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Development of the Effective Musical Notation Reading Strategies Scale in Learning Violin and Factors That Affect the Level of Using Such Strategies

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ABSTRACT

This correlational study consisted of 396 undergraduate violin students studying at three different types of faculties in 18 universities in the 2016-2017 academic year in Turkiye. Data collection was made by using the Effective Musical Notation Reading Strategies Scale (EMNRSS) developed by the researcher and a personal information form. The data were subjected to exploratory and confirmatory factor analysis for construct validity, and in order to determine the internal consistency of the scale within the framework of the reliability tests, the Cronbach's Alpha coefficients were calculated. The three-factor structure that emerged in the exploratory factor analysis was confirmed according to the fit index values obtained as a result of the confirmatory factor analysis (X^2/SD = 2.38; NFI = 0.93; CFI = 0.96; GFI = 0.84; RMSEA = 0.059). The alpha value for the first factor of the scale (post-play) was calculated as 0.89 whereas such value was 0.87 for the second factor (during-play) and 0.83 for the third factor (pre-play). The alpha value calculated for the total scale score was 0.92. As a result of the analyses, a 34-item five-point Likert-type scale with three factors was developed. The EMNRSS may be utilized in future research to explore the factors that affect students' level of using such strategies. The applicability of the EMNRSS to levels other than undergraduate level may also be explored.

Key words: Violin Education, Musical Notation, Scale, Critical Thinking, Effective Reading Strategies

INTRODUCTION

Education is the most effective process that shapes, changes, develops and perfects individuals and societies. Music education is a significant branch of education where new tendencies in learning-teaching activities are explored and applied. The latest trends in education focus on how students will learn as independent learners, how they will motivate themselves towards learning and how they can orient their learning process effectively (Yokus & Yokus, 2010).

Learning music involves a complex processing system that includes attention, memory, psychomotor skills, auditory processing, visual-spatial processing, and long-term memory. Drawing attention to intentional strategies that include training ourselves to remember what to think about and when, Iott (2021) states that if we focus on how we learn, we can prepare for the following stages and challenges of instrumental learning. The first step to exploring how individuals learn should be understanding the brain's cognitive process that allows people to sense their surroundings and experiences, providing them context and significance. Reading skills are connected to cognitive function and have a crucial impact on learning. Therefore, using reading skills is one of the most crucial components in the music learning process.

Cecen and Alver (2011) stated that reading, one of the most important ways of acquiring knowledge, is evaluating and interpreting the signs and symbols perceived by the brain by the voice organs and the eyes. Besides, reading involves making meaning from the written characters and transforming the text into a meaningful sound with the cooperation of cognitive behaviors and psychomotor skills.

Just as reading skills affect music education, music education also affects reading ability. According to Tierney and Kraus (2013), music education and reading are theoretically interconnected, which means that music education improves reading ability.

Reading is a mental activity like listening, and it is necessary to visualize what is read and understand the thoughts put forward in the read text. In addition, it is essential to grasp the links between thoughts to compare them with the person's knowledge and reconstruct the existing information with these links. The act of reading consciously can be associated with critical reading skills. This skill includes effective and questioning reading. This approach, described as critical reading, includes critical thinking skills such as

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organizing, analyzing, reflective thinking, judgment, synthesis, problem-solving, and comparison in reading (Kurnaz, 2013). According to Johnson (2010),

> Part of being an effective reader, then, is approaching texts critically, to evaluate what you read for not just what it says, but how and why it says it. Being an effective reader also means being able to evaluate your own practices, always working to improve how you read (p. 13).

Why Effective Musical Notation Reading is Important in Violin Education?

According to Iott (2021), just as we add meaning to the text we read, we must add meaning to music to perform and read it well. Understanding and thinking about music is the foundation of effective music learning throughout one's musical development. It begins with the ability to control the tonality and meter of a piece, and through this skill, verbal descriptions and music theory concepts become meaningful.

In the 21st century, it is crucial to follow the developments in the field of educational sciences and conduct research on the adaptation of these developments to the music education process to raise individuals equipped. It is necessary to read the musical text and know the meaning of many signs and some rules to understand music (Danhauser, 2006, p. 9). To interpret music, more is needed rather than just to read the notes. The prerequisite for this is to read the musical text/work effectively and correctly perceive the message that the composer wants to give. Therefore, the work must first be read effectively to comment. Ciftcibasi (2013) stated that notes form the alphabet of music and that learning this alphabet effectively and accurately is a fundamental skill required to read and decipher musical writing and to understand the speed and speed changes of the player (p. 15).

Mastering a complex instrument like the violin requires a deep understanding of musical notation, reading skills, and technical proficiency. Reading skills, often underestimated in violin education, are crucial for a violinist to interpret and perform music correctly.

There has recently been an increase in the search for new learning-teaching approaches in violin education as a dimension of instrument education. Therefore, it is clear that adding new dimensions to playing/studying methods from other fields will contribute to instrument performance. In this context, using effective note-reading strategies within the critical reading skills framework is vital to provide students with cognitive, affective and psychomotor skills because instrument training begins with an effective reading of notes.

Music students need to read music at the same level of competence they have for reading books. A student with poor sight-reading skills will be deemed uneducated and illiterate. Effective musical performance relies on adequate sight-reading skills (Dalkiran, 2011).

Critical reading is the process of thinking about, evaluating and adopting the habit of using one's judgment on a reading material, which delivers a critical aspect to the teaching process. This approach, identified as reading by thinking, involves using critical thinking skills such as organization, analysis, reflective thinking, judgment, synthesis, problem-solving and comparison in reading (Kurnaz, 2013).

Strategy as a concept involving the system implemented in guiding the interaction between the student and the educational resources throughout a lesson (Senay Sen, 2013) is also often used in music and instrument education. In instrument education, the most crucial element the student interacts with is the musical pieces or etudes they will work on. This kind of interaction involving muscle-mind coordination requires the effective use of specific cognitive skills. Since instrument education starts by reading musical notation, it is necessary to use specific strategies to help students acquire reading skills. Instrument education is a process that requires the acquisition of many technical and musical skills. Thus, while performing, focusing on tone, rhythm, reading, technique, character, phrasing, nuances, color, expression, and understanding harmony and theory is necessary. Therefore, students who can determine the strategic approaches to achieve learning goals and organize their learning process can accomplish their goals more swiftly (Zimmerman et al., 1996, as cited in Yokus, 2010, p. 147).

Many studies so far show that music education increases students' critical thinking abilities and that critical thinking skills enable musicians to interact with a musical piece, providing the opportunity for foresight and problem-solving during the process. Therefore, critical reading skills develop students' critical thinking skills as an approach to teaching critical thinking based on content and skills.

In this regard, using the measurement tool, which involves strategies correlated with critical reading skills, aims to increase students' quality of reading musical notation, awareness about their own thinking and learning process and mindful execution of such process.

Measurement tools different from conventional measurement and assessment enable effective research for collecting more detailed information. Namely, education no longer solely aims to measure achievement, change of behavior or whether a particular behavior is acquired. It is also vital as to what a student does during the educational process, which methods would lead to better results, how the teacher can assist the student in this process and what kind of teaching methods the teacher uses for support. The measurement and evaluation of these aspects through various measurement methods directly influence the achievement of both students and teachers and the education itself (Turkmen, 2016).

In this regard, this study aims to develop a helpful measurement tool for determining the level of use of effective musical notation reading strategies in undergraduate-level violin students that renders valid and reliable results and determines the factors that affect such levels.

METHOD

Research Design

This study is correlational research that determines the level of use of effective musical notation reading strategies among undergraduate-level violin students and examines the difference in such levels in terms of the variables set within the

scope of this study. Correlational research aims to identify the relationship among two or more variables and obtain clues about the cause and effect (Buyukozturk et al., 2018).

Participants

The population of this study consisted of violin students studying in higher education institutions providing undergraduate music education in the 2016-2017 academic year in Turkiye. The sample of this study consisted of undergraduates of first-year, second-year students, junior or senior years receiving violin education in three different types of faculties (Departments of Music Education at Faculties of Education; Departments of Musical Sciences at Faculties of Fine Arts; or Departments of Music at State Conservatories) at 18 universities in 7 regions of Turkiye as determined by purposive sampling. Purposive sampling enables in-depth research by choosing information-rich cases related to the phenomenon of interest. It is preferred when it is aimed to work on one or more specific case(s) meeting certain criteria and having particular characteristics (Buyukozturk et al., 2018).

This study was designed as a correlational research consisting of 396 undergraduate violin students (n= 396) studying at three different types of faculties in 18 universities in the 2016-2017 academic year in Turkiye. Among the individuals who participated in the research sample, 312 were females (78.8%), and 84 were males (21.2%). Although the age group varied in the range of 16 to 37, it was determined that 202 participants (51%) were at the age of 21-25. Further, the average age was 21. About the faculty types, it was determined that 323 participants were students at the faculties of education, 45 at the faculties of fine arts and 28 at the conservatories. Among the participants, 86 were first-year students, 122 were sophomores, 98 were juniors, and 90 were seniors. For the types of secondary schools the participants had graduated from, it was observed that 314 participants had graduated from fine arts high schools (79.3%). 44.9% of the participants started playing the musical instrument at 10-14.

Research Instrument and Procedure

The "Effective Musical Notation Reading Strategies Scale" (EMNRSS, Appendix 1) developed by the researcher and a personal information form were used in the data collection. The researcher designed the personal information form for specific demographic characteristics of the participants, which involved gender, age, faculty type, class level, secondary school type and age of onset in playing the musical instrument. The effective musical notation reading strategies scale preparation process. During this process, a pool of items consisting of 93 items was prepared, which involved positive and negative statements by using cognitive theories forming the conceptual basis of this study and the learning strategies, metacognitive strategies, and critical reading strategies explained within the scope of these theories. This pool of items was reviewed by nine specialists, including a music educator, violin educator, Turkish language specialist and measurement and evaluation specialist. The feedback of the specialists about the validity of the scope was received, and the items were reviewed accordingly, reducing the number of items to 86. The scale form consisted of 86 items and was designed in a 5-point Likert-type as "(1) Never, (2) Seldom, (3) Sometimes, (4) Often, (5) Always". The scale was applied to 20 violin students at the Music Education Division of the Department of Fine Arts at Gazi Faculty of Education, Gazi University, to determine whether there were any incomprehensible items. In this regard, it was observed that all items were comprehensible and that there were no problems in terms of meaning.

The research data was collected with the approval of the ethics commission numbered 77082166-302.08.01-, obtained from the Gazi University Ethics Commission on 19/04/2017. Accordingly, the final version of the scale was applied in the relevant departments of the universities from which permission was obtained. The data was collected with the data collection form prepared by the researcher and used the method of data collection under observation. Furthermore, the scale was applied voluntarily. Before collecting data, the purpose of the research was explained to the students, and they were told that the research was optional. None of the students refused to participate in the research. Accordingly, a data set was generated based on the answers of 396 participants (n= 396).

Data Analysis

The data was analyzed using a computer software package commonly used in social sciences, enabling data calculation in this field. In the data analysis, within the validity and reliability testing framework of the "EMNRSS", exploratory factor analysis and confirmatory factor analysis were calculated for construct validity. Before the construct validity testing, the Kaiser-Meyer-Olkin (KMO) test was conducted for the suitability of the sample size, and Bartlett's test of sphericity was conducted to test the suitability of the data for principal component analysis. The Cronbach Alpha reliability coefficient was calculated to determine the scale's internal consistency.

RESULTS

Construct Validity

To determine the psychometric characteristics of the scale, firstly, exploratory and confirmatory factor analysis methods were used to provide proof of construct validity. Exploratory factor analysis aims to discover the factor structure based on the relations among variables, whereas confirmatory factor analysis analyses the assessment of the fit between the model and data tests the hypotheses formed about the relations among variables (Klein, 1998; Tabachnick & Fidell, 2007). Due to the small size of the study group, the exploratory and confirmatory factor analyses were made on the same group, which may be considered a limitation of this study.

Exploratory Factor Analysis

For exploratory factor analysis, analyses were conducted on the data collected (n=396). Concerning the adequacy

of sample size in factor analysis, Comrey and Lee (1992) report that 200 is fair and 300 is good (Comrey & Lee, 1992, as cited in Tabachnick & Fidell, 2007). Accordingly, 396 has been considered an adequate sample size in this study. The KMO value calculated according to the results of the Kaiser-Meyer-Olkin (KMO) test conducted for the suitability of the sample size has been determined as 0.91. Field (2013) reported that in evaluating sample size, KMO values above 0.90 may be interpreted as very good. As for testing the compatibility of the data for principal component analysis, Bartlett's sphericity test determined that the chi-square value was statistically significant ($p<.05$). In this regard, it is observed that the sample size of this study was appropriate for factorability. Additionally, since the test of sphericity was statistically significant, the data was suitable for principal component analysis.

An analysis of the eigenvalues obtained and variance values explained as a result of the principal component analysis reveals that although before rotation, there had been 4 factors with eigenvalues greater than 1, after rotation, i.e. at the final stage, the scale tested had three factors having eigenvalues greater than 1. Kaiser (1960) explained that factors with eigenvalues greater than 1 would be considered as a dimension of a scale (Kaiser, 1960, as cited in Yong & Pearce, 2013). Further, it is observed that the scree plot flattens out after the third dimension. Figure 1 shows the scree plot for the eigenvalues.

At the first stage, it was found that the eigenvalue of the first factor was 9.587, which accounted for 28.198% of the total variance; the eigenvalue of the second factor was 3.458, which accounted for 10.435% of the total variance; and the eigenvalue of the third factor was 2.022 which accounted for 5.946% of the total variance. After rotation, it was observed that the eigenvalue of the first factor was 5.812, which accounted for 17.095% of the total variance; the eigenvalue of the second factor was 5.428, which accounted for 15.964% of the total variance; and the eigenvalue of the third factor was 3.917 which accounted for 11.520% of the total variance. The three factors, in total, explained 44.58% of the variance in the scale scores. The varimax rotation method was used to determine the factor pattern of the items in the EMNRSS. The factor loadings obtained after the rotation are shown in Table 1.

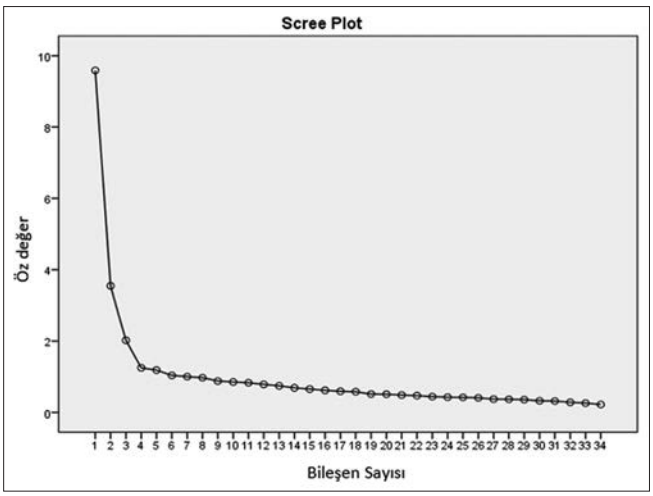

Figure 1. Scree plot for eigenvalues (Öz değer: Eigenvalue, Bileşen Sayısı: Number of Components)

In the principal component analysis conducted to reveal the factor pattern of the scale, those items with factor loading below 0.30 and overlapping items were left out of the analysis one by one, and the analysis was repeated. Reviewing the values submitted as the final status in Table 1, it is observed that the factor loadings of the items vary between 0.470 and 0.808. There is a total of 34 items on the scale, namely 13 in the first, 13 in the second, and 8 in the third. Following the items formed within the scope of this study, the first factor was determined as post-play, the second factor as during-play and the third factor as pre-play. The items to be included

Table 1. Factor loadings of scale

Items	Factors		
	1	2	3
i77	0.692		
i81	0.685		
i58	0.676		
i79	0.674		
i64	0.667		
i85	0.656		
i78	0.649		
i66	0.629		
i56	0.618		
i82	0.608		
i80	0.606		
i61	0.513		
i84	0.494		
i59		0.684	
i67		0.673	
i46		0.643	
i70		0.641	
i60		0.635	
i50		0.629	
i68		0.628	
i62		0.601	
i71		0.595	
i45		0.594	
i53		0.591	
i54		0.557	
i43		0.470	
i12			0.808
i10			0.720
i11			0.700
i14			0.614
i13			0.610
i1			0.513
i37			0.511
i36			0.500

in the scale were re-numbered based on the factor pattern and were lined up as follows: 1-8: pre-play / 9-21: during-play / 22-34: post-play.

The items of the pre-play dimension identify the strategies that students use. At the same time, they start reading musical notation and involve the strategies of the preliminary examination, paying attention to key concepts and planning the practice process. Examples of pre-play dimension are "I examine the time signature of the musical piece to determine my beat unit" or "By looking at the finger numbers on the musical piece, I know which positions I will use." The items of the second dimension under the title during the play identify the strategies students use while performing a musical piece by reading the musical notation. They involve repetition, organization and metacognitive strategies, the examples of which are "I don't practice on passages" or "While working on a piece, I don't know how to use the knowledge I gather from other lessons." The items of the post-play dimension define the strategies of watching oneself and evaluating and re-organizing the practice process. In this dimension, the student will record himself/herself, which he/she will watch later and evaluate, according to which the student will re-plan his/her practice and re-start the process, and if necessary, revise his/her practice strategy to work on correcting his/her mistakes. These stages will be repeated until the musical piece is performed at the desired level and quality. The post-play dimension may be exemplified by the statements, "I evaluate my performance after playing the piece" or "I deliberate on how to solve a problem I encounter in a piece."

Confirmatory Factor Analysis

A confirmatory factor analysis was conducted to verify the three-factor structure determined in the exploratory factor analysis. In evaluating the goodness of fit index obtained from the confirmatory factor analysis, "Criteria for Fit Indices in Structural Equation Modelling and Acceptance Cut offs" (Cokluk et al., 2018) were taken as the criteria. The goodness of fit index values obtained from the confirmatory factor analysis are shown in Table 2.

An analysis of the fit values submitted in Table 2 shows that the values obtained for all goodness of fit indexes are within the recommended values. In other words, they are acceptable. Further, Figure 2 shows a diagram of the measurement model examined through confirmatory factor analysis.

It is observed in the measurement model diagram shown in Figure 2 that the standardized factor loadings are between 0.41 and 0.79, whereas the error variance values vary between 0.38 and 0.83. The fact that the factor values are more significant than 0.30 and the error variances are smaller than 0.90 signifies that they are within the acceptable categories.

An evaluation of the EMNRSS in terms of both fit indexes and factor loadings reveals that the three-factor model for

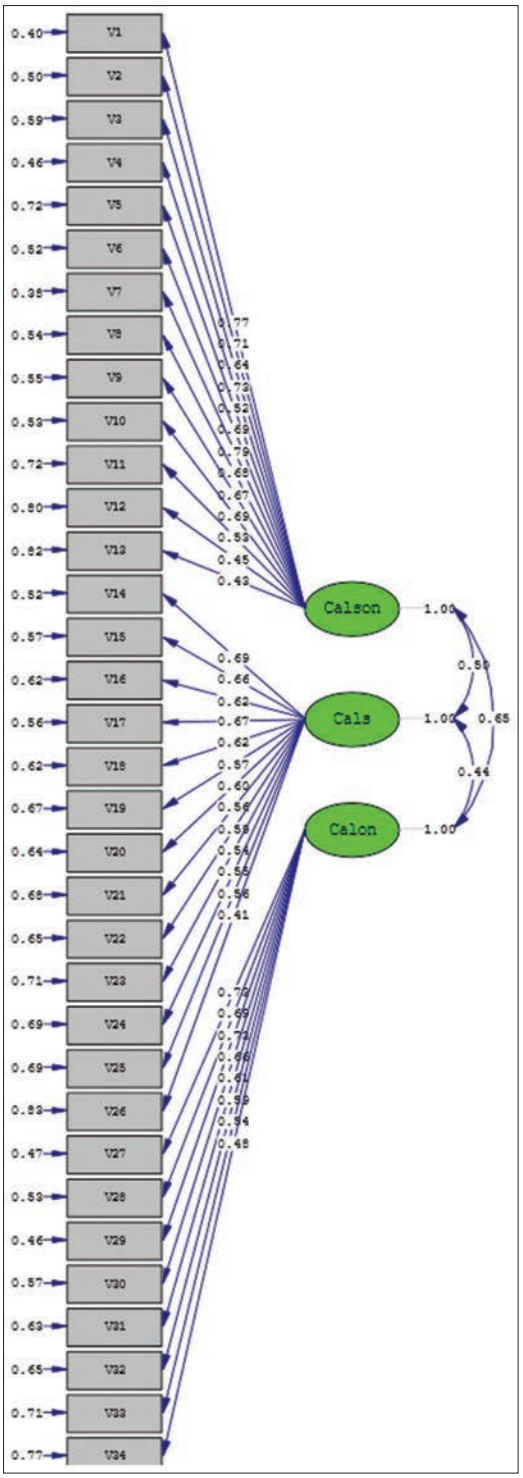

Figure 2. Track diagram (Calson: post-play; Cals: during-play; Calon: pre-play, and standardized coefficients).

Table 2. Goodness of fit indexes for confirmatory factor analysis (CFA)

Model			CFI	GFI	NFI	RMSEA
CFA	1245.01	**2.38**	0.96	0.84	0.93	0.059
Acceptance values		$\chi^2/df \leq 3$*	≥0.90	≥0.90	≥0.90	≤0.080

*3≤χ^2/df≤5> Acceptable fit. χ^2/df≤5> Very good fit.

the EMNRSS developed for use in violin education is fit to data.

Internal Consistency Coefficient

The Cronbach Alpha coefficient, as the internal consistency coefficient, was used to measure the reliability of the measurements obtained from the scale. As for the total scale score, the stratified alpha value was calculated. The Cronbach Alpha reliability coefficients for the scale are shown in Table 3.

Table 3 shows that the alpha value calculated for the post-play dimension of the EMNRSS is 0.892, whereas such value is 0.871 for the during-play dimension and 0.832 for the pre-play dimension. The stratified alpha value calculated for the total scale score was calculated as 0.929. The measurements of the scale may be reliable due to the fact that the factor scores of the scale, as well as the Cronbach Alpha values calculated for the total score, are higher than 0.70.

Clustering Analysis

A two-step clustering analysis was conducted over the total score the students attained in the EMNRSS to determine the level of use of effective musical notation reading strategies in undergraduate-level violin students. In this regard, the clusters were formed to maximise the difference among them and distance measurement was made according to the log-likelihood prediction. As a result of the clustering analysis, two groups were formed given the averages: high-level effective musical notation readers and low-level effective musical notation readers. The descriptive statistics of the groups are shown in Table 4.

As seen in Table 4, two groups have been formed due to the clustering analysis made for determining the students' level of using effective musical notation reading strategies. In group one, the lowest EMNRSS score was 35, and the highest was 128, with an average of 112.51. Therefore, this group was named the low-level group for effective musical notation reading strategies. In group two, the lowest EMNRSS score was 129, and the highest was 169, with an average of 144.90. Therefore, this group was named the high-level group regarding effective musical notation reading strategies. Accordingly, it was determined that 48.5% of the students were at a low level, and 51.5% were at a high level in terms of using effective musical notation reading strategies.

Analysis of the scores the students attained in the three factors of the scale based on the level of using effective musical notation reading strategies

Since a standard distribution hypothesis was not obtained, the Mann Whitney U test was used in order to analyze whether there was a statistically significant difference between the scores the students attained in the three factors (pre-play, during-play and post-play) of the scale and the level of use of effective musical notation reading strategies in undergraduate level violin students. The results are submitted in Table 5.

Table 3. Cronbach alpha reliability coefficients of scale

	Total	Post-Play	Sub-Factors	
			During-play	Pre-Play
Cronbach Alpha	0.929	0.892	0.871	0.832

Table 4. The students' level of using effective musical notation reading strategies

Group	Level	*f*	%	*M*	*SD*	*Min-Max*
1	Low	192	48.5	112.51	12.23	35-128
2	High	204	51.5	144.90	10.09	129-169

Table 5. Analysis of the scores the students attained in the three factors of the scale based on the level of use of effective musical notation reading strategies

	n	*Mean Ranks*	*Sum of Ranks*	*Z*	*p*
Post-Play					
Low	192	122.69	23557.00	12.794*	0.000
High	204	269.85	55049.00		
During-play					
Low	192	109.67	21056.50	14.991*	0.000
High	204	282.11	57549.50		
Pre-Play					
Low	192	125.28	24054.00	12.411*	0.000
High	204	267.41	54552.00		

*$p<.05$

Table 5 shows a statistically significant difference in the student's level of use of effective musical notation reading strategies in terms of the scores they attained on the three factors of the scale ($p<.05$). The mean ranks reveal that in all factors, those students who had low levels (48%) of use of effective musical notation reading strategies had lower scores. Thus, compared to students who had high levels (52%) of effective musical notation reading strategies, the students with low levels scored lower during-play, post-play and pre-play factors. When the effect size (Cohen's *d*) was calculated for these values, which were found to be significant, the scores were found to be 0.64 for post-play, 0.75 for during-play and 0.62 for pre-play factors. According to Cohen's criteria (1988), the d value obtained upon calculations is interpreted as 0.20 (small effect size), 0.50 (medium effect size) and 0.80 (large effect size). The values calculated in this study are more significant than 0.50, which indicates a large effect. Thus, it may be concluded that the significant differences have a large effect.

Analysis of the students' level of using effective musical notation reading strategies in terms of variables

It was analyzed whether the undergraduate violin students' level of using effective musical notation reading strategies significantly differed in gender, age, faculty type, class level,

Table 6. Analysis of the students' level of using effective musical notation reading strategies in terms of age (Kruskal-Wallis H test)

	n	*Mean Ranks*	*SD*	χ^2	*p*	*Significant Difference*
Post-Play						
Ages 16-20	178	198.92	2	1.480	0.477	-
Ages 21-25	202	195.50				
Ages 26 and above	16	231.59				
During-Play						
Ages 16-20	178	201.80	2	0.278	0.870	-
Ages 21-25	202	195.60				
Ages 26 and above	16	198.34				
Pre-Play						
Ages 16-20	178	191.81	2	7.165*	0.028	1-3
Ages 21-25	202	198.62				
Ages 26 and above	16	271.38				
Total						
Ages 16-20	178	199.21	2	1.149	0.563	-
Ages 21-25	202	195.59				
Ages 26 and above	16	227.28				

*p<.05

secondary school type and age of onset in playing the musical instrument. Accordingly, it was determined that gender, class level, secondary school type and age of onset in playing the instrument did not significantly differ (p>.05). The analyses of the variables that have significantly differed are submitted.

It is observed in Table 6 that there is no statistically significant difference (p>.05) in terms of age between the total score and the post-play and during-play sub-dimension scores the undergraduate violin students attained in the EMNRSS. In contrast, a statistically significant difference (p<.05) was observed about the sub-dimension of pre-play. A Bonferroni pairwise comparison test was conducted to determine to which groups such significant difference stemmed, which revealed that the significant difference detected in the sub-dimension of pre-play in terms of age stemmed from the students in the age group of 16-20 and the students in the age group of 26 and above. The analysis of the mean ranks revealed that the total score the students in the age group of 16-20 attained in the sub-dimension of pre-play of the EMNRSS was lower than that attained by the students in the age group of 26 and above. The effect size was calculated as 0.02 for this comparison, which gave significant results. Thus, the effect size may be small.

Analysis of variance (ANOVA) was used to analyze whether the level of effective musical notation reading strategies among undergraduate violin students significantly differed regarding the faculty type as the standard distribution assumption was met. The results of the analysis are submitted in Table 7.

It is observed in Table 7 that there is no statistically significant difference (p>.05) in terms of faculty type about the total score and the post-play and during-play sub-dimension scores the undergraduate violin students attained in the EMNRSS. In contrast, a statistically significant difference (p>.05) was observed about the sub-dimension of pre-play. A Bonferroni pairwise comparison test was conducted to determine to which groups such significant difference stemmed, which revealed that the scores the students of the faculties of fine arts and faculties of education attained in the sub-dimension of pre-play were higher than those attained by the students of state conservatories. The effect size was

Table 7. Analysis of the students' level of using effective musical notation reading strategies in terms of faculty type (ANOVA)

	n	*M*	*SS*	*SD*	*f*	*p*
Post-Play						
FE	323	48.62	9.55	(2.393)	0.394	0.675
FFA	45	47.58	8.52			
SC	28	47.46	9.63			
During-Play						
FE	323	46.56	9.96	(2.393)	0.434	0.649
FFA	45	46.49	10.51			
SC	28	44.71	10.96			
Pre-Play						
FE	323	34.50	5.35	(2.393)	3.575*	0.029
FFA	45	34.89	4.15			
SC	28	31.82	5.91			
Total						
FE	323	129.68	19.76	(2.393)	1.076	0.342
FFA	45	128.96	17.77			
SC	28	124.00	21.61			

*p<.05

calculated as 0.02 for this comparison, which gave significant results. Thus, the effect size may be small.

DISCUSSION AND CONCLUSION

As the case has been in other areas of education, one of the most crucial factors for success in music and instrument education is students' ability to organize and control their learning activities because individuals with awareness and planning skills about the things they should do as well as their prospective achievements can render the studying process more effective (Yokus & Yurudur, 2015; Jørgensen, 2004 as cited in Kilincer & Aydiner Uygun, 2013). Current music education studies focus on how variables such as cognitive level, learning styles, teaching models, effective practice methods, high-order thinking skills, mental preparation practices, individual study process, self-efficacy levels, motivation levels, cognitive strategies, studying tactics, performance examination anxiety, attitude towards lessons, learning approaches and learning strategies, speed reading techniques and time management skills influence achievement and performance (Dogan, 2017; Parasiz & Gulum, 2017; Taninmis, 2016; Babacan & Kuçukosmanoglu, 2015; Cinardal et al., 2015; Yildiz, 2015; Yokus & Yurudur, 2015; Akyuzluer, 2014; Coskun Senturk, 2014; Ertem, 2014; Sever, 2014; Akin, 2013; Aydiner Uygun, 2013; Ciftcibasi, 2013; Feyzi; 2013; McPhail, 2013; Ozmentes, 2013; Piji Kucuk & Uzun, 2013; Sikes, 2013; Aydiner Uygun & Kilincer, 2012; Gun & Kose, 2012; Sager & Ayhan, 2012; Deniz, 2011; Er & Kus Ozer, 2011; Nacakci & Kurtuldu, 2011; Sever, 2011; Zellner, 2011; Cerit, 2010; Gergin, 2010; T. Yokus, 2010; H. Yokus, 2010; Okan, 2009; Yildirim, 2009; Nielsen, 1999; Nielsen, 2001; Nielsen, 2004; Ozmentes, 2008; Ertem, 2003; Hallam, 2001a; Hallam 2001b).

In this study, a scale has been developed to determine the level of use of effective musical notation reading strategies in undergraduate-level violin students. Because of the aim of this study, analyses for determining the psychometric characteristics of the EMNRSS have been conducted. As a result of the exploratory factor analysis, it has been determined that the scale has a three-factor structure, which is named "post-play", "during-play", and "pre-play", respectively. These three factors, in total, explain 44.58% of the variance in the scale scores. Confirmatory factor analysis was conducted to provide additional proof of the construct validity of the measurements obtained through the scale. The fit index values obtained through the confirmatory factor analysis verify the three-factor structure revealed in the exploratory factor analysis (X^2/SD = 2.38; NFI = 0.93; CFI = 0.96; GFI = 0.84; RMSEA = 0.059).

The Cronbach Alpha coefficient, the internal consistency measure, was used to calculate the reliability of the measurements obtained through the scale. Accordingly, the alpha value for the total scale was calculated as 0.92, whereas the alpha values for the three factors of the scale were calculated as 0.89 for post-play, 0.87 for during-play and 0.83 for pre-play. Since the Cronbach Alpha values calculated for the factor scores and the total score were higher than 0.70, these findings have shown that the measurements obtained through the scale are reliable. The EMNRSS is a five-point Likert-type scale consisting of 34 items collected under three factors. The items in the scale have been re-numbered based on the factor pattern as 1-8: pre-play/9-21: during-play/22-34: post-play.

In the evaluation of the total scores on the scale, 128 points or lower have been considered as a low level, whereas 129 points or higher have been considered as a high level. The total scores in the scale show that 48.5% of the students have a low level of use of effective musical notation reading strategies, whereas such level is higher in 51.5% of the students. It is observed that the students' levels of using effective musical notation reading strategies differ in a statistically significant way in terms of the scores they attain in the sub-dimensions of the scale (p<.05). The percentages show that the students' level of using effective musical notation reading strategies is above average. In this regard, it is observed that the students realize the act of questioning within the framework of effective reading strategies and ask questions about the musical piece concerned. As for the relationship between independent and critical thinking and a democratic classroom environment, it may be concluded, based on the results of this study, that the learning environment is democratic.

It has been determined that the undergraduate violin students' level of using effective musical notation reading strategies did not significantly differ in terms of gender, class level, secondary school type and age of onset in playing instrument (p>.05), whereas statistically significant differences have been found in terms of age for the sub-dimension of pre-play [X^2=7.955; p<.05] and faculty type for the sub-dimension of pre-play [F(2-, 395)=3.575; p<.05].

The total scores attained in the scale show that the independent variables analyzed within the scope of the study did not affect the undergraduate violin students' level of effective musical notation reading strategies. As for the scores attained in the sub-dimensions of the scale, it is observed that the students' level of using effective musical notation reading strategies differed in the sub-dimension of pre-play in terms of age and faculty type variables.

As a result of the comparisons, it has been determined that the significant difference found in the pre-play dimension in terms of age stemmed from those students in the age groups of 16-20 and 26-30. An analysis of the mean ranks has revealed that the total score the students in the age group of 16-20 attained in the sub-dimension of pre-play of the EMNRSS was lower than that attained by the students in the age group of 16-20. The probable reason for this is considered to be the direct proportion between metacognitive awareness and age, as well as the more extensive accumulation of knowledge as to how to start working on a piece and an increase in the strategies employed in this regard since class levels increase in parallel with age. In the research conducted by Yildiz (2015) about the study approaches of students, no statistically significant differences were found in terms of the variable of age, whereas in the study of Ozmentes (2007) dealing with the attitudes of students on practising musical instruments, a significant difference in favour of ages 23 and above was determined.

It is considered that the probable reason for the determination of a statistically significant difference ($p<.05$) in terms of faculty type in the sub-dimension of pre-play in favor of those students attending the faculties of fine arts and faculties of education is the small sample size and that the lesson contents in the curricula of state conservatories may not have been designed in view of critical reading. As an expected finding, those students attending the faculties of education may have higher levels of awareness about their approach to contemplating thinking or learning about learning due to the intensive pedagogical formation courses they take in addition to the courses on music as their specialized field. Accordingly, those students attending the music education departments in the faculties of education may have improved levels of using effective musical notation reading strategies in the sub-dimension of pre-play. Previous studies on the metacognitive awareness level of undergraduate students of various fields about learning and reading strategies have shown that the students' levels of employing strategies and metacognitive awareness significantly vary regarding the faculty type (Ates, 2013; Kilincer, 2013). However, few studies have been conducted about undergraduate students attending different types of faculties in the same field. A study analyzing the tendency towards critical thinking in students attending higher education institutions providing professional music education (Cinardal et al., 2015) determined that the tendency towards critical thinking significantly differed in faculty type. In this regard, the studies available in the literature support the present research findings.

Evaluating the results of this study, it is considered that future studies may investigate other factors that affect students' level of use of effective musical notation reading strategies. Quantitative research designs may be formed in which the EMNRSS will be applied to undergraduate string instrument students. Studies revealing the correlation between effective musical notation reading strategies and critical thinking may be conducted. The applicability of the EMNRSS on levels other than the undergraduate level may be investigated. Experimental studies for enabling students to acquire effective musical notation reading strategies in violin education may be conducted.

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APPENDIX 1. The effective musical notation reading strategies scale

Instructions

Please evaluate on the scale as to what extent you realize the statements below to the extent they define you. Please leave no item empty and mark only one statement in each. The term *piece* used in the scale items also covers "practice pieces, études, etc." Each statement has been numbered and the meaning of each number has been listed below. Please choose the statement you think that reflects you by marking the respective box with "X"

Item No.	Statements	Never	Seldom	Sometimes	Often	Always
1.	Depending on the time signature of the musical piece (4/4, 6/8, 5/8, etc.), I determine my beat unit.	1	2	3	4	5
2.	I examine the time signature of the musical piece in order to determine my beat unit.	1	2	3	4	5
3.	By looking at the articulation marks on the notes (staccato, portato, legato, etc.), I determine which bowing techniques I will use.	1	2	3	4	5
4.	I recognize the tempo terms (Allegro, Moderato, Vivace etc.).	1	2	3	4	5
5.	By looking at the finger numbers on the musical piece, I know which positions I will use.	1	2	3	4	5
6.	I analyze the tone/scale of the piece that I will play.	1	2	3	4	5
7.	I will watch the live recordings of the piece (if any) and observe the interpretations of different performers.	1	2	3	4	5
8.	In order to get an idea about the musical piece I will work on, it is important that my teacher performs it for illustrative purposes.	1	2	3	4	5
9.	If I come across a difficult piece, I abandon it.	1	2	3	4	5
10.	I don't know how to solve a problem I encounter during my performance.	1	2	3	4	5
11.	I will do sight reading without needing to examine the characteristics of the piece.	1	2	3	4	5
12.	I don't practice on passages.	1	2	3	4	5
13.	I am not able to discern my mistakes during my performance.	1	2	3	4	5
14.	I will disregard the specified tempo when I'm playing.	1	2	3	4	5
15.	I find repetitions boring in passage practices.	1	2	3	4	5
16.	I will play the whole piece without minding the parts I have difficulties with.	1	2	3	4	5
17.	While working on a piece, I don't know how to make use of the knowledge I gather from other lessons.	1	2	3	4	5
18.	When I am sight reading a piece, just playing the notes is sufficient for me.	1	2	3	4	5
19.	I will disregard the ornaments (trill, mordant, grace note, etc.) while performing the piece.	1	2	3	4	5
20.	I will disregard the fingering numbers that are specified on the piece while I'm working on it.	1	2	3	4	5
21.	I don't really contemplate on the piece, instead I do whatever my teacher instructs me to do.	1	2	3	4	5
22.	I will contemplate on what I have learned after working on the piece.	1	2	3	4	5
23.	When I fail about the piece, I plan different practice methods to overcome such failure.	1	2	3	4	5
24.	When I come across conflicting information in the piece, I review my opinions.	1	2	3	4	5

(Contd...)

Appendix 1. *(Continued)*

Item No.	Statements	Never	Seldom	Sometimes	Often	Always
25.	I develop strategies to resolve difficult passages.	1	2	3	4	5
26.	I come up with illustrations to think more concretely about those techniques that are difficult for me (e.g. resembling the detaché bowing technique to painting with a paintbrush).	1	2	3	4	5
27.	After performing, I plan exercises to correct my mistakes.	1	2	3	4	5
28.	I deliberate on how to solve a problem I encounter in a piece.	1	2	3	4	5
29.	I effectively utilize my knowledge about violin theory in order to perform the piece.	1	2	3	4	5
30.	I gradually increase the tempo I have determined in order to reach the tempo specified for the piece.	1	2	3	4	5
31.	I evaluate my performance after playing the piece.	1	2	3	4	5
32.	In cases where I experience technical difficulties, I discuss with my teacher my opinion about certain changes on the piece.	1	2	3	4	5
33.	While working on a piece, I use markings on the pages to remember the parts I should be careful about.	1	2	3	4	5
34.	I record my performance which I later watch/listen to detect my mistakes.	1	2	3	4	5

Thank you for participating