SAME TEXTBOOK, DIFFERENT POINTS OF VIEW:
STUDENTS AND TEACHERS AS TEXTBOOK USERS

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The utilization of textbooks by mathematics teachers has been the subject of many recent studies; students’ opinions, however, have not received such attention. The study presented in this paper aims to investigate both students’ and their teacher’s ways of and reasons for using the textbook, with an emphasis on the vertices of the Socio-Didactical Tetrahedron. The findings indicate that the beliefs about being a teacher and about being a student strongly influence textbook utilization. Also, the students’ use of the textbook is influenced by the teacher’s intentions. Here the extension of the didactical tetrahedron to a socio-didactical tetrahedron proved to be very valuable due to the social factors involved in textbook use.

INTRODUCTION

From the perspective of teaching and learning, the mathematics textbook is a very valuable resource designed for use by both students and teachers (Pepin, Gueudet & Trouche, 2013). Many studies investigated teachers’ use of textbooks (e.g., Pepin & Haggarty, 2001; Jukić Matić & Glasnović Gracin, 2016) and showed that textbook content and structure affect teachers’ choices in different ways during the processes of both planning and enacting a lesson. One of those choices is the decision on the extent of textbook use in the classroom, which is reached by reflection on the textbook content and the aims of the teachers and those of the curriculum. The utilization of textbooks from the students’ point of view has not received the same attention as the teachers’ textbook utilization (Rezat, 2012). As a result of their teachers’ intentions and choices, students mainly use textbooks as a source of exercises and for homework (Fan, Zhu, Qiu & Hu, 2004). Still, studies that examine teachers and their students together in terms of textbook use are scarce. Such research has been conducted by Rezat (2012) and Viholainen, Partanen, Piironen, Asikainen and Hirvonen (2015). These studies highlighted the need for further research in which teachers and students as textbook users are taken into account jointly, and not as separate research participants.

The study presented in this paper aims to investigate both the students’ and their teacher’s ways of and reasons for using the textbook, with an emphasis on the social aspects of their interaction with textbooks.
Social aspects of textbook use

Various social and institutional aspects, such as family, colleagues, peers, personal beliefs, rules and institutions influence the process of teaching and learning (Rezat & Sträßer 2012), and thus may also affect how and why textbooks are used by teachers and students.

The aim of the study presented in this paper is to investigate and contrast the textbook utilization seen by a teacher and simultaneously seen by his/her students. For this purpose, we formulated the following research question: Which social and institutional parameters influence the teacher’s textbook use and which parameters influence his/her students’ use of the textbook?

THEORETICAL FRAMEWORK

The theoretical framework used to examine the utilization of mathematics textbooks from both the teacher’s and students’ point of view is Rezat and Sträßer’s (2012) socio-didactical tetrahedron (SDT). This model derives from the original didactical tetrahedron with vertices: teacher, student, (mathematical) content and the artefact (textbook), which is extended by social and cultural influences positioned as the bottom vertices. These vertices and connected points are: public image of mathematics, norms about being a student/teacher, noosphere, institution, and peers and family. The model of the socio-didactical tetrahedron as proposed by the authors is presented in Figure 1.

![Figure 1. Socio-didactical tetrahedron (Rezat & Sträßer 2012, p. 648)](image)

The social and institutional parameters are often considered to be less visible because the persons involved often are not conscious of them. In this paper, we used the SDT model to find which connections among the vertices of the SDT become the most prominent and the most powerful for students and for their teacher during the process of using a textbook.
METHODODOLOGY

The study presented in this paper is a case study which involved one female mathematics teacher from lower secondary education in Croatia (grades five to eight) and six of her students, divided into two targeted groups. The aim was the in-depth examination of participants’ views and experiences on textbook utilization according to the research question. The criteria for teacher selection were: teaching experience (15 years), participation in previous studies and the utilization of textbooks in classroom practice. All the student participants were eighth-graders (age 14) and the teacher had been teaching them mathematics for the past four years (from grade 5 to grade 8). Students were chosen to focus groups according to their interest in the study and various school achievement.

The study encompassed the qualitative methods in the form of classroom observations (4 lessons), a semi-structured interview with the teacher, and interviews with each targeted group of students. Combining the observations and interviews provided a more in-depth understanding of the issues researched. Selected data presented in results reflect the compatibilities and divergences of teacher’s and students’ answers related to the research question.

RESULTS

The classroom observations showed that the textbook was used to a large extent for acquiring new content, for practising and for assigning homework. The interview showed that the teacher’s beliefs and intentions affected the classroom enactment and the textbook use. In this paper the focus is on the two faces of the SDT model which contain the point Student. These are the tetrahedron faces Textbook – Student – Teacher and Textbook – Student – Mathematics (Figure 1).

The SDT face: Textbook – Student – Teacher

The participant students are asked to describe how they use the mathematics textbook. They said that they use it a lot, which is confirmed in the observed lessons. Furthermore, the students said that they use the textbook at home for homework, but also to prepare for the following lesson the next day:

Student1: I use it [the textbook] when I get back home. If we have mathematics the following day, I read through some definitions in the textbook, go through several tasks and do the homework. Usually we have enough homework to go over and understand the content... and before a test I go through the definitions and I practice from the revision section in the textbook...

Student3: I use it for homework, I use worked examples if I don't understand something and for revising before a test.

These responses refer to the SDT vertex norms about being a student which is connected to textbook use. For these participants, norms about being a student means: to use the textbook for homework, but also to prepare for the next lesson at home using the textbook and to revise for tests. In the interview, the teacher said that the textbook
they use completely covers the content in the tests and that “if students use the textbook consistently they will achieve good results”.

Teacher: All the exam questions correspond to the tasks that we did in school or the students had them for homework.

The teacher believes that her job is to provide the content and tasks; her students should use the textbook both in the classroom and at home. In this way, the norms about being a teacher is connected to the students' utilization of the textbook and to the norms about being a student.

Regarding the relation Textbook-Student-Teacher, many details observed in the classroom correspond to the teacher’s and students’ beliefs from the interview. Decisions about whether or not to use the textbook, and what will be used, are made by the teacher in the preparation phase when she consults the textbook and other resources:

Teacher: My students copy the definitions from the textbook, we also do the worked examples. But the motivational parts and acquiring new knowledge... sometimes we use the textbook for that, sometimes not. It depends on whether it is well presented in the textbook.

These teacher’s decisions about the students’ textbook use, are in line with the teacher’s beliefs as a mediator between the textbook and students. This is also evidenced in classroom observations.

The participating students stated that from their perspective:

Student2: She [the teacher] explains in her own words to make it clearer for us. The same content can be found in the textbook, but it’s a little bit more difficult to understand.

Student1: And then, she adds some interesting facts or something that would make it easier to learn... things that are not necessarily in the textbook.

The students were aware of the role of the teacher as a mediator between the textbook and the students, which is also a part of the norms about being a teacher from the SDT. The teacher claimed that she uses the textbook to introduce new content, but since she considers that the tasks in the textbook they use are not challenging enough, she also uses other professional resources. Here we notice the role of noosphere from the SDT model.

Although the teacher in the interview indicated that the textbook is used at home mostly by the stronger students, the results show that a weaker student uses the textbook as well, but for his own reasons:

Student2: I do not use my notebook for studying, I always only use the textbook. In every subject. (...) Because I have very untidy handwriting. I use the notebook as a tool in school because it is obligatory; if I don’t write things down in it I’ll get a minus or an ‘F’.
This response relates to another important point on the tetrahedron – institution, which is placed on the edge containing norms about being a student and norms about being a teacher. In Croatian schools the use of notebooks is a very important element of learning mathematics. This student, however, learns exclusively from the textbook at home because of his handwriting. He acknowledges that for institutional reasons he must have a notebook in school, but he uses the textbook for studying because it provides clear, structured and legible content.

**SDT face: Textbook – Student – Mathematics**

The teacher mentioned another reason why she relies on the textbook structure and content so much during her lessons:

Teacher: I mostly think... that if someone did not understand something during the lesson, he or she can open the textbook at home and easily read through it.

The students think in a similar way:

Student2: I really like that the textbook has worked examples; if something wasn’t clear to me in school, I just look at the examples... I find the explanation in the book and after that I can solve the task by myself.

Student3: If I wasn’t present [at school], I just take a look in the textbook.

As well as being a help to students at home, the textbook may help parents and tutors. Here we come to the side point peers and family from the bottom (social) part of the SDT:

Student2: I... I often get stuck because I have problems with mathematics, and when something is not clear to me, my father mainly helps me. (...) He uses the Internet and the textbook...

**DISCUSSION AND CONCLUSIONS**

The case study reported in this paper portrayed teaching and textbook use as social processes from two mutually dependent perspectives: the students’ and the teacher’s. The results show that the students’ use of the textbook is dependent on the teacher-mediation process between student and textbook (e.g. Pepin & Haggarty, 2001; Love & Pimm, 1996). Further, many of the teacher’s decisions concerning use of the textbook are influenced by the social component norms about being a teacher. This SDT vertex encompasses the teacher’s pedagogical content knowledge as a strong component (An, Kulm & Wu, 2004).

The teacher’s and the students’ answers in the interviews mainly correspond with the observed lessons (Jukić Matić & Glasnović Gracin, 2016). Also, the study showed the strong relation between the norms about being a teacher and the norms about being a student. Still, some hidden details and social and institutional reasons for textbook utilization were found in the students’ interviews which were not evident during the observations and which the teacher was not aware of. One of these was the fact that a student uses the textbook a lot at home because his bad handwriting makes his notebook unusable.
Institutional reasons were also very important for understanding why the textbook was used so much in the school and at home. Namely, school as an institution has its rules, and textbooks in Croatia are obligatory and regulated by the Ministry of Education.

Many teachers and the public often believe that the use of textbooks depends mostly on the content (Jukić Matić & Glasnović Gracin, 2016), but this qualitative triangulation has shown another perspective. In addition to the content, teachers and students use / do not use a textbook for reasons related to institutions, conventions and norms of being a teacher and student, and for other social and institutional reasons. Therefore, it is useful to use the SDT in order to better understand the teaching and learning of mathematics.

References


