

Abstract:

The main parameters describing content and the accessibility of information from textbooks are many aspects such as text difficulty and others. Individual characteristics of pupils - that are represented by chosen student preconceptions and misconceptions – also belong to key factors. The providing of the comprehensive view of the issues regarding analysis and the linking of acquired pieces of knowledge with the practical textbook creation have been the main aims of this dissertation. The creation of an instructional text follows the analysis results of the topic carbohydrates and their metabolism in chosen textbooks and the preconception analysis of biochemical terms. The instructional text respects the results of the analysis.

The theoretical background of textbook creation (the functions of textbooks, their structure, content, characteristics and investigated parameters) has been described in detail in the theoretical part of this doctoral thesis. It is followed by the survey of the information concerning student preconceptions and the possibilities for their analysis and use in teaching. The aspects of textbooks use from the perspective of pupils, teachers and publishers, as well as the relation of the topic carbohydrates and their metabolism to curriculum documents have been described in the last part.

The practical part of the dissertation includes descriptive and relational research. In the first phase – the analysis of the thematic unit carbohydrates and their metabolism in nine chosen textbooks of high school chemistry, the analysis of entire textbooks and the analysis of created instructional text have been carried out. The overall difficulty has been set by the Nestlerová-Průcha-Pluskal method. The dissertation has been also focusing on several aspects including semantic coherence and distance, didactic equipment and content as well as conceptual text analysis. The results were subsequently compared and statistically evaluated. In the second phase – the analysis of preconceptions and misconceptions of the terms photosynthesis and the structure of carbohydrates by the pupils of nine secondary schools throughout the Czech Republic (245 respondents, grammar schools and natural science lyceum) has been performed. The gained results have been interpreted, compared and statistically evaluated.

The creation of an instructional text with lower syntactical, semantic and overall difficulty and higher semantic textual distance - compared to already existing texts with the topic of carbohydrates and their metabolism (in chosen textbooks) - is the main goal for the conclusion of this dissertation. It has been proved that rather authors (more than featured content in textbooks) are the principal carriers of parameters. The authors can reach lower difficulty through their own analysis of textbooks. Another observation is the fact that it is possible to use the methodology focused on the determination of difficulty Nestlerová-Průcha-Pluskal not only for entire textbooks, but also with sub-thematic units. The significant misconceptions of the term photosynthesis and the structure of carbohydrates were found out during the analysis of preconceptions.

Key words: textbooks, text difficulty, equipment, preconceptions, misconceptions, carbohydrates, metabolism, photosynthesis, structural formula, creation of textbooks