IARTEM
International Association for Research on Textbooks and Educational Media

IARTEM *e-Journal*
Volume 6 No 3

Volume 6 Number 3

How teachers reflect on textbook materials and how they utilise them

Jana Stará and Tereza Krčmářová
Charles University in Prague
Czech Republic

Abstract

This paper provides an overview of research findings and information in the area of teachers' use of textbook materials. Furthermore, it presents the results of qualitative research dedicated to this issue, which was carried out with three Czech primary school teachers. These results were acquired on the basis of direct lesson observations as well as analysis of video recordings and interviews. The results show what innovative textbook materials can bring to teachers, who is open to thinking about subject matter and its didactic transformations, and what they can bring to those who are less open or less willing to dedicate their time and attention to this reflection. The results also offer some findings regarding what textbook materials should look like if these groups of teachers are to work with them effectively. The selected teachers see themselves as the ones who decide on instructional content although they base their decisions on textbook materials. Interpretation of the methodology suggested in textbook materials and their subsequent utilisation depends largely on the teaching approach adopted by individual teachers. All teachers agreed that textbook materials should be concise and should contain

inspirational methodology ideas. Not all of them wanted to use textbooks as a source of their own learning.

Keywords: materials development, primary teaching, textbooks research.

Introduction

Research surveys (Grossman & Thompson 2008, Peacock & Gates 2000) reveal that on the one hand, teachers are aware of the need to modify existing textbook materials. On the other hand, their instruction depends on commercially published textbook materials to a large extent, such as textbooks, workbooks or worksheets for pupils as well as teachers' books and teaching software (Sikorová 2011, Peacock & Gates 2000, Lambert 1996, Grossman & Thompson 2008).

Many professionals are of the opinion that teachers should be active designers of the curriculum (Rodríguez & Mesa 2012, Spilková 2007). In their opinion, teachers should be able to analyse state and district curriculum decisions, and to a certain extent they should be able to decide about the content of education and methodology, and select, utilise and elaborate their own textbook materials to provide greater contextual appropriateness. In these times of curriculum reforms, development of subject matter methodologies and individualised teaching, these demands on teachers are very ambitious.

In our research we were therefore interested in how teachers reflect on textbooks in this context. Do they see them as materials to get inspired from when preparing their lessons? To what extent do teachers base their decisions on textbooks when selecting content and instructional methods? How much do teachers think about subject matter and instructional methods stated in textbooks? How much do they change them? Are they influenced by the concept of textbooks in the long term? How do they perceive their work with textbook materials? Do they think they are failing or succeeding? What type of textbook materials suit them?

Use of textbook materials by teachers

Based on research surveys, teachers put a serious amount of effort into adaptation of curricular materials. In the research of perceptions of 383 primary school teachers regarding printed textbook materials in Galicia (Spain), 71% of

teachers reported that textbook materials are among the topics of discussion in schools. According to 55.9% of them, the questions most frequently reported were how to adapt textbook materials to the working context (Rodríguez & Mesa 2012).

Longitudinal qualitative research of ten American English teachers showed that it is mainly the less experienced teachers who feel overloaded by the requirement to design their own textbook materials. They welcome materials that offer specific tasks or teaching activities ideas. At the beginning of their teaching practice, they devote an enormous effort to seeking appropriate textbook materials that can be used in their lessons and in the course of lesson planning. In the course of their search, they draw on recommendations from more experienced colleagues, and library and internet resources. They complain that during their teacher training period they learned how to critically evaluate existing textbook materials, what they learned less though was how to adapt and effectively utilise them. Commercially published textbook materials enable them to try new teaching methods in practice and gain experience with them (Grossman & Thompson 2008).

Especially at the beginning of their professional careers, teachers use existing textbook materials to plan their lessons with relative consistency, even though they think that the majority of commercially published textbook materials require some adaptations and adjustments (Grossman & Thompson 2008, Peacock & Gates 2000). These authors conclude that the researched teachers consider their content knowledge to be insufficient and therefore need to fall back on textbook materials. However, at the same time they don't give up on their endeavours to adapt and adjust these materials.

Do textbooks materials help teachers to navigate subject matter and its structure? Qualitative studies of primary school math teachers, who were the participants in the introduction of the Framework Curriculum of math teaching in California (e.g. Cohen 1990, Wilson 1990), show that even though textbook materials (mainly teachers' books) contain texts explaining and defending innovations, teachers still maintain their old concepts and stick to the old content. This contradicts the concept of the designers of these materials, even though the teachers may believe that they understand and fulfil their intention. A similar conclusion was reached by Millard (2005), also on the basis of math teachers research, as well as by the authors of the research conducted in 'Basics of Humanities' and natural science lessons (the Czech lower primary school subject called "Prvouka") (Stará et al 2010).

Studies show that the level of understanding and implementation of a new concept is influenced by the intricacy and complexity of the reform or innovations reflected in the material (Dusenbury et al 2003). The more complex the material the more time required to study it through (see also Wilson 1990, Peacock & Gates 2000), and the less probable it is that it will be used as a teaching resource by teachers in compliance with its author's intentions. By contrast, in the case of the materials with clearly defined goals and key features that concentrate on a specific field, the content is more likely to be implemented in lessons (see the results of the meta-analysis of fidelity research from the field of drug abuse prevention in school settings: Dusenbury et al 2003. See also Stará 2011).

The above-mentioned research concerning inexperienced teachers in the course of science teaching (Peacock & Gates 2000) as well as research focused on geography teachers in secondary school (Lambert 1996) shows that teachers cannot and/or are not willing to devote too much time to the study of textbook materials. They prefer materials that are easy and fast to navigate and can provide answers to their questions. When selecting textbook materials, their decision is based neither on the nature and depth of the content nor on the quality of concept presentation.

The case of the teacher, Oublier (Cohen 1990), shows that the teachers' own journey in moving from what they are familiar with to new areas can result in a curious combination of new and traditional topics and methods. This result can be perceived by the teachers as a big change while for the observer this change may seem minute or even unnoticeable.

According to many experts, commercially published textbooks can no longer be perceived as materials that carry authority and will therefore be rigorously used by teachers. Currently the concept of participation with the text coined by Remillard (2005) is coming to the fore. In this concept, teachers and textbook materials are in a mutually dynamic relationship. Teachers adapt and interpret texts and in the process of working with texts they themselves undergo changes. At the same time, the textbook texts are products of sociocultural development and, as such, they are retrospectively formed by both teachers' and pupils' actions (Brown 1992, Dvořák et al 2008:83, DBRC 2003, Wang & Hannafin 2005).

Pinar et al (2004:699-704) mention the approach they call curriculum enactment, in which the implementation means a change in teachers' thinking.

In this approach, teachers individually develop themselves and change their thinking as well as their behaviour while working with the curriculum. This process can therefore be referred to as curriculum development rather than its implementation.

Based on the above-stated research results, teachers (especially novices) rely on textbook materials when planning their lessons, probably mainly due to the fact that they are not fully confident when it comes to content knowledge. On the other hand, they don't find commercially published textbook materials fully satisfying and think that they should be adapted. Teachers adapt textbook materials (mainly the innovative ones) according to their existing knowledge and experience. It often seems as if they did not understand the intention of the authors of textbook materials. It is, however, possible that their process of instruction is influenced by the textbook materials, even though this may not be apparent to external observers.

Research goals and methodology

Our research intention was to gain insight into how Czech teachers think about innovative textbook materials and how they use them. We aimed to find out if teachers participate with textbook materials, if they are engaged in curriculum enactment and how this is done, and how textbook materials influenced this process. In other words, our aim was to find out if teachers are influenced by textbooks, if textbooks are adapted by teachers, and the nature of this process.

We posed the following research questions: How do teachers think about new textbook materials? How do they use them?

Selection of research participants

Due to the character of our research, we chose not to work with a big research sample, similar to many other researchers of this type (e.g. Remillard 2000, Sosniak & Stodolsky 1993, Stará et al 2010, Schneiderová, Krajcik & Blumenfeld 2005). We sought participants for the study from amongst teachers in schools that cooperate with the Faculty of Education. We chose three teachers from the 1st grade of primary school, who were planning to teach a selected thematic unit in the following semester for the first time in their teaching practice. The teachers and the pupils' parents consented to us making

audio and video recordings during the lessons. Our researchers were also present at the lessons dedicated to the selected thematic unit.

The first teacher we researched gained a lower primary education degree at the Faculty of Education more than 20 years ago and has had many years of work experience (Teacher A). We also intended to research how teaching is implemented by a teacher with relatively little teaching experience, who gained her degree later. Therefore, we approached a teacher who had graduated five years earlier (Teacher B). When analysing the data regarding Teacher B we were unsure whether this teacher was a typical representative of teachers with relatively little work experience and decided to study another teacher in the same situation. With the help of an insider – a long-term partner who cooperates on students' teaching practice at Prague's primary schools – we identified and approached a teacher with the same amount of teaching experience as Teacher B (almost four years), but with a different teaching style (Teacher C).

With all three teachers we observed four lessons focused on subject matter from the thematic unit "Science – Scientist", from the materials contained in the textbook, *Prvouka*, published by Fraus publishing company for the lower levels of primary school. It is suggested that the subject matter be taught over four lessons. We assumed that the lessons were preceded by lesson planning, where teachers consider and change the projected subject matter in relation to themselves and to their pupils. We inferred the process and content of lesson planning indirectly from the lesson observations and interviews.

Methodology

At first, we looked at relevant sections of the teacher's book with the aim of analysing the goals that the projected lessons explicitly and implicitly pursued. Furthermore, we analysed methods, which were suggested as tools for implementation of the given goals. We also analysed the "big ideas" (see e.g. Harlen 2010) from the science field, to be conveyed to pupils for this topic according to the authors of the teacher's book. We later used the results of these analyses to establish codes and their categorisation was used for the analyses of observed lessons.

As an illustration of the collected data and to demonstrate how we organised it, we offer examples of some "big ideas" that we identified in the course of our analysis of textbook materials. These are the paraphrases of ideas, or groups of

paraphrased ideas with similar meaning, which are to be found in the teacher's book and the textbook for pupils and which are in harmony with the goals explicitly stated in the teacher's book (Dvořáková, Stará & Dvořák 2007:70-8):

- Scientists discover characteristics of nature or the human world and try to understand items and phenomena that surround us. When researching these items and phenomena, scientists can discover useful things that are important for human life and the development of society. Inventions and discoveries made by scientists and inventors help us. Many things, which we now take for granted, people didn't know of in the past.
- Also we (pupils) can investigate qualities of materials. We can do simple experiments. We plan them and record the results.

For the purpose of conveying these "big ideas", textbook materials suggest instructional methods and procedures. Below we give examples of some instructional methods related to the above-stated ideas and their comparison with methods used during lessons (table 1).

Together (in pairs) we visited the 'Basics of Humanities' and natural science lessons ("Prvouka" lessons) led by the selected teachers and carried out direct observations. Beforehand, it was agreed with teachers that they could use textbook materials, which suggest how this thematic unit can be implemented in the lesson. However, they were also asked to change (or omit) whatever they wanted with regard to subject matter and methodology, if possible in the same way as they would do if they weren't participating in the research.

Immediately after the fourth (and last) observed lesson, we carried out a forty-five minute semi-structured interview, which we also audio-recorded. From the interviews we aimed to establish: what the teachers changed in their lessons and why; what they did in the same way as suggested in textbook materials and why; how textbook materials influenced their concept of the lesson, etc. We transcribed all of the audio recordings.

We coded the transcribed lessons using the software MAXQDA, used for qualitative analyses of texts. As previously mentioned, the source of the codes we used were the goals, "big ideas" and teaching methods identified in the course of the preceding analysis of the teacher's book. Afterwards, we performed additional analysis, at first individually with each of the three teachers, and afterwards also comparatively between them.

The list of the codes was gradually modified and supplemented. Based on their meanings, the concepts were grouped in categories. Simultaneously with coding we also used memoing to record ideas and relationships. Memoing helped us:

> …move easily from empirical data to conceptual level, refining and expanding codes further, developing key categories and showing their relationships, and building toward a more integrated understanding of events, processes, and interactions in the case. (Lawrence & Tar 2013:33).

In the course of data analysis, we gradually unveiled relationships, which we used as starting points to interpret the data.

Table 1: Instructional methods to convey "big ideas" and fidelity of approach

Instructional methods suggested in textbook materials	***Fidelity to the methods suggested in textbook materials (yes/no), and methods used.***		
	Teacher A	***Teacher B***	***Teacher C***
Discussion stimulated by the photographs in the textbook (old and modern kitchen) ***Conveyed "big idea":*** Inventions and discoveries made by scientists help us. Many things, which we now take for granted, people didn't know of in the past.	Yes + comparison of old and new appliances brought in by the teacher.	Yes	Yes + reading a story (found by the teacher in the children's encyclopaedia) about Prokop Diviš, the inventor of the lightning rod.
Preparation of the research plan by pupils. ***Conveyed "big idea":*** Also we (pupils) can investigate qualities of materials. We can do simple experiments. We plan them and	Yes + adaptation of the designed plan to better suit the developmental specifications of	No	No

record the results of our research.	younger children.		
Experiments (qualities of materials) carried out by pupils. ***Conveyed "big idea":*** Same as previous.	No Demonstration of the experiment carried out by the teacher instead.	Yes But instructions for pupils not clear	Yes But too fast, rather perfunctory.
Organisation of the research data in a table. ***Conveyed "big idea":*** Same as previous.	Yes Frontal and systematic.	Yes In groups, mainly not supervised by the teacher, no feedback to pupils.	Yes In groups, mainly not supervised by the teacher, feedback to pupils rather perfunctory.

Research results

Our analysis enabled us to elaborate a number of findings in answer to our basic research questions: How do teachers think about textbook materials? How do they use them?

Finding 1: Teachers perceive themselves as decision makers regarding instructional content. In the process of making their decisions, they draw on curriculum materials.

The teachers adopted the basic concept of the current curriculum reform and they perceive themselves as those who select the subject matter taught in lessons. In their own words, they view textbook materials as just one of the sources that influence instructional content. In the interview, none of the teachers mentioned that textbook materials would influence her decision-making when selecting subject matter. In interviews, they didn't refer to the fact that teaching (and textbook materials) should match the Framework or School Education Programme (official state curricula programme and its application to the specific school). On the contrary, they stated that their decisions regarding the subject matter were based on their experience, beliefs, preferences and

interests. They do not see the curriculum documents as the reference framework, but themselves.

However, all of the teachers we researched were using teacher's books as a starting point when selecting the subject matter. Teachers A and C used them as a starting point for lesson preparation and Teacher B automatically used them to make her lesson plans:

> Teacher A: I confess that I read the goals (in the teacher's book), but then I decide what is most important and do it accordingly… I adapt it to my style of work and also to the group of children…
>
> Teacher B: In fact, once I read that, it was ready, it's all prepared…
>
> Teacher C: You take out something, you add something …Everyone can add what suits them, everyone can add, what they like.

Finding 2: Teachers differ in the extent to which they reflect on subject matter and methodology.

As an integral part of her lesson preparation, Teacher A conducts methodological analysis prior to lesson planning as well as engaging in conscious reflection after the lesson implementation. Reflection on the goals set by the designers of textbook materials is relatively deep. She pays significant attention to the goals, which includes studying the texts in the teacher's book. To her, they serve as a source of content as well as methodological knowledge. She prepares for lessons daily, which is also apparent from her exercise books with detailed preparations. Understanding the subject matter and its structure well is fundamental for her, and she actively participates with the texts presented in textbook materials. She stresses that it is important to know where the chosen strategies and methods lead: "…So it wasn't an activity for the sake of activity." (Teacher A)

She is willing to invest her time to understand the content. In this connection, Teacher A pointed out the purpose of the texts, which are used to further teachers' knowledge of subject matter and which are also part of the mentioned teacher's book: "The texts for teachers are of value. I can read them and don't have to search for it elsewhere."(Teacher A).

On the contrary, Teacher B considers the texts in the teachers' book to be a ready-made lesson plan, which she can use immediately:

> Interviewer: What was the work you had to invest into it?

> Teacher B: I just had to get the aids… that was the only thing I had to do. Otherwise, it is done wonderfully, very well prepared. There is much information, therefore I may have forgotten something, but I felt that it was wonderfully prepared. There are set goals, aids, which you need, so even without extra reading this… For example, it's important if everyone will need something, or if it's for a group. This was the only thing I had to search for. But, otherwise, it's simply wonderful, a real bombshell, I was over the moon, engulfed by it… once I read it, it was in fact all ready, I had it all prepared… just to get these aids, think about it a bit and organise it in my head… Because it's in the teacher's book all together, I can plan the whole week beautifully (laughter).

Teacher B admitted in the interview that sometimes she finds it more difficult to navigate the texts in textbook materials that determine instructional content and methodology, and that this was reflected in her lessons. She admits that lessons were a bit chaotic, which could have been caused by insufficient planning and relying on "ready-made" plans. In spite of this, however, she doesn't conclude that she should spend more time on lesson planning and reflection of subject matter and methodology:

> Teacher B: I feel that it was somehow chaotic… I find it difficult to navigate the structure… Maybe I didn't think some things over enough, I didn't chew them over enough… In this sense it was more demanding for me, but I like it (textbook materials) very much…
>
> Interviewer: Now, when reflecting on the lesson, would you change something?
>
> Teacher B: Not really.

Teacher C chooses what suits her teaching concept from the suggestions of subject matter and teaching methods. She changes, adjusts and adapts suggestions made by the designers of textbook materials according to her concepts. In this sense, she doesn't strive to grasp the meaning and structure of subject matter (qualities of materials), and she doesn't utilise opportunities to develop her knowledge with the help of the texts for teachers written in the teacher's book. On the contrary, she implements the subject matter that is closer to her interests (she prefers teaching about natural resources at the expense of physics subject matter), and this subject matter she creatively adapts for her lessons. Teacher C is aware of the specifics that go hand in hand with the education of lower primary school teachers, but she takes as a fact that

she can't have all the required professional knowledge. She is ready to ask for help from the teachers, from parents or friends, who specialise in the given field, or she is ready to seek the information in encyclopaedias or other materials:

> I don't have knowledge about these individual materials. Nor about the laboratory aids… For sure, children could ask many questions that I wouldn't be able to answer. But again, I would search it out somewhere or we would find it in an encyclopaedia… Or maybe I would visit a chemistry teacher from the upper primary school… I'm more interested in natural resources, I have better relationship towards them than I have to these metals, plastics… (Teacher C)

Finding 3: Interpretation of the methodology suggested by textbook materials and their utilisation depends on the teaching concepts adapted by individual teachers.

Based on the lessons analysed, it became obvious that the system of information that she wants to convey to her pupils is important for Teacher A. The interview with her and the analysed lessons show that she laid stress on the fact that pupils understood the subject matter. The methods were selected with this goal in mind, and she gave preference to methods that she had experience with and that she considered effective. For Teacher A these are mainly explanation, and whole-class controlled discussions and demonstrations, which are the methods used mainly in traditional concepts of education.

She treats instructional and methodological innovations with caution. For example, as opposed to the suggestion in the teacher's book that pupils research the qualities of materials in groups, she demonstrated experiments herself, which meant that pupils were in the role of observers. She explained this:

> I confess that I did this in front of the whole class. But when they do it in groups, as described in the teachers' book, it's also relevant… I did it in front of the whole class, because I don't know the children that well, I don't know what they would do, so it was safer for me. (Teacher A)

She adapted teaching methods suggested in the teachers' book (experiments in groups, group discussions, less controlled discussions) with a sense of reinforcing her control of lessons and knowledge acquired by pupils.

The fact that for Teacher A it was important what pupils learn was also apparent from the lessons. This teacher thoughtfully used advanced organisers, summarised individual parts of subject matter, rigorously used concepts she aimed to convey as well as control questions, and introduced some teaching methods in phases. She used examples from the life of children and visual aids; she finished activities once she was sure that pupils had acquired the appropriate knowledge.

> They were always confusing two things – how can I affect this, like when I cut or sink it, with the activity, what will it do… But then again, I had a feeling that they figured it out… It just took a long time before I finally managed to squeeze it out of them… (laughter). (Teacher A)

Teachers B and C were, to a large extent, implementing methodological suggestions utilising forms of social learning suggested in textbook materials. They even managed and controlled pupils' learning less than the designers of the textbook materials proposed. In the interview, they didn't mention any problems encountered when applying these methods. They measured their success not by the educational outcomes (knowledge and skills gained) as did Teacher A, but by the children's engagement:

> I didn't originally intend for the activity to take such a long time (study of natural resources) but then I let them do it, they enjoyed it… Afterwards it would be possible to study for example sugar, how it melts, changes its state… They would surely enjoy it… (Teacher C)

> They were excited by the laboratory, because it comes from the world of adults. Suddenly, they had a chance to take a look into that world. The world they will enter later on. Again, some yes, some no. But again, they will concentrate on a different field. Some will want to become scientists, some confectioners, so it would be good if they could take a look into this environment. And this showed them the science world as it is. (Teacher B)

The extent to which subject matter and teaching methods suggested by textbook materials was modified differed with individual teachers. Teacher C, especially, chose the information that she preferred and that she thought would be of interest for children from the subject matter suggested in textbook materials (natural resources subject matter), and she significantly reduced or changed other subject matter (physics subject matter). Also, both younger teachers (B and C) somehow simplified subject matter knowledge as well as the

development of specific science skills and strengthened development of social and communicative competences.

Finding 4: Teachers share the request that textbook materials should contain inspiring teaching methods.

All three of the researched teachers stated that they would welcome the inclusion of ideas suggesting activities for pupils in textbook materials from which they could choose:

> Teacher A: I also think that it's good to have other ideas of what to do… Even more of these ideas. So the teacher can choose.
>
> Teacher B: I feel that there are many important activities that navigate children towards their own thinking. That it isn't just some kind of colouring in.
>
> Teacher C: …activities that can be used. To have many of these practical ideas is a good thing…

Finding 5: Teachers differ in their evaluation of the texts that aim to educate teachers.

It suits Teacher A when the texts in the teacher's book offer her related theoretical knowledge from relevant science subjects (for example, qualities of materials and their examination) or from subject matter methodologies (for example, the meaning of getting primary school pupils acquainted with scientific methods of research). Teacher B admits that this information has a meaning, but she doesn't use it. Teacher C sees herself as a professional who is able to determine and evaluate the effectiveness and suitability of suggested methods and doesn't need support in it.

> Teacher A: The texts for teachers are good. So I can read it and don't have to search for it elsewhere.
>
> Teacher B: …I admit I was skipping them. But I guess it has a value that it's in one place.
>
> Teacher C: (I would appreciate) a less strict approach, more ideas, only such activities that can be used. I like more practical stuff, less talk, theory. Every (teacher) can choose what he is more familiar with.

> According to his interests, his opinions… I don´t need the explanations why I should do anything, I am able to decide myself.

Finding 6: Teachers welcome short methodological texts that count on their participation.

Teacher A pointed out that methodological materials which are too detailed and dictatorial can stunt the teacher's creativity and can restrict teachers to a certain extent:

> But the teacher should be able to choose. So (teachers) don't feel that they have to do all of it. But the way it is written it looks like a lesson plan, so I had a bad feeling that I didn't manage to finish it… But it shouldn't be treated by teachers simply as a manual – firstly, secondly, thirdly. (Teacher A)

Teachers B and C didn't feel bound by textbook materials, they saw themselves as the ones who decided about the lesson design, even when using very detailed materials. However, Teacher C mentioned that the style of methodological materials should be "less strict". Teacher B expressed that overly detailed materials could have contributed to the fact that her lesson was chaotic, because she found them difficult to navigate.

Discussion and conclusion

The teachers researched treat textbook materials with self-confident awareness of their own professionalism. All three of them manifested their belief in the importance of a teacher's free will when selecting subject matter and transforming it for pupils. Interestingly, none of them mentioned in the interview that they should be guided by the School Education Programme. On the contrary, they see it as an indisputable fact that they select the subject matter at their discretion, according to their own preferences and experiences, which is something they welcome.

Furthermore, the research showed that textbook materials played a significant role in the selection of subject matter by teachers. All three teachers used textbook materials as a basic source in the course of lesson planning. However, the extent to which they changed subject matter and teaching methods suggested by textbook materials varied. The possible degree of change of the subject matter undertaken by a teacher leads us to question to what extent

teachers' decisions about educational content can be considered legitimate and at what point they start to endanger the standard of pupils' educations. In addition, both of the younger teachers in our research talked about the importance of some teaching methods without considering the subject matter. This raises the question of whether the curriculum reform has put adequate stress on the importance of the acquisition of key competencies at the expense of subject matter taught within individual educational fields.

However, the so-called participation with textbook materials is desirable (Remillard 2005). Teachers shouldn't just adapt and interpret the textbook materials, but they should also be changed by them. That means that they should change the way they treat the subject matter, its selection and methods used to convey it. Teachers should adapt textbook materials but they should do so in a professional manner. We suppose the teachers' support of this should be given by textbook materials if the findings from the subject matter methodologies are presented in the textbook materials in a way that teachers could understand. They should be presented in a way teachers can and are willing to take them into account when planning and implementing their lessons.

Individual teachers' levels of attention to the process of reflection on subject matter and teaching methods suggested in textbook materials varied. In our research, it was the experienced teacher, who graduated before 1989 and had more than 20 years of professional experience, who studied textbook materials in detail in order to understand the meaning and structure of the subject matter so she could convey it to pupils. She thought the subject matter through and because of that she was able to adapt her methods so that they fulfilled their role. With regard to innovations in teaching methods (mainly social forms of learning and inquiry-based learning), this teacher thought about them and partially used them. With this type of teacher, we think that in the longer term, textbook materials can significantly play a part in changes in the process of subject matter selection and its methodological transformations.

In comparison with the experienced teacher, one of the teachers with less professional experience (Teacher C) had a relatively closed opinion concerning what the content and methods of primary education should be. For this reason she didn't let textbook materials influence her significantly, but she adapted them according to her beliefs. In the course of lesson planning, she used her own creative approach, which wasn't always in harmony with the goals projected in textbook materials. For this type of teacher, textbook materials can

probably play only a small role in the course of implementation of subject matter innovations and probably also of their methodological treatment.

The second, less experienced teacher (Teacher B) used textbook materials as a product to set out what her lessons should look like. She stuck to the plan proposed by textbook materials, and she changed them only when implementing the lesson on the basis of pupils' reactions. According to her words, she didn't think the plan through much, which influenced her lessons. The question is whether this teacher will be able to utilise the experience she gained in the course of teaching this thematic unit in the future and if she will build on this experience when teaching the same subject matter again. Considering that she appreciates when textbook materials facilitate lesson preparation, when they offer her a relatively ready-made lesson plan, we think that she (and similar types of teachers) would benefit from textbook materials that are easy to navigate, have a clear structure, enable easy navigation in main science ideas, are concise and are comprehensible. In such cases, it is probable that innovations of subject matter and methodological transformations will influence teachers of this type by means of textbooks materials.

In our case study, it is the approach of Teacher A that manifested that quality and well-designed textbook materials can without doubt serve as an important support for the development of teachers' content knowledge and methodological content knowledge (Grossman & Thompson 2008:2015, Peacock & Gates 2000:160, Squire et al 2003:472). On the other hand, some teachers (Teacher C; see also Cohen 1990, Dusenbury et al 2003, Peacock & Gates 2000, Wilson 1990) ascribe the most important role to initial professional education. These teachers also deem important the knowledge of subject matter methodologies that they learn in the programmes for continuing teacher education, where professional content and its methodological transformations can be conveyed and clarified to teachers.

The teachers researched appreciated mainly individual ideas for pupils' activities. It seems that the requirement to have textbook materials from which they can choose lesson ideas corresponds with their belief about the professional abilities of a teacher, who is able to select from what is on offer. At least one of them (Teacher B) pointed out that the ideas should be comprehensible and clearly organised, so that it wouldn't take her too much effort to choose from them. All of the teachers said that the suggested activities should engage children and encourage their activity. The requirement of the text to engage pupils by attractive and activating activities was apparent mainly in

the case of both teachers with shorter professional experience (B and C). The teacher with longer professional experience (Teacher A) pointed out that the suggested activities also have to agree with goals and instructional content.

In agreement with the mentioned research (Grossman & Thompson 2008, Peacock & Gates 2000), our research also confirmed the significant role that textbook materials play when planning how to methodologically process untraditional subject matter. Another finding, also in agreement with other research (e.g. Peacock & Gates 2000, Wilson 1990), showed that in spite of that, some teachers may not understand textbook designers' intentions, maybe also due to the fact that they are not willing to devote much time and attention to studying the materials (Sosniak & Stodolsky 1993, Wilson 1990) or because of a lack of content or methodological knowledge (Cohen 1990). This can result in the situation where teachers only formally observe the suggested plan, or they more or less consciously change it and replace it with methods they are familiar with, but which can be at odds with the innovation's goals (Cohen 1990, Wilson 1990). The question is if teachers are motivated to continually learn new information in the given field, reflect on it and use it to improve the quality of their teaching, or if they are more likely to adjust the topic over the time to the way of teaching they are used to (Cohen 1990, Wilson 1990, Zahorik 1991).

It seems that a new challenge for the designers of textbook materials is to create materials that convey new subject matter methodological knowledge to modern teachers, who are aware that textbook materials should be adapted to reflect the needs of the community, school and region. Such materials should be designed so as to convey content knowledge and didactical content knowledge to teachers, and influence their teaching in a positive way. At the same time, it should be possible for teachers to adapt these materials to reflect the needs of their pupils and the context of specific lessons.

It is also apparent that the curriculum innovation should go hand in hand with the systematic support of teachers, which shouldn't be restricted to the development of textbook materials, but involve various forms of professional development.

We consider it desirable to conduct further research concerning if and to what extent the teaching approaches and the related attitudes of the researched teachers are characteristic of the teaching of science lessons in primary schools, or of teaching at the beginning of primary education in general. Other questions for further research relate to the extent to which teachers' opinions

with regard to subject matter selection and its transference depend on their school and local community, length of professional experience or the date when they finished their degrees.

References

Brown, A. (1992) “Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings,” *The Journal of the Learning Sciences*, *2(2),* 141-78.

Cohen, D. K. (1990) “A revolution in one classroom: The case of Mrs. Oublier,” *Evaluation and Policy Analysis*. *21(12),* 311-29.

DBRC Design-Based Research Collective. (2003) “Design-based research: An emerging paradigm for educational inquiry,” *Educational Researcher*, *32(1)*, 5-8.

Dusenbury L., Brannigan, R., Falco, M., & Hansen, W. B. (2003) “A review of research on fidelity of implementation: implications for drug abuse prevention in school settings,” *Health education research. 18(2)*, 237-56.

Dvořák, D., Dvořáková, M., & Stará, J. (2008) “Design based research – výzkum učebnic prováděný jejich tvůrci,” in P. Knecht & T. Janík, et al, *Učebnice z pohledu pedagogického výzkumu*, Brno: Paido, 81-9.

Grossman, P., Thompson, C. (2008) “Learning from curriculum materials: Scaffolds for new teachers?” *Teaching and teacher education* [online]. *24(8)*, 2014-26.

Harlen, W. (Ed.) (2010) *Principles and big ideas of science education*. Gosport, Hants: AshforColourPress Ltd.

Lambert, D. (1996) “The choice of textbooks for use in secondary school geography departments: Some answers and some further questions for research” [online] *Paradigm*, 21 [cit. 2013-19-07]. http://faculty.education.illinois.edu/westbury/paradigm/Lambert.html.

Lawrence, Japhet and Tar, Usman (2013) “The use of Grounded Theory Technique as a Practical Tool for Qualitative Data Collection and Analysis,” *The Electronic Journal of Business Research Methods, 11(1)*, 1-50.

Miles, M.B. & Huberman, A.M. (1994) *An expanded sourcebook qualitative data analysis. 2nd edition,* London: Sage Publications.

Peacock, A., & Gates, S. (2000) “Newly qualified primary teachers’ perceptions

of the roles of text materials in teaching science," *Research in Science & Technological Education*, *18(2)*, 155-71.

Pinar, W. F, Reynolds, W. M.; Slattery, P.; Taubman, P. M. (2004) *Understanding the curriculum: an introduction to the study of historicial and contemporary curriculum discourses*. New York: Peter Lang Publishing.

Remillard, J. T. (2000) "Can textbook materials support teachers´learning? Two fourth-grade teachers use of a new mathematics text," *Elementary School Journal*, *100(4),* 331-50.

Remillard, J. T. (2005) "Examining key concepts in research on teachers´ use of mathematics curricula," *Review of Educational Research*, *75(2),* 211-46.

Rodríguez, J.R., & Mesa, M.L.M. (2012) "The opinion of primary-school teachers regarding textbooks and printed curricular materials developed to support their teaching activities," *Educational Media International, 49(2),* 123-37.

Shneider, R. M., Krajcik, J., & Blumenfeld P. (2005) "Enacting reform-based science materials: The range of teacher enactments in reform classrooms," *Journal of Research in Science Teaching*, *42(3),* 283-312.

Sikorová, Z. (2011) *Učitel a učebnice: užívání učebnic na 2. stupni základních škol.* Ostrava: Pedagogická fakulta Ostravské univerzity v Ostravě.

Sosniak, L. A.; Stodolsky, S. S. (1993) "Teachers and textbooks: Materials use in fourth-grade classrooms," *Elementary School Journal*, *93(3)*, 249-75.

Spilková, V. (2007) "Význam portfolia pro profesní rozvoj studentů učitelství," in M. Píšová (Ed.), *Portfolio v profesní přípravě učitele*. Pardubice: Uviverzita Pardubice.

Squire, K., MaKinster, J., Barnett, M., Luehmann, A. L. & Barab, S. (2003) "Designed curriculum and local culture: Acknowledging the primacy of classroom culture," *Science Education. Wiley*, *87(4),* 468-89.

Stará, J. (2011) "Výzkumy souladu záměru vzdělávacích programů s jejich implementací," *Pedagogika*, *61(3),* 290-305

Stará, J., Dvořáková, M., & Dvořák, D. (2010) "Design based research (DBR) a tři učitelé: setkání záměru inovace a reality implementace," in R. Váňová & H. Krykorková (eds) *Učitel v současné škole*, Praha: Univerzita Karlova, 203-18.

Wang, F., & Hannafin, M. (2005) "Design-based research and technology-

enhanced learning environments," *Educational Technology Research and Development*, *53(4),* 5-23.

Wilson, S. M. (1990) "A conflict of interests: The case of Mark Black," *Educational Evaluation and Policy Analysis*. *21(12),* 293-310.

Zahorik, J. (1991) "Teaching style and textbooks," *Teaching and Teacher Education*, *7(2),* 185-96.

BIOGRPAHICAL NOTE

Jana Stara is an assistant professor of general didactics and didactic of social sciences at Charles University, Faculty of Education, Prague, Czech Republic. Her main research interest includes: teaching social sciences at primary schools, setting goals, working with educational goals, using textbook materials by teachers.

Tereza Krčmářová is an assistant professor at Charles University, Faculty of Education, Prague, Czech Republic. Her main interest includes: personal and social education, teacher mentoring and couching, gifted education.

Email: jana.stara jana.stara@pedf.cuni.cz