przegląd krytyczny

critical review

Deep insight into eye-tracking in glottodidactics

Agnieszka Andrychowicz-Trojanowska, Podręczniki glottodydaktyczne: Struktura – funkcja – potencjał w świetle badań okulograficznych, Warszawa, Wydawnictwo Naukowe IKSI, pp. 563

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Eye-tracking technology has become more prevalent in science and research. It has already been used in social sciences, management, marketing (e.g. Stolecka-Makowska & Wolny, 2014), computer/video gaming, as well as linguistics (Grucza et al., 2014), including translation studies, and glottodidactics, i.e. foreign language teaching and learning (see Grucza, 2020).

The reviewed book is a comprehensive compendium of possibilities of using eye-tracking (ET) technology in glottodidactics, using the example of analysing the layout of textbooks by ET. In four theoretical chapters of *Glottodidactic textbooks. Structure—function—potential in the eye-tracking research*, the author discusses the issue of glottodidactics, including the role and position of textbooks in glottodidactics, the characteristics of secondary school students, and the paradigms of eye-tracking glottodidactics. The following chapters are devoted to discussing the study results and the conclusions.

The book begins with the historical view and theoretical background of anthropocentric glottodidactics, including the main foundations of this theory. The author starts from the roots of current glottodidactics and its definition, which dates to 1613 when Helwig and Jung used in their monograph the term "didactics" (original title: Kurzer Bericht von der Didactica oder Lehrkunst Wolfgang Ratichii). As the next source of the term "didactics", the author indicates Didactica Manga by Jan Amons Komeński, dated 1632.

Further, the other movements and paradigms of didactics are given, such as the thesis by Jean-Jacques Rousseau, Johann Heinrich Pestalozzi, Johann Friedrich Herbart, Jan Władysław Dawid, John Dewey, Célestin Freinet, Peter Yakovlevich Galperin, Kazimierz Sośnicki, Bogdan Nawroczyński and Wincenty Okoń. The following thoughts are directed to the development of glottodidactics as a separate subdiscipline of didactics. Glottodidactics is a broader discipline than just a methodology of foreign language didactics. Glottodidactics focused on the methods of foreign language didactics, training foreign language teachers, and creating the teaching materials and resources for learning foreign languages (see more Grucza, 1978). The roots of glottodidactics date back to the Second World War in the United States. In the 50. and 60. of the 20th century, teacher-oriented instructions dominated. In this period, English Language Teaching (ELT; also called English as a Foreign Language, EFL or Teaching English to Speakers of Other Languages, TESOL) were created. As the next steps in the development of glottodidactics, the author discusses the ideas of N. Chomsky, W. Rivers, J. Carroll, and E. Lenneberg, and after that, other movements, such as learner-oriented instructions and communicative language teaching (CLT). The post-war development of glottodidactics in Poland was started by Ludwik Zabrocki and continued by the fathers of the Polish term "glottodydaktyka" – Jan Wikarjak and Franciszek Grucza. After this historical introduction, the author describes the glottodidactics schema, introduced by F. Grucza. Different glottodidactics schemas are also presented—introduced by W. Woźniewicz, W. Pfeiffer, W. Figarski, P. Gębal, M. Dakowska, and S. Grucza. Those characteristics lead to discussion about anthropocentric glottodidactics, based on the anthropocentric theory of human languages. Next, the eye-tracking glottodidactics as a separate discipline is characterised. The term was introduced by S. Grucza in 2016.

The first chapter gives a deep insight into the history, main theses and characteristics of anthropocentric glottodidactics, and indicates its foundations. Anthropocentric glottodidactics is a background of the newly created discipline "eye-tracking glottodidactics". The author describes different perspectives and approaches in didactics, glottodidactics, and eye-tracking glottodidactics.

The next chapter characterises the role and position of textbooks in the glottodidactic schema. The author presents different studies about textbooks' overall roles and impact on learning, including foreign language learning. Textbooks are presented as didactic materials. The theoretical considerations about textbooks start from various definitions and approaches to textbooks in didactics. After that, the historical view and development of textbooks are given. The first textbooks are dated to the 16th and 17th centuries. In Poland, the Commission of National Education introduced the idea of creating textbooks in the 18th century. After a detailed history of the beginning of textbooks in the world and Poland, the author focuses on the process of creating the textbook and presents the four main steps by which the textbooks are developed. Next, the roles of textbooks in the didactics are discussed from different perspectives. The author indicates not only the

main functions of textbooks but also presents various categories of roles of textbooks created by Polish researchers (e.g. F. Polaszek, T. Parnowski, S. Siatkowski, K. Lech, W. Kojs, C. Maziarz, J. Skrzypczak, W. Okoń, L. Leja, D. Zujew, H. Kośla, J. C. Styszyński, P. Szerszeń, W. Pfeiffer, C. Kupisiewicz and others).

The important role of analysing the textbooks is their structure and graphic layout. The author presents all principal parts of the textbook structure, starting from the cover and title pages, as well as describes the artwork (format of the book). Different types of textbooks are given, as well as possible ways of evaluating textbooks by experts. Following, various studies about textbooks are compared with each other. That detailed introduction about textbooks in didactics gives a platform for presenting the characteristics, approaches, studies and role of textbooks in glottodidactics. The author presents different teaching methods and underlines the role of textbooks in them: grammar-translation method, direct method, audio-lingual method, cognitive approach, Total Physical Response, The Silent Way, Counselling Language Learning, The Natural Approach, Callan's method, suggestopedia, communicative approach, Content-Based Language Teaching, Content and Language Integrated Learning, and Task-Based Language Teaching. The essential factor of the autonomy of the students is also underlined. The following pages are devoted to English textbooks as a foreign language, compared to the core curriculum, the criteria for assessing English textbooks, and the results of evaluating English textbooks as a foreign language for secondary school students. The author analyses the format of textbooks, evaluating their graphic clarity.

Interestingly, only three textbooks out of 15 are given 2/3 points (others are given 1 or 2 points). The author also analyses the format of the Reading part, evaluating its graphical clarity. Here, four textbooks out of 14 are given 2/3 points. Glottodidactics, textual and intertextual components are also indicated (e.g. illustrations), as well as the typography of glottodidactics textbooks.

All these theoretical backgrounds, starting from didactics, through glottodidactics, and textbooks in general didactics and glottodidactics, led to the next important factor in learning languages: the characteristics of secondary school students. After a short introduction to the Polish education system, the author presents in detail the group of secondary school students and their characteristics, including cognitive development. The characteristics are not limited to typically functioning students; students with special educational needs are also presented. Here, the author focuses on the rights and laws on special education for students who are not neurotypical(based on the example of dyslexia, ADHD, and Asperger syndrome). The following pages are devoted to indicating the possible ways of minimalizing the negative impacts of these differences in the glottodidactic process.

The last theoretical chapter focuses on eye-tracking glottodidactics. First, historical views on the development of eye tracking are given. The first mention of eye movements dates

back to 1596 (work by Du Laurens). William Charles conducted the first studies on binocular vision in the 18th century. The following key points of the development of ET are the work of John the Evangelist (1823), describing the physiology of the eye. The work of Charles Bell (also 1823) described the reaction of eyes to visual incentives, and the works of Johannes Müller (1826) focused on visual patterns. Measuring eye movements has four steps: the first one dated from the end of the 70s. of the 19th century to the second decade of the 20th century; the second—from the 20s. of the 20th century till the middle of the 70s. of the 20th century; the third—from the middle of 70s. Till the 90s. of the 20th century, and the fourth—from the 90s. of the XX century till nowadays (Płużyczka, 2015). Next, the author gives a deep insight into the eye-tracking methodology, starting with describing different eye-tracking tools (stationary eye trackers, e.g. tower-mounted static eye trackers; head-mounted eye trackers; and head trackers), through essential concepts, definitions and parameters of eye-tracking methodology (e.g. fixations, saccades, microsaccades, ocular drift, ocular microtremor, vestibular-ocular reflex, optokinetic reflex, vergence reflex, pursuit eye movements, etc., as well as Area of Interest – AOI, subject hit count, hit ratio, fixation count, a cluster of fixations, heat maps, fixation frequency, saccade count, saccade duration total, scan paths, scan path length, dwell time, spatial density, etc.). Next, the author indicates the possible implications of eye tracking in basic and applied research and eye tracking in evaluating web pages.

The practical part of the monograph consists of a description of the methodology (including two pilot studies)—tools, conditions of the study, and characteristics of the research group. Next, the main conclusions from the pilot studies were drawn. After that, the author describes the primary research. She evaluated the three different materials from textbooks on the English language and finished the study with a questionnaire for research participants. The author characterises the steps and limitations of the study. The study group consisted of 120 participants (divided into three groups, with 20 students without dyslexia and 20 with it in every group). Three main research questions were introduced: (I) Is learning and teaching a foreign language (here: English) effective when using the materials from the textbooks, and is there any impact of the graphical layout of the textbook page?; (II) Is it possible to find, using ET, the particular textbook page layout which will be the most supportive for students?; and (III) if the graphical layout of the textbook determine the way students learn or if the way of student's learning should determine the graphical layout of the textbook? After that, the results from the study (analysing the entry time, dwell time and first fixation duration, expressed in milliseconds, and revisits and fixation count, expressed in numbers) are presented. For the statistical analysis, some tests were used: Kolmogorov-Smirnov test, Shapiro-Wilk test, ANOVA, and Kruskal-Wallis test). The results are illustrated with several clear and logical charts, tables, and pictures corresponding to the text. The author noticed a clear and significant difference between the teaching potential of the three materials.

Furthermore, this potential could be "adjusted" (changed) by changes in graphical and

text. Next, the important materials in the textbook are located close to those elements on which the student's attention needs to be focused (e.g. the reading part). The graphical parts (pictures, etc.) should be reasonably chosen and located on the page. The questionnaire study shows that colours also play an essential role in learning language from the textbook. The students notice that textbooks are too colourful and the colours are too bright. Pastel colours should be considered when creating a textbook. Next, the students ignore some elements (page numbers, numbers of the exercises, etc.), so the unreasonable highlight is questionable. Paying attention to more effective and conscious ways of working with text is necessary. These skills should be trained among students. It needs to be underlined that all recommendations about the graphical part are universal and could be implemented in any other subject (not only foreign languages).

All the theoretical and practical knowledge is based on over 1250 books, articles, webpages, laws, etc., in Polish, English and Russian.

The book *Glottodidactic textbooks. Structure—function—potential in the eye-tracking research* gives a deep insight into eye-tracking implementation in didactics and glottodidactics. It is a valuable compendium about the possibilities of secondary school students. Significant recommendations for creating the graphical layout of the textbook (pages), based on the leading research and two pilot studies, are given. To the best of my knowledge, the book is the most extensive compendium on this subject.

REFERENCES

Grucza, F. (1978). Glottodydaktyka, jej zakres i problem. *Przegląd Glottotydaktyczny, 1*, 29-44.

Grucza, S. (2020). On the rudiments of the eye tracking glottodidactics. *Beyond Philology, 17*(3), 57-76. https://doi.org/10.26881/bp.2020.3.04

Grucza, S., Płużyczka, M., & Sochul, P. (eds.) (2014). *Widziane inaczej. Z polskich badań eyetrackingowych*. Warszawa: Wydawnictwo Naukowe IKSI UW.

Płużyczka, M. (2015). *Tłumaczenie a vista. Rozważania teoretyczne i badania eyetrackingowe*. Warszawa: Wydawnictwo IKSI UW.

Stolecka-Makowska, A. & Wolny, R. (2014). Możliwości zastosowania techniki okulograficznej w ilościowych badaniach marketingowych. *Studia Ekonomiczne, 195*, 197-205.