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Stimulation of Children's Text Comprehension in Primary Education – On One Educational Strategy

Introduction

Since the thematic focus of this issue is on *The Stimulation of Children's Linguistic Activity in Preschool and Early School Education*, our paper discusses the stimulation of text comprehension in primary education. Based on our expertise in the field of developmental linguistics and mother tongue pedagogy, we propose a language-pedagogy approach to developing a child's receptive ability[7].

The paper explores the possibilities for developing reading comprehension by a pupil in primary education in the Slovak Republic. The need for scientific research into developing reading literacy in Slovakia, with its educational implications, is growing as a result of the unsatisfactory state of the current educational context. All three previous surveys conducted by the Progress in International Reading Literacy Study (PIRLS 2001, PIRLS 2006, PIRLS 2011), an international study of reading achievement in fourth graders, indicate that the Slovak pupils achieved only average results. Particularly problematic is the comprehension of informational texts; the Slovak pupils scored worse in this discipline than in the comprehension of literary texts.

The results of the PIRLS study reflect the absence of systematic and conceptual development of reading literacy in primary education in

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Ľudmila Liptáková
Dana Cibáková

Slovakia. The education reform of 2008 declared that there was a need for the development of reading literacy, however, the state curriculum does not provide for a systematic programme for its development. There are only some partial programmes or initiatives of non-governmental organisations, e.g. the educational programme, Orava Association for Democratic Education, or the programmes for developing reading literacy implemented as a part of the school curricula. Paradoxically, there are relevant scientific studies on text comprehension in Slovakia (e.g. Gavora, 1992), but their results were not considered during the creation of a national educational policy, nor were experts from the given field invited to participate in designing the national curriculum. In this paper, we present an educational strategy focused on the development of comprehension of an informational text by primary school pupils. The strategy is based on the results of previous research on the effectiveness of developing text comprehension on the basis of parallel stimulation of linguistic and cognitive processes.

Reading Literacy and Comprehension Processes

The issue of developing reading comprehension in early school education is currently the subject of a great deal of foreign theoretical and empirical research. Very inspiring, when addressing the problem of developing text comprehension in Slovak pupils, is the research by Polish and Czech colleagues. They provide a valuable scientific stimulus in addition to the proximity of linguistic, cultural and educational contexts. Among many works published by Polish researchers, the studies from the special issue of *L1 Educational Studies in Language and Literature 2013–2014*, guest edited by Elżbieta Awramiuk & Grażyna Krasowicz-Kupis, *Early Literacy Research in Poland,* are especially inspiring in relation to our topic. Equally inspiring are the latest studies into the reading literacy of Czech children, which were presented in the publications by R. Wildová & V. Vykoukalová (2013) and R. Metelková Svobodová (2013).

Our approach to developing pupils' comprehension of text stems from the definition of reading literacy by the PIRLS study. For PIRLS, read-

ing literacy is defined as "the ability to understand and use those written language forms required by society and/or valued by the individual. Young readers can construct meaning from a variety of texts. They read to learn, to participate in communities of readers, and for enjoyment." (Framework and Specifications for PIRLS Assessment 2001, p. 3). We also take into consideration how PIRLS defines the purposes for reading (reading for literary experience and reading to acquire and use information), and the four levels of comprehension processes (ibid., p.5):

1. Focusing on and retrieving explicitly stated information.
2. Making straightforward inferences.
3. Interpreting and integrating ideas and information.
4. Examining and evaluating content, language, and textual elements.

For the purpose of designing educational strategies for developing the comprehension of informational text, we set the operational definition of reading literacy as the ability of a pupil to understand different types of text, respecting the multilevel characteristics of the processes of comprehension and, subsequently, the ability to use the processed information for learning and communication goals (Liptáková et al., 2011, pp. 191–195). The basic starting point for developing text comprehension is, for us, the stimulation of cognitive functions which are linked with hierarchical levels of text comprehension, and are thus essential for comprehension as such. The development of metacognitive processes which enable the pupil to transfer the strategies for obtaining, processing and using information into other contexts is also considered to be a component of developing reading literacy.

The theory of text comprehension and the psychology of reading clarify the cognitive processes on which the individual levels of text reception are based. In the psychology of reading (Stanovich and West, 1981; according to Clarke, S. – Dickinson, P. – Westbrook, J. (eds.), 2010, p. 149), processes of a lower and higher level are set apart. Processes of the lower level include the lexical and sentence level of decoding. The

Ľudmila Liptáková
Dana Cibáková

processes of the higher level operate on the text level; thus, knowing how texts are organised leads the reader to recognition of text models. The knowledge and experience accumulated by a pupil which relate to the world or to the context represented by the given text, facilitate the processes of inference, deduction, prediction, visualisation and thus comprehension of a text (ibid.).

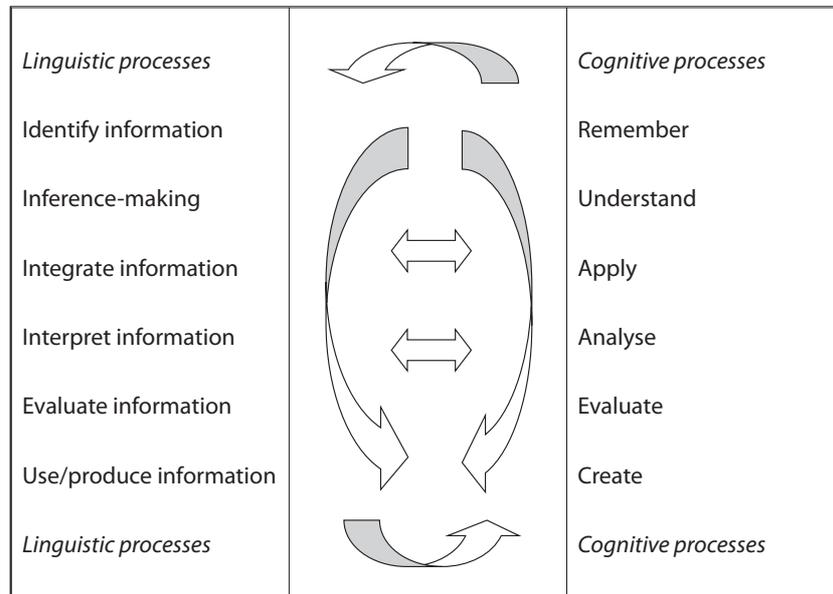### Relation between Linguistic and Cognitive Processes in Text Comprehension

Apart from the abovementioned theoretical approaches, when designing educational strategies to develop text comprehension, we also rely on some other theories on the basis of which it is possible to analyse the relationship between the processes pertinent to language and cognition. At the same time, we start from the findings of cognitive sciences on the inseparable relationship between language and cognition and do so in the framework of a holistic understanding of the relation between general cognitive and linguistic principles (according to Piaget's cognitive theory; Piaget & Inhelder, 1997), as well as in the framework of a modular approach to the relation between language and cognition (according to the theory of universal grammar and the theory of parameters of N. Chomsky, 2007). We likewise link to our previous research, in which we found an association between linguistic and cognitive structures in the speech ontogenesis of children (Liptáková & Vužňáková, 2009). We similarly use the results of the research on the relation between cognitive and linguistic capabilities of a pupil, during which we started from the theory of social constructivism of L. S. Vygotskij (1970; Liptáková, Klimovič, Hlebová & Kresila, 2010).

With the levels of cognitive processes, we start from the cognitive process dimension of the revised Bloom's taxonomy of educational aims (Bloom, 1956), that is, from the cumulative understanding of cognitive processes which are applied when learning and with the processing of information from a text: remember, understand, apply, analyse, evaluate

and create (Anderson, Krathwohl et al., 2001). In the projection of an educational strategy for text comprehension, we attempt to look for answers to the question of how it is possible to utilise the relation of linguistic and cognitive processes for more effective text comprehension by a primary school pupil. For example, how a focused stimulation of memory processes can help a pupil identify information in a text and recall it from memory, or, how stimulation of the inferential thinking of a pupil can produce better inferences of a particular type during text comprehension, etc. We consider this relation to be reciprocal, however. Just as cognitive processes are essential during text comprehension, receptive linguistic processes, when processing the information from a text itself, require a pupil's cognitive activity, and thus activate the particular levels of cognitive processes.

The relationship between linguistic and cognitive processes when comprehending a text is indicated in the following diagram:

Diagram no. 1 – The relation of linguistic and cognitive processes when comprehending a text

Linguistic processes		Cognitive processes
Identify information		Remember
Inference-making		Understand
Integrate information		Apply
Interpret information		Analyse
Evaluate information		Evaluate
Use/produce information		Create
Linguistic processes		Cognitive processes

Ľudmila Liptáková
Dana Cibáková

Empirical Findings on the Relation between Linguistic and Cognitive Processes in Text Comprehension

The aim of this paper is to present a model of the educational strategy for developing comprehension of informational text in primary school. The model is based on the intentional utilisation of the relationship between language processes and cognitive processes. It is the utilisation of the results of the qualitative research into the relationship of linguistic and cognitive processes during stimulating text comprehension of the pupils in the 2nd year of primary school. The conducted research is described in detail in the book, *Language and Cognition in Text Comprehension Development of Pupil at the Primary School* (Cibáková, 2012). In this paper, we are listing only basic information about the research design and its results.

The research was of a qualitative character. By applying an inductive research approach we tried to understand the relation between linguistic and cognitive processes through which a pupil goes during comprehension of an informational text. We created an educational model consisting of 14 stimulation units. The stimulation units contain instruments for stimulating the relevant cognitive functions when comprehending a text (attention, memory function, inferential thinking, comparison, categorisation, orientation in space, etc.) and a structured didactic approach which leads to local and global comprehension of an informational text by a child. The participants in the research consisted of eight pupils from the 2nd year of primary school with an equal level of school performance, whom we selected in cooperation with the class teacher. The pupils went through a 45-minute stimulation unit once each week. The pupils worked in pairs, which in the pre-research phase showed to be a suitable strategy since they proceeded according to the instructions of the administrator, but at the same time learned the sequential steps from each other when resolving tasks. Not all of the pupils participated in every stimulation unit, a fact reflected in the observed results of the impact of stimulation. For the development of text comprehension, we used a set of informational texts for children which were associated thematically. These served to

motivate the pupils when reading and allowed them to create inter-text connections and thus create different types of inferences.

Through the participatory observation of the stimulation unit phases, subsequent analysis of the observed results (the course of the stimulation unit was recorded on a DVD) and through content analysis of the pupils' post-reading activities, we collected qualitative data on the impact of stimulation on the linguistic, cognitive and metacognitive processes of each pupil. The analysis of the collected qualitative data showed that focused and systematic parallel stimulation of linguistic and cognitive processes during text comprehension is reflected in the greater success of processing information from the text by a pupil, thus in the creation of more permanent memory tracks, and in the activation of inferential and interpretational processes. This was also confirmed by a cloze-test, which was given to pupils after the completion of the stimulation programme. The cloze-test was compiled from the text which the pupils knew from the stimulation unit they had participated in. The cloze-test was designed and evaluated qualitatively; the pupils had to fill in the key words of the text or a synonymous variant of them. The pupils who took part in the entire four-month stimulation programme achieved better results in the cloze-test than the pupils who took part in only some of the stimulation units, and they did so despite an equal starting level of school performance in their mother tongue.

The research also brought an interesting finding relating to the metacognitive knowledge of a pupil. After administering all of the stimulation units, we conducted research on how pupils reflected the strategy used for text comprehension. The Pupils were invited, after reading a text, to answer the following questions: *What was the text about? What kind of questions would you ask a friend to find out if he/she understood the text? What would the friend have to sketch to better remember the information which is mentioned in the text? Think of some fun task for your friend which would help him/her better understand the text.* The questions were intentionally formulated so that they were related to the different levels of text comprehension. With pupils who regularly took part in the stimulation units, the repeated use of similar strategies was reflected such that they

also used them in their tasks in regard to the text, they even proposed their own strategies for processing information. Again, a difference appeared between the pupils who participated in the entire stimulation programme and those who took part in only a number of the stimulation units. Thus, it appears that systematic stimulation reinforces a pupil's systematic exploratory behaviour and develops the ability of the pupil to transfer the algorithm learned during the reception of a text to new situations.

Design of an Educational Strategy for the Stimulation of Text Comprehension

Based on the observed effect of stimulation, we adopted the design of the stimulation units from the above research to serve as the model of educational strategies for developing comprehension of informational text in primary education.

When designing the stimulation unit we relied on the theory of mediated constructivist learning and on the diagnostic and stimulation programme, *Mind`s Ladder* (Jensen, 2009)[8], which emerges from Feuerstein's theory of cognitive modifiability (2002). On the basis of the abovementioned theoretical approach, we structured a stimulation unit according to the phases of mental action (*input–elaboration–output*) and according to the *knowledge construction functions* system. The Mind Ladder knowledge construction functions are divided into intellective functions (cognitive functions), non-intellective functions and performance functions. The intellective functions are subdivided into reception, transformation and communication functions according to three phases of the mental action (Jensen, 2009).

The **input phase** (reception phase) is, according to the cited source (ibid.), characterised as the phase of obtaining information (what goes

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[8] We are acquainted with this theory and the program thanks to participation on the research project APVV-0073-06 *The Dynamic Testing of Latent Learning Capacities of Children from Socially Disadvantaged Environments*, led by Iveta Kovalčíková.

in); i.e. the phase of activating both the existing knowledge schemes and knowledge constructing functions (cognitive functions). In our stimulation unit, this phase contains an evocation of the child's general knowledge and linguistic knowledge which are related to the theme and the content of the text, to the given text model and to the verbal tools of the text. We activated the abovementioned knowledge through the method of mind-mapping and structured discussion with the pupil. A separate part of the input phase was tasks for stimulating cognitive functions which are relevant during processes of text comprehension, namely in that they are thematically connected with the text which the children read afterward. The given activities work as motivation and at the same time help pupils in concentrating on further work with the text. We consider it particularly important, in the early years of schooling, to stimulate memory and the inferential processes which are based on the lower levels of text comprehension and which are at the same time an essential foundation for later development of the higher processes of comprehension. Therefore, within the framework of instruments for stimulation of cognitive functions, we focus particularly on *memory* and *inferential processes*. We applied our own instruments as well as the instrument *Logic Boards* (Jensen, 1998–2007), which was modified so that it corresponded thematically with the informational text read by the children during the stimulation unit.

Example. In the framework of developing *inferential thinking* and at the same time *orientation in space,* the task of the child is, for example, to arrange cards according to the instructions of a teacher so that all of the formulated conditions were satisfied (*If – then thinking*): Arrange pictures of fruits the way I tell you to: *The banana and the apple are to the left. The banana is not next to the pear*. The difficulty of the task is increased from the specific to the abstract, so that the pictures of fruit are replaced by cards with words and later cards with the beginning letters of words.

Ľudmila Liptáková
Dana Cibáková

Figure no. 1 – Example for stimulation of inferential thinking

BANANA	APPLE	PEAR
B	A	P
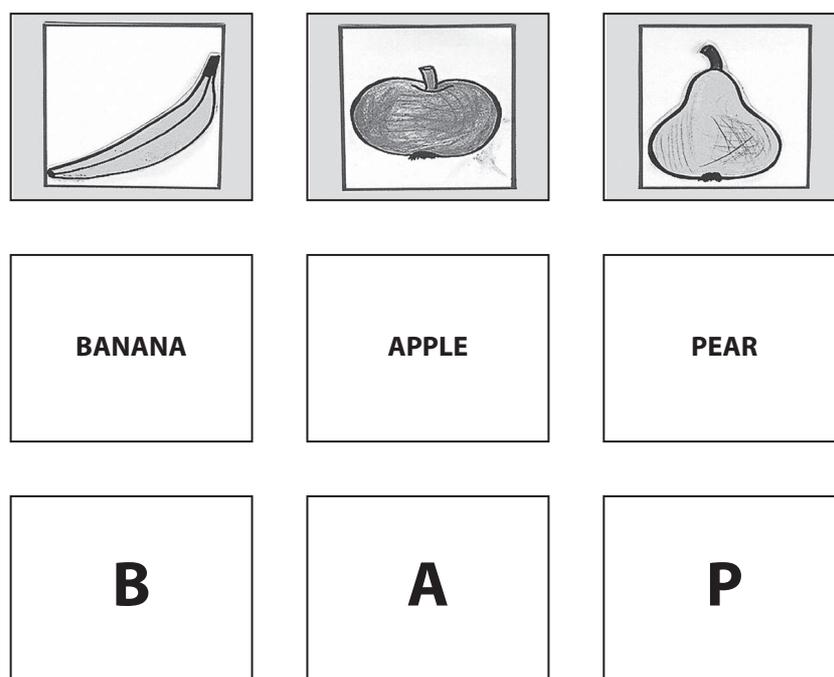
The **elaboration phase** is also called the transformation or processing phase. This phase involves the creation of relations of new information with information already contained in the knowledge and experience acquired by the pupil (what is put together). It is the transformation of knowledge schemes and the development of knowledge constructing functions according to the educational content and process. In the stimulation unit, this phase follows after the activation of the pupil's knowledge and the stimulation of cognitive functions in the input phase. It begins with *the phonological-perception processes* when the text is decoded by the pupil. The reading of a text involves questions for local comprehension, whose function is to hold the attention of the pupil. From the *words and sentences comprehension level,* we gradually progress to the *text level*. The centre of the elaboration phase is a set of *probe and prompt*

stimuli, that is, tasks through which the pupil has to identify explicit information in a text, further deduce implicit text associations and create different types of inferences. With *inferences*, that is, partial deductions which connect previous knowledge with new information, we start from these types of inferences: *bridging and referential inferences* are directly deduced and it is possible to find them in the text; *coherent inferences* are more complex and originate by connecting information between lower and higher levels of text comprehension; *elaborative inferences* emerge out of a text and connect information from the text with knowledge about the world or other texts (Clarke S., Dickinson P. & Westbrook J. (eds.), 2010, p. 163).

Success in solving the tasks in the scope of the processes of reception depends on activation of the cognitive processes of memorisation and inferential thinking. Therefore, we deliberately "trained" them in the input phase. And in contrast, tasks based on the given cognitive processes are a means of further development of these cognitive processes.

The **output phase** (communication phase) involves communicating the results of thinking (what comes out). During the reception of a text, in this phase the reader should have a global comprehension; the comprehension of the idea of the text and knowledge of how I can use the obtained information. Therefore, in the output phase of the stimulation unit, we apply *probe and prompt stimuli* focused on the ability of the pupils to clarify, account for and connect information with their own current knowledge and experiences and use it in their own productive activities, e.g. through drawing a picture or diagram, telling of the experience, etc. In this phase, the pupils can return to the mind-map created in the input phase and fill in the new information which they learned from the text.

During all phases of the stimulation unit, we tried to support the *metacognitive processes* of the pupils and to provide the pupils space for obtaining metacognitive experience through tasks which stimulate deliberate thinking, planning of the process and its evaluation (Larkin, 2010, p. 8–15).

Ľudmila Liptáková
Dana Cibáková

Educational Implications

The presented stimulation programme offers a model for school education and for teachers how to proceed with the systematic development of comprehension of an informational text, particularly in the situation where no national education strategy exists in the given field in Slovakia.

On the basis of a conceptual starting point and our own research findings, we have formulated recommendations for systematic work aimed at developing comprehension of an informational text as a part of the linguistic-communicative component of teaching a mother tongue in primary education (Liptáková, 2012):

1. To develop the ability of a pupil to understand different textual models of spoken and written language, thus, a text differentiated by: *continuity* (linear – nonlinear), *perception channel* (optic, acoustic, combined), *mode* (print – electronic) and *communication intention* (operational, informational, narrative, descriptive, persuasive etc.).

2. To strive for such intertextual connections, when selecting texts, that offer more opportunities for understanding the relational character of comprehension and increase a pupil's interest in reading/listening to a text.

3. To utilise different receptive strategies: the strategy Know – Want to Know – Learned, the strategy I.N.S.E.R.T (Interactive Notating System for Effective Reading and Thinking), mind-mapping, structured reading, creation of predictions etc. (Steele, Meredith, Temple, 1998, 1999).

4. To structure work with a text according to the phases of mental acting:

   4.1 **At the start of text reception (input phase)**:
   To activate general and linguistic knowledge associated with the subject and content of a text, with the given text model and with expressive means used in the text.

To stimulate the cognitive functions necessary during text comprehension (especially attention, memory function, inferential thinking, etc.) through tasks thematically associated with the text.

4.2 **In the course of text reception (elaboration phase)**:

To perceive read/listened to text on the basis of visual-perceptive/ /audio-perceptive processes and phonological processes.

To decode the lexical and syntactic units of a text.

To structure a received text with questions for local comprehension and for holding the attention of a pupil.

To understand a text with the help of probe and prompt follow--up stimuli operating on the different levels of text comprehension (gradually, according to the age of the pupils, from a lower to higher level).

To plan and monitor the engagement of relevant cognitive processes: identification of information explicitly presented in the text; deducing implicit text associations (inferences); clarifying, explaining and substantiating information; connecting information with the existing knowledge and experiences of the pupil; evaluation of information according to certain criteria.

To classify information depending on the type and purpose of the text (organising, selection, outline).

To generalise the obtained information, its meaning and uses (summaries, overviews, proposals).

4.3 **After completion of text reception (output phase)**:

To verify the global comprehension of the text, for example with a cloze-test.

To use the obtained information in the pupil's productive activities (verbal and non-verbal).

5. To stimulate metacognitive processes of the pupil during text comprehension:

- questions before reading/listening to a text: *Why is this text good to read/listen to? What can I learn from it? What kind of plan can I choose for this?*

Ľudmila Liptáková
Dana Cibáková

- questions during reading/listening to a text: *What will happen next in the text? Why do I think so? What proof do I have?* To support *posing questions by the pupil* at the different levels of text comprehension.
- questions after reading/listening to a text: *What did I learn from the text? How can I use it? Where and how can I obtain additional information?*
- metacognitive language: deliberate use of vocabulary which is associated with metacognitive processes, e.g. *verba cogitandi*, vocabulary from the semantic field of *memory, thinking* (Larkin, 2010, p. 7).

Discussion

The presented model of an educational strategy for developing text comprehension, which is based on empirical findings about the possibilities of simultaneous stimulation of linguistic and cognitive processes, is proposed as one possible way to enhance the reading literacy of Slovak pupils in primary education.

The pedagogical findings were also utilised in designing curricula for the teaching of the Slovak language for primary education in the area of comprehension of an informational text as a part of the development of reading literacy (Liptáková et al., 2011). We offered the curriculum as a proposal to the representatives of the national educational authorities in the form of a school educational programme. Another impact of the research is the project of *Encyclopaedia of Language for Children* (a national research project of the Cultural and Educational Grant Agency of the Slovak Republic 023PU-4/2012), whose aim is to prepare an encyclopaedia of language as a tool for comprehending an informational text and as well as a source of discovering and obtaining linguistic and metalinguistic knowledge and the development of linguistic awareness of a junior school child. At the same time, we offer the presented strategy for developing the reading literacy of a pupil for comparison with educational strategies in different countries.