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Adaption of the Students' motivation towards science learning (SMTSL) questionnaire into Albanian language

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Abstract. This study focused at adapting the students' motivation towards science learning questionnaire (SMTSL) into the Albanian version, originally developed by Tuan, Chin, and Shieh (2005), into a different cultural context, focusing on chemistry learning subject. 366 students from natural sciences high school enrolled in 10th, 11th and 12th grade were randomly selected to participate in the study. The present study applied and confirmed the questionnaire with 35 items and 6 subscales, same as in orginal version. The questionnaires' reliability (α.86) was acceptable for the Kosovar context and study's findings were in compliance with the results of the previous studies. SMTSL's factioral structure was confirmed using explanatory factor analysis. Results showed that the questionnaire is valid and six-subscales motivation construct can be applied in this study's cultural setting and sample with reference to learning chemistry.

Keywords: Motivation, science learning, chemistry learning, questionnaire adaptation

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INTRODUCTION

One of the key aspects that drive individuals to undertake certain activities to achieve a goal refers to motivation (Maehr & Meyer, 1997). According to many approaches and studies, the word motivation is related to different factors and vigor that "move" people so that they respond (Ainley & Ainley, 2011; Broussard & Garrison, 2004; Ryan & Deci, 2000), and as a process which includes activities oriented toward goals (Cook & Artino, 2016). Many often motivation refers to an internal force that influence and drive toward our thoughts, feelings and goal-oriented behavior (Brophy, 2013; Mubeen & Reid, 2014; Tariq, Mahmood & Mubeen, 2011). Brophy (2003) refers to motivation as a theoretical concept which implies several stages to explain goal-oriented behavior. Ainley (2004) describes motivation as something about "energy, direction, the reasons for our behaviors and what we do and why" (p. 2). In addition, according to Başdaş (2007) motivation can be used as a meaning to trigger individuals' respond towards an engagement. In conclusion, factors for leading humans' behaviors and all related energies in achieving its goals are fully determined by motivation (Azizoğlu & Çetin, 2009; Yılmaz & Çavaş, 2007).

Based on these conceptions, it can be indicated that the goal, direction, efforts and specific actions could be impacted by several factors (intrinsic or extrinsic) which can trigger motivation. In this regard, considerable numbers of theories have tried to shed light on specific aspects of motivation by contributing to a multidimensional and unique perspective of explaining human motivation and distinct implications for practice and future research (Cook, Thompson & Thomas, 2011). Cook, & Artino (2016) highlight that social-cognitive theory emphasizes self-efficacy as the main incentive for achievement; expectancy-value theory emphasize the expectation of success and perceived value as a function of motivation; while the attribution theory focuses on the causal attributions individuals create to explain the results of an engagement. Goal orientation theory suggests that students tend to be active in achievement tasks, rather than be focused on content or about doing better than others or avoiding failure-performance goals (DeShon & Gillespie, 2005; Kaplan & Maehr, 2007; WandeWall & Cron,

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2001). In countrary, self-determination theory highlights freely actions motivated by intrinsic interests or by extrinsic values that have become integrated and internalized (Deci, Vallerand, Pelletier & Ryan, 1991; Ryan & Deci, 2000).

Motivation and learning

The concept of motivation can be viewed from a complex perspective which attempts to explain human behavior and efforts at different endeavors (Sevinc, Ozmen & Yigit, 2011). It is considered an important factor in many spheres of life, consequently in the field of learning and academic success (Deci & Rein, 2008). Motivation to learn is believed to be one of the significant issues not just for researchers but in general for the educational system. Learning process can be considered as a behavioral change, therefore motivation is crucial for behavior assuming that motivation can be affected from indivudual as well as environmental factors (Schumacher & Ifenthaler, 2018). Since there are numerous factors that indicate motivation, motivation towards learning can steam from different sources as well, for example: the need for ambition, self–efficacy, expectations, curiosity, goals and achievement. Motivation for learning can be internal such as the enjoyment of learning and problem-solving in a subject area, or the desire for academic recognition and status (Jordan, Carlile & Stack, 2008). Curiosity, persistence, learning and performance are domains related to motivation (Barlia & Beeth, 1999; Vallerand et al, 1992). According to Palmer (2005) from the educational viewpoint, learning process occurs when students permanently are motivated. Therefore, motivation can be considered as an educational variable that initiate learning and promote learning skills (Barlia, 1999).

Since the learning process is considered a lifelong process, in order to continuously be acquainted with updated knowledge and a process of self-development, a high motivation is crucial. Tuan, Chin & Shieh (2005) emphasize motivation as an affective component for learning because students' motivation is responsive for an effective learning and good scores achievement. Most psychological theories agree that changes resulting from learning occur in the way how students' think, feel and behave (Schunk, 2012; Illeris, 2016). In the broadest sense, learning is the process of combining experience and practice, which impacts changes in individuals' thinking and acting (Woolfolk, 2010).

Motivation towards science learning

An important goal of the general education and science system is to encourage the younger generation and professionals to foster motivation for science, both, to cultivate it and to practice (Dermitzaki, Kotsis & Vavougios, 2013). Motivation towards science learning is of particular importance, first for knowing how to integrate science into practical principles related to learning and secondly it's a vital factor in many other dimensions such as: critical thinking and supporting additional literacy basic skills for teaching science (Bolat, 2007; Lee & Brophy, 1996). In addition, Çavas (2011) stresses that motivation to learn science supports the insights of students which is an added value to learn and comprehend science. Numerous factors are reported to affect the enhanced motivation of students to learn science such as: gender, class level, the level of education of parents, academic accomplishment, the engagement in laboratory tasks, attending additional courses, using technology (Gbollie & Keamu, 2017; Sevinc, Ozmen & Yigit, 2011). In addition, achievement in science courses is related with students' motivation level (Chan & Norlizah, 2017). Using different approaches during teaching process requires implying several teaching strategies, for example: learning related to context, to projects, instruction, web-based, which may indicate in matching internalized students styles of learning and increase their motivation towards science learning and their achievement grades (Argaw, Haile, Ayalew & Kuma, 2016; Dasari, 2006; Vaino, Holbrook & Rannikmae, 2012; Wang & Reeves, 2007). If taking into consideration the constructivism approach, prior knowledge plays an important and active role to construct new knowledge, which can impact the motivation to learn (Mintzes, Wandersee & Novak, 1998; von Glasersfeld, 1998). Hence, students' perceptions of the importance and significance of the assignments, influence their engagement and active role in using both prior knowledge and insights to learn, whereas, when they do not perceive assignments as inappropriate, the likelihood of using more superficial strategies and only memorizing information during problem solving, are bigger (Pintrich and Schunk, 1996).

Inappropriate teaching methods can be considered as a reason for low motivation levels toward science especially chemistry learning (Devetak & Glazar, 2011). Missing concretization tools can also affect motivation for science and academic achievement (Hofstein & Lunetta, 1982; Okebukola, 1986; Hofstein, 2004).

In relation to the above mentioned factors impacting motivation for science learning, Tuan, Chin & Shieh (2005) mention six important dimensions/constructs which impact motivation for science learning, They have also focused on a combination of factors by incorporating constructivism approach and other learning and motivation strategies. The six dimensions/constructs are the main dimensions which are represented and used to measure motivation towards learning not only in their original study, but in the present study as well (self-efficacy, active learning strategies, science learning value, performance goal, achievement goal, and the learning environment stimulation). These six factors were respectively applied and analyzed appropriately in the methodology section for adapting a questionnaire into the Albanian version (Kosova context), providing careful methodological review for its objectivity and validity.

Kosovo has made considerable efforts through its educational strategic documents and new Curriculum Framework, to encourage students for science learning. In this regard the educational system of Kosovo has been focused in capacity building, investing in institutional and legal infrastructure to make science learning a key area of study (EC, 2018; MEST, 2016; KFOS, 2014).

METHODS

The present study

The study focused on describing the process of adapting the students' motivation towards science learning questionnaire (SMSTL) into the Albanian language, with a sample of high school students, in order to measure their motivation towards chemistry learning. The original questionnaire was developed by Tuan, Chin, and Shieh (2005), from where the permission was obtained to use for the present study context. While describing the adaptation process, the study focused mainly on the adequate parameters and analysis to verify questionnaire's validity and reliability dimensions.

Participants: Three hundred and sixty-six students from natural science high school (236 females and 130 males) enrolled in the 10th, 11th and 12th grade were selected randomly to be part of the study sample. The sample consisted of one of the main–well known Natural Sciences High Schools in Prishtina, named "Xhevdet Doda".

Table 1. *Demographic characteristics of the sample: its spread according to the year of study and gender*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	236	64.3	64.5	64.5
	Male	130	35.4	35.5	100.0
	Total	366	99.7	100.0	
Missing	System	1	.3		
	Total	367	100.0		
Grade		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	X	196	53.4	53.6	53.6
	XI	52	14.2	14.2	67.8
	XII	118	32.2	32.2	100.0
	Total	366	99.7	100.0	
Missing	System	1	.3		
	Total	367	100.0		

Instrument: The structured questionnaire for measuring motivation scale for learning science (SMTSL) was administered to gather data. The original version was used by Tuan, Chin & Shieh (2005), consisted of six main domains which tend to assess students' motivation towards science learning, mainly in six dimensions: self-efficacy, active learning strategies, the value of learning science subject, performance goals, achievement goals, learning environments stimulation. Demographic data were also included in the final questionnaire which enabled to compare and prove them in regard with other study variables.

Table 2. *Scales of the original SMTSL Tuan, Chin, Tsai & Cheng, (2005) number of items, example items and description (p. 550)*

Scale	Number of itmes	Example item	Description
Self-efficacy	7	Whether the science content is difficult or easy, I am sure that I can understand it	Students' beliefs about their own ability in achieving a good performance in science learning task
Active learning strategies	8	When learning new science concepts, I attempt to understand them	Students' active participation through a variety of strategies in constructing new knowledge based on their previous understanding
Science learning value	5	I think that learning science is important because I can use it in my daily life	Students' perception of important values associated to science learning
Performance goal	4	I participate in science courses to get a good grade	Students' competition with peers in classroom and attention seeking from the teacher
Achievement goal	5	During a science course, I feel most fulfilled when I attain a good score in a test	Students' satisfaction related with their increased competence and achievement during science learning
Learning environment stimulation	6	I am willing to participate in this science course because the content is exciting and changeable	Learning environment that affects the motives of students in science learning

Procedure: Initially the consent from the author of the original version of the questionnaire Tuan, Chin & Shieh (2005) was taken. The author gave permission to use a questionnaire for academic aims and following procedures were taken adequately. Data were gathered among 366 participants and they were informed properly regarding the aim of the study. The consent was taken from the principal of the school and parents as well. The questionnaires were administered during the April–June period 2019 (third period of academic year). During the administration process, the necessary feedback and clarification was provided. The Statistical Package for Social Sciences (SPSS version 23) was used to analyze the data.

Translation of the SMTSL

After the permission has been obtained, the SMTSL questionnaire has undergone a procedure of translation (from English to Albanian). A back-translation procedure has been applied as well from the Albanian and English native speakers. Part of the adaptation and translation team of the questionnaire were members of the teaching staff of the Faculty of Education with an expertise in the subjects of Psychology and Chemistry, who were also researchers of this study. A native English speaker was consulted as well to avoid translation dilemmas and adapt adequate concepts. After a few meetings and exchange of several versions, a consensus on the final version was made and an appropriate translation was chosen to be used in the study. In comparison to the original version of the SMTSL, the present research applied term chemistry instead of science. This is because based on the Kosovo's National Curriculum Framework, students' learn sciences subjects separately (chemistry, biology, physics, applied chemistry, applied biology and applied physics) and not integrated in one science course (MASHT, 2016).

Statistical Procedures

Initially, the data of the study were subject to the normality test (Kolmogorov-Smirnov) in order to have a clear picture of their distribution. Descriptive statistics of the data were reported as well. Then, factor analysis (EHF through the Rotation Method: Varimax with Kaiser Normalization) was used to verify the validity of the questionnaire. Further interpretations were made based on the loading of the factors and their inter correlations, and significance was assessed by Pearson's correlation. In addition, to verify the reliability of the questionnaire in general and its constructs, the Cronbach's alpha was applied and furthermore, to confirm the reliability, the Guttman lambda 2 reliability analysis was added as well.

RESULTS

SMTSL questionnaire's structural validity

Prior to applying the analysis to assess the reliability level of the SMTSL scale and its subscales, factor analysis with assertions consisting of each subscale was applied with SPSS version 23. After collecting data with the entire study sample, factor analysis of the whole questionnaire and its subscales was applied to identify the factorial structure and to confirm the homogeneity of the degree of the scale assertions (Bryman & Cramer, 1999). Prior to this, data were subject to the suitability for factor analysis. Overall, while interpreting the results for the whole questionnaire and its subscales regarding explanatory factor analysis, the focus was on the following indicators: Descriptive statistics; Item Correlation Matrix; Barlet's test of sphericity; total variance explanation; full illustrative overview (scree plot); and the Matrix of components with rotation. The observation of the correlation values indicated significant correlation at .39 and above .73 between subscales and items. The value of KMO (Kaiser-Mezer-Olkin), was .842 sufficiently acceptable (Pallant, 2010). Also, Bartlett's test of sphericity was statistically significant (.000), findings which sufficiently prove the appropriateness for factor analysis with regard to the general SMTSL questionnaire. Factor analysis was performed through the Rotation Method: Varimax with Kaiser Normalization which explains the correlation at 22.120%, sufficient for the social sciences. These data support the fact that, from these assertions, six main domains may be used to measure motivation toward science learning in six dimensions explained in the composition of the original questionnaire in the methodology section, which correspond to the original version of the questionnaire (Tuan, Chin & Shieh, 2005). The value for the Kaiser-Meyer-Olkin KMO measure of the first subscale (self-efficacy) was .837 (well above the acceptable value of .50). Values from Bartlett's test of sphericity showed statistical significance (.000), sufficient value to prove the appropriateness for factor analysis with regard to the SMTSL subscales in general.

Table 3. *Factorial load of items within questionnaire subscales*

Factor load of sub-scales	I. Self-efficacy	II. Active learning Strategies	III. Science learning Value	IV. Performance Goal	V. Achievement Goal	VI. Learning Environment Stimulation
Self-efficacy						
Q1.	.742					
Q2.	.530					
Q3.	.737					
Q4.	.780					
Q5.	.633					
Q6.	.678					
Q7.	.627					
Active learning Strategies						
Q8.		.651				
Q9.		.691				
Q10.		.661				
Q11.		.564				
Q12.		.349				
Q13.		.607				
Q14.		.587				
Q15.		.668				
Science learning Value						
Q16.			.628			
Q17.			.453			
Q18.			.481			
Q19.			.663			
Q20.			.760			
Performance						
Goal				.444		
Q21.				.692		
Q22.				.859		
Q23.				.814		
Q24.						
Achievement						
Goal					.679	
Q25.					.513	
Q26.					.802	
Q27.					.862	
Q28.					.758	
Q29						
Learning environment stimulation						
Q30.						.316
Q31.						.777
Q32.						.737
Q33.						.788
Q34.						.654
Q35.						.782

Factor analysis was performed through the Rotation Method: Varimax with Kaiser Normalization which explains the correlation at 46.23%. For the second subscale (active learning strategies), the Kaiser-Meyer-Olkin KMO's measure obtained .768, as well as Bartlett's test of sphericity was statistically significant (.000), and Varimax's method with Kaiser Normalization explained the correlation at 36,704%. The third and fourth subscales, (the value of learning science subject) and (the performance goals) also obtained the Kaiser-Meyer-Olkin KMO's value of .648, respectively .607, including the Bartlett's test of sphericity, which showed statistical significance (.000) for both subscales, and the Varimax method with Kaiser Normalization which explains the correlation at 36.945% and 51.942% for both subscales.

Results from the fifth subscale (achievement goals) and the sixth subscale (learning environment stimulation) also resulted in significant and acceptable data to continue with the other methodological steps to adapt the questionnaire. Thus, the obtained value of the Kaiser-Meyer-Olkin KMO was .743 and respectively .732, including the Bartlett's test of sphericity, which showed statistical significance (.000) for both subscales, and the Varimax method with Kaiser Normalization which explains the correlation at 53.692% and 48.453% of explained variance. Table 3 presents the results of the factor analysis, for the entire questionnaire, divided into six scales, with adequate assertions and factorial loadings.

Following the confirmatory analysis, all of the items showed satisfactory factor loading by showing values not lower than .316. Hence, the final version of the applied questionnaire for this study consisted of 35 items, showing a percentage of explication of 22.120%.

SMTSL questionnaire's reliability

Once the validity of the questionnaire was tested, the general questionnaire and its subscales were subjected to measure the level of reliability, prior to being used in the selected sample. In this context, the Chronbach's alpha analysis was applied to analyze the internal consistency of the general construct of the questionnaire and each of its subscale. After completing the content validation and testing process on the reliability of the questionnaire, measuring scales were included in the final questionnaire, which was then used throughout the selected study sample (high school students). The reliability values of Chronbach's alpha showed .86 for the general scale, while satisfying values also for the subscales, with the exception of one subscale.

Table 4. *Means, standard deviations, reliability coefficients and Guttman's reliability values*

	Number of items	M	SD	Cronbach's α	Gutman split-half Coefficient
SMTSL	35	129.553	19.662	.86	.655
Self-efficacy	7	25.728	5.566	.79	.622
Active learning Strategies	8	31.271	5.041	.77	.764
Science learning Value	5	19.021	4.454	.65	.746
Performance Goal	4	14.579	3.387	.76	.764
Achievement goals	5	19.830	4.336	.71	.752
Learning Environment Stimulation	6	18.969	5.810	.70	.742

As for the internal consistency of the subscales, the values of the Cronbach's alpha appeared acceptable for all of the subscales (from .79 to .71), based also on the Cohen, Manion, and Morrison's (2000) cutoff criteria, although interferences were required in one of the subscales to increase the reliability value. Since the third subscale showed lower values of internal consistency (α.46), we have followed the suggestions of previous studies regarding the same issue in a different context and when an item was deleted (the one which we had also doubts about the proper understanding and objectivity) it indicated an increase in the alpha coefficient, from .46 to .65 (Dermitzaki, Stavroussi, Vavougis & Kotsis, 2013). In this regard, the self–efficacy subscale showed an internal consistency of (α0.79), active learning strategies (α0.77), performance goals (α0.76), achievement goal subscale (α0.71) and learning environment stimulation scale (α0.70). Furthermore, the reliability coefficients of the general scale and its subscales based on the Guttman's lambda 2 analysis showed satisfactory values, from .622 to .764.

When the Pearson's correlation analysis was applied to test the internal construct validity, the results showed that the subscales correlated positively with each-other, with a medium and high correlation coefficients which allows us to confirm the independency of the construct (see Table 5). The coefficient values of the correlations among scales vary from .21 to .53, indicating in this way an adequate variability and relation between scales within the overall construct of the motivation scale (see also Pekrun et al. 2004).

Referring to the correlation coefficients in the table below (Table 5), it can be understood that there are four subscales which dominate with the higher values of the coefficients, meaning they appear very inter-related to each-other, such as: self-efficacy, active learning strategies, the value of learning science and learning environment stimulation. Unlike these good relations, it was noticed that two other subscales didn't show strong correlations in comparison to the other set of the subscales of the questionnaire. The values from the table below (Table 5), show that the lower values of the coefficients were perceived among performance and achievement goal subscales.

Table 5. *Correlations between subscales and the general scale of SMTSL*

		Total_SE	Total_ALS	Total_SLV	Total_PG	Total_AG	Total_LES
Total_SE	Pearson Correlation	1	.514**	.357**	.200**	.306**	.412**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	365	365	365	365	365	365
Total_ALS	Pearson Correlation	.514**	1	.367**	.210**	.406**	.383**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	365	365	365	365	365	365
Total_SLV	Pearson Correlation	.357**	.367**	1	.211**	.373**	.473**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	365	365	366	366	366	366
Total_PG	Pearson Correlation	.200**	.210**	.211**	1	-.032	.098
	Sig. (2-tailed)	.000	.000	.000		.536	.061
	N	365	365	366	366	366	366
Total_AG	Pearson Correlation	.306**	.406**	.373**	-.032	1	.452**
	Sig. (2-tailed)	.000	.000	.000	.536		.000
	N	365	365	366	366	366	366
Total_LES	Pearson Correlation	.412**	.383**	.473**	.098	.452**	1
	Sig. (2-tailed)	.000	.000	.000	.061	.000	
	N	365	365	366	366	366	366

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

DISCUSSION and CONCLUSIONS

The study focused on describing the process of adapting the students' motivation towards science learning questionnaire (SMTSL) into the Albanian language. The original version was developed by Tuan, Chin and Shieh (2005) and the present study applied it into the different cultural context, with a natural sciences high school students as a targeted group, focusing on chemistry learning subject. Motivation to learn is believed to be one of the greatest topics for researchers, in particular for the educational system. Various theoretical approaches and studies have been developed to explain and understand the complexity of the motivation and numerous factors are said to impact the process of motivation and learning. Encouraging insights and science literacy in students and teachers to increase their motivation for science learning is crucial for learning outcomes. This can impact students' engagement in science learning and further their enhanced understanding of the science learning value. In order to measure students' motivation in general, adequate psychometric measurement parameters are needed in certain fields, in this regard in science learning (chemistry) as well. Previous studies using the students' motivation towards science learning questionnaire in diverse cultural contexts have been focused on the reliability and validity dimensions of the questionnaire to prove its internal consistency and construct validity. Several studies have applied adequate statistical procedures and standardization aspects to adopt the questionnaire for different contexts but for the same purpose, to measure students' motivation for science learning. In this regard, literature points out that few studies have focused on the explanatory factor analysis, while there were findings that indicate that additional set of factorial analysis were used to generally conclude the consistency of the questionnaire (Spector, 1992). The present study applied the explanatory factor analysis to confirm the validity and consistency of the questionnaire. In general, the findings of this study confirm that the scale appears to be acceptable and reliable and its factorial structure is consistent. When tested, the values of the correlation of the general scale and its subscales, the results showed medium to high correlations by supporting the questionnaire's internal construct validity.

In general, the results obtained through the explanatory factor analysis confirmed that the questionnaire is valid. The values regarding factorial loads of the items indicate to be greater than .36. According to Figueiredo-Filho & Silva-Junior (2010) these values are indicators of clear dissemination referring to significant values of the factorial loads, in our case, values between .31 and .78. In addition, this is further enhanced based on the KMO values obtained in this study, which appear to be rational taking into consideration the values of the range of .64 to .84 (Dini, Alves, Oliveira & Guirardello, 2014). The results for the items' loadings were significant as well and the general percentage of explication for the whole questionnaire, which consisted of 35 questions resulted to be 22.120% of the variance. This value reassures the validity of the questionnaire. The same results were suggested from the original study as well Tuan, Chin & Shieh (2005a) with two exceptions on two items which had lower factorial load regarding respective factors. In the literature, it is reported that few studies indicate positive results between these subscales of the questionnaire as a factor which impact general motivation towards science learning (Brophy, 1998; Hofstein, 2004; Pintrich & Schunk, 1996). In this regard, these subscales could be good indicators for measuring general motivation factor, hence the adopted instrument into the Albanian language for the Kosovar context could be an added value for the educational context to foresee and measure potential variables indicating the learning motivation in different fields.

Regarding the inter correlations between the subscales of the questionnaire, the highest correlations dominated between four subscales as follows: self-efficacy, active learning strategies, the value of learning science and learning environment stimulation, while the lowest correlations were perceived among two other subscales: performance goals and active goals. The same results with regard to the correlation coefficients among the subscales of the questionnaire were also confirmed in the study where the original version of the SMTSL was developed by Tuan, Chin, and Shieh (2005). In this regard, there are findings which emphasize the two abovementioned subscales showing lower correlations as well, when the general factor of the motivation was examined. Furthermore, findings on the higher correlations among the four subscales may show that for the targeted sample of this study, goal-oriented motivation dimension turns out to be an important dimension for learning chemistry in relation to the overall motivational constructs which the questionnaire measures. In conclusion, from the discussion of these findings and a process of the adaption of the questionnaire, it can be confirmed the usage of the first developed model of SMTSL by Tuan, Chin, and Shieh (2005) into different cultural settings and with different cohort-ages regarding the educational context.

Reliability analysis is another crucial parameter after the validation process of the adaption of the questionnaire. Therefore, according to the descripted values provided by Oviedo and Campos-Arias (2005), the values of Cronbach's alpha gained through the results of this study appear to be satisfied and acceptable. Hence, it can be concluded that the internal consistency of the whole questionnaire and its subscales for the Albanian version was acceptable. The reliability values of α for the general scale was .86, supporting also acceptable values for other subscales (from .79 to .71), with the exception of one subscale. These findings regarding the acceptable values on reliability analysis were compared with findings of previous studies which applied this scale in different cultural context but with the same aim of the study (Dermitzaki, Kotsis & Vavougios, 2013; Başer, 2007; Tuan, Chin, Tsai & Cheng, 2005; Yilmaz & Cavas 2007). The reliability values indicated that within the subscale of science learning value, the removal of one item, will have an impact in the higher value of reliability of this subscale. These findings are in line with findings from the present study as well and highlight the impact of this subscale within the general students' motivation rather than student specific personal characteristics regarding chemistry learning (Dermitzaki, Kotsis & Vavougios, 2013). Furthermore, findings from Tuan, Chin, Tsai & Cheng (2005) and Dermitzaki, Kotsis & Vavougios (2013) have also come across satisfied, but lower reliability value for the science learning value subscale, in contrast to the other scales (α0.70). This might be the reason that future directions of this study suggest the potential removal of one item (18) of this subscale when motivation towards science learning aimed to be measured in a wider population. Adding up, Guttman's reliability analysis indicated acceptable and satisfied values for the six subscales and the whole scale as well.

In conclusion, from the final findings of the present study, the researchers may conclude that the adopted questionnaire for assessing students' motivation towards science learning into the Albanian version, is valid and reliable. From this point of view, the findings may advise the administration and utilization of this questionnaire in the function of measuring motivational aspects in relation to learning within the wider educational system, principally in Kosovo's context. However, in order to further confirm these findings and expand further psychometric aspects of the utilization of the questionnaire in a wider spectrum with a wider sample, additional studies are certainly recommended. In this aspect, regarding the future directions of the research, it is important to consider other relevant factors, which may have an influence in the measurement of motivation through the use of the questionnaire in different contexts and with different demographic characteristics of the sample, such as ethnicity, economic background, gender, etc. (Pintrich, 2003).

In addition, from the final findings, it could be recommended that the Albanian version of the questionnaire could be further supplemented, especially the issue of language and phraseology, in order to have a better reflection of the complete questionnaire construct, as a very important and valid instrument for further expansion of the research regarding a comprehensive approach on learning and motivation. For future studies, it would be very important to emphasize and identify other interrelated factors/variables within the general motivation construct. This can serve as an added value to describe and understand how several constructs regarding motivation affect the quality and the process of science teaching and learning, as well as the improvement of teachers' professional practices and strategies that would positively influence students' level of motivation to learn science.

However, regarding the future research, findings identify few of the limitations of the study as well to consider further. Firstly, the sample of the study is not overrepresented, covering only students from Natural Sciences High School, focused in chemistry subject. Secondly, the findings of the present study should be carefully considered if the questionnaire would be applied in the larger general population to measure motivation in a wider spectrum of education, which might include other fields as well. Last, but not least, improvements of the Albanian version of the SMTSL, in particular regarding removal or editing some items of the questionnaire would result in tackling motivation toward learning from a broader perspective.

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