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Digital Literacy, Education and Employment Status: Evidence from Bosnia and Herzegovina

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Abstract

At time when digitalization processes are happening faster than ever all around the world, it is not surprising that importance of digital literacy is on the same level as basic literacy. During the COVID-19 pandemic, we witness that the importance of digital literacy is more important than ever before. In this "new normal", people all around the world are going through a process of change. This study aims to investigate if digital literacy depends on employment status and education level of people in Bosnia and Herzegovina (B&H). Using structured survey as a measurement instrument, the data has been collected from 210 respondents, residents of Bosnia and Herzegovina. The validity and reliability of measurement instrument was confirmed through Exploratory Factor Analysis and Cronbach's alpha values. To find out about differences in digital literacy of employed and unemployed respondents, Mann-Whitney U test has been performed in SPSS. To understand differences in digital literacy because of different education levels, the Kruskal-Wallis H test has been performed in SPSS. Results revealed that difference in digital literacy of employed and unemployed respondents is statistically insignificant. On the other hand, differences in digital literacy at different education levels are found to be statistically significant.

Keywords: digital literacy, COVID-19, Bosnia and Herzegovina.

1. Introduction

In the 1990s, a person who possessed basic reading, writing and computing skills was called literate. In recent years, wider range of literacy needs to be created, such as information literacy, media literacy, creative literacy, visual literacy, financial literacy, digital literacy etc. Success in the 21st century includes mastering the expertise of science, technology, and society, as well as a comprehensive interpretation of information in all its aspects.

Digital literacy is a modern form of literacy that is required for society daily. It is not about how social media functions (Facebook, Instagram, LinkedIn, etc. how contact networks operate (WhatsApp, Viber, etc.) or how to listen to music or view videos (YouTube, Vimeo, Spotify), it's all about devices, Internet knowledge, skills and choices. Unfortunately, it is during COVID-19 virus pandemic that we realize the extreme importance of digital literacy. As the pandemic started raging across the globe we turned to digital technologies. Education, shopping, banking, health, overnight turned virtual which became the new normal and continues to be so. From working to studying, or even socializing, most of us are living a virtual life in more ways than

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we might have ever imagined before. With the growing value of technology in society, digital literacy is being recognized as the most important platform for lifelong learning (Lynch, 2017).

Digital Global reported that Internet penetration in Bosnia and Herzegovina was 72 percent – 2.35 million B&H residents are connected to the Internet, which is only slightly lower than the average in southern Europe of 77 percent. The penetration of mobile internet is 105 percent, which means that in Bosnia and Herzegovina the number of subscriptions to mobile internet is higher than number of inhabitants. Citizens of Bosnia and Herzegovina are also active users of social networks with 1.7 million (53 percent) users (Global, 2020).

This study starts with proposition of following research questions:

RQ1: What is the level of digital literacy of citizens in B&H?

RQ2: Is there a difference in digital literacy of citizens in B&H considering employment status of citizens in B&H?

RQ3: Is there a difference in digital literacy of citizens in B&H considering education level of citizens in B&H?

In the upcoming sections, relevant literature review will be presented, research questions and hypotheses proposed and tested.

2. Literature review

2.1 *Digital Literacy*

Digital literacy means using and becoming aware of technological communication, technologies while using them, learning from accurate and useful information, and generating accurate and useful information in the digital world. The human world is driven and transformed by technology. The world will have new qualities in most human functions, spheres, and activities. People can interact from any part of the world through technology that gives access to all sorts of knowledge and communication. To do that, being digitally literate is essential (Wardynski, 2019).

2.1.1 *Definition of digital literacy*

The concept of digital literacy was first used by Paul Gilster in his book "Digital literacy" from 1997. He said that digital literacy is the ability to understand information, to evaluate and integrate information in multiple formats that the computer can deliver. "Being able to evaluate and interpret information is critical because you can't understand information you find on the Internet without evaluating its sources and placing it in context" (Gilster, 1997). A broad definition of digital literacy is given by Allan Martin: digital literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process (Allan & Madigan, 2018).

Bawden (2008) notes that digital literacy touches on and includes many things that it does not claim to own. It encompasses the presentation of information, without subsuming creative writing and visualization. It encompasses the evaluation of information, without claiming systematic reviewing and meta-analysis as its own. It includes organization of information but lays no claim to the construction and operation of terminologies, taxonomies, and thesauri.

"Digital literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills" is one of definitions given by American Library Association (ALA, 2016).

Digital literacy encompasses the skills and abilities necessary for access once the technology is available, including a necessary understanding of the language and component hardware and software required to successfully navigate the technology (Jaeger, Bertot, Thompson, Katz & DeCoster, 2012).

From a pragmatic point of view, digital literacy is the set of skills, knowledge and attitudes required to access digital information effectively, efficiently, and ethically. It includes knowing how to evaluate digital information and how to use it in decision-making (Julien, 2015).

2.1.2 *Importance of digital literacy*

In the literature, the "literacy" word is used as "competence" or "skill". Literacy types which were discussed throughout the development of digital technologies are called as "new literacies". New literacies are a relatively new concept in the literature. In comparison, the definition of literacy holds a social standing such as having essential abilities to understand, use, operationalize something. There are numerous of new literacies that are a subset of digital literacy such as information, media, visual, ICT (Coskun, 2020).

The Certiport – IC3 Digital Literacy suite of products includes solutions that range from assessment to certification. With learning and practice solutions, assessment tools, and certifications specifically designed for a variety of ages and occupations, the IC3 Digital Literacy program is simply the best way to ensure that students and employees are prepared to succeed in a technology-based world (Certiport, 2020).

2.1.3 *Digital literacy in Bosnia and Herzegovina*

The latest census conducted in Bosnia and Herzegovina in the year 2013, indicated that the number of illiterates was 89.794 of the total number of people over the age of 10. This census was the first time that data on computer literacy was collected in B&H. Out of a total of 3,180,115 persons that are over ten, there were 1,229,972 or 38.7 % informatically illiterate people. This means that 1.3 million of citizens in country B&H cannot use computer and Internet. More precisely, it was reported that 1/3 of people in B&H never used a computer, while ¼ never used the internet (BHAS, 2016). In addition to these data, we have one pilot study conducted in 2019 about digital literacy. The findings reveal that communication, informative, technological, and personal security skills represent positive side of digital literacy in Bosnia and Herzegovina, while critical skills and device security skills are to be improved. Results also revealed that gender has statistically significant effects on digital literacy, while age and education level do not (Mekić & Hadžimusić, 2019).

There is no any other exact data about digital literacy in Bosnia and Herzegovina, but all information provided below show that digital literacy can be improved in Bosnia and Herzegovina because we as society are ready to accept technology and use benefits of technology.

In the last report on the results of the annual survey of users Regulatory Agency for Communications (RAC) licenses for the provision of Internet services in Bosnia and Herzegovina for 2019 showed that the use of the Internet in Bosnia and Herzegovina is constantly increasing. There is a total of 65 Internet service providers in B&H. In 2019, there were a total of 746,271 internet subscribers in Bosnia and Herzegovina. RA estimates that in the same period there were 3,330,502 Internet users, the rate of Internet use in B&H in 2019 was 94.32% (RAC, 2019).

Digital Global, reported that Internet penetration in Bosnia and Herzegovina was 72 percent – 2.35 million B&H residents are connected to the Internet, which is only slightly lower than the average in southern Europe of 77 percent. The penetration of mobile internet is 105 percent, which means that in Bosnia and Herzegovina the number of subscriptions to mobile internet is higher than number of inhabitants. Citizens of Bosnia and Herzegovina are also active users of social networks with 1.7 million (53 percent) users (Global, 2020).

Agency for statistics of Bosnia and Herzegovina reported about usage of information and communication technologies in households and individuals in 2020. Percentage of households with Internet access is 72.8 %, the percentage of households that have access to mobile phone is 92.9% (BHAS, 2020).

BHAS reported that the most common reason for using the Internet for private purposes in 2020 was for making calls (BHAS, 2020). Also, interesting is fact that during COVID-19 virus in Bosnia and Herzegovina use of Internet banking service increased from 7.8 % in 2019. to 16.7% in 2020.

2.1.4 *Digital literacy at the time of COVID-19*

COVID-19 has disrupted all spheres of life. Above all it affected health, but also economic, social, financial and educational spheres and made everything stop. People, governments, scientists have tried again and again with various methods to stop the virus. On 11 March, COVID-19 was declared a pandemic, the most challenging in recent history. In the moment of this study COVID-19 is not still over and there is no answer when it will be. The Coronavirus pandemic is the most challenging crisis the world faces since the Second World War, one that is killing people and will also lead to an economic recession that probably has no parallel in the recent past, United Nations reported (UN, 2020). World Health organization details about COVID-19 on 9 December 2020 was 67,210,778 confirmed cases, 1,540,777 confirmed deaths in a 220 countries, areas or territories with cases (WHO, 2020).

As the pandemic started raging across the globe we turned to digital technologies. Education, shopping, banking, health, overnight turned virtual which became the new normal and continues to be so. From working to studying, or even socializing, most of us are living a virtual life in more ways than we could have ever dreamed before. With the growing value of technology in society, digital literacy is being recognized as the most important platform for lifelong learning (Taurines, 2020).

Importance of digital literacy can be paralleled with basic literacy. Today, as we stare at a new normal where physical interactions are replaced by virtual existence, we realize that we need more action to be digital literate and we need it now. Digital literacy training and skills are crucial to facilitating this transition and to a longer-term human capital investment in a country (USAID, 2020).

COVID-19 has brought with it countless challenges, especially for the education sector. But it also presented us with opportunities to explore new ways to teach and learn, build 21st century skills, and collaborate to promote lifelong learning opportunities for all (IDB, 2020).

2.2 *Education, employment status and digital literacy*

Digital literacy is an important and evolving concept having influence on the status of current and future work force as the labor market is being transformed globally by implementation of digital technology. The existing jobs are being redefined and new jobs are being created

presenting new demands for updated ICT related knowledge and skills often called digital literacy (Vrana, 2016).

Many jobs require a working knowledge of computers and the Internet, digital skills, to perform certain functions. In the twenty-first century, digital literacy has become an important part of our everyday life. Job recruiters often use employment Web sites to find potential employees, thus magnifying the importance of digital literacy in securing a job.

The acquisition and possession of vital digital literacy skills in information communication technology by academic library staff has been discovered to enhance individual job satisfaction and career progression (Itsekor & Iwu-james, 2012).

The labor market transformations are happening globally and are changing the existing jobs by redefining them and creating new ones with new demands for updated ICT related knowledge and skills. Nowadays, most jobs require an understanding of technology and employees should possess the ability to use appropriate technologies for communication, collaboration, and information management. Employees must possess the ability to manipulate a device and to find relevant content using the device.

Skills of digital literacy are directly related to the concept of employability as digital literacy aims to improve employability because it is a gate skill, demanded by many employers when they first evaluate a job application and as such, it is important to students who are seeking employment.

Digital literacy is directly related to the individual's employability which is represented by the combination of factors and processes which enable people to get employed and to stay in employment or to move on in the workplace (Vrana, 2016).

Digital literacy is an important factor for socio-economic development of the society and employability of the labor force. Without adequate digital literacy, it is not possible to participate in the economy and the digital society, particularly having in mind the digital transformation that the world of work is experiencing in the content and the organization. People without any digital skills have low employability, so will remain inactive and while not employed, will be deprived of income and their chances to acquire necessary digital skills will remain low (Bejaković & Mrnjavac, 2020).

Based on the findings reported above, we define the following hypotheses for this study:

H1: People with different employment status show different levels of digital literacy

H2: People with different education levels show different levels of digital literacy

The proposed hypotheses are visually presented in figure below.

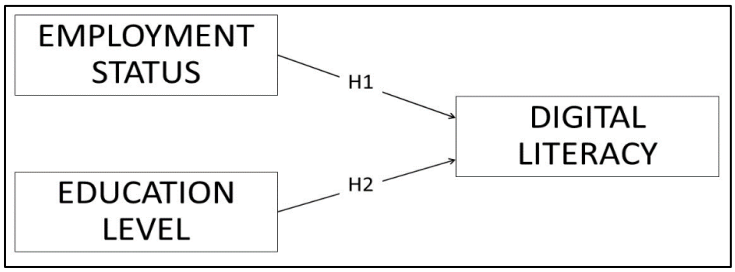

Figure 1. Research model

3. Methodology

3.1 *Data collection*

The data used in this survey was collected by distributing a structured survey. The scales used for the preparation of this instrument were previously used by researchers and proven reliable and valid for measuring digital literacy. To measure this variable, the researchers considered the work of Rodriguez-de-Dios, Igartua and Gonzalez-Vazquez (2016) who considered measuring this construct through six important dimensions: Technological skills, Personal security skills, Critical skills, Device's security skills, Informational skills, and Communication skills.

All the items in the questionnaire were measured with a five-point Likert scale. The distributed questionnaire contained questions in two different categories as follows:

Section 1: Demographics

Section 2: Digital Literacy

The data was collected online, using Google Forms. The respondents were approached by contacting relevant online groups and forums on different social media. A total of 210 respondents filled out the survey.

3.2 *Population and sample*

The population of this study is Bosnia and Herzegovina, while the sample are 210 respondents who provided full responses to questionnaire. The best evidence that sample is well balanced in terms of gender, education level, age, place of residence and employment status is detailed review of the sample characteristics presented in table below.

Table 1. Sample characteristics

Variable	Demographics	Number	Valid Percent
Gender	Female	118	56.2
	Male	92	43.8
Education Level	Highschool	60	28.6
	Bachelor	106	50.5
	Master	39	18.6
	Doctorate	5	2.4
Age	Generation Y (1981-1996)	111	52.9
	Baby Boomers (1946-1964)	5	2.4
	Generation X (1965 -1980)	42	20.0
	Generation Z (1997-2015)	52	24.8
Place of residence	Entity FB&H*	109	51.9
	Entity RS*	93	44.3
	Brčko District	8	3.8
Employment Status	Unemployed	91	43.3
	Employed	119	56.7
**Explanation of acronyms:* *Entity FB&H – Federation of Bosnia and Herzegovina* *Entity RS – Republika Srpska*			

There were 118 females and 92 male respondents. When it comes to education level, bachelors dominate the sample (106 respondents), while the second largest category are respondents with completed high school (60). The master level is on the third place (39 respondents) while only five respondents have completed third cycle of studies. Talking of age, generation Y dominate the sample (52.9%), followed by generation Z (24.8%) and generation X

(20%). There are only 2.4% of Baby Boomers who participated in the study. When it comes to place of residence, 51.9% of respondents are from Entity Federation of Bosnia and Herzegovina, 44.3% of respondents are from Entity Republika Srpska, and 3.8% of respondents are from District Brčko. Finally, 56.7% of respondents are employed while 43.3% of respondents were unemployed in the moment of data collection.

3.3 *Statistical methods applied*

Both descriptive and inferential statistics were performed in Statistical Package for Social Sciences (SPSS). Prior to hypotheses testing, the measurement instrument was tested for validity and reliability using Exploratory Factor Analysis and Cronbach's Alpha values. When it comes to empirical part, to choose appropriate statistical methods for purpose of hypotheses testing, the data was tested for normality and indicated that it does not have normal distribution. Accordingly, it was decided to apply two non-parametric tests: Mann Whitney-U test an Kruskal-Wallis H test.

4. Results

4.1 *Validity and reliability*

Using Principal Components Method and Varimax rotation, the Factor Analysis has been performed. The results of this procedure are summarized in the table below. Factor loadings were observed for each item and those with factor loadings greater than 0.5 on the factor with which they were hypothesized to correspond were considered adequate indicators of that factor (Hair, Black, Babin & Anderson, 2010). It was necessary to remove following items due to overloading: CRS4, IS1, IS2 and IS3.

Table 2. Loadings of items per dimensions of digital literacy

C's α*	Code	ITEM	CS**	PSS**	CS**	TS**	DSS**	IS**
0.876	CRS1	I compare different sources to decide if information is true	**.760**	.204	.227	.114	.254	-.032
	CRS2	I easily determine if the information I find online is reliable	**.822**	.178	.143	.141	.187	.060
	CRS3	I easily identify the author of the information and evaluate their reliability	**.769**	.230	.224	.100	.219	.070
	CRS5	If I meet someone online, I know how to check if their profile is real	**.620**	.387	.252	.113	-.050	-.011
0.857	PSS1	I know how to deactivate the function showing my geographical position (e.g., Facebook, apps)	.160	**.627**	.384	.201	.261	.033
	PSS2	I know when I can post pictures and videos of other people online	.346	**.654**	.150	.201	.148	.058
	PSS3	I use 'report abuse' buttons on social media sites	.304	**.789**	.185	.132	.177	-.080
	PSS4	I change the sharing settings of social media to choose what others can see about me	.203	**.777**	.289	.134	.177	.050
0.910	CS1	I compare different sources to decide if information is true	.284	.203	**.840**	.147	.104	-.026
	CS2	I determine if the information I find online is reliable	.258	.231	**.824**	.159	.177	-.102
	CS3	I identify the author of the information and evaluate their reliability	.187	.313	**.817**	.149	-.002	.004

0.784	TS1	I can bookmark a website I like so I can view it later	.144	.314	.261	**.658**	.058	-.005
	TS2	I can download/save a photo I found online	.080	.099	.180	**.778**	.213	.075
	TS3	I can download information I found online	.062	.181	.175	**.849**	.100	.087
	TS4	I can connect always to a Wi-Fi network from smartphone, no matter the device or where I am	.124	.009	-.069	**.706**	-.117	-.140
0.772	DSC1	I am able to use software to detect and remove viruses	.213	.184	.101	.077	**.839**	.075
	DSC2	I know how to detect a virus in my digital device	.239	.254	.098	.073	**.792**	.087
0.626	IS4	I get tired when looking for information online	.086	.059	-.046	.047	-.025	**.857**
	IS5	Sometimes I end up on websites without knowing how I got there	-.028	-.038	-.027	-.054	.155	**.833**

Note 1: * C's α – Cronbach's Alpha
Note 2: **
CS – Critical Skills; PSS – Personal Security Skills; CS – Communication Skills; TS – Technological Skills; DSS – Devices Security Skills; IS – Informational Skills
Note 3: Source of scales' items: Rodriguez-de-Dios, Igartua & Gonzalez-Vazquez (2016)
Source of validation: Author's own work

4.2 *Empirical findings*

All empirical findings are summarized in Table 5.3 below:

Table 3. Hypotheses tests

Hypothesis		Sig.	Status
H1	People with different employment status show different levels of digital literacy	0.447	Not supported
H2	People with different education levels show different levels of digital literacy	0.040*	Supported

Note 1: *Significant at 95% confidence interval
Source: Author's own work

People with different employment status show different levels of digital literacy Hypothesis 1 was not supported with the sig value of 0.447 (above 0.05) demonstrating a statistically insignificant difference between employed and unemployed respondents when it comes to their digital literacy levels.

People with different education levels show different levels of digital literacy Hypothesis 2 was supported with the sig value of 0.040 (less than 0.05) demonstrating a statistically significant difference between different categories of education when it comes to their digital literacy levels.

5. Discussion and conclusion

This study aimed to investigate if digital literacy depends on employment status and education level of people in Bosnia and Herzegovina. Upon data collection process, 210 responses collected from residents of Bosnia and Herzegovina were processed using SPSS. The validity and reliability of measurement instrument was confirmed through Exploratory Factor Analysis and Cronbach's alpha values. To find out about differences in digital literacy of employed and unemployed respondents, Mann-Whitney U test has been performed in SPSS. To understand

differences in digital literacy because of different education levels, the Kruskal-Wallis H test has been performed in SPSS.

Results revealed that difference in digital literacy of employed and unemployed respondents is statistically insignificant. On the other hand, differences in digital literacy at different education levels are found to be statistically significant.

Even though it was expected that difference between categories will be significant in both cases (employment status and education levels), it was found that while employment status is insignificant for digital literacy, the education level matters.

If comparing mean values of digital literacy for those who are employed (3.993) against those unemployed (3.980), there is almost no difference. On the other hand, when comparing mean values of digital literacy at different education levels, difference is obvious.

The highest level of digital literacy is assigned with respondents who completed master level (mean value 4.128). The following category with highest value of digital literacy are those with undergraduate degree (mean value 4.043). The third on the ranking list are respondents with PhD degree (mean value 3.923). The lowest level of digital literacy has been indicated at category of respondents with high school as highest completed education (mean value 3.803).

The practical implication for policy makers is to strengthen the educational system in Bosnia and Herzegovina and do improvement of study programs at all cycles of study since all of them contribute to digital literacy of respondents. It is recommended for future research to focus on relationship between education level and digital literacy from different point of view. For example, the one may consider impact of formal, informal, and non-formal education on digital literacy. In addition, the one may consider effects of different educational orientation on digital literacy of people.

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