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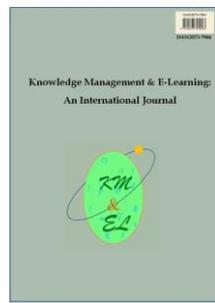
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## **Impact of self-regulated learning on academic performance and satisfaction of students in the online environment**

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**Abstract:** The concept of self-regulated learning (SRL) hasn't been researched enough in Bosnia and Herzegovina (B&H) and hence this study represents an important milestone in understanding this concept in this context. The conducted research was initiated with the presupposition that SRL had a positive impact on satisfaction and academic performance of students. In order to prove the goals of the research, two main hypotheses were formulated. The results of the exploratory factor analysis (EFA) have shown that the statements within SRL are grouped into five factors: goal-setting, metacognition, environment structuring, computer self-efficacy and social dimension. Multiple regression analysis proved that 4 of 5 factors have a positive impact on satisfaction and academic performance of students. Only goal-setting yielded no significance on the two aforementioned variables, while remaining four factors showed a significant influence on students' satisfaction and academic performance.

**Keywords:** Self-regulated learning; Online learning; Student satisfaction; Academic performance; Multivariate analysis

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## 1. Introduction

Nowadays, information and communication technologies are permeating almost all aspects of human life and, as such, they are growing more and more influential in the domain of learning. In comparison to traditional, classroom-based learning, one of the key advantages of online learning has to do with its flexibility with regards to time and location (Waschull, 2001) while remaining both effective and efficient (Weichhart, Stary, & Appel, 2018). In recent years, many education institutions are also starting to make use of online resources to deliver their educational content to students. There are several factors that determine whether online learning will be efficient and successful. One of the most prominent factors that will lead to successful implementation of online-based learning is self-regulation (Rakes & Dunn, 2010; Sun et al., 2008; You & Kang, 2014; Yukselturk & Bulut, 2007). While there is a plethora of studies and empirical data on learners' independence in learning within traditional, classroom-based environments as well as a clear correlation between learners' autonomy and academic performance, research on the same matter is quite limited in online contexts (Russell, 2013).

The application of online tools in learning can be a challenge for students and higher education institutions (HEIs). There is an increasing number of mandatory online courses in curricula (Cohen & Baruth, 2017). Therefore, it is necessary for students to attend these courses in order to meet their program requirements. In this process, an essential skill is self-regulated learning (SRL), which encapsulates autonomous navigation through learning content and enables for students to be successful in capitalizing on what online learning environments have to offer. Therefore, it is of high importance to research the impact that SRL has on satisfaction and academic performance of students. In order to assess this, the sample in this research is contained to Bosnia and Herzegovina (B&H). The concept of SRL is investigated by means of the following constructs: goal-setting, environment structuring, computer self-efficacy, social dimension and time-management. These constructs are key in measuring the level of SRL (Zimmerman, 2000; Barnard-Brak, Paton, & Lan, 2010; Pellas, 2014; Broadbent & Poon, 2015; Alvi & Gillies, 2015; Zheng et al., 2016) and for that reason they are selected for this study.

This study will explore SRL strategies employed by higher education (HE) students from B&H in online environments and further inspect the impact that these strategies have on academic performance and satisfaction with online resources of the given population. The investigation of SRL in online contexts has not been researched in B&H so far. Given the massive use of online resources by B&H students for learning purposes, as well as the emergence of distance-learning programs and LCMS (Learning Content Management System) platforms in some B&H higher education institutions, it is deemed imperative that research such as the one presented in this paper is conducted in B&H to facilitate better exploitation of the said resources. This comprehensive study incorporated the largest universities in B&H (both public and private ones) in an attempt to give an overall assessment of the situation in B&H higher education environments.

The main research question is whether HE students who administer self-regulation more in online learning environments have better results at their respective universities and whether better self-regulation triggers a larger amount of satisfaction with the concept of web-based learning. The research will also seek to answer what particular SRL strategy is the most effective one for students of B&H. The paper will start with the literature review of the main concepts. SRL will be inspected in general, as well as in relation to online learning contexts and each SRL strategy will be briefly outlined. The following chapter will present the model used in this research. The main

and supporting hypotheses will be formulated as well. The methodology will be discussed in the next chapter and it will be followed by the results and findings of the data analysis. The discussion will reflect on the implications of the findings and relate them to other similar studies conducted in different countries.

## 2. Self-regulated learning

As online learning places all control into the hands of online learners, they are required to take it upon themselves to plan, organize, monitor, self-reflect and evaluate their learning processes. Successful SRL includes constant active engagement, adjustment and readjustment of learning strategies and they depend on various factors. Zimmerman, one of the most eminent researchers of SRL, defines self-regulation as “self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals” (Zimmerman, 2000). Bandura (1986) states that SRL represents interrelatedness between personal, behavioural and environmental triadic process. Schunk and Ertmer (2000) echo Zimmerman (2000) in that SRL is cyclical since personal, environmental and behavioural aspects change during the process of learning.

Online learners need to be independent and autonomous as the essence of successful online learning is self-direction and self-management (Broadbent & Poon, 2015; Serdyukov & Hill, 2013). SRL has a lot in common with a learner’s ability to exercise self-control, and an extensive body of literature has shown that aspects such as withstanding temptation, resisting distractions, persevering through long-term goals, delaying gratification – all being part of self-control – vary considerably depending on individual characteristics (Baumeister & Tierney, 2011; Zhu, Au, & Yates, 2016). The fact that all of this is no easy task has been confirmed by many online learners who stated that staying motivated and consistent can be hard to maintain (Elders, Polzella, & Graetz, 2003; Levy & Ramim, 2012; Michinov et al., 2011). Not a large number of students are self-regulated to the maximum of their capacities, but those who *are* report a higher level of academic satisfaction and are able to absorb more knowledge (Pintrich, 2000; Zimmerman, 2000). With regards to self-regulation in online contexts, several studies have shown that a large number of learners’ experience problems, and in comparison to other environments, students in online contexts are less successful (Lajoie & Azevedo, 2006; Lee, Shen, & Tsai, 2008; Samruayruen et al., 2013; Tsai, 2010). Barnard-Brak et al. (2010) suggest that “disorganized profiles of self-regulated learning are associated with [...] poorer academic outcomes (e.g., lower GPAs)”. In addition to those already mentioned, SRL is further comprised and facilitated by numerous factors and facets of meaning. Upon conducting the literature review it has transpired that the following dimensions are thought to represent SRL in the most accurate manner, and for that reason they were selected for this study. These factors are goal-setting, environment structuring, computer self-efficacy, social dimension and time-management.

### 2.1. Metacognition

Metacognition refers to a learner’s awareness of one’s cognitive processes and a conscious effort to influence and facilitate one’s learning pathway. The concept can be traced back to Valencia-Vallejo, López-Vargas, and Sanabria-Rodríguez (2019), who defined the term as “one’s knowledge concerning one’s own cognitive processes or anything related to them, e.g., the learning-relevant properties of information or data”. The influence of learners’ metacognitive awareness on academic performance has been corroborated by different research over the past 30 years (Stewart, Cooper, & Moulding,

2007; Akyola & Garrison, 2011). In terms of online contexts, different research found that metacognition in e-learning environments influences cognitive and emotional engagement and metacognitive awareness significantly facilitated effective self-regulation (Pellas, 2014; Lehmann, Hähnlein, & Ifenthaler, 2014; Norman & Furnes, 2016). Metacognitive strategies inspected in this study refer to strategies employed during the learning process (awareness of using various forms of learning materials to facilitate learning) and post-learning process or self-reflection on what has been processed.

## *2.2. Goal-setting*

Goal-setting takes place in an initial phase of self-regulation. Setting a goal involves determining a specific objective that will guide and direct a learner on their learning journey. The important features of goal-setting strategy are goal specificity, goal proximity, goal difficulty and self-set goals (Schunk, 1990). Goals are present in different segments of SRL, namely: forethought (specifying the goal and deciding on the strategies to be employed to attain it), performance control (implementing the goal strategies and monitoring the process) and self-reflection (assessing the progress and, if necessary, modifying the strategies to be more in tune with the attainment of the goal) (Zimmerman, 1998). When students set their own goal, they take more responsibility for and commitment to their learning, which results in making students more proactive, empowered and motivated (Elliot & Fryer, 2008; Zimmerman, 1990). In terms of online learning goal-setting is seen by some research as significantly related to the academic performance (Curry et al., 1999; Schrum & Hong, 2002).

## *2.3. Environment structuring*

Environment structuring is usually a part of forethought phase in SRL (Zimmerman & Schunk 2001; Mosharraf & Taghiyareh 2013). It generally denotes learners' effort to find a comfortable place to study, reduce distractions, focus their attention and structure their surroundings so that they facilitate the completion of the learning goals without interruptions (Corno, 1993). Research conducted by Barnard-Brak et al. (2010) found a positive relationship between environment structuring and successful self-regulation in blended learning contexts. Better use of environment management skills was seen to have a positive impact on performance by Zimmerman and Martinez-Pons (1986). Environment structuring reflects autonomy and independence of online learners – as “[online learners] do not study in a structured and controlled classroom context, they must be able to structure their own physical learning environment, whether at home or elsewhere” (Lynch & Dembo, 2004). This study focused on the effects that comfortable physical environment and distractions may have on the learning process.

## *2.4. Computer self-efficacy*

Self-efficacy in general refers to a learner's belief and confidence in one's abilities. It is “a subjective judgment of one's level of competence in executing certain behaviours or achieving certain outcomes in the future” (Shea & Bidjerano, 2010). Self-efficacy is an important aspect of self-regulation. According to socio-cognitive motivational model created by Zimmerman (2001), self-efficacy beliefs motivate learners to instigate and persevere with self-regulation, and they also determine and shape particular strategies employed in the course of self-regulation. Self-efficacy is strongly related to academic performance and is one of the best predictors of college GPA, according to Robbins et al.

(2004). The beliefs and attitudes about one's competencies have been extensively researched in traditional education, but studies on self-efficacy in web-based learning environments are scarce (Tobias, 2006; Wang & Wu, 2008). However, the research that was conducted on computer and Internet self-efficacy shows its strong impact on learners' performance (Bolt, Killough, & Koh, 2001; Compeau & Higgins, 1995; Joo, Bong, & Choi, 2000; Tsai & Tsai, 2003). Thompson, Meriac, and Cope (2002) conducted an experiment where learners with higher Internet self-efficacy performed better at the given task than the learners with lower self-efficacy. This research focused on students' awareness of their computer skills and abilities in finding efficiently the needed materials.

### 2.5. Social dimension

According to a sociological approach, knowledge is a socially constructed phenomenon, rather than individual (Gergen, 1982). Some studies on SRL have emphasized the shift from an individual constructivist perspective to a social constructivist perspective (Alvi & Gilles, 2015; Hadwin, Järvelä, & Miller, 2011). Pressley (1995) argues that self-regulation is influenced by social dimension in regard to the overall learning process and he falls back on Vygotsky's learning theory to demonstrate that learning is a social practice and that knowledge is constructed through social interactions. It is further argued that self-regulation mediated through the social practice usually eventually leads to internalized independent self-regulation. In terms of online learning, online communities can facilitate learning experience and develop strategies in learners that improve SRL (Dell, Hobbs, & Miller, 2008). Online courses for example encompass "a high degree of peer interaction and teamwork which requires more proactive and self-directed involvement on the part of individual learners" (Puzziferro, 2008). Learners who establish relationships, share knowledge and ideas forge learning communities in that way, and generally have a larger inclination to SRL (Ausburn, 2004; Brookfield, 1986). According to Bandura (1997), the support and encouragement learners receive through social interaction with other learners and subsequent success influence them to be more self-regulated, and they attain a high level of self-efficacy. This study focused on peer-aided help in learning through communication and discussions, and satisfaction students may have from interactions with other users.

## 3. Research hypotheses and the methodology

In defining the model for this study, the main assumption was that SRL is an independent variable that influences the dependent variables: satisfaction and academic performance of the participants. Since SRL is a multidimensional concept, it is necessary to examine to what extent each dimension of the independent variable influences the dependent variables of this research. Based on these relations, the following hypotheses are formulated:

**H1:** *Self-regulated learning influences satisfaction with online learning*

Based on the first main hypothesis, the following supporting hypothesis are formulated as well:

**H1a:** *Computer self-efficacy has a positive influence on satisfaction with online learning*

**H1b:** *Social dimension has a positive influence on satisfaction with online learning*

**H1c:** *Metacognitive strategies have a positive influence on satisfaction with online learning*

**H1d:** *Goal-setting has a positive influence on satisfaction with online learning*

**H1e:** *Environment structuring has a positive influence on satisfaction with online learning*

**H2:** *Self-regulated learning influences academic performance of the participants*

Based on the second main hypothesis, the following supporting hypothesis are formulated as well:

**H2a:** *Computer self-efficacy has a positive influence on academic performance of the participants*

**H2b:** *Social dimension has a positive influence on academic performance of the participants*

**H2c:** *Metacognitive strategies have a positive influence on academic performance of the participants*

**H2d:** *Goal-setting has a positive influence on academic performance of the participants*

**H2e:** *Environment structuring has a positive influence on academic performance of the participants*

The participants of the study are students of B&H public and private universities. There are 46 licensed HEIs in B&H. Out of that number there are 10 public HEIs (21.73%) and 36 private HEIs (78.27%). For the purpose of this, research 3 public HEIs and 8 private HEIs were selected via simple random sample. The students surveyed are attending all three cycles of study.

First, HEIs were contacted to establish the means of questionnaire distribution. For that purpose, an online version of the questionnaire was used. One public and three private HEIs were given a paper-based questionnaire, while other HEIs were given a link to its online equivalent. The data from the paper-based questionnaire was entered manually into the Ika.si platform for online questionnaires.

The questionnaire was accessed by 1651 students and 405 of them filled out the questionnaire. However, 375 of participants filled out more than 80% of the questionnaire and only those respondents were included in the analysis. The questionnaires that were filled out less than 80% were excluded from the analysis. Out of the total number of participants 48.7% were female students while 51.2% were male students. Furthermore, 85.1% of the respondents are full-time students and 89.2% of students attend first-cycle studies, 7.3% attend second-cycle studies and 3.5% attend third-cycle studies. The largest number of participants attends the first year (38.9%), 19.7% of students attend second year, 24.8% attend the third year, 12.5% attends fourth year, while 4% attends fifth and higher years of study. Students aged 17-20 comprised 34.9% of the total sample, students aged 21-23 made up 43.7% of the sample, students aged 24-27 comprised 8.5% while students whose age is over 27 made up 12.8% of the sample.

The questionnaire consisted of 2 parts. The first part of the questionnaire is comprised of questions related to participant characteristics – age, gender, year and type of study, type of HEI they're attending and what online sources they use for studying. The second part of the questionnaire consists of different factors that participants

responded to in the form of Likert scale of 5 levels, starting from strongly disagree to strongly agree.

The process of data analysis consisted of 3 phases: (1) checking the reliability of the research results using Cronbach’s alpha indicator; (2) examining the internal consistency of the data using exploratory factor analysis (EFA) and (3) investigating the formulated hypotheses of the research using multiple regression analysis. In addition, correlation analysis was conducted to ascertain the relatedness of the factors in the analysis.

Table 1 shows the studies and research that served as a foundation for construction of the second part of the questionnaire. Based on these pieces of research, the questionnaire items were formed, and those can be retrieved from Table 2.

**Table 1**  
Studies used to create the questionnaire

Factor	Number of statements	Source
Environment	4	Barnard-Brak et al. (2010); Zheng et al. (2016)
Goal-setting	3	Barnard-Brak et al. (2010); Zheng et al. (2016)
Computer self-efficacy	4	Zhang et al. (2005); Ratten (2013)
Social dimension	4	Vonderwell et al. (2007); Ophus & Abbitt (2009); Shea & Bidjerano (2010)
Metacognitive strategies	4	Shannon (2008); Chang & Chang (2014)
Satisfaction	4	Roach & Lemasters (2006); Li et al. (2016)
Academic performance	4	Li (2012); Ifeanyi & Chukwuere (2018)

With environment construct it was attempted to research whether students are in a comfortable environment and whether they have any distractions while learning online. For example, to capture these aspects of the Environment construct some of the items are devised as following: *I conduct my online learning in a place where I do not have a lot of distractions* and *I learn online in a comfortable environment*. With construct of goal-setting it was attempted to investigate whether students set short-term and long-term goals, whether they terminate their learning process until they reach their goals and whether they set clear goals before learning. With computer self-efficacy construct it was attempted to find out whether students have confidence in their knowledge and skills, whether they know how to use online tools and whether they are able to discern important information online. With social dimension construct it was attempted to investigate whether communication with other learners helps students in learning, whether they are comfortable with this communication and whether the participation in online discussions helps them with their learning curve. Metacognitive strategies construct sought to explore whether students paraphrase and sum up online materials to gain a better understanding, whether students use diverse online materials, and whether they access different materials if primary ones are too difficult. Satisfaction construct wanted to explore whether students will continue using online tools for learning purposes and whether they are satisfied with online learning. Academic performance construct sought to explore whether the grades improve for students who use online learning to larger extent, and whether their team work is better with online learning. Items of the questionnaire were devised by the aspirations to receive answers to all of these questions.

Each construct consisted of minimum three items as at least 3 items are necessary for Cronbach's alpha test.

#### 4. Results

In order to examine the reliability of EFA results, we used Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity (Puška, Maksimović, & Stojanović, 2018). The value of KMO measure is required to be higher than 0.6 so that the correlation matrix is adequate for the EFA. With Bartlett's test it is necessary that significance value is less than 0.05. The results of the conducted factor analyses show that the value of KMO index is greater than 0.6, while Bartlett's test of sphericity is less than 0.05, which meets all conditions for the reliability of EFA.

**Table 2**

Rotated factor loadings and Cronbach's alpha values

Factors	1	2	3	4	5
<b>Factor 1.</b> Computer self-efficacy (CSE) $\alpha = 0.884$ , Mean = 4.01, SD = 0.91, % of Variance = 38.296					
I am confident with my knowledge and skills when using online resources for learning.	.878				
I am able to use the Internet efficiently to find appropriate information in the course of online learning.	.802				
I quickly find the information on the Internet that is needed for my learning.	.799				
In the course of online learning I quickly tell apart good information from bad.	.751				
<b>Factor 2.</b> Social dimension (SD) $\alpha = 0.869$ , Mean = 3.55, SD = 0.89, % of Variance = 11.867					
Communication with other users in online environment helps me learn.		.870			
I feel comfortable while communicating with other users in online learning process.		.861			
Participating in online discussions helps my online learning.		.786			
Online learning is a great platform for the communication with other users.		.717			
<b>Factor 3.</b> Metacognitive strategies (MCS) $\alpha = 0.785$ , Mean = 3.68, SD = 0.89, % of Variance = 7.485					
I paraphrase and summarize online materials to enhance their understanding.			.797		
I use various online materials (images, videos, tables, etc.) to understand a specific concept.			.744		
When a specific online material is too difficult, I find a similar one in a different form.			.689		
In the course of online learning I actively ask myself questions and check in the materials if they are answered.			.524		
<b>Factor 4.</b> Goal-setting (GS) $\alpha = 0.760$ , Mean = 3.29, SD = 1.04, % of Variance = 7.044					
I set clear short-term (daily and weekly) and long-term (monthly) goals.				.801	
I do not stop with online learning until I complete my daily				.738	

goal	
I set my goal clearly before I start learning online.	.692
<b>Factor 5.</b> Environment (EV) $\alpha = 0.755$ , Mean = 3.59, SD = 1.02, % of Variance = 5.989	
I learn online in a comfortable environment.	.804
I know in what place I can learn the most efficiently in the online environment.	.771
I conduct my online learning in a place where I do not have a lot of distractions.	.591
<b>Total variance explained:</b> 70.680%, Kaiser-Meyer-Olkin Measure: 0.887, Bartlett's Test of Sphericity, sig = 0.000	
<b>Factor 1.</b> Satisfaction (SF) $\alpha = 0.922$ , Mean = 3.89, SD = 0.92,	
I will continue learning online in the future.	.923
Learning online is pleasant experience.	.909
I am satisfied with the influence of online learning on my understanding of the subject matter.	.889
I like the idea of online learning.	.883
<b>Total variance explained:</b> 81.186%, Kaiser-Meyer-Olkin Measure: 0.817, Bartlett's Test of Sphericity, sig = 0.000	
<b>Factor 1.</b> Academic performance (AS) $\alpha = 0.892$ , Mean = 3.49, SD = 0.95	
My grades are better when I use online resources.	.805
I have a better exam pass rate when I use online resources.	.742
My individual work at university is better after I learn online.	.739
My group work at university is better after I learn online.	.739
<b>Total variance explained:</b> 75.628%, Kaiser-Meyer-Olkin Measure: 0.767, Bartlett's Test of Sphericity, sig = 0.000	

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Table 2 shows the results of EFA for items related to SRL, satisfaction and academic performance. EFA has been performed using analysis of the main components with factor varimax rotation and Kaiser normalization was also applied (Kaiser, 1958). As three variables are inspected, three factor analyses were conducted. In the process of selecting a number of factors eigenvalues method was used, that is Kaiser criterion. The values of this criterion need to be greater than 1 so that the items can be grouped into one factor. Factor loading of items should preferably weigh greater than 0.5 on the relevance factor and less than 0.5 on all other factors (Thongmak, 2014; Zheng et al., 2016).

The results of the conducted EFA show that 18 items related to SRL are grouped into 5 factors while 4 items related to satisfaction and 4 items related to academic performance have been grouped into one factor respectively. With SRL variable the following factors are grouped: Computer self-efficacy (CSE) ( $\alpha = 0.884$ , Mean = 4.01, SD = 0.91) that explained the most variance, that being 38.296%, Social dimension (SD) ( $\alpha = 0.869$ , Mean = 3.55, SD = 0.89) which explained 11.867 % of variance, Metacognitive strategies (MCS) ( $\alpha = 0.785$ , Mean = 3.68, SD = 0.89) that explained 7.485 % of variance, Goal-setting (GS) ( $\alpha = 0.760$ , Mean = 3.29, SD = 1.04) that explained 7.044 % of variance, Environment structuring (ES) ( $\alpha = 0.755$ , Mean = 3.59, SD = 1.02) that explained 5.989 % of variance. These five factors explained the total of 70.680 % of variance. The second EFA that grouped the items into one factor – Satisfaction (SF) ( $\alpha = 0.922$ , Mean = 3.89, SD = 0.92) – explained 81.186 % of variance.

The third EFA that also grouped items into one factor – Academic performance (AP) ( $\alpha = 0.892$ , Mean = 3.49, SD = 0.95) – explained 75.628 % of variance.

Respondents have shown that they agree the most with statements related to goal-setting, which also showed that there is the largest dispersion in given answer (which is indicated by the standard deviation). Results of Alpha coefficients in this study are in 0.755-0.922 range, which implies that internal consistency of the collected data is good for statistical analysis. If the values were less than 0.75 it would have been questionable if the data can be taken into consideration (Leontitsis & Pagge, 2007).

**Table 3**  
Correlation between research variables

	EV	GS	CSE	SD	MCS	AS
Environment structuring (EV)						
Goal-setting (GS)	.454**					
Computer self-efficacy (CSE)	.445**	.381**				
Social dimension (SD)	.375**	.439**	.320**			
Metacognitive strategies (MCS)	.473**	.441**	.498**	.492**		
Academic performance (AS)	.467**	.344**	.433**	.456**	.526**	
Satisfaction (SF)	.506**	.325**	.452**	.420**	.582**	.716**

Note. \*\* Correlation is significant at the 0.01 level (2-tailed)

In order to investigate the relation between the used variables in this study Pearson correlation coefficient was calculated. The results gained via this analysis are shown in Table 3. These results show that there is a positive and significant correlation between all research variables, at 0.01 level, and indicate that the group is coherent. Academic performance and satisfaction are related the most ( $r = .716$ ,  $p < 0.01$ ), while the least related are social dimension and computer self-efficacy ( $r = .320$ ,  $p < 0.01$ ). Out of the factors within SRL goal-setting is the least connected to academic performance ( $r = 3.44$ ,  $p < 0.01$ ) and satisfaction ( $r = .325$ ,  $p < 0.01$ ) while metacognitive strategies are connected the most with dependent variables of academic performance ( $r = .526$ ,  $p < 0.01$ ) and satisfaction ( $r = .582$ ,  $p < 0.01$ ).

In the course of investigating the created model of research, that is, the formulated hypotheses multiple regression analysis was applied. The task of multiple regression analysis is to include more factors in the analysis and by joining them and analysing them together, estimate the influence of the independent variable on the dependent variable. Testing hypotheses of the research will be conducted by applying indifferent statistic at the 0.05 significance level.

The results of the conducted multiple regression analysis are shown in Table 4. In order to test the formulated hypotheses of the research two regression analyses were conducted, one for each hypothesis. When testing the first hypothesis the following assumptions were the initial points: SRL factors are used as an independent variable while satisfaction is used as a dependent variable. The influence of independent variables on the dependent variable was tested. Model summary shows that there is a high relatedness of these variables, which is indicated by multiple regression coefficient ( $R = .659$ ) and this model explained 43.4% of the main population, which is indicated by determination coefficient ( $R^2 = .434$ ). Significance level generated using this model has shown that there is a significant influence of the independent variable on the dependent variable ( $p = .000$ ). Based on the results of this analysis, it can be concluded that there is

a significant influence of SRL on satisfaction, which proves the first main hypothesis. So as to test the supporting hypotheses, the individual influence of each SRL factor on satisfaction will be tested. In the process of testing the influence of environment structuring on satisfaction it has been proved that it also has a significant positive influence on satisfaction ( $p = .000$ ;  $B = .251$ ). This proves the first supporting hypothesis. The results of tested influence that goal-setting has on satisfaction show that there is negative significant influence of this variable on the dependent variable ( $p = .233$ ;  $B = -.057$ ) so that the second supporting hypothesis is rejected. The third supporting hypothesis proved there is a significant positive influence of computer self-efficacy on satisfaction ( $p = .000$ ;  $B = .145$ ), which proves the third supporting hypothesis. The results gained through testing the fourth supporting hypothesis show that there is a significant positive influence of social dimension on satisfaction ( $p = .006$ ;  $B = .131$ ), thus proving the fourth supporting hypothesis. Testing the fifth supporting hypothesis revealed that there is a significant positive influence of metacognitive strategies on students' satisfaction ( $p = .000$ ;  $B = .351$ ), which proved the fifth hypothesis. Inspecting all factors in their entirety and their influence on satisfaction it can be concluded that metacognitive strategies have the greatest influence, which is indicated by the value of  $t$ -test ( $t = 6.831$ ), followed by environment structuring ( $t = 5.208$ ) and computer self-efficacy ( $t = 3.064$ ).

**Table 4**  
Regression analysis results

Independent variables: Self-regulated learning	Dependent variables: Satisfaction (SF)			Hypotheses status
	<i>B</i>	<i>t-value</i>	<i>p</i>	
Environment structuring (EV)	.251	5.208	.000	accepted
Goal-setting (GS)	-.057	-1.194	.233	rejected
Computer self-efficacy (CSE)	.145	3.064	.002	accepted
Social dimension (SD)	.131	2.780	.006	accepted
Metacognitive strategies (MCS)	.351	6.831	.000	accepted
<b>Model Summary:</b> $R = .659$ ; $R^2 = .434$ ; Adjusted $R^2 = .426$ ; $F(test) = 56.517$ ; $sig. = .000$				accepted
Independent variables: Self-regulated learning	Dependent variables: Academic performance (AS)			Hypotheses status
	<i>B</i>	<i>t-value</i>	<i>p</i>	
Environment structuring (EV)	.206	4.095	.000	accepted
Goal-setting (GS)	-.012	-.241	.809	rejected
Computer self-efficacy (CSE)	.151	3.069	.002	accepted
Social dimension (SD)	.211	4.291	.000	accepted
Metacognitive strategies (MCS)	.255	4.761	.000	accepted
<b>Model Summary:</b> $R = .622$ ; $R^2 = .387$ ; Adjusted $R^2 = 0.379$ ; $F(test) = 46.647$ ; $sig. = .000$				accepted

In testing the second hypothesis SRL is used as an independent variable while academic performance is used as a dependent variable and the influence of former on the latter was inspected. The overall results show that there is a significant relatedness of these variables on the dependent variable, which is indicated by multiple correlation

coefficient ( $R = .622$ ). This model explained 38.7 % of the dependent variable, which is indicated by determination coefficient ( $R^2 = .387$ ). The results generated via applying multiple regression analysis show that there is a significant influence on SRL on academic performance ( $p = .000$ ), which proved the second main hypothesis in this research. When the supporting hypotheses were tested the factors of SRL were used as independent variables while academic performance was a dependent variable. The results of tested influence of environment structuring on academic performance have shown that there is a significant positive influence of this variable ( $p = .000$ ;  $B = .206$ ), which proved the first supporting hypothesis. In the course of testing the influence of goal-setting on academic performance it has been proved that there is negative, non-significant statistical influence ( $p = .809$ ;  $B = -.012$ ), which means that this hypothesis is rejected. The results of the tested influence of computer self-efficacy on academic performance showed that there is a significant positive statistical influence ( $p = .002$ ;  $B = .151$ ) which proves the third supporting hypothesis. The fourth supporting hypothesis – social dimension – also turned out to have a significant positive influence on academic performance ( $p = .000$ ;  $B = .211$ ) so that this hypothesis is proved as well. The inspection of the fifth supporting hypothesis has shown a significant positive relatedness of metacognitive strategies and academic performance ( $p = .000$ ;  $B = .255$ ) thereby proving the fifth supporting hypothesis as well.

When inspecting the influence of the individual factors of SRL on the academic performance we can see that the greatest influence resides with metacognitive strategies ( $t = 4.761$ ), social dimension ( $t = 4.291$ ) and environment structuring ( $t = 4.095$ ). Based on the results of tested hypotheses it is evident that only goal-setting has no influence on satisfaction and academic performance while all other factors of SRL do have a positive influence on these variables.

## 5. Discussion

This research investigated the influence of SRL on satisfaction and academic performance on the sample of B&H students. Academic performance and satisfaction are key factors that determine whether students will keep using online learning. Students will learn online if it helps them master knowledge faster and easier. If that is enabled, the students will continue using online tools. For that reason, in this research, it was important to investigate to what extent each variable influence satisfaction and academic performance of students. It was essential to find out how students react to online learning environments as they encounter this form of learning for the first time since in primary and secondary educations, they encounter only traditional forms of learning.

Using EFA statements within SRL they were grouped into 5 factors. Similar results were received by Zheng et al. (2016), but they inspected additional dimensions of SRL: goal setting, environment structuring, task strategies, time management, help seeking and self-evaluation. Hood, Littlejohn, and Milligan (2015) incorporated more statements within SRL and grouped all statements into 8 factors using EFA: goal setting, self-efficacy, task strategies, learning strategies, help seeking, self-satisfaction and evaluation, task interest and learning challenge. Since SRL has a lot of dimensions, different authors based their research concept on different dimensions. This paper used environment structuring, goal-setting, computer self-efficacy, social dimension and metacognitive strategies.

The results of multiple regression analysis show that SRL influences satisfaction and academic performance. This has been proved by the research conducted by Barnard-

Brak et al. (2010), which showed that unlike this study, there is less influence of SRL on academic performance. However, individual influence of SRL dimensions on satisfaction and academic performance has not been researched significantly. Correlation analysis has been mostly applied to investigate the connection between these variables. (Corkin, Yu, & Lindt, 2011; Komarraju & Nadler, 2013).

What has been researched in this study relates to individual influence of SRL dimensions onto satisfaction and academic performance. The results of the conducted regression analysis show that four dimensions have a significant influence on satisfaction and academic performance: environment structuring, computer self-efficacy, social dimension and metacognitive strategies, while goal-setting does not have a significant influence. Cazan (2012) received a similar result with her SRL dimensions and their influence on academic performance, but not all dimensions showed a positive influence: metacognitive self-regulation and self-efficacy yielded no influence. Similar results were received by Corkin et al. (2011) that used hierarchical regression analysis to ascertain whether there is SRL influence on academic grades.

Results in this research have shown that environment structuring has a positive and significant influence on academic performance ( $t$ -value = 4.095;  $p$  = .000) and satisfaction of students ( $t$ -value = 5.208;  $p$  = .000). In that respect it has been proved that online learning needs to be conducted in the environment that stimulated active learning (Bakir, 2014). Due to widespread use of information technologies students feel comfortable in online environment (Parkes, Stein, & Reading, 2015) and due to that, this variable significantly influences their satisfaction and academic performance.

Goal-setting variable proved to have negative influence on satisfaction of students ( $t$ -value = -1.194;  $p$  = .233) and academic performance ( $t$ -value = -.241;  $p$  = .809), but it has no significant influence. This has shown that even though setting goals is important as it helps students to focus on studying and achieve better results (Bruhn et al., 2017) it does not play a role for students in B&H. The reason for that could be that students encounter online environment for the first time in learning and may set unrealistic goals. That could potentially make them dissatisfied so that they miss on achieving good academic results.

Results have shown that the variable of computer self-efficacy has a positive and significant influence on satisfaction of students ( $t$ -value = 3.064;  $p$  = .002) and academic performance ( $t$ -value = 3.069;  $p$  = .002). In that way it has been proved that students that have better computer self-efficacy will perform better academically and will be more satisfied (Chien, 2012). The students that have better computer self-efficacy will embark on mastering more difficult tasks in online learning and will achieve better results. Due to that, it is important that students are trained in how to use online learning platforms as that will enable them to be more confident and achieve better results.

In order for students to be more satisfied and achieve better results they should make social interactions in an online environment, as proved by the study. Through social dimension students establish interactions and gain necessary information from other students that help them in learning in the online environment. In that way students are motivated to use communication tools in the online environment, which increases the social interaction. (Cidral et al., 2018).

In the process of learning students have to include their knowledge, cognition and consciousness. In relation to this the metacognition variable has proved to have a significant positive influence on satisfaction ( $t$ -value = 6.831;  $p$  = .000) and academic performance ( $t$ -value = 4.761;  $p$  = .000). This means that the students have to apply

metacognitive strategies to efficiently manage their cognitive and learning processes. In that manner they have to be responsible to use metacognitive strategies so as to achieve better academic performance and have higher levels of satisfaction. (Karlen, 2016).

The implications of the results for B&H case is that they reveal what is necessary for students in order for them to be satisfied with using online tools and materials in learning processes, and achieve better academic results in the process. Higher education institutions need to primarily adapt their platforms that they use in online environments to students in order to facilitate interpersonal interaction. Furthermore, HEIs need to facilitate metacognitive strategies of students and train students in to use these platforms effectively. Students will then achieve better learning experiences and will be more comfortable with the entire process. With all these activities the HEIs will encourage students to use the online tools more, gain more diverse knowledge and in turn be more competitive on labour markets. In that manner HEIs will no longer limit themselves to the regular, full-time studies, but they will conduct online courses more, which would in turn be accessible to more students. Due to these implications, it is of high importance that results from this research are applied in practice.

## 6. Conclusion

This research explored the influence of SRL on satisfaction and academic performance of students at B&H higher education institutions in the frame of online learning. Random sampling was used to select 11 HEIs and students there received the questionnaire. The results that were generated showed that SRL has an influence on satisfaction and academic performance. However, not all dimensions of SRL exhibit a positive and significant influence of this sort. The dimension of goal-setting proved to have no influence on either of the two variables. All other dimensions exhibit a significant influence. In order to achieve a better academic performance and be satisfied, for students in B&H the following dimensions are useful: environment structuring, computer self-efficacy, social dimension and metacognitive strategies.

This research is among the first pieces of research on this topic in B&H. This research also examines what influence do particular dimensions of SRL, which is a progress in both theoretical and practical understanding of SRL application on satisfaction and academic performance.

This research has certain limitations. Not all HEIs in B&H were included in the research. Secondly, it is necessary to apply other statistical analyses to investigate the relationship between variables, so as to confirm the given results. It is necessary to include a greater number of respondents and include more factors and questions into the analysis. The given results could not be compared to similar ones on the level of B&H as so far there have been no similar research endeavours in this area. Based on these limitations, it is necessary to incorporate more dimensions of SRL in the following research and include more respondents and HEIs so as to gain a comprehensive overview of the situation in B&H. Apart from that, it is necessary to delve deeper into what and to what extent do characteristics of students influence the application of SRL.

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