The readability of abstracts in library and information science journals

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Abstract

Purpose – The purpose of the research was to find out if there are any differences in the readability score between abstracts published in scientific journals from library and information science with and without an impact factor. Therefore, the author made a comparison between the readability of abstracts from one journal with (Journal of Documentation) and one journal without (Knjižnica or Library) an impact factor.

Design/methodology/approach – As a measure of readability, the Flesch Reading Ease Readability Formula was used. Then, with the help of statistical experts, a comparison of the readability scores between the abstracts of two selected journals was performed.

Findings – The results showed that some statistically important differences exist between the abstracts published in the Journal of Documentation and Knjižnica. The statistically important differences were found in the number of words and sentences in abstracts and in the readability of abstracts included in the research. Therefore, it can be said that there exists a statistically important difference between abstracts with and without an impact factor.

Originality/value – The primary purpose was to find out whether there is a statistically important difference in the readability score of abstracts with and without an impact factor in the field of library and information science. Some similar research studies have been conducted in other scientific fields.

Keywords Abstracts, Scientific journals, Library and information science, Readability

Paper type Research paper

1. Introduction

Librarians and information scientists are college graduates who are able to read difficult texts. Interestingly, Gazni (2011) found that the articles of the five most-cited institutions with more difficult abstracts were cited more than articles with easier ones. Stremersch *et al.* (2007) from the field of marketing and Hartley *et al.* (2007) from the field of psychology examined the correlation between the number of times articles were cited and their readability and came to the same conclusion.

In our research, we wanted to see if there are any differences in the readability score between abstracts published in scientific journals from library and information science with and without impact factor. For users from Slovenia the data about impact factor are available through the COBISS system (shared catalog of Slovene libraries). JRC (Journal Citation Reports) is a factual database that contains records with data about the impact factor for major serial publications from world production. The impact factor is an important tool for evaluating journals according to citation data taken from more than 12,000 world-renowned scientific and professional journals. The JCR database is published annually by Clarivate Analytics from the USA in two editions: the JCR Science Edition (JCR SE) for the field of science and technology and the JCR Social Sciences Edition (JCR SSE) for the field of social sciences (JRC, 2022). The impact factor is

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also one of the ways to measure the scientific and professional successfulness of researchers and research groups according to the methodology of the Slovenian Research Agency.

We tried to calculate the readability of abstracts from two freely available scientific journals. The first was *Journal of Documentation* (ISSN 0022–0418, URL: https://www.emerald.com/insight/publication/issn/0022-0418), which was established in 1945. The journal impact factor for the year 2020 is 1.819. The second was *Knjižnica* (English: *Library*; ISSN 1581–7903, URL: https://knjiznica.zbds-zveza.si/knjiznica), which was established in 1957 by the Slovenian Library Association and publishes mostly Slovenian language articles, but also provides abstracts in English. The journal has no impact factor. Abstracts from both journals are published in structured form. The *Journal of Documentation* uses the structured form from issue 1 of volume 55 and the journal *Knjižnica* from issue 1 of volume 61 on. Both journals strive to publish the work of LIS professionals.

As we can read on the web page of *Knjižnica* (2022), the scientific journal publishes the latest findings and professional achievements in the fields of librarianship, information science, book studies and related sciences. *Knjižnica*'s mission is to contribute to the development of theory and practice and to raise the level of knowledge and professional skills of employees working in those fields. The journal publishes articles from Central, Southern-Eastern and Eastern Europe.

As stated on the web page of the *Journal of Documentation* (2022) the scientific journal publishes research papers with novel models or results in information-related disciplines. Particularly welcome are submissions exploring topics where concepts and models in library and information science overlap with cognate disciplines (for example psychology and cognitive science, the physical sciences, communication and media studies, museum studies, computer science, sociology, publishing).

If we want to research the readability of abstracts in scientific journals from library and information science with and without impact factor, we should at the beginning explain the term abstract. Lancaster (2003, p. 100) states that an abstract is brief but accurate representation of the contents of a document. For informative abstracts it is suggested (SIST ISO 214:1996, pp. 2–3) that the abstract states the purpose, methodology, results and conclusions presented in the original document.

In his commentary, Hartley (2016, p. 235) describes what is new in the abstracts of science articles. In addition to traditional, graphical and video abstracts, tweetable abstracts are becoming increasingly popular. According to Hartley (2016, p. 235), graphical abstracts are more difficult to understand, and one has to process a text beforehand in order to understand the graphic. Video abstracts (five minutes in length) allow authors to present their research in person to the reader and are usually created after a paper has been accepted for publication. These abstracts usually include a welcome introduction to the aims and findings of the paper that follows. Some journals now also require tweetable abstracts as well as traditional ones. Tweetable abstracts contain the essence of a study in 110–120 characters or less. Hartley (2016, 235) assumes that their aim is to facilitate the rapid dissemination of an article's contents to a wider audience.

However, as Hartley (2016, p. 235) writes, graphic, video and tweetable abstracts merely represent an addition to traditional abstracts. They are designed to draw attention to an article that is or will be published in a scientific journal. When they draw the attention of potential readers, the traditional abstract will be read, and readers will subsequently be able to decide whether or not to read the entire article.

(1) An example of a graphical abstract from the *International Journal of Pharmaceutics*: https://www.sciencedirect.com/science/article/abs/pii/S037851732030956X

(2) Examples of video abstracts from *New Journal of Physics*: https://www.youtube.com/user/NewJournalofPhysics

(3) Examples of tweetable abstracts from the *International Journal of Gynecology and Obstetrics*: https://twitter.com/ijgolive?lang=en

A traditional abstract can be published in structured or nonstructured form, and Hartley (2004, p. 368–389) describes the characteristics of structured abstracts compared to traditional ones. He summarizes these characteristics from all of the research studies on the topic known to him, most of which were based in a medical or psychological context. The results of his research showed that, compared with traditional abstracts, structured abstracts:

(1) contain more information (but not always);

(2) are easier to read and are easier to search (although some authors have questioned this);

(3) are possibly easier to recall;

(4) facilitate peer review for conference proceedings;

(5) usually take up more space;

(6) sometimes have confusing typographic layouts;

(7) may be prone to the same sorts of omissions and distortions that occur in traditional abstracts (Hartley, 2004, p. 368)

2. Theoretical points of departure and literature review

2.1 About readability formulas

The Flesch Reading Ease Readability Formula is one of the oldest and most frequently used readability formulas (Burke and Greenberg, 2010). According to the The Flesch Reading Ease Readability Formula (2022), this score is also considered to be "one of the oldest and most accurate". Many researchers have successfully used it in different areas, such as software engineering (Budgen *et al.*, 2008), medicine (Hall, 2006) and information science (Richardson, 1977; Lei and Yan, 2016; Gazni, 2011). The formula produces a score by assessing the average number of words per sentence and syllables per word. Its main weakness is that it assumes that longer sentences and words are more difficult to read. While this is generally true, it may not always be the case. For example, "information" is a long word, but we cannot say that it is hard to read, or that it is unknown, either in general or to LIS professionals.

The Flesch readability score can be calculated using a freely available readability calculator on the web, such as Readability Formulas (2022), created by Brian Scott. The Readability Formulas (2022) web page states that it was developed in 1948 by Rudolf Flesch:

Rudolf Flesch, an author, writing consultant and a supporter of the Plain English Movement, was raised in Austria. He studied law and earned a Ph.D. in English from Columbia University. Through his writings and speeches, Flesch advocated a return to phonics. In his article, *A New Readability Yardstick*, published in the *Journal of Applied Psychology* in 1948, Flesch proposed the Flesch Reading Ease Readability Formula. The Flesch Reading Ease Readability Formula is a simple approach to assess the grade-level of the reader. This formula is best used on school texts. It has since become a standard readability formula used by many US Government Agencies, including the US Department of Defense. Primarily, the formula was used to access the difficulty of a reading passage written in English [1].

The specific Flesch Reading Ease Readability Formula (The Flesch Reading Ease Readability Formula, 2022) is:

$$\mathrm{RE} = 206.835 - (1.015\,x\,\mathrm{ASL}) - (84.6\,x\,\mathrm{ASW})$$

According to the website, RE in the Flesch Reading Ease Readability Formula (The Flesch Reading Ease Readability Formula, 2022) refers to readability ease; ASL refers to the average sentence length (i.e. the number of the words divided by the number of sentences); and ASW refers to the average number of syllables per word (i.e. the number of syllables divided by the number of words). The output, denoted as RE, is a number ranging from 0 to 100. The higher the number, the easier text is to read. Scores between 90.0 and 100.0 are considered easily understandable by an average 5th grader. Scores between 60.0 and 70.0 are considered easily understood by 8th and 9th graders. Scores between 0.0 and 30.0 are considered to be easily understood by college graduates. According to the Flesch Reading Ease Formula, a better text should contain shorter sentences and words. A score between 60 and 70 is largely considered acceptable (90–100: very easy, 80–89: easy, 70–79: fairly easy, 60–69: standard, 50–59: fairly difficult, 30–49: difficult, 0–29: very confusing). In accordance with the Flesch Reading Ease Readability Formula, we should also emphasize that full stops, colons and semicolons serve as sentence delimiters, and that each group of continuous non-black characters with beginning and ending punctuation removed counts as a word. Finally, each vowel in a word is considered one syllable, but is subject to the following: "-es", "-ed" and "-e", (but not "-le") endings are ignored; words of three letters or shorter count as single syllables; and consecutive vowels count as one syllable.

Some of the other free readability formulas available on the Readability Formulas.com (2022) website are: the Flesch-Kincade Grade Level, the Fog Scale (the Gunning Fog Formula), the SMOG Index, the Coleman-Liau Index, the Automated Readability Index and the Linsear Write Formula. The Flesch-Kincaid formula includes the average sentence length and the average number of syllables per word. The Gunning Fog Formula includes the average sentence length and the percentage of hard words (words with more than three syllables). The SMOG readability formula counts the words with three or more syllables in each group of sentences, even if the same word appears more than once. Sentences are taken from the beginning, the middle and the end of the text. The Coleman-Liau Index takes into account the average number of words and the average number of sentences per 100 words. For the Automated Readability Index, the number of letters per word and number of words per sentence are important. Finally, the Linsear Write Readability Formula proposes using a 100-word sample of the writing. Words with two syllables or less and words with three syllables or more are counted.

As we can see, different formulas are used to determine the degree of readability. According to all the formulas, the most important are: the number of syllables, the length of sentences, word length, the number of easy words and the number of complex words. Therefore, when we start to write a text, we should take that into consideration.

2.2 Limitations of the readability formulas

The readability formulas have been criticized because their basic component is word length and not the comprehension of the meaning. Some words are long but we comprehend their meaning and some are short but we do not comprehend their meaning. That defect was moderated in some formulas with word frequency by creating lists of the most frequent words. However, these lists ignored recently developed words and words of some sociocultural groups even though they are frequently used. Also, the sentence length as the basic component of readability formulas has been criticized. Furthermore, readability formulas have been criticized for their heavy reliance on quantitative factors (vocabulary and syntax) and their disregard of qualitative factors (idea density and conceptual difficulty). The factors that are regarded as the most significant factors of the latter nature are background knowledge, reading fluency, motivation and engagement. Readability formulas have also been criticized because they are completely heedless of the interactive nature of the reading process and therefore do not correlate with the psycholinguistic model of reading. Some

studies have emphasized personal interest or the purpose of the reader as a potential source of comprehensibility. Given that the formulas are often criticized, even called unreliable and deceptive, that means that we can only focus on teacher or writer's personal decisions and regard them as the authority figure in determining text difficulty as well as taking measures to facilitate the process of reading and comprehension for students or readers. However, this is a very subjective and rather controversial approach (Pishghadam and Abbasnejad, 2016). Gazni (2011) also emphasizes that the readability formulas ignore the reader's prior knowledge, interest and motivation.

2.3 Statistical tests

Hayes (2021) explains that the *t*-test is a type of inferential statistic used to determine if there is a significant difference between the means of two groups which may be related in certain features. It is mostly used when data sets, such as the data set recorded as the outcome from flipping a coin 100 times, follow a normal distribution and may have unknown variances. The *t*-test is used as a hypothesis testing tool, which allows for the testing of an assumption applicable to a population, and it looks at the t-statistic, the t-distribution values and the degrees of freedom in order to determine statistical significance. According to Bartlett (2014) the two-sample *t*-test is one of the most used statistical procedures. The purpose of the *t*-test is to test the hypothesis that the means of two groups are the same. The variable in question is normally distributed in the two groups. When this assumption is in doubt, then the non-parametric Mann–Whitney test is suggested as an alternative to *t*-test. The Mann–Whitney test is a non-parametric test that aims to test the equality of two populations. It is used when we have two samples coming from two populations (The Concise Encyclopedia of Statistics, 2008).

Cankar and Bajec (2003, p. 97) state that the power of statistical tests depends on the sample size and the effect size is a statistical measure, that can, contrary to the statistical characteristics, overcome problems related to sample size.

We know the standardized differences between arithmetic means and measures of agreement. Measures of agreement include statistics showing the proportion of explained variance, for example R2, e2, h2 and w2. These are currently the most commonly cited measures of agreement, as computer statistical packages often calculate them in a routine report, but they are rarely interpreted (especially in terms of effect size), as researchers still mainly focus on interpreting statistical significance. Measures of agreement can be interpreted as the degree of agreement between the effect and the dependent variable. Standardized differences between arithmetic means reflect the distances between the arithmetic means of samples in units of a certain standard deviation. The best known among them are Hedges g coefficient, Glass Δ5 and Cohen d. All three are very similar, with the other two being more intended to research plans with a larger number of experimental groups. The Cohen d is calculated by dividing the difference of the arithmetic means with the total standard deviation calculated from the achievements in all samples together. When the research plan contains repeated measurements, we also take into account the correlation between the two measurements by calculating the effect size measure based on the *t* value obtained from the *t*-test. It should be emphasized that in this case high correlations between measurements can lead to overestimation of the effect size between samples. Among researchers, Cohen's d was the most established, perhaps because Cohen was the only statistician to provide guidelines for its interpretation. Values around 0.2 are expected to represent a small effect and values around 0.8 a large effect. These values can be interpreted in two ways. In the first method, we interpret on which percentile of the control group the arithmetic mean of the experimental group is located. At a Cohen d value of 0.2, this is at the 58th, at a value of 0.5 at the 69th and at a value of 0.8 at the 79th percentile. The percentiles in this case tell us what percentage of individuals in the control group is below the arithmetic

mean of the experimental group. In the second method, we explain how much of the distribution of the experimental group overlaps with the distribution of the results of the control group. Thus, at the value of Cohen d 0.2, we can find in the experimental group 92.3% of the same results as in the control group, at the value of 0.5 67% of the same results and at the value of 0.8 52.6% of the same results. From the point of view of these interpretations, we also talk about the practical importance of the size of the effect – an effect that leads to only a small overlap of distributions or large deviations of the arithmetic mean one from other is practically important, regardless of sample size (Cankar and Bajec, 2003, p. 102–104).

The reports of effect sizes are useful for three reasons.

(1) They allow researchers to present the magnitude of the reported effects in standardized metrics which can be understood regardless of the scale that was used to measure the dependent variable. That allows researchers to communicate the practical significance of their results instead of only reporting the statistical significance. That means that researchers are allowed to communicate the practical consequences of the findings for daily life instead of the likelihood of the pattern of the results observed in an experiment, given the assumption that there is no effect in the population.

(2) Effect sizes allow researchers to draw meta-analytic conclusions by comparing standardized effect sizes across studies.

(3) Effect sizes from previous studies can be used when planning a new study. *A priori* power analysis can provide an indication of the average sample size a study needs to observe statistically significant results with a desired likelihood (Lakens, 2013).

2.4 Literature review

The readability and readership of journals in library science was already tested 45 years ago (Richardson, 1977). The readability of abstracts from 15 major national journals in library science (*American Libraries*, *College and Research Libraries*, the *Journal of the American Society of Information Science*, the *Journal of Education for Librarianship*, the *Journal of Library Automation*, the *Journal of Library History*, *Library Journal*, *Library Quarterly*, *Library Trends*, *RQ*, the *School Library Journal*, *School Media Quarterly*, *Special Libraries*, *Top of the News* and the *Wilson Library Bulletin*) was measured with the Flesch Reading Ease Readability Formula. The results indicated that they were difficult to read, and that, in general, they were comparable to academic or scholarly journals. The results also showed that a connection did in fact exist between readability and readership.

The study of Lei and Yan (2016) included four journals from information science from 2003 to 2012 (*Scientometrics*, the *Journal of Informetrics*, *Research Policy* and *Research Evaluation*). The results showed that the abstracts were very difficult to read in terms of readability indices, such as the Flesch Reading Ease Readability Formula and SMOG. The results also showed that the readability of abstracts remained stable across time. However, that does not mean that academic writers should not pay any attention to the readability issue.

In contrast to Lei and Yan (2016), Plaven *et al.* (2017) showed that the readability of the science literature was steadily decreasing. In their study, 709,577 abstracts from 123 scientific journals published between 1981 and 2015 were analyzed. This trend is indicative of the growing use of general scientific jargon and is not encouraging, neither for scientists nor for the wider public. Plaven *et al.* (2017) used Flesch Reading Ease and the New Dale-Chall Readability Formula to measure readability. The results of the mentioned research were also confirmed by Graf-Vlachy (2021) that replicated the research in the field of management and organization.

Above-mentioned studies related to the readability of abstracts from the field of library and information science used Flesch Reading Ease Readability Formula as at least one of measures for readability.

The results of the studies mentioned below showed that the readability of structured abstracts in the field of software engineering and educational psychology was higher than the readability of traditional abstracts.

The results of the study presented by Budgen *et al.* (2008) showed that structured abstracts from software engineering can, in comparison with traditional abstracts, improve both information content and readability. The structured versions of the abstracts for a random selection of 25 papers described software engineering experiments. Sixty-four participants were each presented with one abstract in its original unstructured form and one in a structured form and were asked to assess their clarity and completeness. The results of the study were consistent with the results from other disciplines. Namely, Budgen *et al.* (2008) report that structured abstracts also improve readability in the field of educational psychology.

Kitchenham *et al.* (2008) researched abstracts from software engineering as well. The abstracts were obtained by looking at the empirical conference papers from the Evaluation and Assessment in Software Engineering Conference (EASE04 and EASE06) which did not have a structured abstract (23 in total). Two novice researchers created structured versions of the abstracts, which were used to extract length in words and readability in terms of the Flesch index and the automated readability index (ARI) for both the structured and unstructured abstracts. The structured abstracts were on average 142.5 words longer than the unstructured abstracts. The readability of the structured abstracts was 8.5 points higher according to the Flesch index and 1.8 points higher according to the ARI. Therefore, the abstracts had a higher level of readability and were longer, which is in accordance with the characteristics of structured abstracts as presented by Hartley (2004, p. 368–389).

The study that questioned the accessibility of research for broader audience over time (in this case, patients) was presented by Severance and Cohen (2015), who analyzed the readability of medical research journal abstracts. The medical journal abstracts were downloaded from PubMed.org in 10-year batches starting with 1960 and finishing with the 2000s. In order to determine the readability score, the Coleman-Liau Index (CLI) was used. According to the CLI score, the results indicated an increase in difficulty of 0.7804 grade levels within the timespan examined. Thus, the task of patients attempting to learn more about their medical conditions or treatment options through primary literature has become more difficult. However, research conducted by Stricker *et al.* (2020, p. 1) in psychology indicates that the solution to this problem lies in plain language summaries (PLS). The above authors explain that PLSs are "abstracts of peer-reviewed journal articles that aim to explain the rationale, methods, findings, and interpretation of a scientific study to non-expert audiences using non-technical language." The above-mentioned research compared the readability (e.g. word difficulty, sentence length, etc.) of 103 abstracts from two peer-reviewed psychology journals (*Archives of Scientific Psychology* and the *Journal of Social and Political Psychology*). In the study the PLS and corresponding scientific abstract were compared. The results revealed that PLSs were easier to read than scientific abstracts. To compare the readability of scientific abstracts and the PLSs, the SMOG Index was used.

Finally, we would like to present the study of Yeung *et al.* (2018), which researched the 100 most-cited articles from neuroimaging. The readability of the trimmed abstracts and full text was evaluated against the number of authors, the country of the corresponding author, the total citation count, the normalized citation count, the article type, the publication year, the impact factor of the year it was published and the type of journal. The results showed that the experimental articles and methodology papers were more readable than the review or meta-analysis papers. Also, the articles published in journals with a higher impact factor were less readable, and the texts of the articles were significantly more readable than the abstracts. This supports the idea that the readability of abstracts should be investigated.

3. Research design

A total of 120 abstracts were analyzed in our study: 60 from the *Journal of Documentation* and 60 from *Knjižnica*. From the *Journal of Documentation* the abstracts were selected from Vol. 77, No. 6 to Vol. 77, No. 1. Volume 77 of the journal was published in 2021. From the journal *Knjižnica* the abstracts were selected from Vol. 64, No. 3–4 to Vol. 60, No. 2–3. Volumes 60 to 64 were published between 2016 and 2020. Number 3–4, Vol. 64 for the 2020 was the last published number when we started the research. The abstracts were selected from the last published number down. In the selected volumes and numbers from the journal *Knjižnica* some of the abstracts were published in unstructured form. To achieve the equal comparison of the abstracts from the journals unstructured abstracts were excluded from the research. The research was conducted in February and April 2022.

3.1 Methodology

As a measure of readability, the Flesch Reading Ease Readability Formula was used for two reasons. The first reason is that according to The Flesch Reading Ease Readability Formula (2022), this score is also considered to be "one of the oldest and most accurate". The second reason is that many researchers have successfully used it in library and information science (Gazni, 2011), as was already described in Chapter 2.4. As already mentioned, the Flesch readability score can be calculated using a freely available online readability calculator (Readability Formulas, 2022).

Furthermore, with the help of statistical experts a comparison of the data between the two selected journals was conducted. We tried to ascertain whether there exists a statistically important difference between the selected scientific journals from library and information science as far as the average number of words, average number of sentences, average number of words per sentence in the abstracts and readability of abstracts are concerned. However, our primary goal was to find out whether there are any differences in readability.

Therefore, the research question was:

RQ: Are there any statistically important differences in the readability score between the abstracts published in scientific journals from library and information science with or without an impact factor?

4. Results and discussion

In Table 1 the average number of words, sentences, number of words per sentence and readability score for abstracts included in the research from the scientific journals *Journal of Documentation* and *Knjižnica* are presented.

For the statistical comparison between the number of words, number of sentences and number of words per sentence in the abstracts from the *Journal of Documentation* and

Abstracts (JDoc and K)	JDoc		*K*
Average number of words	248.58		271.82
		260.20	
Average number of sentences	10.05		11.20
		10.62	
Average number of words per sentence	25.39		25.03
		25.21	
Overall median readability score	14.74		19.80
		17.27	

Table 1.
The indices of readability of abstracts from the *Journal of Documentation* (JDoc) and *Knjižnica* (K)

Knjižnica included in the research, the Mann–Whitney U test was used. p value of 0.05 or lower is generally considered statistically important.

The results showed that in the number of words ($U = 1363.00$, $p = 0.022$) and in the number of sentences ($U = 1344.50$, $p = 0.016$) in the abstract statistically important differences exist between the scientific journals. The effect size in the case of the number of words (Cohen $d = 0.295$) and sentences (Cohen $d = 0.356$) between the abstracts from the *Journal of Documentation* and *Knjižnica* included in the research is small. Abstracts from *Knjižnica* include more sentences and words than abstracts from the *Journal of Documentation*. Abstracts from the *Journal of Documentation* contain on average approximately 249 words and 10 sentences per abstract. Abstracts from *Knjižnica* contain approximately 271 words and 11 sentences per abstract.

However, there exists no statistically important difference between the number of words per sentence ($U = 1748.00$, $p = 0.785$) between the abstracts from the *Journal of Documentation* and *Knjižnica* included in the research. The effect size is very small (Cohen $d = 0.067$). The abstracts from the *Journal of Documentation* and *Knjižnica* contain on average approximately 25 words per sentence.

And now about the readability of abstracts. The result of the t-test for independent samples ($t = 2.311$, df $= 118.00$, $p = 0.023$) showed that there exists a statistically important difference between the readability of abstracts from the *Journal of Documentation* and *Knjižnica* included in the research. p value of 0.05 or lower is generally considered statistically important. The effect size is small (Cohen $d = 0.422$). The abstracts from the *Journal of Documentation* and from *Knjižnica* both fall into the very confusing group (readability score 0–30). That means that they are difficult to read and easily understood by university graduates. The readability score is in accordance with the skills of librarians and information scientists for whom the selected scientific journals are intended. The abstracts from the *Journal of Documentation* included in the research are statistically heavier to read than abstracts from *Knjižnica* included in the research. That means that abstracts from scientific journals from library and information science with an impact factor are heavier to read than abstracts from scientific journals from library and information science that have no impact factor.

Our results from the field of library and information science are in accordance with the results of Gazni (2011), Stremersch *et al.* (2007), Hartley *et al.* (2007) and Yeung *et al.* (2018) from other fields of science.

5. Conclusions

The results showed that there exist some statistically important differences between the abstracts published in the *Journal of Documentation* and *Knjižnica*. The statistically important differences were found in the number of words and sentences in abstracts and in the readability of abstracts included in our research. According to the results, we can answer our research question. There exist statistically important differences in readability score of abstracts published in scientific journals from library and information science with or without an impact factor. Because of the correlation with citation and the impact factor, we can also confirm the results of Gazni (2011) that articles with heavier abstracts are more cited.

As we already mentioned, the main weakness of The Flesch Reading Ease Readability Formula (2022) is that it assumes that longer sentences and words are more difficult to read. However, our results showed that abstracts from *Knjižnica* (with on average more words and sentences per abstract) achieved better readability scores than abstracts from the *Journal of Documentation* (with on average less words and sentences per abstract). However, we must emphasize that syllables per word are also included in the formula.

At the end, we would like to emphasize the statement of Pinto *et al.* (2008, p. 802): "Nowadays, the dramatic growth in the number of documents and the time pressure we all suffer have made abstracting more important than ever." Therefore, the research work regarding the abstracts should continue also in the future. Future research related to the readability of abstracts in library and information science could be focused on differences in the readability scores between abstracts published in native and non-native language. We are looking forward to new research studies.

Note

1. https://readabilityformulas.com/flesch-reading-ease-readability-formula.php, retrieved on 1 April 2022

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