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Information readability of e-textbooks for history (on the example of Polish textbook for primary school, grade six)

Universal access to the Internet, available on steadily growing number of devices, raises questions about an important role of education of the young generation. In this context, the behaviour of schoolchildren who use the Internet constitutes an issue that requires attention. Internet users surveys conducted by various institutions (e.g. Gemius S.A. or Cisco Systems, Inc.) indicated that the network is almost indispensable to contemporary producers and consumers of information. In 2011 a company studying analysts' forecasts and mobile network traffic Cisco Systems, Inc. prepared the document Cisco Connected World Technology Report, where relations between human behaviour and the Internet with its omnipresence of network technologies were analysed. The global report based on surveys of college students and professionals 30 years old and younger in 14 countries describes present challenges that companies face as they strive to balance current and future employee and business needs. Nonetheless, from the mentioned report one can draw a conclusion of the younger generation who is completing or have recently completed their education[1]. In Cisco press release materials we can read that:

> One of every three college students and young professionals considers the Internet to be as important as fundamental human resources like air, water, food and shelter, that confirms increasingly important role of the network in human life. More than a half of the study's respondents found also that they could not live without the Internet and cite it as an integral part of their lives[2].

Similarly, Gemius is a company which provides regularly analysis of the Internet Polish users' behaviour. Their characteristic is the standard of the Internet audience measurement in Poland. The Gemius study is a hybrid research combining two methods. The first one consists on measurement of online traffic (site-centric), the second

[1] Website of Cisco Company: http://www.cisco.com/c/dam/en/us/solutions/collateral/enterprise/connected-world-technology-report/cisco-2014-connected-world-technology-report.pdf (online access: 30.05.2017).

[2] Website of Cisco Company: https://newsroom.cisco.com/press-release-content?articleId=474852 (online access: 03.10.2017).

one analyses users' behaviour (user-centric)[3]. It gauges website traffic, audio and video consumption and mobile applications. According to some recent reports published by Gemius, 27.7 million Poles were active in the network in March 2017. The majority of those – 23.9 million web users – were connected to the Internet via desktop or laptop and they spent in the network more than 3 hours a day. Mobile devices in Poland were used by more than 20.6 million people; they are present in the virtual reality almost an hour each and every day, they use the Internet the longest on Sundays.

Already mentioned above Cisco report indicates that the number of worldwide smartphone and mobile phone users will increase reaching 5,5 billion by 2021, that means there will be more mobile devices users than bank accounts (5,4 billion), houses and flats with running water (5,3 billion) or landline phones (2,9 billion). This is the result of the analysis published in the eleventh edition of the annual report: *Cisco Visual Networking Index*™ (*VNI*) *Global Mobile Data Traffic Forecast* (*2016 to 2021*)[4]. Mobile data traffic will increase 7-fold by 2021 compared with 2016. This augmentation will be 5-fold in Poland. There will be 1.5 mobile devices per capita. People will use nearly 12 billion mobile-connected, networking devices (including machine-to-machine modules). By 2020 total amount of data transferring via Wi-Fi network will constitute 49 percent contribution in total IP traffic.

The above data indicate that both predicted huge development access to telecommunications technology and rapidly growing traffic of Internet users will imply further multiplication and transmission of electronic data. By researchers of sociology and information science – information overload in everyday life is considered today's an extremely important issue of an information society. Professor Wiesław Babik points it out:

> the idea of general reflection on mankind's situation in the information world and the human condition in the world of information overload and the acceleration of technology comes from Alvin Toffler, American futurist, studying the digital revolution, some changes in technology and communication[5].

The knowledge society developed nowadays must be also based on appropriate education. Some scientists postulate that modern education system would make students aware not only what benefits can knowledge bring to them, but also it would raise awareness of unexploited capabilities. These unused potential opportunities are related to the fact that some of the valuable knowledge is omitted because of information overload[6]. According to the previously mentioned data it will probably be unchanging state of our reality. Efforts to improve the quality of school textbooks

[3] Polskie Badania Internetu: http://pbi.org.pl/en/ (online access: 03.10.2017).

[4] Website of Cisco Company: http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/complete-white-paper-c11-481360.html (online access: 25.05.2017).

[5] W. Babik, *Kultura informacyjna a ekologia informacji współczesnego człowieka. Studium porównawcze*, in: *Kultura informacyjna w ujęciu interdyscyplinarnym-teoria i praktyka*, vol. 2. Red. H. Batorowska, Z. Kwiasowski. Cracow 2016, p. 45.

[6] Jan A. Fazalgić, *Zjawisko „nadmiaru informacji" a współczesna edukacja*, "E-mentor", 2010, no. 4. – http://www.e-mentor.edu.pl/artykul/index/numer/36/id/773 (online access: 20.05.2017).

are generally connected with enhancing the attractiveness of the content and with reducing impediment in reception[7].

However, to make students aware of the extent of their knowledge, selection of information and creation of high quality information, first they should be taught the appropriate (or maybe "the most concrete") way of transferring information. Nonetheless, the definition of "the appropriate way of transferring information" is hard to make up. It means transferring information without the burden of information overload, nor requiring any additional filtering, e.g. selecting. Here it is also worth to mention, in line with Jadwiga Kowalikowa's remarks, that a textbook should be also modern and effective[8]. As an effective textbook this scientist regards a book, that presents a new material, make it possible for readers to understand it, learn it and take it in, as well as apply it in some new situations when difficulty of use will increase. In short, the mentioned scholar explains the modernity of the textbook as when the author of a book consults modern science, ideas and pedagogical practice as well as uses the latest technology:

> A student accustomed to computers for a long time, is used to employ the Internet everyday and expects the same from the textbook (preferably multimedia) including the network into the educational area and accepting its characteristic forms of information transmission[9].

Research on readability of information in a school textbook started with a definition of textbook itself. As it turned out, there are plenty ones and they are often remarkably expanded, e.g. the entry in Słownik pedagogiczny ed. by Kupisiewicz & Kupisiewicz in 2009[10]. As Wojciech Walat in 2004 points out: no universal concept of school textbook nor multimedia textbook have been developed[11]. Several years later in Poland, electronic textbooks already exist, although there is still no consistent, universal concept.

In the late 16th and early 17th century scientific school textbook theory has its beginnings, when *Wielka dydaktyka* by Jan Amos Kemensky was published. The first theorist of textbook in Poland was Grzegorz Piramowicz, the author of *Przestrogi potrzebne do pisania książek elementarnych*, the work published in 1775. Some later reflections on textbooks weren't numerous; next works appeared in the interwar period: by Janusz Balicki (1932), Zygmunt Mysłakowski (1936), Roman Ingarden (1939). The research on school books blossoms only in the sixties of the twentieth century. Among the analysed questions the following issues were discussed: distinguishing features of the textbook differentiating it from other genres of writing, didactic functions, general rules of creation of texts. Specialised and multimedia textbooks have likewise been studied. Textbooks for learning chosen subjects

[7] C. Nowarski, *Dydaktyczne spojrzenia na gimnazjalne podręczniki historii „Przez wieki" z Wydawnictwa Nowa Era*, „Prace Komisji PAU do Oceny Podręczników Szkolnych" vol. 7 (2010), p. 23.

[8] J. Kowalikowa, *Dobry podręcznik szkolny*, „Prace Komisji PAU do Oceny Podręczników Szkolnych", vol. 7 (2009), p. 14.

[9] Ibidem, p. 15.

[10] C. Kupisiewicz, M. Kupisiewicz, *Słownik pedagogiczny*, Warsaw 2009, p. 135.

[11] W. Walat, *Podręcznik multimedialny: teoria, metodologia, przykłady*, Rzeszów 2004, p. 9.

were characterised separately. The researchers dealing with the subject of school textbooks make up and use different definitions of that book. Nonetheless, it can be generalised that term "textbook" is labeled in two ways: the first defines missions that have to be fulfiled by a textbook, the second describes the textbook itself. Often enough in a variety of analysis one comes back, however, to the classic definition of textbook made up by Roman Ingarden in 1939, which was:

> it is a school book which contains the most principal information from some field of knowledge and it is closely connected/linked with course and programme of teaching.

Similarly, there is no primary definition of e-textbook, to which one could appeal, nor guidelines according to which editors should prepare e-textbooks, these guidelines are only sketched out by minimum functional requirements[12]. Gathering researchers' findings so far Wojciech Walat, in his work entitled: *Podręcznik multimedialny: teoria–metodologia–przykłady*, undertook an attempt to define the multimedia e-textbook[13]. He contends that the multimedia textbook is a proper textbook (a core textbook) extended by audiovisual materials and supporting texts; on the other hand, that "extension" develops concurrently with the proper textbook, not as secondary to it. In *Encyklopedia Pedagogiczna XXI wieku*[14] there isn't a separate entry dedicated to e-textbook, however, in the entry dedicated to textbook the information about the conventional textbook in the era of computer is set apart. The concepts of audiovisual textbook and electronic one are defined there. The electronic textbook is described as „a book made by IT techniques, linked with z the latest audiovisual techniques"[15]. The audiovisual textbook was described as follows:

> it is written in many languages, exteriorly being a collection of various types of teaching materials and audiovisual support, whereas internally having a homogeneous structure, with printed texts as highlighted elements[16].

An interesting proposition is the typology of e-textbooks by Marlena Plebańska. It was published in a study released in 2013 by Centre for Education Development (Ośrodek Rozwoju Edukacji): *Podręczniki multimedialne w polskich szkołach. Raport z badania*[17]. In her study the researcher distinguishes five types of e-textbook, as following: static e-textbook, slightly multimedia one, multimedia one, interactive one and smart one.

When discussing the presented typology it is worth mentioning that the author characterises a static e-textbook as the traditional textbook mapped on a scale of

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[12] Website of Ośrodek Badania Edukacji: *Podręczniki multimedialne w polskich szkołach. Raport z badania*. – a PDF file https://www.ore.edu.pl/materialy-do-pobrania/category/158-e-podrczniki-materiay-do-pobrania?download=1939:podrczniki-multimediamne-w-polskich-szkoach (online access: 25.05.2017).

[13] W. Walat, *Podręcznik multimedialny…*, p. 9.

[14] *Encyklopedia pedagogiczna XXI wieku*, vol. 4, P, red. prowadzący U. Śmietana, Warsaw 2005.

[15] Ibidem, p. 470.

[16] Ibidem, p. 470.

[17] Website of Ośrodek Rozwoju Edukacji https://www.ore.edu.pl/strona-ore/index.php?option=com_phocadownload&view=category&id=158&Itemid=1776 (online access: 03.10.2017).

1 to 1, in PDF format. Similarly as in the case of a static school book as in a slightly multimedia e-textbook we can talk about transforming the traditional textbook into electronic format, enriched by some multimedia materials, frequently edited in PDF format, with poor linear/sequential reading (continuous navigation). When it comes to the multimedia e-textbook it can be understood as a book constructed in an entirely multimedia way, just at the level of the concept itself, enriched by some advanced multimedia elements, animations and simulations, also equipped with random reading (discrete navigation). Moreover, the interactive e-textbook is described as a book interactively constructed, taking into account division of the content layer and multimedia layer. It is enriched by some advanced multimedia elements, it provides interactive exercises and it makes it possible for the user to interact with the textbook. Whereas a smart e-textbook permits a teacher by oneself to build lesson content on the basis of available resources, with optional use of basic or modified versions.

Aleksandra Kamińska in her work entitled: *Zalety i wady e-podręcznika postrzegane z perspektywy nauczycieli* points out that a good e-textbook has got all the features of traditional textbook, it must be compatible with teaching basic programme (established by the Polish Ministry of Education) and should carry out all the functions of the textbook, in other words: informative function (it would provide information and fixe it in the pupil's knowledge system), exploratory one (it consists of self-exploration of a content), practical one (a pupil would acquire the skills to apply knowledge in practice) and finally, self-learning function (a textbook should encourage into self-learning)[18] . When it comes to a textual and graphic layers, every e-textbook ought to be adjusted to the pupil's age, subsequently the content should be understandable to a pupil and ought to correspond to their level of development. This is a crucial issue from the standpoint of text readability. As the aforementioned researcher wrote, giving a technologically advanced multimedia textbook it is recommended to apply it to the principles of a proper balance between the text and the interactive part:

> According to the authors of e-textbooks, it is essential to maintain a right proportion between the textual layer and other interactive elements, i.e. there ought to be one interactive element per 1,000 characters (for younger pupils, i.e. in classes 1–3, one interactive element per 800 characters). This element would be from average activity level, it means this element should be dynamic (a short film, animation, game, audio file and the like)[19].

When we proceed to tests of density of information in e-textbooks, first of all we need to describe the platform where the chosen item had been posted. That item is located on the website www.epodreczniki.pl, which is a technological platform (that is described on this site) as well as a complex IT system including a set of necessary services and tools that make available the most important functions: it supports processes of storing, management, edition and mass distribution of an open educational content, although compatible with current teaching basic programme. This project was co-financed by European Union funds, as a part of the Human Capital Operational Programme (Program Operacyjny Kapitał Ludzki). That platform was built as a

[18] A. Kamińska, *Zalety i wady e-podręcznika postrzegane z perspektywy nauczycieli*, „Zeszyty Naukowe Wyższej Szkoły Humanitas. Pedagogika" 2015, no 10, p. 115.

[19] Ibidem.

project implemented by the Centre for Education Development (Ośrodek Rozwoju Edukacji), which is a nationwide, public teacher training institution, managed by the Minister of National Education. This Centre was established on January 1, 2010, as a result of the merger of the National In-Service Teacher Training Centre (Centralny Ośrodek Doskonalenia Nauczycieli) and the Methodological Centre of Psychological and Pedagogical Counselling (Centrum Metodyczne Pomocy Psychologiczno-Pedagogicznej), based on the order of the Minister of National Education. According to the data placed on the website of the Centre, its purpose is „to undertake and implement activities to improve the quality of education system in accordance with the state education policy in the field of general education and upbringing"[20]. It is worth mention that before this project the programme „Digital school" („Cyfrowa szkoła") has already been launched. It was a government initiative aimed at developing information and communications technology skills of teachers and students. E-learning resources and e-textbooks were planned as a part of „Digital school".

Among the information about the e-textbook project one can read that it is an answer to the needs of students and to challenges of the modern, digital school. The e-textbooks mean the whole learning and teaching environment. They enable people to work in teams as well as they adapt to an individual style of learning. Their resources can change dynamically. Every student and every teacher on their profile account might lay their materials up, share it with other people, create an author's version of the textbook[21].

On the platform there are resources for learning 14 subjects as well as for the early school education; those resources can be divided into: the early school education (classes 1–3); the primary school (classes 4–6); the middle/intermediate school and the secondary/high school. Some complementary methodological and didactic resources (e.g. curriculum, lesson plans, tutorials for teachers and set books) are planned to be on this platform but for the time being there are no materials in the appropriate tabs. Assumedly the resources are made available, without any restrictions, open to everyone; they are absolutely free and can be integrated with electronic registers and e-learning platforms. It is worth mention that all materials included in those e-textbooks (it means some texts and illustrative materials) are available on a free of charge license basis CC BY 3.0 Polska or under the notion of „fair use", i.e. one can use these materials for educational purposes.

For that research was chosen the textbook for history and civics (social studies) for the sixth year of primary school entitled: *Historia i społeczeństwo. Wspóln@historia. Klasa 6 podstawowa*. Assumedly the child 11- or 12-year-old is the recipient of this textbook. According to Jerzy Ronikier, the author of the work: Mit i historia. Mitotwórcze funkcje podręczników szkolnych:

> among all the school subjects this is the history that most influences the shape of the worldview of states, nations and societies[22].

[20] The official website of Ośrodek Badania Edukacji: http://new.ore.edu.pl/index.php/o-nas/ (online access: 25.05.2017).

[21] Website of the project Epodreczniki.pl: http://www.epodreczniki.pl/begin/cele-projektu/ (online access: 25.05.2017).

[22] J. Ronikier, *Mit i historia : mitotwórcze funkcje podręczników szkolnych*, Kraków cop. 2002, p. 11.

By contrast. Paul Valéry, French poet, essayist and prose writer, said the following about history:

> History (also as a school subject) is the most dangerous product evolved from the chemistry of the intellect... It produces dreams and drunkenness, it heals wounds... History will justify anything. It teaches precisely nothing, for it contains everything and furnishes examples of everything. On the other hand, history as a school subject is the one which the instruction (programme) issued by the minister of education[23].

The authors of the textbook are: Robert Kołodziej, Przemysław Wiszewski and Joanna Wojdon. They are scientists and academic teachers associated with the University of Wrocław, which is one of four substantive partners of the whole project; the other partners are: Wrocław University of Environmental and Life Sciences, Łódź University of Technology and Grupa Edukacyjna SA. Whereas Company Contentplus.pl sp. z o.o. is responsible for technical editing and development of graphic and programming elements. This is a copartnership that creates multimedia educational resources to order of both public-sector and private clients, it implemented projects for incl.: Ministry of National Education (the Centre for Education Development, Educational Research Institute), TVP Kultura, the University of Wrocław, the Wrocław University of Environmental and Life Sciences or Harvard Business Review Polska. The version published on the platform is the 33th one and it is the latest and still available on May 23, 2017. A technology partner is Poznań Supercomputing and Networking Centre, it works on educational projects as well as it keeps maintaining and developing the electronic scientific infrastructure.

The construction of this textbook is quite typical, so it maps a traditional book structure. Then this textbook consists of forty-five chapters, a glossary of six entries/terms and bibliography. The elements of the book architecture mentioned above facilitate the way of finding out particular lines which will be discussed during classes.

Language plays an important role in preparation of school textbooks and their use in the educational process. The Polish researchers who study electronic textbooks do not indicate what language should be used in these books, how much information a single sentence should bring or what are the words that could be too difficult to comprehend. There are no guidelines provided in this regard. Of course, in scientific literature there are analysis of the language of the textual layers which are classified as difficult; however, there is no guidance on how to create electronic, multimedia school textbooks in which the text plays as important role as the other elements that help the learning process.

Without any doubt, it should be essentially comprehensible and should enable readers to acquire new knowledge. Things that might make a reception of a text difficult are structure of the text, complicated sentences, difficult vocabulary, hermeneutic terminology, imagery and use of professional jargon. The authors of the publication entitled: *W poszukiwaniu metody automatycznego mierzenia zrozumiałości tekstów informacyjnych* point out that in many countries for a long time people have tried to write texts addressed to the average reader in a transparent, understandable way. A case in point is Sweden that implemented a special programme, thanks

[23] Ibidem.

to that official letters which were previously written in an office style have become comprehensive to most citizens. Whereas texts written in English could be evaluated according to degree of difficulty of sentences in it, due to a simple tool calculating the readability parameter which is sometimes included in a popular text editor[24] .

In the present situation, where we continually accumulate, process and share enormous amounts of data, where the Internet and mobile devices connecting to the network often are the basis of work and entertainment, it is worth to mention that the education, especially at the primary level, because of „information chaos" students should be taught in a clear, understandable and transparent manner, especially it applies to the knowledge contained in the textbooks.

Some scientific methods to measure readability of texts appeared in the mid--nineteenth century. The contemporary analysis measuring this issue were launched in America in the twentieth century. Within a few decades a really large number of patterns came into being which recited a degree of comprehensibility of texts conceived in American version of English. Among existing patterns used to calculate readability of texts at present the following ones enjoy the most interest: the Flesch Reading Ease Formula and its modification: the Flesch-Kincaid Formula, as well as the Dale-Chall Readability Formula, The Gunning Fog Index Readability Formula („Fog Index"), Fry readability graph and the Bormuth Readability Index.

Rudolf Flesch in 1948 was the first to develop a formula for text readability. What was the formula? One should calculate the average number of syllables in a word and the average number of words in a sentence. By substituting into the formula, the text intelligibility index was obtained. The Gunning "Fog Index" is one of the more popular formula for studying the fog of English-language texts. It was developed in 1952 by an American businessman Robert Gunning. One can adjust his assumptions to the realities of the Polish language. According to Gunning difficult words are those that contain more than three syllables. In Polish the words that are composed of four and more syllables can be considered as difficult. The smaller is the result, the better, more understandable is the text. In Poland, the formula for readability (of the press) was also developed by Walery Pisarek in 1969. Despite the existing and proven formulas for studies of the comprehension of the text, some researchers point out that it is also important to study syntactic and thematic cohesion for potential audiences.

It is worth while to remind that in 1989 the article by Ewa Nowak entitled: *Przegląd wybranych metod i narzędzi badań podręczników* appeared. Furthermore, the mentioned work also organises information of analysis of the Polish textbooks, when it comes to its transparency. The study used the formulas of: R. Flesch, W. Pisarek, R. Gunning[25]. It is also worthwhile to return to the results of textbook readability test of Krystyna Gąsiorek, published in 1990[26]. In the conclusions to analysis of the communicability of school books for the primary school classes (1–8), carried out according to the C.H. Björnson's formula of communicativeness (LIX, the Swedish

[24] W. Gruszczyński [et al.], *W poszukiwaniu metody automatycznego mierzenia zrozumiałości tekstów informacyjnych*, „Poradnik Językowy" 2015, issue 2, pp. 9–10.

[25] E. Nowak, *Przegląd wybranych metod i narzędzi badań podręczników,* „Pedagogika Pracy" 1989, z. 15, pp. 23–34.

[26] K. Gąsiorek, *Czytelność podręczników szkolnych w związku z rozwojem słownictwa uczniów*, „Z Teorii i Praktyki Dydaktycznej Języka Polskiego" vol. 10 (1990), pp. 125–145.

Readability Formula). It was clearly indicated that too difficult index of readability of the text inserted in the textbook causes that new concepts and information:

> become sets of empty sounds, thereby extending the group of words which keeps being repeated without understanding, so a student hasn't any chance to keep them even in the passive memory[27].

On the other hand Anna Seretny in the article *Wskaźnik czytelności tekstu* from 2006 presented the results of research done on selected Polish and English passages of text corresponding to language level z language proficiency tests: „First Certificate in English" and „Certificate of Proficiency in English"[28].

During the study of content of the textbook only tests of readability were performed – readability understood as measurement of the number of sentences, words and difficult words. The average length of a word, of a sentence, of a paragraph were counted. The programs developed for the Polish language were very useful. The following computer programs were used during the study: Jasnopis and Logios. The first of them has got two versions – basic and advanced. In the expanded version we observed fogginess of entries, texts and rare entries. The comprehensibility of the text and its difficulty are determined graphically (a special scale) and numerical. The interpretation of the results presented in that programme is shown in the Tab. 6. Logios lets us analyse stylistic features of the text and shows the level of fogginess of the language through this tool: index FOG-PL. On the Logios website there is information about readability measures on the level of Polish educational system, so the level of accessibility is primary school – is FOG 1-6, the level of accessibility is master's studies – FOG 16–17 (see Tab. 7).

The study was conducted on randomly chosen 5 samples of text (some selected paragraphs from the text of a textbook). The passages were copied, then analysed in the programmes mentioned above (see Tab. 1-5). The results suggest that in the Jasnopis programme the samples constitutes 60%, which received the result 4/7, that means that the reader's required education equals to the level of the secondary/high school. One of the samples, representing 20% of the materials analysed got the result 3/7, which should place the reader on the level of middle/intermediate school. Finally, the hardest passage (constituting the remaining 20% of the material) got the result 5/7, which means that its difficulty corresponds to people learning at licentiate/engineering studies. On the other hand the results of the Logios programme indicate that 60% of studied texts achieved the 9–10 years of education level, which corresponds the last classes of middle/intermediate school or the first year of secondary/high school. The remaining samples gained 20%. The most difficult one (identical as in the case of the analysis performed by the Jasnopis programme) corresponding to 13–17 years of education and determines accessibility of the text on the level of master's studies. The passage of the text analysed in Tab. 4 of the Logios programme shows that it corresponds the best to the recipients with 11–12 years of education (secondary/high school level). None of the examined passages of the texts was designated as corresponding to the primary school pupils, finishing

[27] Ibidem, p. 144.
[28] A. Seretny, *Wskaźnik czytelności tekstu*, „Ling Varia" 2006, no. 2, pp. 87–98.

their education at this stage. This would correspond to the Logios programme as the result FOG 6/7. When it comes to the Jasnopis programme only one passage (Tab. 2) got 3rd classes which, however corresponds to required reader's education on the middle/intermediate school level.

The carried out research shows that the readability of texts placed in analysed electronic textbook may turn out to be too difficult for readers 11- or 12-year-old who have completed 5 years of primary school education.

The analysis of readability of texts carried out for the discussed textbook is relevant because this is the first free e-textbook created for the primary school education needs which is available in the network. It can be used for further research on information density or on attractiveness of competing texts for the electronic textbook. According to the automatic evaluation used to analyse the programmes, the e-textbook is a bit too difficult for the young reader. Of course, it should not be forgotten that the most important role to play in the teaching process is still the teacher; however it is worth pointing out that first of all the electronic textbook ought to be readable enough to play a leading role in the education, competing with Internet resources often used by the pupils. Then the electronic textbook can not be less attractive and less understandable than other educational materials available online. Among the analysis prepared for the Centre for Education Development (Ośrodek Rozwoju Edukacji), one can find the conclusions from the study of children and young people's computer reading (*Czytelnictwo komputerowe dzieci i młodzieży*) prepared by the Educational Research Institute (Instytut Badań Edukacyjnych)[29]. The analysis was conducted in 2014, indicating that among the children aged twelve more than half of them search the Internet at least once a week seeking information for school education (57% of respondents).

Other reading activities of twelve-year-olds in the network involve reading online newspapers and browsing news portals and reading blogs. The survey mentioned above indicates that already in primary school the students complete by themselves their knowledge acquired during standard education. At this point, the question arises: Are the materials used by the pupils more understandable thus do they complete difficult textbook knowledge, or maybe are they the result of other factors e.g. obligatory homework assignments, the necessity to receive better the content learned at school or just pupils' curiosity?

[29] Instytut Badań Edukacyjnych: http://www.ibe.edu.pl/pl/media-prasa/aktualnosci-prasowe/455-czytelnictwo-komputerowe-dzieci-i-mlodziezy (online access: 03.10.2017).

Passages of text originate from the textbook *Historia i społeczeństwo. Wspóln@ historia. Klasa 6 podstawowa*, are located on the platform www.epodreczniki.pl

Tab. 1. Analysis of the Jasnopis and Logios programms

Analysis of the Jasnopis programme (selected data)	Analysis of the Logios programme
Cenzura i terror **(Rozdz. 30: Między propagandą a rzeczywistością. W PRL)** Aby utrzymać się przy władzy, komuniści stosowali różne metody. Była już mowa o sfałszowanych wyborach w 1947 roku. W późniejszym czasie doszło do tego, że w wyborach mogli startować tylko komuniści i ich sojusznicy. W latach pięćdziesiątych – na wzór stalinowski – stosowano terror: aresztowano ludzi podejrzanych o działalność antykomunistyczną, umieszczano ich w więzieniach, gdzie byli bici i torturowani, skazywani na wieloletnie kary pozbawienia wolności albo na śmierć. The number of sentences: 4 The number of words: 66 The number of difficult words: 3 **The difficulty class of the text:** 4/ 7 The text slightly more difficult, understandable to secondary-school graduates or to people having much more life experience	**Cenzura i terror** **(Rozdz. 30: Między propagandą a rzeczywistością. W PRL)** Aby utrzymać się przy władzy, komuniści stosowali różne metody. Była już mowa o sfałszowanych wyborach w 1947 roku. W późniejszym czasie doszło do tego, że w wyborach mogli startować tylko komuniści i ich sojusznicy. W latach pięćdziesiątych – na wzór stalinowski – stosowano terror: aresztowano ludzi podejrzanych o działalność antykomunistyczną, umieszczano ich w więzieniach, gdzie byli bici i torturowani, skazywani na wieloletnie kary pozbawienia wolności albo na śmierć. **FOG for your text: 13–17 years of education** DIAGNOSIS: difficult language (university graduates)

Source: Part of the Chapter 30 from the textbook *Historia i społeczeństwo. Wspóln@historia. Klasa 6 podstawowa* (https://www.epodreczniki.pl/reader/c/223790/v/latest/t/student-canon).

Tab. 2. Analysis of the Jasnopis and Logios programms

Analysis of the Jasnopis programme (selected data)	Analysis of the Logios programme
Wprowadzenie **(Rozdz. 1: Reformy państwa w czasach Stanisława Augusta Poniatowskiego)** Na ulicach Warszawy, na placu Zamkowym panował nieprawdopodobny tłok. Tłumy mieszkańców miasta, które liczyło już wówczas około 100 tysięcy ludzi, cisnęły się przed wejściem do Zamku Królewskiego, zapełniały schody i korytarze zamkowe. Mimo, że ciepłe majowe popołudnie zachęcało raczej do odpoczynku i spacerów, jednak nikt ze zgromadzonych nie miał na to ochoty. Każdy chciał być teraz w zatłoczonej i wypełnionej po brzegi sali senatorskiej. Obradował w niej król, senat i posłowie. Tego dnia mieli podjąć decyzję o wprowadzeniu w Rzeczypospolitej nowego prawa – Konstytucji, która zmieni Polskę i Litwę. Po wielu latach słabości państwo polskie znów miało być sprawne i silne, mieć dużą armię i nie bać się agresji ze strony sąsiadów. Dlatego wśród tłumów panował prawdziwy entuzjazm. A na Zamku trwało odczytywanie Konstytucji. Punkt po punkcie czytał ją marszałek sejmu Stanisław Małachowski. Mimo ogromnego tłoku i ciasnoty nikt nie narzekał. Wszyscy uważnie wsłuchiwali się w tekst Konstytucji. Po jej odczytaniu król położył rękę na Piśmie Świętym i zaprzysiągł nowe prawo. Był 3 maj 1791 roku. The number of sentences: 14 The number of words: 165 The number of difficult words: 2 **The difficulty class of the text:** 3/ 7 Easy text, understandable for the average Pole	**Wprowadzenie** **(Rozdz. 1: Reformy państwa w czasach Stanisława Augusta Poniatowskiego)** Na ulicach Warszawy, na placu Zamkowym panował nieprawdopodobny tłok. Tłumy mieszkańców miasta, które liczyło już wówczas około 100 tysięcy ludzi, cisnęły się przed wejściem do Zamku Królewskiego, zapełniały schody i korytarze zamkowe. Mimo, że ciepłe majowe popołudnie zachęcało raczej do odpoczynku i spacerów, jednak nikt ze zgromadzonych nie miał na to ochoty. Każdy chciał być teraz w zatłoczonej i wypełnionej po brzegi sali senatorskiej. Obradował w niej król, senat i posłowie. Tego dnia mieli podjąć decyzję o wprowadzeniu w Rzeczypospolitej nowego prawa – Konstytucji, która zmieni Polskę i Litwę. Po wielu latach słabości państwo polskie znów miało być sprawne i silne, mieć dużą armię i nie bać się agresji ze strony sąsiadów. Dlatego wśród tłumów panował prawdziwy entuzjazm. A na Zamku trwało odczytywanie Konstytucji. Punkt po punkcie czytał ją marszałek sejmu Stanisław Małachowski. Mimo ogromnego tłoku i ciasnoty nikt nie narzekał. Wszyscy uważnie wsłuchiwali się w tekst Konstytucji. Po jej odczytaniu król położył rękę na Piśmie Świętym i zaprzysiągł nowe prawo. Był 3 maj 1791 roku. **FOG for your text: 9-10 years of education** DIAGNOSIS: język zalecany w komunikacji publicznej (standard plain language)

Source: Part of the Chapter 1 from the textbook *Historia i społeczeństwo. Wspóln@historia. Klasa 6 podstawowa* (https://www.epodreczniki.pl/reader/c/223790/v/latest/t/student-canon)

Tab. 3. Analysis of the Jasnopis and Logios programms

Analysis of the Jasnopis programme (selected data)	Analysis of the Logios programme
Główne wydarzenia z wojny-relacje prasowe (Rozdz. 27: Od Westerplatte do Hiroszimy. Druga wojna światowa na świecie) Wiosną 1940 roku Niemcy zaatakowały najpierw Danię i Norwegię, a następnie 10 maja – Belgię, Holandię, Francję i Luksemburg. Armia holenderska skapitulowała 14 maja, po czterech dniach walki, belgijska – 28 maja, po 18 dniach, francuska – 22 czerwca. Tak szybki postęp ofensywy niemieckiej możliwy był dzięki najnowszym zdobyczom techniki, zastosowanym w wojskach zmechanizowanych, lotnictwie, łączności. Taki sposób prowadzenia działań wojennych został nazwy wojną błyskawiczną (po niemiecku: Blitzkrieg). Po raz pierwszy zastosowały go Niemcy przeciwko Polsce w czasie kampanii wrześniowej. W sierpniu 1940 roku rozpoczęły się niemieckie bombardowania Wielkiej Brytanii – tzw. bitwa o Anglię. Miały one poprzedzić inwazję niemiecką na Wyspy Brytyjskie. Jednakże lotnictwo brytyjskie (z pomocą Polaków) stawiło czoła Niemcom, a do inwazji lądowej nigdy nie doszło. Niemal cztery lata później, 6 czerwca 1944 roku, w tak zwany D-Day, na plażach północnej Francji wylądował desant wojsk alianckich (głównie amerykańskich i brytyjskich). Rozpoczęły one nową fazę działań wojennych przeciw Niemcom. Stopniowo Niemcy byli wypierani z terenów Europy Zachodniej. 8 maja 1945 roku doszło do podpisania kapitulacji III Rzeszy. The number of sentences: 12 The number of words: 166 The number of difficult words: 4 **The difficulty class of the text:** 5/ 7 Text more difficult, understandable for educated people	**Główne wydarzenia z wojny-relacje prasowe (Rozdz. 27: Od Westerplatte do Hiroszimy. Druga wojna światowa na świecie)** Wiosną 1940 roku Niemcy zaatakowały najpierw Danię i Norwegię, a następnie 10 maja – Belgię, Holandię, Francję i Luksemburg. Armia holenderska skapitulowała 14 maja, po czterech dniach walki, belgijska – 28 maja, po 18 dniach, francuska – 22 czerwca. Tak szybki postęp ofensywy niemieckiej możliwy był dzięki najnowszym zdobyczom techniki, zastosowanym w wojskach zmechanizowanych, lotnictwie, łączności. Taki sposób prowadzenia działań wojennych został nazwy wojną błyskawiczną (po niemiecku: Blitzkrieg). Po raz pierwszy zastosowały go Niemcy przeciwko Polsce w czasie kampanii wrześniowej. W sierpniu 1940 roku rozpoczęły się niemieckie bombardowania Wielkiej Brytanii – tzw. bitwa o Anglię. Miały one poprzedzić inwazję niemiecką na Wyspy Brytyjskie. Jednakże lotnictwo brytyjskie (z pomocą Polaków) stawiło czoła Niemcom, a do inwazji lądowej nigdy nie doszło. Niemal cztery lata później, 6 czerwca 1944 roku, w tak zwany D-Day, na plażach północnej Francji wylądował desant wojsk alianckich (głównie amerykańskich i brytyjskich). Rozpoczęły one nową fazę działań wojennych przeciw Niemcom. Stopniowo Niemcy byli wypierani z terenów Europy Zachodniej. 8 maja 1945 roku doszło do podpisania kapitulacji III Rzeszy. **FOG for your text: 9-10 years of education** DIAGNOSIS: Language recommended in standard communication (standard plain language)

Source: Part of the Chapter 27 from the textbook *Historia i społeczeństwo. Wspóln@historia. Klasa 6 podstawowa* (https://www.epodreczniki.pl/reader/c/223790/v/latest/t/student-canon)

Tab. 4. Analysis of the Jasnopis and Logios programms

Analysis of the Jasnopis programme (selected data)	Analysis of the Logios programme
Galicja, czyli zabór austriacki (Rozdz. 6: Róbmy swoje. Postawy Polaków pod zaborami) W II połowie XIX wieku i na początku wieku XX najłatwiej żyło się Polakom w zaborze austriackim, gdzie cieszyli się dużą autonomią i mogli „robić swoje". Nie byli germanizowani jak dzieci we Wrześni ani rusyfikowani jak mieszkańcy zaboru rosyjskiego po upadku powstania styczniowego. Mieszkający tam Polacy wykorzystali tę sytuację, by rozwijać polską naukę, kulturę i sztukę. We Lwowie działał Uniwersytet Jana Kazimierza. W Krakowie – Uniwersytet Jagielloński. Uroczyście obchodzono rocznice ważnych wydarzeń z dziejów Polski, na które przybywali Polacy z pozostałych zaborów oraz z emigracji The number of sentences: 6 The number of words: 84 The number of difficult words: 3	**Galicja, czyli zabór austriacki (Rozdz. 6: Róbmy swoje. Postawy Polaków pod zaborami)** W II połowie XIX wieku i na początku wieku XX najłatwiej żyło się Polakom w zaborze austriackim, gdzie cieszyli się dużą autonomią i mogli „robić swoje". Nie byli germanizowani jak dzieci we Wrześni ani rusyfikowani jak mieszkańcy zaboru rosyjskiego po upadku powstania styczniowego. Mieszkający tam Polacy wykorzystali tę sytuację, by rozwijać polską naukę, kulturę i sztukę. We Lwowie działał Uniwersytet Jana Kazimierza. W Krakowie – Uniwersytet Jagielloński. Uroczyście obchodzono rocznice ważnych wydarzeń z dziejów Polski, na które przybywali Polacy z pozostałych zaborów oraz z emigracji
The difficulty class of the text: 4/ 7 The text slightly more difficult, understandable to secondary-school graduates or to people having much more life experience	**FOG for your text: 11-12 years of education** DIAGNOSIS: Language quite difficult

Source: Part of the Chapter 6 from the textbook *Historia i społeczeństwo. Wspóln@historia. Klasa 6 podstawowa* (https://www.epodreczniki.pl/reader/c/223790/v/latest/t/student-canon)

Tab. 5. Analysis of the Jasnopis and Logios programms

Analysis of the Jasnopis programme (selected data)	Analysis of the Logios programme
Kultura i etniczność **(Rozdz. 44: Współpraca i konflikt, czyli jak przeżyć wśród ludzi)** Ludzie czują się raźniej w grupie. Dotyczy to także dużych i wielkich grup społecznych. Odwołując się do wspólnej przeszłości, wartości, języka, modeli zachowań – to jest kultury – oraz terytorium i związanych z nimi wspólnych interesów politycznych tworzą wspólnoty etniczne. Od XIX w. funkcjonują one w ścisłym związku z istnieniem konkretnych państw i przekształcają w nowoczesne, powszechne narody. Grupy etniczne mają różną wielkość. Niektóre, jak Hindusi lub Chińczycy Han liczą po kilkaset milionów członków. Ale najmniejsze, jak lud Korowai z Papui liczą po kilkaset osób. Nie wszystkie grupy uznające się za narody miały lub mają swoje państwo. Nie wszystkie narody składają się tylko z jednej grupy etnicznej. Zarówno najbogatsze kraje świata (USA, kraje Unii Europejskiej), jak i najuboższe (środkowa Afryka) są zamieszkiwane przez społeczeństwa wieloetniczne. The number of sentences: 10 The number of words: 123 The number of difficult words: 1 **The difficulty class of the text:** 4/ 7 The text slightly more difficult, understandable to secondary-school graduates or to people having much more life experience	**Kultura i etniczność** **(Rozdz. 44: Współpraca i konflikt, czyli jak przeżyć wśród ludzi)** Ludzie czują się raźniej w grupie. Dotyczy to także dużych i wielkich grup społecznych. Odwołując się do wspólnej przeszłości, wartości, języka, modeli zachowań – to jest kultury – oraz terytorium i związanych z nimi wspólnych interesów politycznych tworzą wspólnoty etniczne. Od XIX w. funkcjonują one w ścisłym związku z istnieniem konkretnych państw i przekształcają w nowoczesne, powszechne narody. Grupy etniczne mają różną wielkość. Niektóre, jak Hindusi lub Chińczycy Han liczą po kilkaset milionów członków. Ale najmniejsze, jak lud Korowai z Papui liczą po kilkaset osób. Nie wszystkie grupy uznające się za narody miały lub mają swoje państwo. Nie wszystkie narody składają się tylko z jednej grupy etnicznej. Zarówno najbogatsze kraje świata (USA, kraje Unii Europejskiej), jak i najuboższe (środkowa Afryka) są zamieszkiwane przez społeczeństwa wieloetniczne. **FOG for your text: 9-10 years of education** DIAGNOSIS: Language recommended in standard communication (standard plain language)

Source: Part of the Chapter 44 from the textbook *Historia i społeczeństwo. Wspóln@historia. Klasa 6 podstawowa* (https://www.epodreczniki.pl/reader/c/223790/v/latest/t/student-canon)

Tab. 6. Interpretation of the statistics results of the Jasnopis programme

Classe	Descriptive labels	Approximately required reader's education
1	Text childishly easy	Primary school classes 1–3
2	Text is very easy	Primary school classes 3–6
3	Easy text, understandable to average Pole	Middle/intermediate school
4	Text slightly more difficult, understandable to secondary-school graduates or to people having a lot of life experience	Secondary/high school
5	Text more difficult, understandable to educated people	Licentiate/engineering studies
6	Text difficult to be received by an average Pole	Master's studies
7	Text very complicated, technical, its understanding may require some expertise	Doctorate or specialisation in the field which the text concerns

Source: http://www.jasnopis.pl/aplikacja

Tab. 7. Interpretation of the statistics results of the Jasnopis programme

Level of accessibility – primary school education	FOG 1–6
Level of accessibility – middle/intermediate school education	FOG 7–9
Level of accessibility – secondary/high school education	FOG 10–12
Level of accessibility – licentiate studies	FOG 13–15
Level of accessibility – master's studies	FOG 16–17
Level of accessibility – PhD studies	FOG 18–21
Doctorate required	FOG 22 and more

Source: http://www.logios.pl/result/8e63493d-425b-4537-b713-5e91e038e775

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Information readability of e-textbooks for history (on the example of Polish textbook for primary school, grade six)

Abstract

The article contains a description of the rules of the creation and development of a free electronic textbook for primary school in Poland. There is also a presentation of the results of a study on the comprehensibility of a textbook available on the www.epodreczniki.pl platform. The main goal of this work is to indicate if the text proposed to the students is clear and comprehensible for them; the range of readability is prepared with the use of the analyses made with the use of the Jasnopis and Logios programs. The source for the research was found in the data from studying randomly selected text fragments from the history textbook for the sixth grade, available online and processed in the selected computer programs, created for the reason of measuring the comprehensibility of the text in Polish. As a result of the research it was established that the readability of the texts included in the e-textbook *Historia i społeczeństwo. Wspóln@ historia. Klasa 6 podstawowa* (History and society. Common history. Sixth grade primary school) can be too difficult for the recipients aged 11–12, after five years of education in primary school. However, it was also established that there are no guidelines to construct an electronic textbook text complemented with various multimedia content, often replacing the very text in the book.

Keywords: multimedia textbook, information readability

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