing. The first three stages called as SELF concerns, Stage 3 called TASK and Stages 4, 5, 6 called as IMPACT concerns. The instrument used is a questionnaire with a set of scales to prepare a numerical and graphical representation of the type and strengths of participants’ concerns (Newhouse, 2001). Since the development of the CBAM model, this questionnaire has been utilised in curriculum reform efforts across disciplines, in science, technology, social studies and mathematics (Hope, 1997; Gershner & Snider, 2001; Christou vd., 2004; Yuliang & Huang, 2005). With the recent influx of curriculum reform efforts during the 1990s, new attention has been given to the stages of concern as a vital dimension of professional development (Clarke, 1994; Friel & Gann, 1993).

In this report, we used case study approach by choosing three male 6th grade mathematics teachers (coded as T1, T2 and T3) using the new curriculum at the first time. We focus on only three teachers in this paper to understand, at a detailed level, the patterns of adaptation for individual teachers—a level of description and analysis that would not be possible with a larger number of teacher. The intent here was to identify how teachers’ concerns changed throughout adoption and implementation of the 6th grade curriculum over two years. The Stages of Concern Questionnaire (SOCQ) was administered to these mathematics teachers for two times (first at the end of the 2006-2007 Spring Semester and second at the end of the 2007-2008 Spring Semester). All of the questionnaires were scored manually according to the guidelines set forth in the Manual for Measuring the Stages of Concern about an Innovation (George, 2006).

3. Results

In this section, we will explain the three mathematics teachers’ changes of concerns in two years by looking at their profiles constructed from the questionnaire data separately. We used the numbers 0 to 6 to represent the Stage0: Unconcerned, Stage1: Informational, Stage2: Personal, Stage3: Management, Stage4: Consequence, Stage5: Collaboration and Stage6: Refocusing consecutively.

3.1. T1’s change of concerns

As seen from Figure1, T1’s profile showed similar pattern in two years but at the 2nd year overall concerns decreased to some extent. For Stage0, a mean percentile less than the 40th percentile is considered low, while greater than the 75th percentile is regarded as high. T1’s
Stage 0 concerns fall down from 96% to 61% that means he is beginning to be more interested in to the program and become aware of it. T1’s concerns decreased until Stage 4: Consequences at the 1st year. Surprisingly, his Stage 1: Informational concerns decreased from 90% to 12% in two years. The low score at Stage 1 (12%) tends to indicated that he was not interested in getting any information about the 6th grade curriculum at the second year. In spite of the decline at Personal concerns, T1 has a peak at Stage 2: Personal (31%) at the 2nd year. Concerns at the personal stage tend to indicate that T1 is still uncertain about the demands on his of facilitating the use of curriculum, his inadequacy to meet those demands, and his role.

**Figure 1: Concern Profile of T1**

The decrease at T1’s Stage 3: Management concerns (18%) revealed that he did not have any organization, scheduling or time problems at the 2nd year while he has moderately high concerns (69%) during the 1st year. T1 had minimum Stage 4 concerns with 19% and 5% in both years that means T1 did not much concern about the program’s impact on students including performance and competencies, and changes needed to increase student outcomes. Interestingly, T1 has peak at Stage 5: Collaboration (84%, 68%) in both years. This showed his desire for working with colleagues to make the change effective. When looking at T1’s Stage 6: Refocusing concerns, there is a sharp decline at both semesters and concerns reduced by time (47% and 22% respectively). These low scores indicate that he did not want to make any major changes in the program. In other words, he has no definite ideas and alternatives to the existing form of curriculum and used it appropriate to the offered content. To sum, T1 seems to adapted to the curriculum after two years because his earlier concerns lowered. From Figure 1, T1’s self and task concerns reduced fairly except he has some personal concerns at Stage 2 and his concerns moved to the later stages. But, because of his need for collaboration, T1 is not interested in the effects of program on students (Stage 4 concerns) and not thinking of alternative ways (Stage 6 concerns). At this point, his collaboration concerns resolved first to make his program implementation better.

**3.2. T2’s change of concerns**

As seen from Figure 2, T2’s overall concerns profile did not change remarkably in two years except Stage 5 and Stage 6. For Stage 0: Unconcerned, his concerns elevated from 87% to 96% that is the indication of his low interest or involvement with the program. Also, the maximum Stage 0 concern in the 2nd year showed that the curriculum is not of high priority and central to the thinking and work of him. T2’s Stage 1: Informational (93%- 93%) and Stage 2: Personal (97%-92%) concerns were high and very close to each other in both years. This means T2 wanted to get more information about the new program and his role to meet those demands. In the 1st year, while T2 has a peak at Stage 2, in the 2nd year this concern reduced a little. The decline in his personal stage is a sign of understanding his degrees of the decrease on doubt and potential resistance to an innovation.

T2’s Stage 3: Management concerns remained same (73%) in two years. This indicates T2 has little concern about following the program and organization or timing issues. T2 has minimum scores at Stage 4: Consequences (59% and 48%) that means he has no consideration of the program’s effects on students during two years. For Stage 5: Collaboration concerns, T2 has a peak (97%) at the first year, but his concerns become lessened at the second year (80%). This situation can be explained as T2 want to coordinate with others at the first year, but later his desire for collaboration decreased some degree. The most important reason for his Stage 5 concerns is that T2 was the only 6th grade mathematics teacher in his school and he truly didn’t have a chance to work or discuss the program with any teachers. But, his desire for collaboration reduced at the second year. It is probably because he lost his expectation of collaboration with teachers by time. Lastly, T2’s Stage 6: Refocusing concerns seemed quite changed in two years. While T2 tried to follow the textbook and did not use alternative resources in class during the first year (47%), his concerns raised to 84% at the second year. This indicates that contrary to his commitment to the curriculum, T2 started to go away from the curriculum content and tried to make some changes in his instruction. To sum, T2 is at the earlier level of adaptation since he still has high self concerns at Stage 0, 1 and 2. Although his high earlier concerns, he yielded to the program and followed it in the 1st year (see sharp tailing down at Stage 6). But, because his concerns not solved or reduced by time and remained high, he gave less attention to the program and moved away from the content of it during the 2nd year (see tailing up at Stage 6). To make his implementation better, T2 needs to be informed about the curriculum and its’ demands and must be aware of his adequacy to meet those demands urgently. Until his earlier concerns resolved, T2 will not be able to consider the program objectively.
3.3. T3’s change of concerns

From Figure 3, we observed that T3 has very different patterns of concerns in two years. For Stage 0: Unconcerned, his scores were moderate with 40% and 55%. This means that T3 is more interested in the curriculum at the first year, and later started not to concern about the change process at second year. When looking at T3’s Stage 1: Informational concerns, he has a peak at the 1st year (84%) that showed he is interested in learning more details about program. In the second year, T3 has two maximum scores at Stage 1: Informational (66%) and Stage 2: Personal (67%). These scores suggest that T3 wants to learn about curriculum but is uncertain about his role and adequacy to meet program demands. T3’s Stage 3: Management concerns were low in both years (34% and 39%). This indicates that he never have much problem of organizing the course, using the resources and timing. His Stage 4: Consequences concerns were the minimum scores with 38% and 24% that showed he is not intensely concerned about program’s influence on students.

From T3’s Stage 5: Collaboration scores (76%), we can state that he is willing to discuss the program with other people and wants to make coordination at the 1st year. Although his scores seemed to be reduced at the second year (59%), he has a peak at Stage 5. This is probably because of his high Informational and Personal concerns. Since T3 want to be informed about curriculum and have doubts on his qualities, he is looking for help from others and willing to make collaboration regarding the use of curriculum. According to Stage 6: Refocusing scores (77%) at the first year, there is a low tailing up that reveals T3’s uncertainty of whether or not to follow the program. Actually, he had some ideas about alternatives to the proposed form of curriculum. On the other hand, the tailing off at Stage 6 (38%) suggest that T3 does not have other ideas that would be competitive with program at the second year. To sum, T3 seemed to rejecting the curriculum at the end of first year because of his high informational, collaboration and refocusing concerns. In the second year, his overall profile reflects average interested, not terribly overconcerned, and positively disposed nonuser.

4. Conclusion and Discussion

This paper focused on the change of three individual teachers’ concerns patterns while they were implementing the new 6th grade mathematics curriculum in Turkey. For this aim, CBAM was found to be very useful in developing an initial understanding of the innovation and its effect on teachers. Drawing from the survey responses, this study reveals that selected teachers had very different concerns profiles in two years. According to the results, T1 was the only one teacher becoming more adapted to the curriculum at the end of second year. However, T2 and T3 became resistant to the reform movement since they have relatively high self stages concerns at the second year.

Many combinations of concerns can be imagined and have been observed as seen from the findings. In each case, once the profile of concerns identified, the important work can begin. The crucial step is using the profile to make concern-based intervention and move the person toward more advanced use of innovation (Hall & Hord, 2006; p: 142). From the three case studies presented here, we concluded that all three teachers are not fully aware of the curriculum yet and not much interested in to the program (see Stage 0 scores). Although T1 is merely the one teacher having lower concerns at the earlier stages, he has very high collaboration concerns at Stage 5. To move him toward better use of the program, we need to reduce his collaboration concerns by giving opportunities to discuss the implementation with other teachers or schools. T1’s low Stage 6 scores means that he yielded to the curriculum content and not thinking of any major changes at this time which is reasonable for a person spending only two year for using curriculum. We believed that after three to five years, T1 will suggest alternatives to reap more universal benefit from the curriculum. On the other hand, T2 and T3 still need to be informed about the new philosophy of curriculum and told about its’ benefits and their roles in it. From their profiles, we brought out T2 became resister and T3 became a nonuser of the program. Therefore, T2 did not believe the program’s advantages and not following it. On the contrary, T3 seemed to be interested in to the program and believed his teaching match to the program’s expectations. He is actually becoming a nonuser positive to the program.

Consequently, these three case is a good indicators for conceptualize the outcomes of change process. Unfortunately, results revealed that teachers not adopting to the curriculum very well and they have many concerns required to be solved. To make the advanced use of the 6th grade mathematics curriculum among teachers, curriculum developers and institutions such as Ministry of
Education must be aware of the results and take preventative actions urgently. Otherwise, the whole reform efforts will be wasted.

References


