Usage of Digitised Scientific Resources in Educational Institutions

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Abstract. Over the years studies of scientific publications were on the rise and controlling their content and references was almost impossible. With the provision of platforms like Scopus, Web of Science, and other science databases, this became much easier due to indexation and citation mechanisms incorporated in these databases. In the paper is made an overview of some popular scientific databases. The accessibility of the platforms to people with visual disabilities is investigated. Also, results from scientific research about application of scientific resources and databases in Kosovo's education institutions are presented.
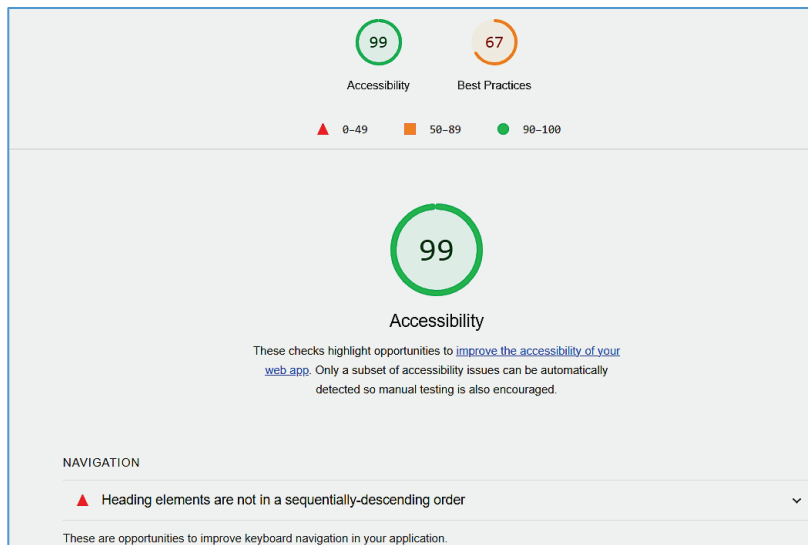
Keywords: Scientific Resources, Scientific Metrics, Scientific Platforms, Accessibility, Education.
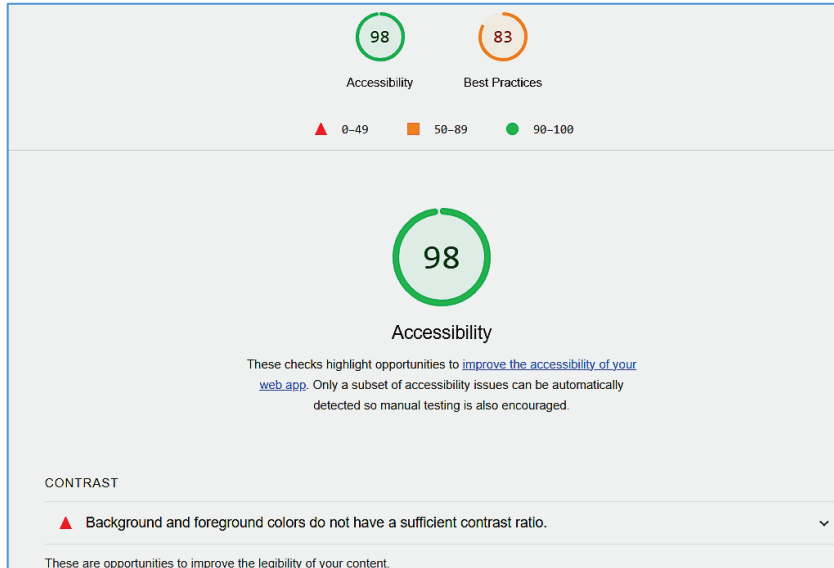
1   Introduction

Nowadays, most educational institutions, organizations or enterprises rely on Information and Communication Technology (ICT) (Bingimlas, 2009). The use of Scientific Resources and Databases (SRD) would further develop the effective learning process with modern technologies (Scrimshaw, 2004), (Georgieva-Tsaneva & Serbezova, 2022). Scopus and Web of Science (WoS) are currently the most popular indexing databases (Mongeon & Paul-Hus, 2016), (Stahlschmidt & Stephen, 2020). Scopus contains about 77.8 million articles from over 23,400 journals, 290 commercial journals, and 850 book series as of January 2020, including over 9.8 million conference papers and 44 million copyrights (Burnham, 2006). Scopus and Web of Science and their applications in educational process are investigated in many research articles (Tavukcu, et al., 2020), (Genc et al., 2019), (Genc et al., 2020), (Pranckutė, 2021). An important research topic is accessibility to scientific resources for people with visual disabilities (Barreto & Hollier, 2019). In Section 2 are presented tests about some popular SRD accessibility to people with visual disabilities. In Section 3 is presented research about the current status of the Kosovo scientific community in SRD and the usage and impact of scientific resources in Kosovo educational system. In Section 4 are discussed results from the conducted survey and its statistical significance.

2　Accessibility of Scientific Resources and Databases

Automated accessibility testing reduces the time required to perform the tests as it is done by machine using presets criteria by standard, the scope of which can be selected by version of the standard and level of compatibility. In the study is considered the Lighthouse software testing tool (Lighthouse, n.d.). Different tools offer a different set of tests as well as a different interface but are selected to provide accessibility for use with a screen reader. In their use will be considered and the scope of the questionnaire, considering those valid for the specific user round criteria. This necessitates the need for additional verification and validation of the results of a person who knows how to use a screen reader and can judge the correctness of the submitted information. The results of the automated testing provide orientation in determination of the main accessibility problem points that should be improved in order to meet web content accessibility standards, but additionally testing by visually impaired people is also necessary as the software does not detect all important accessibility issues of sites, their functionality and usability. Lighthouse is an open-source, automated tool for improving the performance, quality, and correctness of your web apps. It could be used to test the site about several criteria: Performance, Accessibility, Best practices and Search Engine Optimization (SEO). On Figure 1 and Figure 2 are presented results of automation testing of SCOPUS and Web of Science portals using Lighthouse software.

Fig. 1. Accessibility of SCOPUS platform.

Fig. 2. Accessibility of Web of Science platform.

From the results it could be concluded that both scientific portals are well optimized to the latest web accessibility standards with the score of 99% and 98% respectively. Also, both platforms have a good score about Best programming practice usage which is also an important factor related to accessibility. There are some common recommendations about accessibility improvements like sequentially-descending order of heading elements and usage of colors without a sufficient contrast ratio.

3   Kosovo Scientific and Educational Institutions in SRD

3.1   Ranking of Educational Institutions in SRD

Kosovo presently has 31 institutes of academic education. Seven of the overall number have positioned as public universities and 24 of them are private institutions. Kosovo invests the least in the area on research and scientific activity compared to all the countries in the region (Kaçaniku, Rraci, & Bajrami, 2018). Based on (Saqipi & Tahirsylaj, 2018), the authors used key word "Kosovo education" in twelve prominent science databases worldwide, where total was 161 reaches spread throughout the following databases: DOAJ (15), EBSCO (8), ERIC (61), JSTOR (5), ProQuest Dissertation and Theses Database (2), SAGE Journals Online (4), Science Direct (4), Scopus (10), Springer Link (36), Taylor & Francis (12), Web of Science (1), and Wiley Online Library (3). Additionally, including Google Scholar as a search engine with a total of 330 findings with the key word. In 2022 a total of 374 scientists from 14 universities appear as shown on the Figure 3 (AD Scientific Index, World Scientist and University Rankings, Alper-Doger Scientific Index, 2022). The scientists' data is sorted by H-index, then followed

by i10 index, and the number of citations, for each of these three parts, are divided in Total, last 5 years and last 5 year/total.

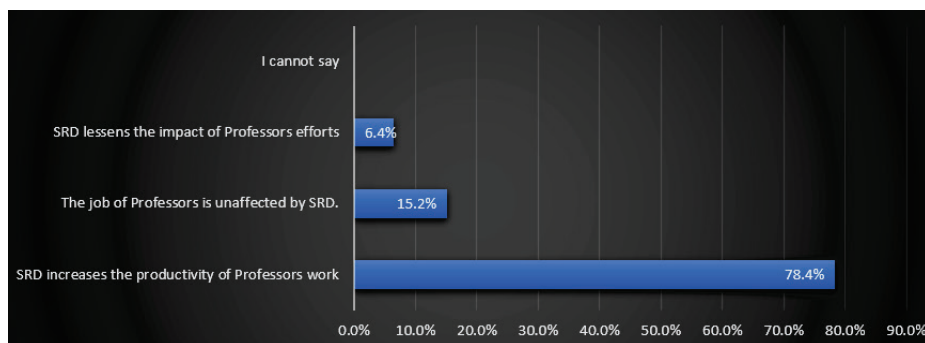| University	Country	Region	World	Name	Country	University	Subject	H INDEX			i10 INDEX			CITATION		
								Total	Last 5 year	Last 5 year/total	Total	Last 5 year	Last 5 year/total	Total	Last 5 year	Last 5 year/total
1	1	18317	54996	Dragan Popović	Kosovo	University of Prishtina- Kosovska Mitrovica	Social Sciences / Psychology / Psihologjia | kompjuterska statistika | motorna kontrola | metodologjia | borilački sportovi |	51	27	0.529	179	85	0.475	8758	2944	0.336
1	2	35321	101431	Bajram Berisha	Kosovo	University of Prishtina	Prishtina / Reproduction | genetics and biotechnology |	40	22	0.550	68	49	0.721	4749	1339	0.282
2	3	62034	174461	Mentor Sopjani	Kosovo	University of Prishtina	Natural Sciences / Molecular Biology & Genetics / Cell and molecular biology | molecular physiology | biochemistry | genetics |	31	16	0.516	58	32	0.552	2203	801	0.364
3	4	66141	185638	Gani Bajraktari	Kosovo	University of Prishtina	Medical and Health Sciences / Cardiology / Cardiology | Echocardiography | Invasive Cardiology | Heart Failure |	29	23	0.793	64	49	0.766	66455	64248	0.967
4	5	80177	224049	Avni Berisha	Kosovo	University of Prishtina	Prishtina / Surface modification | DFT | Monte Carlo | Molecular Dynamic | Corrosion |	27	26	0.963	46	44	0.957	2041	1977	0.969
1	6	92381	257521	Shpend Elezi *	Kosovo	AAB College	Medical and Health Sciences / Internal Medicine / Cardiology |	24	15	0.625	38	20	0.526	10329	6070	0.588
5	7	92603	258370	Fetah I. Podvorica	Kosovo	University of Prishtina	Engineering & Technology / Chemical Engineering / Electrochemistry | Chemistry of materials |	24	20	0.833	34	29	0.853	4922	2034	0.413
1	8	104979	292705	Naim Shabani	Kosovo	AAB University	Medicine |	23	10	0.435	35	10	0.286	1566	352	0.225
6	9	118625	331709	Avni Hajdari	Kosovo	University of Prishtina	Natural Sciences / Biological Science / botany | plant ecology | medicinal and aromatic plants | phytochemistry | nature protection |	21	20	0.952	34	31	0.912	1563	1195	0.765
7	10	119208	333295	Behxhet Mustafa	Kosovo	University of Prishtina	Natural Sciences / Biological Science / botany | plant ecology | ethnobotany | nature protection |	21	20	0.952	31	26	0.839	1493	1113	0.745

Fig. 3. Kosovo Scientist and University Rankings.

3.2 Usage and Impact of Scientific Resources

For the purpose of the research a questionnaire has been developed. The subject of the survey is the usage of SRD in teachers' profession or in education. It is divided into 3 sections: **Section 1**: Description for the questionnaire, **Section 2**: General Information, **Section 3**: Specialized questions. The number of participants in the survey is 172 where 101 of respondents are men, and 70 of participants are women. There are a total of 14 questions in in the questionnaire and most of the answers were of type 1 to 5 scale, except for 3 questions that were from scale 1 to 3. Distribution by age is: 2.3% are under 24 years, 11.6% are 25 to 34 years, 37.2% are between 35 to 44 years, 36% are between 45 and 54 years and 12.8% are older than 55. Respondents are distributed in the following cities: Prishtine, Gjilan, Mitrovice, Gjakove, Peje and Ferizaj. 87 of the respondents are working in the university, 52 in high school and 33 on the other educational levels. About the qualification of the respondents there are 55.8% with PhD or higher level, 37.8% are master's degree and 6.4% are bachelor's degree. Considering answers to the question which of the scientific resources and databases do you use most it appears that: 43.9% are Scopus, 23.2% WoS, 11% Eric, 9.8% IEEE, 4.9% Research Gate, and the others were in a small percentage for Taylor and Francis, Google Scholar and Academia. Also, the respondents are asked to determine how much access or opportunity to use scientific resources and databases throughout their study is provided by their educational institution, and 109 of respondents think "Very", 52 of respondents answered with "Moderately", and 11 answered "Slightly". These results shows a relatively good access to scientific resources in everyday work. More results and conclusions from the survey are presented in the next section.

4   Results

On Figure 4 is shown that many participants or 78.4% indicated that SRD is assisting in increasing the productivity of their activity. 6.4% of respondents said they were unable to predict how SRD may influence their work, indicating that they lacked sufficient expertise in bringing SRD into the classroom. The suggestion would be to compile all previously created digital instructional resources into a collection that instructors may utilize in their regular work.

Fig. 4. SRD influence on academic work.

When it comes to usability the results show that 6.04% of respondents use SRD for more than 10 years, 41.76% of them use SRD for less than 5 years and as a completion 52.20% of respondents use SRD from 5 to 10 years as shown on Figure 5. The same chart also includes some combined results from the questionnaire: access/opportunity offered by educational institution; SRD and successful learning; SRD effects on academic work; and usage of SRD.
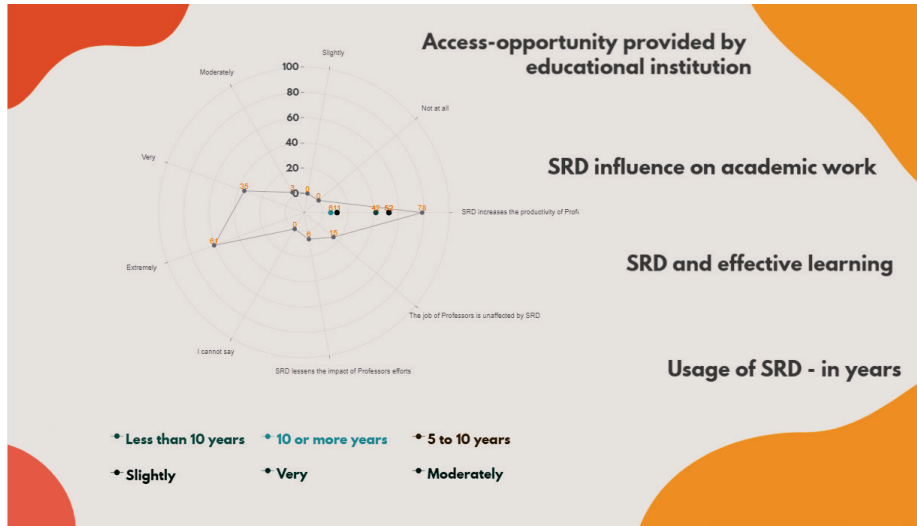
Fig. 5. Combined data from survey.

The results received from a survey made in Google Forms are converted to a Microsoft Excel file and then imported to the statistical analysis program SPSS (Hinton, McMurray, & Brownlow, 2004). The objective of Explanatory factor analysis (EFA) analysis is to determine the link between variables. The use of the Kaiser-Meyer-Olkin (KMO) method demonstrates if the data are suitable for analysis. Since the Kaiser-Meyer-Olkin (KMO) is .628, that is greater than 0.5. and Bartlett's Test of Sphericity is $p<0.001$, it indicates that there are connections between the considered parameters. During the statistical analysis the nine most significant variables are denoted with letters from A to I, followed by the questions' numbers. Questions concerning the duration of utilizing SRD at work/school concern factors A and E. Variables B, C, and D relate to using and influencing SRD for personal usage, students' learning, and educators' work. Variable F and G covers questions about access to SRD from educational institutions and frequency of application of SRD in educational process. Variables H and I are related to questions about SRD support to efficient learning and teachers' educational efforts. In Table 1 is presented some descriptive statistics. The total of participants in this study, which is shown in column N, was 172. Mean values are used to calculate the data group average. The sample size, data normality, multicollinearity, autocorrelation, homoscedasticity, and outliers are examined to check if the requirements of regression are met.

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Table 1. Descriptive statistics.

	N	Range	Minimum	Maximum	Mean		Std .Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std .Error	Statistic	Statistic	Statistic	Std .Error	Statistic	Std Error
A123	172	2	1	3	2.21	.055	.727	.529	-344	.185	-1.049	.368
B1234	172	3	1	4	2.56	.094	1.229	1.511	.061	.185	-1.621	.368
C1234	172	3	1	4	2.32	.088	1.148	1.318	.403	.185	-1.272	.368
D1234	172	3	1	4	3.24	.073	.953	.908	-.618	.185	-1.336	.368
E12345	172	4	1	5	4.29	.063	.822	.675	-1.353	.185	2.709	.368
F12345	172	4	1	5	4.58	.051	.666	.444	-1.925	.185	5.195	.368
G12345	171	4	1	5	4.27	.070	.914	.836	-1.602	.186	2.842	.369
H12345	172	4	1	5	4.49	.060	.784	.614	-2.212	.185	6.417	.368
I12345	172	4	1	5	4.57	.064	.845	.714	-2.632	.185	7.415	.368
Valid N (listwise)	171											

The regression analysis was provided using the stepwise technique presented in Table 2, which implies that only the variables that were chosen are shown in the data set.

Table 2. Coefficients (Dependent variable: A123).

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std . Error	Beta	t	Sig .
1 (Constant)	2.238	.594		3.769	.000
C1234	.066	.050	.105	1.338	.183
E12345	.050	.076	.056	.660	.510
G12345	.064	.067	.080	.951	.343

As it could be seen, the determinant C which relates to the effectiveness, usability, and impact of SRD usage for educational purposes, and professional work, leads as the most significant variable, followed by the other two variables E which involves the duration of usage SRD at work or school and variable G which is related to teachers' frequency of usage of SRD in classes. Thus, it could be concluded that the influence of SRD use on students' learning is important factor in addition with the time of using SRD in the workplace and with the frequency of using SRD by the educator in the courses.

The number of cases with valid usability, effectiveness, educational level, and age parameters is shown in the Case Processing Summary (Table 3). According to the results it is proved the data are valid, and none of them is excluded. Hence it follows, regarding the different age groups of the participants, the two middle classes from 35-44 and 45-54 years, have a much greater tendency to use SRD than the other ages. While at the education level a greater percentage of interest or use of SRD could be

noticed at the University level than other lower levels. It also could be concluded that there is an inclination between age and education levels to effective-ness of SRD. Finally, all these analyses prove that the assertions made in the current research are clear and applicable.

Table 3. Effectiveness of SRD according to educational level and age.

		Count	Marginal Percentage
Educational level	Elementary School	33	19.19 %
	High School	52	30.23 %
	University	87	50.58 %
Use of SRD effectiveness based on educational level		172	100.0 %
B1234	1	43	25.0 %
	2	54	31.4 %
	3	10	5.8 %
	4	65	37.8 %
Age	18-24	4	2.3 %
	25-34	20	11.6 %
	35-44	64	37.2 %
	45-54	62	36.0 %
	55 years or above	22	12.8 %
Valid		172	100.0 %
Excluded		0	
Total		172	

5 Conclusions

In the study is performed research related to evaluation and influence of Scopus and Web of Science on the scientific and educational process. An overview of some the most popular indexing databases is presented and their accessibility to visually impaired people is investigated. In the paper are also presented and analyzed results from performed questionnaire with academic community in Kosovo. As a conclusion statistic confirms that SRD increases larger performance through more motivated researchers and higher learning results.

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