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FACTOR STRUCTURE OF THE EFFECTIVENESS OF THE TEACHING PROCESS IN HIGHER EDUCATION INSTITUTIONS – THE PERCEPTION OF STUDENTS

Papić Blagojević Nataša[1]

Vukadinović Maja[2]

Jovičić Vuković Ana[3]

Abstract: *The present study aims at investigating the students' perception of indicators of effectiveness of the teaching process in higher education institutions. 361 students from five different post-secondary vocational schools participated in the research. The instrument consisted of a list of indicators of the effectiveness of the teaching process, which has been taken from previous research related to characteristics of education at universities. The list included 13 indicators: knowledge, quality, creativity, flexibility, collegiality, critical thinking, cognitive skills, teamwork, cooperation, entrepreneurial spirit, interactivity, objective grading scale and the availability of teaching staff. The exploratory factor analysis was applied to extract the main components. The results have shown that the structure of the effectiveness of the teaching process from the*

[1] Visoka poslovna škola strukovnih studija u Novom Sadu, Vladimira Perića Valtera 4, 21000 Novi Sad, e-mail: npapic.blagojevic@gmail.com

[2] Visoka poslovna škola strukovnih studija u Novom Sadu, Vladimira Perića Valtera 4, 21000 Novi Sad, e-mail: vukadinovicmaja.vps@gmail.com

[3] Visoka poslovna škola strukovnih studija u Novom Sadu, Vladimira Perića Valtera 4, 21000 Novi Sad, e-mail: dr.ana.jovicic@gmail.com

perspective of students consists of two dimensions: Cooperation and Objectiveness.The improvement of the teaching process with the goal of its greater effectiveness is discussed in the context of these results.

Keywords: *higher education / students' perception / factor analysis / effectiveness / cooperation / objectiveness.*

INTRODUCTION

Effectiveness, along with quality, is one of the main issues when it comes to the teaching process in higher education. Many earlier studies explored different aspects of successful teaching and learning. Allan (1996) pointed out the importance of understanding the learning outcomes, Chen & Chen (2010) emphasized the possibilities of practically applying the acquired knowledge, and Ratković Njegovan and Vukadinović (2016) stressed the development of creativity, critical thinking and entrepreneurial spirit (see also Vukadinović, Jovičić Vuković, Papić-Blagojević, 2022). Furthermore, regarding performance indicators of a successful education process, studies focused on exploring the contents of the teaching programs (Chen, Kuo & Yang 2008), the structure and organisation (Rosa & Amaral, 2007), financial and human resources (Bertolin & Leite, 2008; Chen, Kuo & Yang, 2008; Gatfield Barker & Graham, 1999; Heynemann, 2004), productivity and efficiency (Pounder, 1999), the number of academic staff who participate in the teaching process (Johnes, 2006), as well as cooperation and scientific work (Ćukušić, Garača & Jadrić, 2014; de la Torre-Neches, Rubia-Avi, Aparicio-Herguedas, & Rodríguez-Medina, 2020).

For example, the findings of Ćukušić and collaborators (2014) showed that there are four indicators of higher education success level: planning of strategy and quality, organisation and improvement of the educational process and scientific collaboration research and financial resources. Their study, which was very significant in this field, focused on the point of view of teachers and teaching assistants. However, in search of greater success and better quality of the education system, in the context of effectiveness, it is crucial to explore the students' point of view. In this sense, it is essential to address what students perceive as an effective teaching process. Previous research on this subject regarding the indicators of effectiveness showed that students who have the experience

of studying abroad rate those indicators of effectiveness with higher values than in their home country (Ratković Njegovan & Vukadinović, 2016). The indicators of effectiveness in the cited study were: *cognitive skills, flexibility, knowledge, teamwork, collegiality, objective system of grading, cooperation, critical thinking, creativity, interactivity, entrepreneurial spirit*, *quality, and availability of professors*. Although the sample of the research cited was small, the findings provided a significant starting point for further analysis of the effectiveness of the educational process.

This study aims at investigating the students' perception of the indicators of effectiveness of the teaching process by using exploratory factor analysis (EFA). By applying this approach, we aimed at exploring the factor structure of the effectiveness of the teaching process. Based on the abovementioned introduction, it can be hypothesised that collegiality and the quality of knowledge would be singled out as significant components.

METHOD

Participants and procedure

There were 361 students participating in this research which included five post-secondary vocational schools. There were 127 (35.2%) male participants and 234 (64.8%) female ones. They were between 18 and 54 years of age (M = 22.32, SD = 5.926). Regarding the higher education institutions, the participants attended Novi Sad School of Business (39,6%), Post-secondary Technical School of Vocational Studies in Novi Sad (28.0%) and School for Management and Business Communication (7.8%). Furthermore, 13.6% of the participants attended the College of Vocational Studies for the Education of Preschool Teachers and Sports Trainers (Nutritionists and Professional Nurses), while 11.1% attended the Post-secondary Technical School of Vocational Studies from Zrenjanin. Most of the students were state- funded, 69.5%, while 30.5% were self-funded.

The research was conducted as a part of a project called *The analysis of quality and effectiveness of the teaching process in Post-secondary vocational schools* which is funded by the Provincial Secretariat for Higher Education and Scientific Research. Field research was conducted in post-secondary vocational schools on the territory of AP Vojvodina during 2019.

The students' participation in the study was voluntary, i.e. they did not receive any financial compensation. Participation was also anonymous and the study was conducted in accordance with the Helsinki Declaration[4].

Instruments

A pilot version of the list of Indicators of the effectiveness of the teaching process

The list of indicators of the effectiveness of the teaching process was taken from a prior research by Ratković Njegovan and Vukadinović (2016) which was related to the exploration of the characteristics of the university education systems (c.f. Ratković-Njegovan & Vukadinović, 2016).

The list consists of 13 indicators. It was used to examine to what extent the effectiveness of the teaching process at a given institution is characterised by *critical thinking, flexibility, teamwork, knowledge, collegiality, cognitive skills, creativity, cooperation, and entrepreneurial spirit*. In addition, we examined to what extent the teaching process at these institutions is characterised by *interactivity, the objective system of grading, quality and the availability of professors.* Participants evaluated each of the 13 characteristics on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree), rating their perception of how specific characteristics are attributed to the teaching process they participated in.

Data Analysis

Statistical software SPSS for Windows (v25.0) was used to perform data analysis. Exploratory factor analysis (EFA) was conducted to investigate the factor structure of participants' assessments of the indicators of effectiveness of the teaching process. Furthermore, a parallel analysis using syntax was also performed. The parallel analysis was applied in order to decide how many factors should be kept. For this purpose online syntax was used (https://oconnor-psych.ok.ubc.ca/nfactors/parallel.sps).

[4] Declaration of Helsinki defines ethical principles for research procedure which includes human subjects (see more https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/).

RESULTS

In order to extract the factors from the data matrix, the Maximum Likelihood procedure was used. Bartlett's test of sphericity was significant, χ^2 (78) = 1975.802, p < .001. This test indicated that it was appropriate to use the factor analytic model on this set of data. The Kaiser-Mayer-Olkin measure indicated that the strength of the relationship among variables was high (KMO = .916). Two factors with eigenvalues greater than 1 were extracted. After that, a parallel analysis using syntax was performed in order to determine how many factors would be kept in further analysis. The results of parallel analysis have shown that only 2 factors have mean which is lower than Initial Eigenvalues obtained in SPSS (see Table 1). Finally, the results indicated that the two factors gave the solution which is most interpretable.

Table 1. *Parallel analysis with SPSS and Syntax*

	Initial Eigen values			Extraction Sums of Squared Loadings			Random data eigenvalues
	Eigenvalue	% Variance	% Cumulative variance	Eigenvalue	% Variance	% Cumulative variance	Means
Factor 1	5.953	45.78	45.78	5.512	42.39	42.39	1.325
Factor 2	1.441	9.45	55.24	1.245	6.30	48.70	1.240

Note: The results from Parallel analysis using syntax are shown in the last column

These two factors altogether have a common explained variance of 48.70%. Since the correlation between the factors was expected, a Promax rotation was performed. The highest factor loadings on each factor are displayed in Table 2. Only the descriptors with factor loadings of .50 and above are shown.

Table 2. *Two extracted factors presented with factor loadings based on a Maximum Likelihood procedure with Promax rotation for 13 indicators of the effectiveness of the teaching process*

	F1 Cooperation	F2 Objectiveness
Indicators of the effectiveness of the teaching process		
Cooperation	**.788**	
Collegiality	**.772**	
Teamwork	**.765**	
Creativity	**.705**	
Critical thinking	.508	
Cognitive skills	.508	
Flexibility		
Objective grading system		**.890**
Availability of professors		**.699**
Quality		**.569**
Knowledge		**.526**
Developing an entrepreneurial spirit		
Interactivity		

Regarding the contents of the obtained factors (i.e. most loaded scales), the factors are named Cooperation (Factor 1) and Objectiveness (Factor 2). The results have shown that the structure of the effectiveness of the teaching process consists of two dimensions: Cooperation and Objectiveness. Their inter-correlation was found to be very strong (r = .710).

According to the results of EFA, in the final solution it can be indicated that the structure of the students' perception of the effectiveness of the teaching process consists of two factors: Cooperation (*cooperation, collegiality*, *teamwork* and *creativity*) and Objectiveness (*objective grading system, the availability of professors, quality* and *knowledge*). Only the first four items with higher loadings (r >.52) for each factor were kept. The

descriptive statistics for each factor after the item selection (M, SD, MIC and Chronbachs' alpha) is shown in Table 3.

Table 3. *Descriptive statistics for factors of scale measuring the Effectiveness of the teaching process*

	Scale: Effectiveness Factors	*M*	*SD*	*MIC*	*α*
1	Cooperation	3.75	.78	.534	.818
2	Objectiveness	4.11	.65	.477	.785

Note: MIC – Mean inter-item correlation, *α* – Chronbachs' alpha

Moreover, after the item selection, the correlations between factors were calculated. The correlation between Cooperation and Objectiveness is medium strong and significant (r= .556, p < .001).

DISCUSSION

This study has shown that the students' experience related to the structure of effectiveness of the teaching process consists of two factors: Cooperation and Objectiveness.

The first factor of the effectiveness of the teaching process is Cooperation. It includes *cooperation, collegiality, teamwork* and *creativity.* This result indicates that cooperation is one of the most important dimensions of the teaching process in the context of effectiveness. This result corresponds to the findings of earlier studies which reported that one of the performance indicators of successful education is cooperation, along with accreditation and standardisation (Ćukušić, Garača & Jadrić, 2014; Jovičić Vuković, Jošanov Vrgović, Jovin, Papić- Blagojević,2020; Jovičić Vuković, Damnjanović, & Papić-Blagojević, 2020; Pounder, 1999; Vukadinović, Jovičić Vuković, Papić-Blagojević, 2022). Furthermore, the studies reported the differences between what is essential for students and what teachers evaluate as a successful teaching process (Kunnari, Ilomäki, & Toom, 2018; Oder & Eisenschmidt, 2018; Rosa & Amaral, 2007; Westerheijden, 2007). For example, it is suggested that teachers relate successful and effective teaching processes to their competencies and knowledge.

The findings of this study also indicate that it would be advisable to explore and compare students' and teachers' views of the effectiveness of

the teaching process in the future. Further empirical testing in this domain would reveal more precise and subtle relations and differences between the subjects of the teaching process.

The second factor of the effectiveness of the teaching process is Objectiveness. It includes *objective grading system, the availability of professors, quality* and *knowledge*. According to the results, the objectiveness is mostly related to the grading system. Still, from the experience of the teaching practice, it could be presumed that many teachers would understand objectivity as a style of relationship with students, a treatment that excludes bias, as well as their availability during the teaching process. Furthermore, this component of the effectiveness of the teaching process seems to be related to students' view of learning outcomes, such as grades and knowledge.

Moreover, the results of this study suggest that Cooperation and Objectiveness are highly dependent. This indicates that there is some particular "teaching style" which is prefered by students and evaluated highly in the context of the effectiveness of the teaching process. It is the style in which teamwork, collegiality, sharing knowledge and information, and fair, just, and unbiased relationship between teachers and students is emphasised.

CONCLUSION

From the results of this research, it can be concluded that from the point of view of the students, cooperation and objectiveness are seen as predominant components of the effectiveness of the teaching and learning process. One limitation of this research concerns the effectiveness indicators, i.e. the instrument used to measure this attribute. Namely, the indicators of possibilities for practical application of acquired knowledge in evaluating effectiveness were notincluded. It could represent an obstacle to drawing a conclusion related to the effectiveness of the teaching process since previous studies pointed out that effectiveness could be defined not only as the understanding of the learning outcomes but also as a practical application of the acquired knowledge (Altbach, 2002; Allan, 1996; Chen & Chen, 2010; Muñoz-Martínez, Gárate-Vergara, & Marambio-Carrasco, 2021). The other limitation of this study is related

to the sample, since only one half of the educational process (the students) was included in the research, without exploring the other half (the teachers).

Although there are methodological problems, this research can, at least partially, offer some directions for improving higher education in order to achieve higher effectiveness.

FOUNDING

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FAKTORSKA STRUKTURA EFEKTIVNOSTI NASTAVNOG PROCESA U VISOKOOBRAZOVNIM INSTITUCIJAMA – PERCEPCIJA STUDENATA

Nataša Blagojević Papić

Maja Vukadinović

Ana Vuković Jovičić

Sažetak: *Cilj ovog istraživanja jeste da se ispita percepcija studenata kada je reč o indikatorima efektivnosti nastavnog procesa. Učesnici istraživanja bili su studenti (N= 361) različitih visokih strukovnih škola sa teritorije AP Vojvodine. Instrument je činila Lista indikatora efektivnosti nastavnog procesa preuzeta iz prethodnog istraživanja vezanog za karakteristike visokoobrazovnog procesa na različitim univerzitetima. U Listu je bilo uključeno 13 indikatora: fleksibilnost, timski rad, kolegijalnost, kreativnost, kooperativnost, kritičko razmišljanje, kognitivne veštine, znanje, preduzetnički duh, kvalitet, interaktivnost, objektivni sistem ocenjivanja i dostupnost profesora. Rezultati faktorske analize pokazali su da se u percepciji studenata primenom Maximum Likelihood metoda izdvajaju dve komponente a to*

su Kooperativnost i Objektivnost. U kontekstu dobijenih rezultata diskutovane su mogućnosti poboljšanja nastavnog procesa sa ciljem postizanja veće efektivnosti.

Ključne reči: *visoko obrazovanje / percepcija studenata / faktorska analiza / efektivnost / kooperativnost / objektivnost.*