

EMOTIONAL KNOWLEDGE OF MATHEMATICS TEACHERS – RETROSPECTIVE PERSPECTIVES OF TWO CASE STUDIES

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Abstract

In this paper we provide a partial description of certain facets and experiences that are central to the development of emotional knowledge from the retrospective perspectives of two highly experienced mathematics teachers in middle and high school. One of the study participants refers to the emotional knowledge she developed over the years regarding her interactions with her students, while the second participant also refers to the emotional knowledge she developed regarding her interaction with the school principal. Both indicate the differences in their emotional reactions between the first practice years and the years after. The differences are seen primarily in the type and in the intensity of their emotions. While negative feelings mostly accompanied the first years, later years were accompanied by more positive emotions.

1. Introduction

Teaching and emotions are inseparable. Emotions are dynamic parts of ourselves, and whether they are positive or negative, all organizations, including schools, are full of them (Hargreaves, 1998). In his literature review, Zembylas (2007) asserts that although "teacher knowledge" has become a major area of exploration in educational research, limited attention is given to the emotional aspects of teaching. While Shulman's (1987) work on pedagogical content knowledge (PCK) was further investigated and discussed by many researchers, teachers' understandings of emotional aspects of teaching and learning continued to be ignored. Zembylas argues that "any effort to expand current conceptions of PCK should include the connection between PCK and *emotional knowledge* (EK) in general – that is, a teacher's knowledge about/from his or her emotional experiences with respect to one's self, others (e.g. students, colleagues), and the wider social and political context in which teaching and learning takes place" (p. 356). Furthermore, Zembylas continues, in order to teach well, "teachers must be able to connect their emotional understanding with what they know about subject matter, pedagogy, school discourses, personal histories, and curriculum" (p. 364). In this paper we provide a partial description from a study we conducted that focused on themes identified by teachers as central to their

development of EK. We present two case-studies of mathematics teachers, each of whom has more than 30 years of teaching experience.

2. Theoretical background

In the process of determining mathematics teachers' qualifications, teacher educators focus on various types of knowledge identified as essential for good teaching: content knowledge, didactical knowledge, knowledge about students, and knowledge of class management (Shulman, 1987; Shulman, 2000). Often these types of knowledge are discussed, separately on the assumption that teachers are capable of integrating them into a coherent whole. However, issues concerning emotional aspects of teaching and their interrelations with the above knowledge types, are rarely discussed in mathematics teachers' training programs.

Planes and types of EK. Zembylas (2007) finds a reciprocal relationship between PCK and EK, and argues that the latter "occurs on different *planes* as there are different *types* of EK that are aspects of PCK" (p. 358). These planes are: individual, relational, and socio-political. The individual plane refers to how teachers experience and express their EK on the personal plane; the relational plane refers to how teachers use EK in their relationships with students; and the socio-political plane refers to EK of the institutional and cultural context of schooling and its influence on teachers' curricular decisions and actions. There is no hierarchical order between the three planes. Their boundaries are blurred, and mutual influence and interaction exist between them.

Positive vs. negative emotions. Smeltzer (2004) studied the emotions of beginning teachers, and discerned positive and negative emotions according to their characteristics and forcefulness, as they appeared in the teachers' reactions. The categories of positive emotions include: joy-happiness, fulfillment-reward-satisfaction, competence-confidence-motivation, and surprise-fun. The categories of negative emotions include: frustration-anger, incompetence-anxiety-fear-doubt, exhaustion-stress, and disappointment-discouragement-sadness. Smeltzer also found that the most dominant and intense category of emotion is frustration-anger. It comes as a result of the turmoil beginning teachers, experience as defeat, distress, or displeasure. The incompetence-anxiety-fear-doubt category represents low self-efficacy, expressed by feelings of inadequacy, uneasiness, apprehension, worry, hesitancy, or uncertainty. The exhaustion-stress category characterizes weariness, fatigue, and energy loss. The disappointment-discouragement-sadness category refers to the most desperate and desolate of emotions such as unfulfilled expectations, sorrow, low spirits, disheartenment, and dashed hopes.

The categories of positive emotion were found to be of less frequency and intensity. The joy-happiness category represents the delight, pleasure, and contentment experienced in the early years of teaching. The fulfillment-reward-satisfaction category extends the joy-happiness category, representing a deeper and more intense degree of gratification. The competence-confidence-motivation

category signifies teacher self-efficacy identified by assurance, certainty, and proficiency. The least dominant and intense of all the emotional classifications is the surprise-fun category that refers to unanticipated and spontaneous experiences in teaching. In the present study the research participants recounted various emotions that can be generally grouped into positive and negative headings. Moreover, these emotions can also be further categorized according to Smeltzer's types which were previously mentioned.

3. The study

Our study focuses on experienced mathematics teachers, each of whom who has more than 30 years of teaching experience. The aims of our study are to characterize: (i) facets and experiences that are central to the development of EK from retrospective perspectives; (ii) interrelations between EK and PCK; and (iii) the evolvement of teachers' EK during their years of practice from retrospective perspectives. In this paper we provide a partial description of the results from the first part of our study. We also present certain facets and experiences of the emotional component of teaching that are central to the development of EK, as shown in these two case-studies.

3.1 The study participants

Twelve mathematics teachers with more than 30 years of teaching experience each were interviewed. In this paper we will briefly present the narratives of only two of them: Betty (56) and Rose (55), both who teach mathematics in middle-high school. We chose to make use of their stories because more than the other participants, Betty and Rose were able to identify the "causes and effects" that impacted their emotions and the development of their EK. In section 4 we present excerpts from their actual narratives.

3.2 Method

Data collection. We asked the twelve teachers to tell us their stories, with deliberate attention given to emotional aspects of teaching and EK. The interviews were open. We asked the teachers several general questions (for example – why they chose to become teachers), and following their narratives we asked for further clarification. We were careful not to direct them, or to interfere in their associative train of thought. The interviews were tape-recorded. Each interview lasted between 3 to 4 hours and took place in an informal setting, such as the teacher's home or Cafeteria.

Data analysis. Scanning the transcripts of the recorded interviews, we first picked out all the excerpts which included expressions of emotion. Then we differentiated between various types of emotion according to the addressee of the emotional reaction, namely: emotional reactions towards students, the school principal or other colleagues.

Being aware of the small size of our sample, we cannot say that the data collected represents the general emotional profile of the teachers in our country.

However, it does shed light on some important aspects of the teaching experience that should be considered.

4. Results and discussion

In this section we make use of the narratives of Betty and Rose to characterize some of the important facets and experiences that emerged in relation to EK development. In the scope of this paper we focus merely on EK with respect to students and school principal.

Betty's story

Betty is 56 years old and has more than 29 years of teaching experience. Betty was born and raised in Lebanon. She remembers her classmates "standing tensely and quietly in their places until the teacher entered the class and gave us permission to sit down. All the students behaved politely and respected the teachers, and there were no disciplinary problems...When I came to Israel I knew it was a different country with a different culture but I could not anticipate the extreme differences."

Betty immigrated to Israel when she was 16 years old. When she was 18, she began to study computer science. After graduation she worked as a computer programmer for two years in a large commercial company, and then was offered a position as a mathematics teacher in a middle-high school. She accepted the offer. Betty chose to begin her story as a mathematics teacher with a description of her first lesson in the school:

"Although it happened many years ago I remember it as if it were yesterday. This was my first day at school and I had to teach mathematics in one of the 11th grade classes. I opened the door and I was shocked. All the students were half-sitting, half-lying on the tables and no one even bothered to turn his/her head toward me when I entered the classroom. I felt discouraged. I asked the students to sit properly so that we could start the lesson and they said: "This is how we behave!" I felt hopeless and speechless but after a few seconds I said: "If you do not follow my request, I will leave the classroom." One of the boys went to the door lay down on the floor and said: "Over my dead body!" The rest of the students laughed. I was very close to tears and felt very frustrated and hopeless. But I knew that if I showed any sign of weakness I would not be able to teach this class again. So with my remaining bit of strength I insisted that they follow my instructions which eventually they did. I must admit that from time to time I ask myself what I would have done had they had kept misbehaving..."

Unfortunately, I had to face similar situations several times during my first two years of teaching. I felt like the students were testing me, looking to see how consistent my behavior was...However the second time is never like the first. The first time you confront a certain situation which was not anticipated, the emotional effect is very powerful since it is accompanied by a sense of helplessness. The first time it happens to you, you do not know how to respond,

you feel a lack of proper communication skills, and your self-esteem plunges. However, when you face a similar situation again, knowing that you have already survived such an experience, your emotional reaction (ER) is less intense. You feel like you already know how to handle the situation successfully."

Betty claims that although the first years were difficult she chose not to quit her job: "I had many moments when I asked myself why keep on suffering? However, emotionally, I could not afford to give up. It was actually like admitting that I was not capable of handling a class. I could not bear this thought...It was my pride [smiling] that prevented me from quitting."

Betty's description of her first lesson is full of negative emotional expressions: shock, disrespect, hopelessness, and frustration. These emotions resulted in a sense of "being pushed to the corner," which affected her ER and her decision to use the threat of leaving the classroom against the students. After the students laughed, her emotions intensified to such an extent that Betty was close to tears. The fact that Betty chose to open her story with this lively and unpleasant memory demonstrates how powerful these emotional impressions were. Betty, however, quickly regained her composure and repressed her negative emotions. She chose to use an alternative ER, and then insisted that the students follow her instructions. Although this alternative reaction was successful, the pestering thought of "what would have happened if..." occupied her thoughts for years. It appears as if some sort of "emotional sequence" in Betty's mind remained unsolved.

According to Betty, ERs decrease in their intensity due to the building of EK. The second time she had to face such an episode in the teaching environment, she already knew what to do and how to react. Emotions can either paralyze one's actions or serve as a starting point for learning how to transform them into an actual response. This is the meaning of building EK. In Betty's case, EK that was translated into communication skills with students and knowledge about classroom management. In the ensuing years Betty asserts that she continued to suffer from negative emotional experiences and reactions within the classroom. Building her EK actually sustained her through the inner emotional struggle of whether to give up and thus lose her pride or whether to learn to confront her emotions and regulate and navigate her way through them. Gradually Betty built her self-image as a teacher:

"During the first few years of my teaching I remember that my students kept asking me personal questions. I believe this was their way to get to know me and to adjust their behavior to my expectations. At the beginning I was flattered and I cooperated with them. But then I realized that they interpreted this cooperative behavior of mine to mean I was their friend. When I had to be authoritative they were confused. So I realized that I had to operate differently - to be nice to them not as a friend but as a teacher. In fact, my image as a mathematics teacher was built during that period... I believe that after the first two years at the school my image as a mathematics teacher was solidified and the students conveyed that information about me to new incoming students."

Learning to reflect on her EK also enabled Betty to establish her image as well as her status as an appreciated teacher. Although she was tempted to cooperate with the students and to provide them with personal information, she chose to remain nice to them, but not too friendly. We might say that these were Betty's first steps in developing emotional understanding (Denzin, 1984). Betty concluded her story:

"The main difference between my functioning as a beginning and as an experienced teacher is that as a beginning teacher the types of knowledge I had were disconnected, isolated. I had no idea how to integrate my content knowledge, pedagogical knowledge, and EK. Moreover, I wasn't even aware of the fact that such integration was essential to my success as a teacher. I believe that my reflections on the complexity of class management and student-teacher relations was most dominant in developing my EK and in developing my ability to synthesize these types of knowledge. Only after I was able to balance between these types of knowledge did the intensity of my ERs significantly decrease, no longer being the dominant aspect of my teaching."

Betty's reflection on her evolution as a teacher focuses on the importance of merging academic content, pedagogical, and emotional knowledge. In the beginning her deficiencies in EK created a situation according to which her emotions governed and directed her actions, and they were highly intense. With time, her ability to regulate her emotions, reflect on them to generate EK, minimized their intensity and dominance, and enabled her to recognize EK as equally important as other types of knowledge. It was, however, only after she realized that all types of knowledge were interconnected that she felt she became a good teacher.

Rose's story

Rose is 55 and she has 32 years of teaching experience. Rose's parents were both teachers. Her father was a mathematics teacher. Rose claims that "since I was a child I knew I would never be a teacher. I saw my parents working very hard and I didn't want to be like them." When she was 18 she started studying statistics at the university. She recalls: "I hated every moment there. The teachers were bad. We were more than 100 students in a class, and the teachers didn't know us personally. I was shy, and in such a large class I was embarrassed to ask questions or provide answers." By the end of the year, after failing most exams, she started to wonder whether she had chosen the right profession. Before the beginning of the school year her father suggested that she work as a substitute teacher in his school until the beginning of the university's academic year. She accepted the suggestion "just to save some money." However, "the moment I entered the class I knew – this is what I wanted to do! It was something about the chemistry with the students." Rose left the university and started to study in a small college, where she graduated as a mathematics and physics teacher: "I loved the college. There were no more than 10 prospective teachers in a class, and our teachers knew each of us personally. They encouraged me to ask questions and listened to what I had to say." After her graduation she started to teach mathematics in a middle-high school:

"I was young and naïve, and at the beginning I didn't realize that I was sent to teach classes no other teacher wanted. There were many disciplinary problems, but it didn't bother me. The other teachers didn't understand how I managed to survive these students... When I reflected on my experience at the university and the college, I realized that the alienated attitude at the university as opposed to the close and warm relations between the teachers and students in the college had a tremendous influence on my ability to persist in my studies. So I guessed that if I treated each student warmly and personally, not as a problematic person but as an individual, I would be able to see beyond my immediate emotional difficulties that might stem from disciplinary problems. And it worked... I knew that many students hated mathematics and found it very difficult. It was very important for me to reduce their fears. I knew this was one of the keys to my success as a teacher... Nothing however prepared me for the struggle with the school management. I never realized why the principal of the school was hostile. He didn't speak nicely to me and didn't support me as a new teacher. I tried very hard not to let this affect my work with the students. For me, closing the door of the classroom was like entering an airplane and landing in a different country... As I said, I was naïve and I had nothing to do with intrigues. By the end of the year the principal told me that he didn't want me to teach high-school classes anymore, only middle-school classes. He didn't explain why. He said that because I didn't teach the high level classes he didn't consider me important for the school. I felt insulted and humiliated, and although I loved the students I couldn't bear this humiliation and decided to leave this school."

Rose left the school with "hard feelings. My self-esteem was harmed, and I was confused. I didn't realize what had been disrupted." She found a job in another school, but the supervisor of the former school pleaded to return. She acceded to his request on the condition that she continue to teach her students. Rose feels that "I returned to that school as a winner. I gained back my self-esteem. However, the principal couldn't accept the fact that he was forced to have me back against his will. Emotionally, it was very hard to arrive to school every day. I had no idea how to confront him." Three years later her father told her that there was a vacant position in his school and she "went back to where it all started." This new school was highly selective in those days, and she started to work with "totally different students."

From Rose's story it appears that she had a high emotional self-awareness when she started to teach. Reflecting on her emotional experiences as an undergraduate student, she realized that personal and attentive relations with students are essential for developing their readiness to learn. The fact that by the time she started to teach she had already gained some relevant EK helped her handle successfully problematic disciplinary situations, and not to consider them threatening. In fact, we might say that even if there were any conflicts with the students, Rose put them aside since she was emotionally more occupied by an unexpected front – the bad attitude of the school principal. As a new teacher in school she expected to receive supportive

attention from the school management in general and from the school principal in particular. The principal's attitude hurt her feelings and gave rise to feelings of humiliation and insult in her. Her lack of EK regarding relations with management prevented her from confronting her emotions and coping successfully with the situation she encountered. Rose was not able to resolve the situation, and therefore, with her damaged self-esteem, she chose to leave the school. Trying to recover her self-esteem Rose agreed to return to the school, but during the following three years she did not manage to further develop her EK with respect to teacher-management relations, and she decided to leave the school again, this time forever.

As regards to her relationships with students, Rose believes that she had "a breakthrough when my daughter entered middle-school":

"It happened fourteen years ago, and I realized that my approach to the students was too academic. I didn't really know their emotional world. I understood that when they were angry or in bad mood it wasn't because they wanted to struggle with me, but merely because they were teenagers with emotional distresses. I became more curious about their emotional lives. I wasn't angry when they didn't do their homework. I talked to them personally and tried to be more attentive to their emotions... I tried to develop awareness about what might insult them, to recognize those with whom I could be cynical with, those who needed my encouragement, and those who needed my embrace. I stopped punishing them, because I didn't want to insult them... This emotional approach turned out to be beneficial for them as well as for me. I started to enjoy teaching more... to emphasize values and emotions, and to treat them as equal partners... As I said before, many students are afraid of mathematics, and I became more sensitive to this emotion, and I kept looking for various didactical approaches to help them overcome their anxiety."

Rose's further development of her EK as a teacher occurred when she started to develop her EK with respect to her own daughter. From her, Rose became aware of the reasons that underlie her students' anger and dispositions and started to be more involved in their emotional lives. Her new EK directed her towards developing personal emotional relationships with the students on the basis of each student's personality. Although she was already aware of their fear of mathematics, it was only after she established her EK that she was able to successfully integrate her EK and her didactical knowledge as well as her knowledge about the curriculum.

Five years ago the principal of the school retired, and a new principal started to administrate Rose's school: "This principal is bad for school. Since his first day at school he gathered around him 'yes-men' and formed cliques...I refused to join the 'right' clique and, like other teachers in my condition, I have to deal with his harassment. However, unlike my first school, I don't let it ruin me emotionally. I believe I have learned how to control my emotions, to neutralize them when necessary. I don't take it personally. He has his own personal problems, and I can't be responsible for that."

Rose's last excerpt shows that throughout the years she developed her EK regarding teacher-management relationships. When she had to face hostile behavior for the second time, she was already prepared and her ER towards the situation was not as intense as it had been the first time.

5. Conclusions

Teaching is an emotional practice and the use of emotions can be helpful or harmful (Hargreaves, 2000). Thus there is a need to learn about teachers' EK in order to be able to redirect it in desirable directions.

EK is about developing emotional understanding. The last term is constituted from two words which come from totally different areas. *Emotional* refers to activities ruled by instincts and intuition, while *understanding* refers to activities ruled by logic and cognition. The combination of these two terms implies the need to control and lead the emotions by cognitive means, such as understanding. Moreover, while didactical and content knowledge can be acquired in teacher training programs, EK is dynamically built as a result of human interaction. Moreover, EK is subjective and varies from one person to another. Both Betty and Rose describe EK as a knowledge base that is gradually built and which comes as a result of human interaction. When Betty and Rose made their initial steps as teachers, they were well equipped with didactical and curricular knowledge. Their preliminary EK however was influenced by their previous experiences as learners: in Betty's case – her experience as a pupil in school and in Rose's case – her experience as an undergraduate. Both Betty and Rose refer to EK concerning their interaction with students while Rose refers in addition to EK concerning her interaction with the school's principal. Considering Zembylas' (2007) distinction between the three planes of EK, although Betty and Rose refer to the individual, relational and socio-political planes of emotion, in our paper we relate merely to personal relationships. EK that relates to inter-personal relationships develops as a result of what teachers encounter during their professional lives. Namely, when facing crises in teacher-student or teacher-management relationships, coping with the situation produces an ER which in turn produces a practical reaction that can affect the situation itself. Considering Betty's and Rose's narratives, it appears that ERs differ in their intensity and focal points. The intensity is heavily dependent on the rate of familiarity with the focal point, the teacher's personality, social-cultural background, and more.

That the interviews represent retrospective perspectives of events the teachers experienced many years ago, strengthens the feeling that after all these years they served as milestones in building their EK. It is harder to reflect on ER than on cognitive processes since the first action might involve the exposure of weaknesses and difficulties. It is therefore worthwhile to consider Betty's suggestion to create a kind of support group which can help teachers safely make it through the hard start is unusual, since people often tend to avoid the exposition of their feelings in public.

Both interviewees managed to develop a certain level of ability to reflect on their emotions during their teaching practice. This ability enabled them to develop their emotional understanding regarding their relations with students, the school principal, and other colleagues.

In most professions people face new situations, experience frustration and helplessness, joy and satisfaction, and difficult individuals, among other challenges. The inability to reflect on circumstances and ER, to grow and develop into the profession, can lead one to experience negative feelings such as frustration. These feelings, although essential to the process of growth and development, have a tremendous influence on other aspects of one's personal life (Yaffe-Yanai, 2000). It is therefore important that teachers be able to reflect on their experiences, design and develop their EK, and learn to integrate the different types of knowledge they possess. It would be interesting to listen to the stories of teachers who chose to quit teaching in various phases of their professional lives, and compare their EK to those who persisted.

Our focus is on middle- and high-school mathematics teachers. It is reasonable to assume that elementary school teachers have different stories. It would be also interesting to examine the differences between lower-elementary and upper-elementary school teachers to learn how the students' age influences teachers developing EK.

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