FACTOR STRUCTURE OF TEACHER SELF-ASSESSMENT INSTRUMENT (SITE II)*

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Abstract

The purpose of the current study was to test psychometric characteristics of the Self-assessment Instrument for Teacher Evaluation - SITE II (Akram & Zepeda, 2015), namely, to determine the factor structure of the instrument which would enable us to conduct a research of the teacher self-evaluation. The study sampled 310 teachers of upper-primary subjects and elementary school grade teachers from 16 primary, mixed-sex public schools in Serbia. The researchers have applied exploratory factor analysis and extracted variables and determined four factors which correlate moderately and positively, with satisfactory reliability of all four sub-scales. The factors are Subject Matter Knowledge, Instructional Planning and Strategies, Learning Environment and Effective Communication, Assessment. The conclusion is that the SITE II scales in our sample, can in fact be used in its modified version of 26 items and a four-factor structure of the instrument.

Key words: Evaluation; Factor structure; Psychometric characteristics; Self-assessment; Teachers.

1. Introduction

The 21st century brings many invasive and intensive changes in the field of science, technology, education and health systems. For this reason, the skills that the workforce must possess need to change as well, in order for it to remain viable on the market. These changes have reflected also on education systems, including their direct and indirect elements. The demand that is imposed before the teachers of the 21st century is to empower future generations for progress and growth in an environment which is under the influence of intense, profound changes, where the teachers have to be prepared and capable of battling the challenges that learning, education and schools face (Donaldson, 2010).

Given that the 21st century is often seen as the era of life-long learning and improvement, so it is evident that we should turn our attention towards professional development and growth of the teachers. Earlier researches confirms that staff development programs are most successful when they stem from direct needs of the teachers for whom they are intended (Sergiovanni & Starratt, 1983; Wood, McQuarrie & Thompson, 1982 as cited by Iwanicki & McEachern, 1984; Blaško, 2013) where the process of defining the teacher's needs is majorly contributed by self-assessment technique. It is an opportunity for teachers to assess their performance honestly and critically, to assess and recognize their own strengths and weaknesses and recognize the areas of possible improvement (Iwanicki & McEachern, 1984).

According to the definition given by Klenowski, self-assessment is assessment of the value of one's performance and identifying strengths and weaknesses with the aim of improving learning goals (for both teachers and students) (Klenowski, 1995). Self-assessment is based on the humanistic school paradigm, on the approach of self-directed studies. Humanistic school feels that emotional factors, personal growth and belief in the basic human values are unduly overlooked in an overly materialistic and mechanistic society and insists on the much-needed changes accordingly (Akram & Zepeda, 2015).

1.1. Problem of Research

Numerous researches verify the significance of teacher self-assessment for professional development of the teachers and improvement of the education systems (Stronge, 2010; Ngoma, 2011; Akram & Zepeda, 2015). The importance of self-assessment is evident not only in detecting one's own professional and practical needs, but also in assessing the efficiency in practice. "Effective teachers are expected to demonstrate competence in subject matter, perform high levels of teaching skills, meet the accountability standards, share professional knowledge with their colleagues, care deeply about students and their success, and hold distinctive qualities that characterize their effectiveness" (Akram & Zepeda, 2015, p. 134). The finds of contemporary research account for the need of the scientists to deal with the identification of teacher efficiency (Ingvarson, 2002; Korthagen, 2004; Gallagher, 2004; Kimball *et. al.*, 2004). Along with the need came the inclination of the scientific community to design an instrument best suited for teacher self-assessment stemming from the national framework of standards for teachers (Blaško, 2013; Akram & Zepeda, 2015).

The analysis of the available sources has not recorded that the SITE II scale was later validated o translated into other languages. Having in mind that so far studies of this type and topic have not been conducted in Serbia, it would be important to assess the psychometric characteristics of the Self-assessment Instrument for Teacher Evaluation (SITE II) instrument in our environment and with a wider sample which is also the purpose of this study. This paper shows psychometric characteristics of the instrument as well as factor structure, which are then used for further recommendations in accordance with the obtained results.

1.2. Research Focus

In terms of components of teacher self-assessment which are most found in research, there are several models. Authors Akram and Zepeda (2015) analyze the following factors within the teacher self-assessment: subject matter knowledge, instructional planning and strategies, assessment, learning environment, effective communication. Within the study which was conducted under the patronage of National Council of Educational Research New Delhi (2019) Teacher`s Self-assessment Rubrics (TSAR) was used, which contains factors such as designing learning experiences, knowledge and understanding of the subject matter, strategies for facilitating learning, interpersonal relationship, professional development and school development.

Authors Ross and Bruce believe that self-assessment model integrates the following three processes which can be studied: self-observations, self-judgements and self-reactions (Ross and Bruce, 2007). Authors Iwanicki and McEachern highlight the significance of the types of information which can be obtained during the teacher self-assessment process and can be studied for this purpose: the open self, the secret self, the blind self, the undiscovered self (Iwanicki & McEachern, 1984).

Research which focus on the self-assessment of teachers are mostly related to students' perception of teachers and feedback (Montgomery & Baker, 2007; Hašková, Lukáčová & Noga, 2019), or it is conducted with the purpose of identifying staff development needs alongside the external evaluation of teachers (Iwanicki & McEachern, 1984; Peterson, 2000; Ross & Bruce, 2007; Stronge, 2010; Akram & Zepeda, 2015; Department of Teacher Education, 2019). Assuming that the teacher would rather monitor and improve their own behaviour starting with their own goals, expectations and outcomes, while relying on their own resources, abilities and assessment, authors Akram and Zepeda created Self-assessment Instrument for Teacher Evaluation (SITE II). This instrument relies completely on teachers' self-assessment and is contextually in agreement with the Standards of competencies for teachers and their professional development in our environment (Rulebook on the standards of competencies for the profession of teacher and their professional development, 2011). The inspiration for development of the scale was found in Stronge's construct of the indicators of high-quality performance and effective teachers (Stronge, 2010).

SITE was previously developed by National Professional Standards for Teachers in Pakistan, for the needs of the Ministry of Federal Education and Professional Training of Pakistan and UNESCO with the aim of evaluating teachers according to international standards (Akram & Zepeda, 2015; Dowpiset & Eamoraphan, 2018). SITE initially included six factors of Teacher self-assessment (Akram, 2012). However, due to low reliability of the subscales ($\alpha =.60$ i $\alpha =.7$) and a relatively small sample (N=155), the authors decided to exclude professional development indicator and rename the instrument to SITE II (Akram & Zepeda, 2015).

SITE II instrument includes five factors: *subject matter knowledge* – it refers to the teacher's knowledge of the subject itself as well as the nature of the curriculum, principles and methods of work which are deemed the most appropriate choice for

the learning process and students' progress; *instructional plan and strategies* – this refers to the ways teachers plan and program the educational contents, the choice of teaching materials, use of available technologies and other resources and ways of including students in the learning process *assessment* – this provides diagnostic information which refer to students' readiness and motivation to learn, as well as formative and summative information which are key for keeping track of the students' progress; *learning environment* – refers to the educational climate of the environment which directly affects the education process and level of motivation of all participants in the education process; *communication* – it testifies to ability of using the appropriate language in teaching in relation to the students' abilities as well as colleagues and parents (Sanders, 2000; Stronge, 2013; Akram & Zepeda, 2015; Dowpiset & Eamoraphan, 2018; Stronge, 2018).

SITE II scale is devised as a Likert type scale made up of 31 items and five factors. Following the validation of the instruments, the Authors reduced the scale to 28 items. The study which Akram and Zepeda conducted in 2014 sampled 279 (160 male and 119 female) teachers of English and mathematics boys' and girls' high schools in district Okara in Pakistan. The Cronbach alpha for the entire instrument is .94 while he reliability of the subscales was also satisfactory (subject matter knowledge α=.89; instructional planning and strategies α=.86; assessment α=.83; learning environment α=.75; effective communication α=.73).

2. Methodology of Research

2.1. Sample of Research

The sample for the research was comprised of 310 respondents, 80% of whom are females and 20% are males. The average age of the respondents is 43.26 years (SD=9.13) (table 1). They were primary school teachers of elementary school subject and elementary school teachers of young learners from 16 primary, mixed-sex public schools on the territory of Novi Sad. The sample is convenient, 16 out of a total of 22 schools in the territory of Novi Sad were included in the research. The data was collected from January to September 2020 during the COVID-19 pandemics which additionally impeded the research process.

Although the research was not conducted by random sampling, demographic characteristics of the subjects are comparable and diverse when regarded in relation to the total population of Serbian teachers (Statistical Office of the Republic of Serbia, 2014).

The used techniques were survey and scaling, the respondents were given instructions and the purpose of the research was explained. The filled out the questionnaire in written form, anonymously and on voluntary basis. After the questionnaires were completed, data was prepared for statistical analysis.

Table 1. Descriptive characteristics of the sample (n=310)

Subjects' gender	
Female subjects	248 (80%)
Male respondents	62 (20%)
Subjects' age (Mean ± SD)	43.26±9.13
Years of teaching experience	
1-5 years of teaching experience	53 (17.1%)
5-15 years of teaching experience	85 (27.4%)
15-25 years of teaching experience	108 (34.8%)
Over 25 years of teaching experience	64 (20.6%)
Level of qualifications	
Undergraduate studies	192 (61.9%)
Master studies	110 (35.5%)
Specialist studies	4 (1.3%)
Doctoral studies	4 (1.3%)
Subject field	
Lower grade teachers	102 (32.9%)
Humanities	101 (32.6%)
Sciences	59 (19%)
Art and sport	31 (10%)
Practical subjects	17 (5.5%)

2.2. Instrument and Procedures

The data gathered in the first part of the instrument referred to personal characteristics of the respondents while the second part contained Self-assessment Instrument for Teacher Evaluation (SITE II) (Akram & Zepeda, 2015). Initially, the SITE scale contained six factors and 31 items. Due to the low reliability of the subscales (Cronbach alpha was between .60 and.70), the scale was revised and reduced to 28 items and a five-factor solution (Akram & Zepeda, 2015). The authors identify the following factors: Subject Matter Knowledge ("I demonstrate accurate knowledge of my subject matter"); Instructional Planning and Strategies ("I use strategies to enhance students' understanding"); Assessment ("I conduct class tests to monitor student performance"); Learning environment ("I create friendly and supportive classroom environment"); Effective Communication ("I use correct vocabulary and grammar in speaking & writing").

Following the validation, Akram and Zepeda (2015) established that the statements were proven non-discriminatory after the validation, hence the researchers have opted for using the revised version of the instrument. Primary school teachers were asked to assess the level of agreement the with the statements in the five-point Likert scale, where 1 denotes "never" and 5 denotes "always". Examples of the items evaluated are: "I maintain students' results and use future improvement" and "I understand individual differences of students and teach

accordingly". The reliability was measured in the subscales by Cronbach's alpha coefficient which spans form .743 to .899. SITE II scale exhibited high level of reliability and validity in initial research (Akram & Zepeda, 2015).

2.3. Data Analysis

Latent structure of the questionnaire was discovered through exploratory factor analysis, by using principal component model and Promax factor rotation and SPSS 19 software package. The items with communality of over .30 were not included in the further analysis as well as those which have cross loadings with two or more factors. To conduct the parallel analysis the researchers used the Factor software (Factor 10.9.02) devised by Lorenzo-Seva and Fernando (2006).

3. Results of Research

3.1. Initial check of the questionnaire solution

Using Horn's parallel analysis (Lorenzo-Seva & Fernando, 2006) 4 factors were extracted (table 2). The procedure which is based on the hypothesis that only those factors or components whose eigenvalues are larger in relation to eigenvalues obtained by random data with analogue characteristics is called parallel analysis. It is a procedure which considers the variability which represents the result of the specificity of the sampling and can be interpreted as a modification of Kaiser-Guttmann's rule, given the fact that it allows for the opportunity for eliminating those dimensions whose variance is not higher than the one expected of random data. (Subotić, 2013).

Table 2. Extraction of the number of factors

Factor No.	Eigenvalue	Variance percentage	Cumulative variance %	AS random eigenvalues	Decision
1.	10.595	37.839	37.839	1.599	Accept
2.	2.317	8.274	46.113	1.512	Accept
3.	1.771	6.324	52.437	1.445	Accept
4.	1.263	4.512	56.949	1.188	Accept
5.	1.072	3.828	60.776	1.138	Reject
6.	0.920	3.287	64.064		
7.	0.815	2.910	66.974		

Kaiser-Meyer-Oklin test is satisfactory (KMO=.934). Bartlett test of sphericity reached significance at the level p<.001 (p=.000) and indicates that the matrix is acceptable for factorization (table 2). We obtained a four- factor solution which explains 56.95% of the questionnaire variance, and communalities vary from .334 to .732. According to the component matrix it is evident that there are cross-loadings on items 3 (.392 i .630), 7 (.333 i .461) i 8 (.347 i .363). After eliminating the third item ("I demonstrate a variety of skills of my subject area(s)") and the eighth

item ("I base instruction on goals that reflect high expectations"), a four-factor structure was obtained. The percentage of explanation of variance is 58.17% and communalities range between .430 and.743 (table 3).

Table 3. Component matrix

		Factor			
		1	2	3	4
25	I encourage students to interact respectfully	.905			
23	I create friendly and supportive classroom environment	.892			
28	I respond to students' questions in appropriate language	.813			
27	I explain lessons according to the age and ability of students	.778			
21	I create a climate of mutual trust and respect in classroom	.769			
26	I use correct vocabulary and grammar in speaking & writing	.721			
24	I ensure students' participation in the learning process	.702			
22	I maintain a classroom setting that minimizes disruption	.646			
18	I maintain students' results and use future improvement		.859		
16	I conduct class tests to monitor student performance		.816		
15	I use student learning data to guide planning		.766		
20	I keep official record of students' learning progress		.764		
14	I teach the required curriculum according to time-table		.630		
19	I revise content to enhance students' achievement		.600		
17	I evaluate students' performance and provide feedback		.486		
10	I change teaching methodology to make topics relevant			.855	
12	I use appropriate material, technology, and resources			.842	
5	I use school and community resources to help students			.752	
9	I use strategies to enhance students' understanding			.728	
6	I teach according to the intellectual, emotional needs of the students			.530	
11	I understand individual differences of students and teach accordingly			.511	
13	I engage, motivate, and maintain students' attention			.433	
1	I demonstrate accurate knowledge of my subject matter				.848
2	I link content with past and future learning experiences				.660
7	I effectively address appropriate curriculum standards				.597
4	I communicate content in ways that students can understand				.415

Based on the content of the first factor which includes items 25, 23, 28, 27, 21, 26, 24 and 22 (Table 3), we can name it Learning Environment and Effective

Communication. This factor includes motivational learning environment, interaction and effective communication between teachers and students.

Research shows that positive climate in the classroom (learning environment) enhances the students' achievements (Akram & Zepeda, 2015; Stronge, 2010; Wang, Wang, Wang, & Huang, 2006). Teacher efficiency is also evident in their communication skills. Efficient teachers are more productive in their communication with students and are able to adapt their language and to listen actively (Stronge & Tucker, 2003). The second factor was named Assessment and it includes the following items: 18, 16, 15, 20, 14, 19 and 17 (Table 3). This factor includes the process of assessment of the students' current achievement, where the teacher collects and analyses formative and summative information regarding students' progress (Sanders, 2000). The third factor includes items 10, 12, 5, 9, 6, 11, 13 (Table 3). This factor was named Instructional Planning and Strategies and it refers to teacher's knowledge of the different teaching strategies and techniques with the aim of maximizing student learning (Tomlinson, 1999; Stronge, 2010). The fourth factor was named Subject Matter Knowledge, and it is made up of items 1, 2, 7, 4 (Table 3). It includes the teacher's knowledge and usage of the subject matter, which refers to the quantity, organization of matter and teaching skills of the teacher (Akram & Zepeda, 2015; Stronge, 2010).

Based on the correlation matrix (Table 4), we can deduce that the factors correlate moderately and positively.

Table 4. Component Correlation Matrix

Component	1	2	3	4
1	1			
2	.513	1		
3	.539	.535	1	
4	.537	.425	.430	1

3.2. Reliability of the questionnaire
Subscale of the first factor includes 8 items, and Cronbach's alpha for the first subscale (Learning Environment and Effective Communication) is .899. After the analysis of the item, we can conclude that the reliability of the first factor would not be affected by eliminating any of the items (Table 5).

Table 5. Item analysis of the subscale of the first factor

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
21	32.7097	8.744	.685	.886
25	32.6387	8.821	.732	.883
23	32.7032	8.229	.803	.875
28	32.6032	8.881	.719	.884
27	32.6710	8.558	.715	.884

26	32.6419	8.943	.616	.892
24	32.7968	8.434	.670	.888
22	32.9000	8.382	.596	.898

The second factor (Assessment) contains seven items and Cronbach alpha for this factor is .862. Item analysis of the second factor shows that the reliability of the second factor would not be affected by eliminating any of the items (Table 6).

Table 6. Item analysis of the subscale of the second factor

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
18	25.8613	10.903	.728	.828
16	25.8581	11.313	.730	.829
15	26.1581	11.091	.684	.834
20	25.9452	11.353	.643	.840
14	26.0871	12.326	.467	.864
19	26.1452	11.516	.583	.850
17	25.6677	12.333	.600	.847

The third subscale (Instruction of Planning and Strategies) includes seven items and its reliability is .842. Item analysis of the third factor proved that the reliability would not be affected by eliminating any of the items. (Table 7).

Table 7. Item analysis of the subscale of the third factor

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
10	25.6968	8.697	.682	.808
12	25.7645	8.569	.624	.817
5	25.7903	8.904	.522	.834
9	25.6968	8.756	.652	.812
6	25.6065	9.294	.581	.824
11	25.5613	9.076	.554	.827
13	25.5742	9.171	.582	.823

Cronbach's alpha for the fourth subscale is .743 and it includes four items.

Based on Table 8 we can devise that some changes would occur by removing the seventh item. However, those changes would not significantly influence the reliability of the subscale apart from reducing the number of items, for which we found no theoretical ground. Hence, we decided to keep the item in the given factor.

Table 8. Item analysis of the subscale of the fourth factor

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	13.4000	2.027	.537	.685
2	13.3806	1.991	.619	.639
4	13.4194	2.050	.571	.666
7	13.6065	2.142	.433	.745

Based on the Cronbach's alpha we obtained for all subscales, namely the indicator of internal consistency, we can determine that we can use all four factors which relate to teacher self-assessment scale as reliable measure.

4. Discussion and conclusion

The purpose of the present study was to examine the psychometric characteristics of the SITE II instrument, namely, to determine its factor structure with the goal of using it in Serbia.

The composite structure of the instrument is made up of 28 items, which the authors grouped into five factors (Akram & Zepeda, 2015). By the means of Horn's parallel analysis, we extracted four factors (Learning Environment and Effective Communication; Assessment; Instructional Planning and Strategies and Subject Matter Knowledge), and the four-factor solution was explained with 56.95% variance of the questionnaire with communality ranging from .334 to.732. Due to high cross-loadings, two items were eliminated, which reduced the instrument to 26 items with pure four-factor structure and the percentage of explanation of the variance of the questionnaire of 58.17% and communalities ranging from .430 to .743. The four factors that were obtained mutually correlate moderately and positively, and the reliability of all four subscales was found high.

Having in mind that the data the researchers obtained through the self-assessment of the teachers give a unique insight in their instruction practice, as well as their personal perspective, which cannot be done by any other means (Berk, 2005) it is evident that there is a need for conduction more studies which deal with the topic. This is the source of the need for finding and validating the most adequate instrument for teacher self-assessment with the aim of self-evaluation.

Teacher self-assessment entails continual process of analysis, guiding, modifying and planning of instruction practice, as well as personal contribution of the teachers to the school culture. Self-assessment also includes constant self-examining: What have I done well? What am I satisfied or dissatisfied with? What are the ways

can I contribute to improving my own practice or practice of the school as a whole? How can I improve environment for the students and communication with them? What meaning do the grades that students get have for me? How can I improve the learning process by using various teaching strategies and techniques? What is the level of subject matter knowledge, and what are my teaching skills like? Examining the psychometric characteristics of this instrument had the goal of validating the questionnaire which would be used in research aimed at providing teachers with answers to the questions asked, but also giving them a base for developing and improving their competencies and the education system in Serbia as a whole.

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