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LEARNING TO LEARN FROM THE TEXTBOOK: THE CASE OF NOVICE TEXTBOOK LEARNERS[1]

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The purpose of this paper is to describe aspects of the textbook that a novice textbook learner has to recognize and use in order to make learning efficient. These aspects are (a) text genre, (b) special language, (c) navigation through the textbook, and (d) textbook tasks. The paper culminates in describing and analyzing thinking operations the textbook learner has to utilize in order to carry out the textbook tasks. The description of textbook elements and processes is anchored in the context of socialization of the child into the printed culture.

Key words: textbook learning, novice textbook learner, concept about the textbook, textbook genre, textbook language, navigation through the textbook, task operations

The child's entering the school is one of the most relevant events in her[2] life. The child acquires new roles and enters new culture. School culture provides fresh impetus for the cognitive, personal and social development of the child. There is one layer of culture which is specific for school. On entering the school the child transfers from predominantly oral culture to textual culture. This does not suggest that the child was entirely free of textual

[1] The article is based on plenary paper at the 12th IARTEM Conference on Textbook and Educationl Media in a Digital Age (Ostrava, Sept. 18-20).

[2] I shall refer to a child, a pupil or a teacher as "she". This by no means indicates negligence or indifference to males; it only reflects the deficiency of English to denote both genders in a common word.

products in the pre-school period. On the contrary, the child was a recipient of a wealth of different types of books: fairly tales, story books, poems and other textual forms before she enters the school. In school, however, the child encounters much more textual materials and gets in contact with new textual forms. The dominant textual material is the textbook. By textbook I mean many printed forms of instructional materials such as workbooks, readers, maps etc.

The target of this paper is a *novice textbook learner*. Such a learner can be described as a pupil who is in the process of acquiring knowledge and skills to use textbooks for learning purposes in the initial stage of school attendance. This acquisition is being done through both individual learning and interaction with a teacher, other pupils and – in home learning – with parents. Becoming a novice learner is a process which starts in grade 1 but has antecedent in child's pre-school experiences with a variety of book materials, especially with picture books. The process of learning to learn from a textbook continues until the pupil becomes a skilled textbook learner, which is typically not earlier than in lower secondary grades. The stage of expert textbook learner is reached by pupils in upper secondary grades where they are exposed to more sophisticated textbooks as concerns structure, form and content.

The purpose of this paper is to describe the elements of textbook genre, language, navigation and tasks that a novice textbook learner has to recognize and use in order to make her learning efficient. Proportionally, the larger part of the paper describes the thinking operations the textbook learner has to utilize in order to carry out the textbook tasks. The description of textbook elements and processes will be anchored in the context of printed culture socialization of the child.

Entering the written culture

Almost in all societies, school culture is a written culture. Nearly all school subjects rest on written materials, predominantly on a variety of textbooks. Textbook is a cultural product, and its function is to transfer knowledge, values, attitudes, rules, and principles of culture. As such, the textbook has an important historical function because it assures cultural continuity in the society. Through the subject matter the pupil acquires knowledge that had been selected by experts as relevant cultural products and that had been incorporated into the textbook content and form. Therefore, learning from a textbook should be viewed as both a cognitive and a socio-cultural process. Through reading, comprehending and remembering the text content, and

responding on it, the pupil expands her social roles and perspectives. She is being socialized as a pupil. Exposition to school written culture is an important factor in supporting cognitive and social development of the pupil. However, the pupil becomes not only a recipient but also a producer of a range of written materials. She learns, and then expands, her role of a reader and a writer.

The pre-school period of the child is a period of predominantly oral culture. The child cannot read so the messages she concentrates on are non-verbal rather than written. The child observes the world around her, she „reads" picture books and watches TV programmes. Through these channels she expands her knowledge of the world. Parents and other adults teach the child which details she has to concentrate on in picture books, how books are read, what do the individual segments of books mean – thus helping the child to bridge the oral and the textual realms.

Non-verbal materials and especially pictures in textbooks still dominate over verbal sections in early grades of primary school. However, as the child passes from grade to grade, the verbal elements achieve stronger position and the pupil gets entirely fully absorbed by textual culture.

Concept about the textbook

When coming across textbooks in grade 1 the child observes differences which are between them and the books that she met with before. By learning from textbook, the pupil gets elementary knowledge about properties of the textbook which can be termed *concept about the textbook.* Briefly, concept of the textbook is elementary knowledge about the peculiarities of what a textbook is and how it is used. I assume that concept of the textbook includes the knowledge of textbook as a specific textual genre, specific language, specific structure and specific tasks. These elements shall be clarified in the rest of the paper.

Concept about the textbook is one type of concepts the child acquires in the school environment – the other being concept about learning, concept about the teacher, concept about the school etc. Though these concepts are elementary notions they are important tools for pupils that affect her learning in school.

In using the designation of concept about the textbook I was inspired by M. M. Clay's[3] [4] notion of *concept about print*, the understanding of conven-

[3] M.M. Clay, *An observation survey of early literacy achievements*, Auckland 1993.

[4] M.M. Clay, *Concepts about print: What have children learned about printed language?* Portsmouth 2000.

tions inherent in printed texts. Concept about print is a sublevel of concepts about the textbook. Without knowledge of print conventions the pupil would not understand the basic properties of the textbook. Concept of print is being developed as early as in the pre-school period and as a function of text-rich culture of the child's environment.

In her theory, Clay delineates 24 elements that cover concept of print, among them:

– Book cover orientation (knowledge of what the cover of the book is).

– Directional arrangement of the book and page (knowledge that the book is read from front to back, from left to right, from top to bottom of the page[5]).

– Knowledge that print, not picture, is read.

– Understanding of reading terminology such as word, letter.

– Understanding of some punctuation marks (knowledge that period means stop in reading, question mark means asking a question).

School causes an important change in purposes of reading in the child. While in the pre-school period reading for pleasure dominated, in school it is reading for learning which the child is focused on. The function of the textbook is learning in the learning time, while the function of children's literature was chiefly amusing in children's free time.

Textbook genre

While pre-school literature is basically epical and is represented by narratives, stories, fairly tales, or it is poetical with such genres as poems, the textbook is chiefly informational. Narratives and stories depict sequences of events involving characters and their behaviours, describe their intentions, and feelings. Such event sequences correspond in many ways to sequences of events that children experience directly and that constitute the core content of their world knowledge.[6] At school, instead of narratives and poems the pupil is exposed to factual texts that bring content-specific information. By being exposed to them the pupil learns to distinguish, and to be aware of, specific features of *textbook genre*, which is typical for content-specific literature.

While children's literature is structurally modest, the textbook abounds with structure. The content of the textbook must be organized and struc-

[5] This is the book directional arrangement in the Western culture.

[6] R. Gersten et al., *Teaching reading comprehension to students with learning disabilities: A review of research*, Review of Educational Research, Summer 2001, 2, p. 279-320.

tured so that it enables comprehension, remembering and application of the content. The textbook contain specific text segments that serve a variety purposes in the process of learning. Expository text serves to present new content. Content preview's function is to introduce the content. Content overview provides a short description of content. Lesson target focuses attention of the pupil on learning outcomes. Other structural elements within expository text are rules, principles and definitions. Exercises, tasks, problems, questions support the development of content understanding and application.

For the novice textbook learner these elements represent structural features that she probably had not met in her pre-school books. The child has to learn them to identify and understand their functions in order to facilitate the learning of the textbook content.

Textbook language

Related to textbook genre, but still distinct from it, is *language*, another important property of the textbook that the pupil has to adopt herself to. Though academic content can be communicated through means other than language, e.g., through physical models, visuals, demonstrations, language is the most important means of communication both in classroom interaction and individual learning from textbook by the pupil. Language is a gate through which the pupil enters the textbook content.

The textbook language is academic. *Academic language* has particular attributes in order to serve efficiently in performing classroom learning and communication.

> Academic language refers to the language used in school to acquire new or deeper understanding of the content and to communicate that understanding to others. In other words, academic language is characterized by the specific linguistic features associated with academic disciplines, including discourse features, grammatical constructions, and vocabulary across different language domains (listening, speaking, reading, writing) and content areas (language arts, mathematics, science, and history, among others).[7]

One of the remarkable features of textbook is the use of objective language. Objective language is a factual language which describes objects,

[7] M. Gottlieb, E. Ernst-Slavit, *Academic language. A foundation for academic success in Mathematics*, [in:] *Academic Language in Diverse Classrooms: Mathematics, Grades K-2*, California 2013.

states and actions. On the other hand, subjective language expresses opinions, beliefs, and preferences.[8] In this paper I consider those sentences subjective if they are *I-phrases*. In contrast, objective language is typically represented by *it-phrases*. One cannot expect that an early grade textbook is written in subjective language because it is very difficult for the author to deliver the content area in I-form. As a result, it-language prevails in textbooks.

In inspecting some grade 1 textbooks I found, however, interesting uses of I-language. I take as an example *Biology for Grade 1*[9], which is a standard Biology workbook used in primary schools in Slovakia. A content page in this workbook consists of a heading followed by pictures which are the source of tasks for pupils. Unit heading is an important regulatory element for the page because it orientate the pupil to learning. I found I-language in many headings of units:

I know my body.
I can distinguish animals.
Alternatively, my-language is used instead of I–language:

My family.
My time schedule.

By using I-language the intention of authors was to personalize the content by offering the pupil to share their own experiences with the content of the unit, which is a good instructional approach. A remarkable feature is, however, that I-language changes to we-language later in the textbook headings:

We learn to observe animals.
We learn to observe plants.

In the later parts, the textbook headings fully adhere to it-language and thus it approaches to academic language:

Development from flower to plant.
Life of plants and animals under water.

The gradual transition from I-language to it-language in this sample of a workbook unit is an example of a perfect strategy of how to customize pupils to the academic world as represented by textbook language.

[8] J. Wiebe et al., *Learning subjective language*, Computational Linguistics, 2004, 3, p. 277-308.
[9] A. Wiegerová, G. Česlová, *Prírodoveda pre 1. ročník základnej školy* [Biology for year 1 of the primary school], Bratislava 2012.

Another significant feature of textbook language in early grades is *vocabulary*. At least two situations can be discerned as concerns the requirements to the child. Everyday words that the child used in the pre-school period turn to be *special terms* of the particular content area. Apples or bananas were everyday words concerning eating. However, in Botany lessons they become special terms within the botanical category of fruits; in Language Studies apples and bananas are put in a linguistics context and become grammatical plurals and substantives. The transition from everyday language to content-specific language is a huge step of the child in the process of becoming a textbook learner.

Another situation in learning and using academic language are specific terms that the child did not know and did not use in pre-school period. The pupil learns terms that she did not encounter before – take for instance the concept of a set in mathematics. More abstract terms are typical for the terminology of a content area. For instance, the term reptile is used in connection with snakes, the term mammal in connection with dogs. The pupil learns individual terms and cumulatively builds her content-area vocabulary.

The teacher may witness considerable differences among pupils in language development due to variability in child's family socio-cultural background. Therefore teachers have to scaffold meanings of new vocabulary to pupils so that they become solid bases for understanding and remembering the content.

Further, as Gee[10] notices, language use is not only vocabulary, grammar and pronunciation. It is a way of being in the world, way of acting, thinking, interacting, valuing, and believing, as connected to particular identities and social roles of people. Language in the classroom transmits social and cultural messages. Through language the textbook learner is associated with social and cultural aspects of the school in the process of socialisation.

Navigation through the textbook

This is a group of knowledge and skills that the pupil needs in order to use the textbook efficiently. In the textbook the pupil notices pictures or illustrations, sees expository notes, receives tasks and is assigned activities. They all are placed at a specific position in the textbook. The aim of the pupil is to locate this place. Ideally, this should be done with investing little atten-

[10] J.P. Gee, *Reading*, Journal of Urban and Cultural Studies, 1992, 2, p. 65-77.

tion to the localisation. Therefore, learning to identify the specific textbook features which help navigate across the textbook is a very important task of a novice textbook learner. Usually, this learning is done with the help of the teacher. However, since the textbook elements can easily be identified visually, much of learning is performed by the pupil herself.

Textbooks use a wide range of navigation elements. Most of them seem to be trivial to adults but not to a novice textbook learner. Let us take pagination as an example. There are many pagination varieties. The page number can be placed in page footer, at any position, i.e., in the centre, on the left or on the right. Similarly, the numeral can be placed in the page header, again in the centre, on the left or on the right. The position in the footer and the header may vary according to the position of the page. The left hand page may have pagination on the left side, the right hand page may have it on the right side. So what is assumed to be an easy matter for an adult may be a complicated task for a novice textbook learner. The aim of the pupil is to quickly identify at which position the pagination is placed in a particular textbook and then to use the knowledge of it throughout the school year. Each textbook may have its own pagination style, so the pupil has to learn it anew for a textbook for each school subject.

It should be stressed, however, that page numbers are more than just navigation tools. They are *signs of progression* of the pupil in the textbook. As the pupil proceeds in the textbook from page to page, the numbers increase, and they are signs of pupil's learning advancement. Thus page numbers exceed their navigation roles and serve as a learning reward for the pupil.

Other navigation elements are names of chapters, units, sections and activities, easily recognizable because they keep constant sizes, fonts and colours throughout a textbook. Specific navigation elements are also icons denoting activities:

- ➲ observe
- ✂ cut out
- ? question
- I task
- Δ problem

Such navigation elements are visually attractive, they are quickly learned and efficiently used by pupils.

Structural elements of the textbook usually hold the same position on a page throughout a textbook. For instance, content preview, expository text, content overview are positioned on the left side of the page, whereas questions, tasks, and activities are on the right side of the page. The pupil learns that their positions are not arbitrary, and that the textbook is a well organ-

ized learning medium. Again, this is not only an educational but also a textual phenomenon which introduces the pupil into the textual culture.

Task operations

In addition to recognizing and understanding textbook genre, form, language, and content, the pupil has to learn to understand tasks that a textbook contains. Tasks are assignments or problems included in each unit of a textbook which function as instruments for learning. More specifically, they are executive tools that aim pupils to comprehend, remember and apply the subject matter of a particular textbook section. The task is an activity in which pupils use language and knowledge to achieve a specific outcome. The result of a task execution is pupils´ knowledge, skill, attitude, interest, value and other outcomes of learning. Thus the task constitutes the textbook component that leads pupils to learning results.

Linguistically, tasks are questions that the pupil has to answer, or commands that she has to carry out. Even if a question or a command is very simple – as they typically are in early grades textbooks – in fact they are complex entities.

This part of the paper concentrates on demonstration that in order to accomplish a task the pupil has to elaborate on it mentally by decomposing it to several subtasks and then carrying out each of them. In other words, the pupil dismantles the learning task to several subgoals which she subsequently accomplishes one by one.

What follows is a demonstration of the process of task decomposition. For this purpose I chose a workbook which contains a wide assortment of tasks and therefore is a good source of data. The workbook is *Biology for Grade 1,* which has been mentioned earlier in this paper.

Each unit of the textbook consists of a one-page content material in the form of images and schemes which are followed by 2 – 7 written learning tasks on a separate page. The workbook is activity-based and learning tasks constitute the most important part of a unit accomplishment. Because pupils´ reading skills are poor in grade 1, tasks are read, and frequently also commented, by the teacher. The teacher also adds explanation to the content material, or she presents additional materials. She also may give pupils other tasks that she takes from the methods section of the textbook. In working with the content pupils employ their everyday experiences with the content in question. Task completion is a pupil's individual activity or an activity shared with peers.

In order to demonstrate how tasks are composed of and how they are performed by pupils I chose a unit entitled *Plants Around Us*. The upper part of the unit page consists of four images representing four phases of the development of an apple (flower, bud, unripe fruit, and apple), however, the images are in a scrambled order. The lower part of the page contains images of 12 products made of fruit – canned fruit, conserved fruit, dried fruit, fruit juice, fruit ice cream etc. (Fig. 1). The content material is followed by four learning tasks on adjacent page.

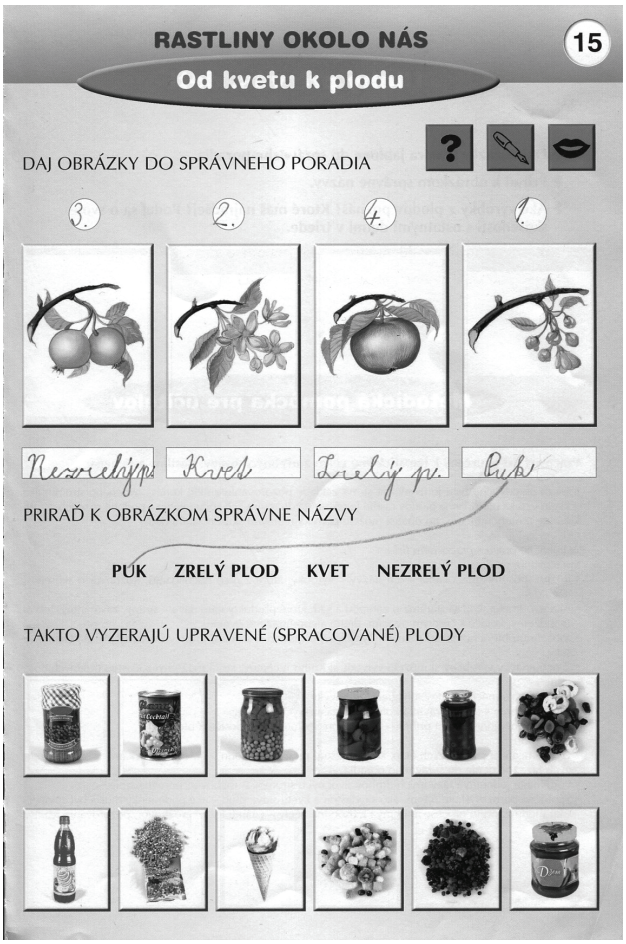

Fig. 1. Unit page Plants Around Us

The first task requires pupils to put the images that depict the four phases of development of the fruit in correct order. This relatively simple

action, however, has some preconditions in order to be carried out. In order to perform the task the pupil has to decompose it to the following subtasks:

1. Identify fruit attributes in images.
2. Retrieve knowledge of fruit phases.
3. Detect relative positions of fruit phases.
4. Order images chronologically.
5. Assign numbers to positions.

Decomposition of a learning task is a necessary condition for comprehension of the task and for task accomplishment. This is because typically a learning task is not a single-piece activity. Several subtasks are imbedded in it.

Decomposition of a task to subtasks is a latent, unobservable process that takes place in pupil's mind. It is a mental process similar to other plans of action that people carry out in order to act successfully. In fact, all expert knowledge is an ability to dismantle complex situations to a small number of organized "chunks".[11]

In order to accomplish the task the pupil has to construct all the needed subtasks and carry them out. The task accomplishment fails if the pupil is unable to construct one or several subtasks, or if subtasks were constructed in improper order. The order of subtasks is therefore an important element in the process of subtask construction and execution. In some cases, the pupil is unable to perform the task decomposition, or is unable to decompose the task in a required manner. The teacher then offers her help and guides the pupil to dismantle the task to meaningful segments, to understand the task and to do necessary steps in the task execution.

I use the term *construction* when referring to subtask processes done by the pupil. I do so in order to stress that it is an active learning process rather than a passive learning mechanism. The pupil actively engages in task analysis using a range of individual learning strategies.

The speed of subtask construction by the pupil is determined by the complexity of the task as well as by the range and intensity of pupils' experiences with task decomposition. When experiences are large, decomposition runs smoother and quicker, and vice versa. Also, the pupil's content-specific knowledge is an important factor in decomposing the task. Rich knowledge of the specific content is a good precondition for the success in tasks.

Table l depicts the tasks wording, subtask and schemata associated to the unit *Plants around us*. The first column displays the literal wording of the

[11] C.M. Zeitz, K.T. Spoehr, *Knowledge organization and the acquisition of procedural expertise*, Applied Cognitive Psychology, 1989, p. 313-386.

tasks, as copied from the textbook, the middle column describes the assumed subtasks as a result of decomposition of the task by the pupil, and the right column shows the name of the task schema (which will be clarified bellow).

In listing the subtasks, I used a more abstract approach which is specific for mental modelling, a theoretical framework that attempts at describing the processes of human thinking, understanding and remembering.[12] For this purpose, specific names of substantives or verbs in the subtasks were substituted by a generic word, i.e., *fruit* was substituted for *the object*.

Table 1
Summary of tasks, tasks decomposition to subtasks and tasks schemata associated with Unit 15, Biology 1

Task wording	Subtasks	Task schema
Put the images of the tree branches in the correct order.	Given a finite set of objects, (1) identify their attributes, (2) retrieve knowledge of attributes, (3) detect relative positions of objects, (4) order objects chronologically, (5) assign numbers to positions.	Sequencing
Attach names to images.	Given names of objects, (1) relate names to object attributes, (2) attach names to objects.	Naming
Which product made of fruits you are familiar with?	Given a finite set of objects, (1) identify product attributes, (2) retrieve product knowledge, (3) select familiar object	Selecting
Which fruit product you like most of all?	Given a finite set of objects, (1) infer attributes, (2) make judgment of preference.	Evaluating

As it is obvious, the number of subtasks within each task varies. It ranges from 2 to 5, thus corresponding to the complexity of the task. To accomplish the four tasks, the pupil has to construct 12 subtasks and carry them out.

During the school year the pupil comes across similar tasks in the Biology workbook and she infers that some tasks share identical properties. By the process of observing similarities the pupil develops a prototype task. In the terminology of cognitive science the pupil constructs a *task schema*. Schema is a knowledge structure in the memory of the learner. It is a generic

[12] D. Gentner, *Psychology of mental models*, [in:] *International Encyclopedia of the Social and Behavioral Sciences*, eds. N.J. Smelser, P.B. Bates, Amsterdam 2002, p. 9683-9687.

representation of an object, event, or situation in the mind.[13] People have schemata of many objects and actions, which help them understand situations and perform actions. Basically, all knowledge is organized in schemata in the memory.

Schemata have significant importance in the learning process. When the learner activates a schema, the process of task accomplishment is easier and quicker because the learner concentrates attention and the working memory on fewer pieces of information. Thus the use of schemata in learning is an important facilitator in the learning process.

The first task in Table 1 concerns ordering objects. In the Biology workbook there are many tasks that require ordering things, events or actions. While carrying out these tasks the pupils gradually generates a schema of Sequencing. To recognize the schema, the pupil relies on *task clue*. Task clue is a signal word or words that alert the pupil of a particular task. In this case the clue was *correct order* (the task wording is *Put the images of the tree branches in the correct order*). In reading or hearing the task clue, the pupil is assumed to search for a schema in her memory to account for the information that follows.

Similarly, the pupil generates task schemata for Naming (attach name clue), Selecting (which of clue), Evaluating (like most clue). Other units in the Biology workbook contain schemata of Comparing, Contrasting, Categorizing, Excluding, Enlisting, Completing, Proposing and others.

Each content area may require different types of schemata. It can be assumed that, for instance, literature or mathematics tasks schemata may be somewhat different from those of biology tasks schemata though they may share some identical features. Individual schemata can be embedded into other schemata so they constitute a more complex entity. Schema development is a continuing process, i.e. the pupil elaborates on already existing schemata if tasks requiring the use of other schemata.

Task schemata are *formal types* of schemata. They exist irrespective of the specific subject matter, or put it differently, one schema can fit tasks of different domains. This general characteristic is the obvious advantage of using schemata in the learning process. Other examples of formal schemata are, for instance, story schema, research article schemata, and newspaper news schemata.[14] Dissimilar to formal schemata are content schemata which help

[13] B.B. Armbruster, *Schema theory and the design of content-area textbooks*, Educational Psychologist, 1986, 4, p. 253-267.

[14] W. Kintsch, T.A. van Dijk, *Toward a model of text comprehension and production*, Psychological Review, 1978, 5, p. 363-394.

learner to understand subject matter information. Textual schemata are helpful in reading and comprehending texts. There is an instructional strategy (schema-based instruction) that teaches pupils explicitly to identify and use schemata in a specific content area, e.g., in mathematics problem solving. It is assumed that this instructional strategy is more effective than instructional strategy based on less specific principles. Learners are taught to categorize various problem types to determine the most appropriate actions needed to solve the problem.[15]

Task decomposition is predictable. i.e., each phase in decomposition can be logically inferred. However, to reveal the pupil's authentic thinking process during working on a task needs empirical observation. The usual research method for it is think-aloud procedure, i.e., pupil's verbalisation while reading and solving the task and subsequence recall of steps in performance. It can reveal not only the trajectories of pupil thinking but also the hesitation positions and errors the pupil makes. Research using think-aloud procedure has been conducted in many subject-specific areas, e.g., in mathematics problem solving tasks.[16]

The idea of task decomposing brings an important impetus to textbook authors because it makes them aware of implicit thinking processes that are in each learning tasks. Authors should write task that better fit the decomposition capacities of pupils. Well-written tasks help in generating and using task schemata, ill-written tasks make it difficult to generate them by the pupil and, consequently, they hamper her learning process.

Conclusion

Learning to be a pupil requires acquisition of broad range of knowledge and skills. This paper demonstrated that learning to use textbooks, which is part of pupils´ learning area, requires specific knowledge and skills of which we described some: understanding the functions of the textbook (concept about the textbook), knowledge of textbook genre and language, and skill of navigation throughout the textbook. In order to understand and use the knowledge of the subject matter the pupil has to acquire the ability and skills to operate with learning tasks. It was showed that before carrying out such a

[15] C.C. Griffin, A.K. Jitendra, *Word problem-solving Instruction in inclusive third-grade*, The Journal of Educational Research, 2009, p. 187-201.

[16] M. Montague, A. Brooks, *Middle school students' mathematical problem solving: An analysis of think-aloud protocols*, Learning Disability Quarterly, 1993, 1, p. 19-32.

tasks the pupil has to decompose it to, usually several, subtasks. Each of them has a specific task goal.

How pupils are engaged in textbook learning and which knowledge and skills they actually use in a particular textbook unit must be, however, validated by empirical research. The research needs to answer such questions as what is the relative difficulty of acquisition of specific knowledge and skills for learning from the textbook by the pupil, which is the relative proportion of their use, how much differs this knowledge and skill in individual content areas. Though learning is a latent individual process, it is always supported by the teacher. The research must provide answers of which teacher strategies are efficient in developing pupils´ knowledge and skills in using the textbook and how these strategies should be demonstrated and taught to the teacher.

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