

COGNITION OF MUSICAL INSTRUMENTS AS AN INTEGRAL PART OF MUSIC TEACHERS COMPETENCIES

RYTIS URNIEŽIUS¹

SUMMARY. This article aims to reason the importance of the knowledge about musical instruments by future music educators. The cognition of musical instruments include competencies necessary for the handling of the instruments by instrument teachers, ensemble leaders, teachers-arrangers and teachers-composers. Another important field of knowledge is the characteristics of instruments and their artistic possibilities that teacher has to explain for pupils in their classes while listening to the music and discussing it. Considering these activities as an essential element of music educators' work, the ability to distinguish the timbres of the most common professional instruments by ear should be treated as one of the fundamental abilities of pedagogues.

Keywords: instrumentation, orchestration, timbre, music education.

Introduction

The necessity for the music teachers to know the technique and the possibilities of the artistic expression of musical instruments presumably do not demand any reasoning. This kind of knowledge is essential for instrument teachers, school ensembles leaders, teachers-arrangers and teachers-composers. Apart from these activities, music teachers have to explain the peculiarities of instruments and their artistic possibilities in classes while listening to the music and discussing it. Teachers should be able to explain the importance of timbre in the spectrum of musical means of expression to achieve a perception of the music creation as a whole. Thus the cognition of musical instruments in the educating of music teachers has a twofold purpose: as knowledge necessary for the handling of instruments in

¹ *Doctor of Humanities (Musicology), Professor at Vilnius University Šiauliai Academy, Lithuania, Višinskio St. 25, LT-76351 Šiauliai, rytisur@gmail.com; rytis.urniezius@sa.vu.lt.*

performing practice and as a theoretical knowledge which is manifested in the fields of music history and analysis². To conclude, the cognition of musical instruments is necessary for music teachers because of numerous reasons.

Regrettably, this field is not always sufficiently represented in the process of the future music teachers education. For instance, in Lithuania, which is considered a country of old and rich singing traditions, a music teacher is habitually a choirmaster who can play keyboard instruments on a more or less proficient level. This model in recent years is changing, teachers acquire skills in guitar, electronics and other instruments. However, the basis of instrumental music of European tradition – the variety of professional musical instruments, is usually considered as a matter of less importance.

Some items of the practical application of musical instruments knowledge were mentioned in the publication by the author of this article concerning the arrangement skills of the music teachers³. Yet, the cognition of musical instruments is a much broader field of experience. The current article is focused on the grounding of the importance of instruments knowledge by future music educators. The small-scale empirical research described here was intended to show the peculiarities of teachers' ability to distinguish the timbres of the most common professional instruments by ear – one of the fundamental abilities of instrumentation⁴ knowledge.

The timbre of musical instruments as an essential means of musical expression

The variety of musical instruments and their timbres is an important vehicle of artistic expression used by composers in their works. However,

² It has been proved that teaching primary school children to recognize and distinguish the timbres of different instruments positively affects the development of their speech and is helpful in the therapy of speech disorders (see: Buzás, Zsuzsa, and Dudás, Eleonóra. "Testing the Knowledge of Musical Instruments of 10-14-year-old Students in an Online Test Environment." *The Wind Music Research Quarterly / Mitteilungsblatt der IGEB*, 2021 March, International Society for Research and Promotion of Wind Music, p. 27, <https://www.igeb.net/uploads/1/1/4/6/114653395/2021march.pdf>).

³ Urniežius, Rytis. "Arrangement Competences of Music Teachers: Readiness to Meet Unexpected." *Musicologica Brunensia*, vol. 55 no. 2, 2020, pp. 139-147.

⁴ The meaning of the term *instrumentation* is unambiguous: in some sources, this term means the act of scoring for different ensembles from small chamber groups to a full orchestra (in this case the meaning of the word *instrumentation* is close to the word *orchestration*). Other authors use the word *instrumentation* to name the knowledge of musical instruments: their technique, application, possibilities, etc. Music dictionaries and encyclopaedias often present all versions of the meaning (*Music Dictionary*, 2017. <https://www.dolmetsch.com/defsi1.htm>; *The Free Dictionary by Farlex*, 2003-2021. <https://www.thefreedictionary.com/instrumentation>). In this article the term *instrumentation* is used in the second meaning, i. e. it indicates the knowledge of qualities of the musical instruments.

the complaints that orchestration (hence the role of instrumental timbres) is a neglected field in musicological research can be found in the music literature sources of different times. Even the role of the timbre in musical art is often underestimated. For example, Julian Rushton described the attitude by Frederick Corder expressed at the beginning of the 20th century in *Grove's Dictionary* that music should not be assessed as artistically important until it passes "simple but infallible test": the "black and white test," when the orchestral work transcribed for piano is assessed without any timbre variety⁵. Johnathan Stock criticizes the limitation of music analysts who "generally discounted" the timbre of instruments restricting their method with "monochrome note-heads of the short score".⁶ The question of why music theorists generally ignore the orchestration aspect is discussed in the dissertation by Timothy Cutler.⁷

The reasons for the underestimating of the instrumental timbre are most likely numerous, however, the most important of them can be highlighted. The pitch and duration have obvious priority over two other qualities of musical sound: volume and timbre. As a result, melody, harmony and rhythm, which are based on pitch and duration, are considered the most important constituents of music. Dynamics and orchestration thus are considered as the means of expression of secondary importance: while changes of rhythm and pitch would distort musical theme even beyond recognition, the changes of timbre and loudness would only change the character of the still recognizable theme. Although such assessment seems reasonable at first sight, the overall aggregate nature of the piece of art should not be forgotten: no musical work can be performed without at least minimal dynamic nuances and variety of timbres which are vitally important moulders of the dramaturgy of the musical piece. Also, the historical evolution of musical language reveals that at least during the last two centuries the significance of timbre in music grew immensely. Thus music in our days cannot be treated as a two-dimensional art thrust into the space of two-axis – pitch and duration, but as at least a three-dimensional phenomenon that acquires depth and fullness when complemented with the dimensions of dynamics and timbre.

⁵ Rushton, Julian. "The art of Orchestration." *The Cambridge Companion to the Orchestra*. Ed. by Collin Lawson, Cambridge University Press, 2003 (first published), 2005 (reprinted), 2009 (digital), p. 92-93.

⁶ Stock, Jonathan P. J. "Orchestration as Structural Determinant: Mozart's Deployment of Woodwind Timbre in the Slow Movement of the C Minor Piano Concerto K. 491. *Music & Letters*, 1997, vol. 78, no. 2 (May), p. 210.

⁷ Cutler, Timothy S. *Orchestration and the Analysis of Tonal Music: Interaction between Orchestration and Other Musical Parameters in Selected Symphonic Compositions, c. 1785-1835*. Doctoral dissertation. Yale University, 2000, UMI ProQuest Digital Dissertations, <http://wwwlib.umi.com/dissertations/>.

Thus, although different opinions about the discussed item could exist, generally there is no ground for ignoring the timbre of instruments in the instrumental compositions, especially after the enhanced development of orchestration in the 19th century and the multitude of experiments with timbre in the works by the composers of the 20th and 21st centuries. The widely known statement by Rimsky-Korsakov: “orchestration is a part of the very soul of the composition”⁸ generalizes the achievements of instrumental expression during Romanticism. Concerning the general trends of the later period, Julian Rushton wrote: “The history of thinking about the orchestra in more recent years is connected to the liberation of timbre, or orchestral colour, as an expressive element in its own right”⁹. Megan Lavengood expresses similar ideas: “Traditionally, music analysis of this sort is done with a printed musical score; therefore, music theories have tended to favor musical domains captured in that medium, like rhythm, pitch, and structure. Timbre is only an abstract idea in the musical score, and thus historically, timbre has typically been neglected in music analysis. Yet timbre is one of the most immediate aspects of our musical experience, so many contemporary music theorists have recently become interested in timbre analysis”¹⁰.

The survey of ideas presented above underpins the necessity for the educated musician (music teachers are not an exception) to treat the timbre as an important means of musical expression and, consequently, the necessity to obtain sufficient knowledge on this subject to pass it to their pupils: “The ability to accurately perceive, evaluate, and identify the sounds produced by musical instruments is a skill at which all music educators should excel. <...> In elementary general music curricula, teachers challenge students to develop the ability to identify musical instrument timbre.”¹¹. Yet it can be presumed that considering still occurring cases of the underestimation of musical instruments timbre, the knowledge of music teachers in this field could also be insufficient. Regrettably, the skill of aural identification of timbres and the ability to analyse the manifestation of timbre expression in one or another piece of music by the future music teachers does not attract much attention from researchers in music education. Therefore it is difficult to find appropriate publications on this subject. But those sparse sources which mention the timbre identification skills regard them as important and sometimes even point to the shortcomings of the future teachers’ education.

⁸ Римский-Корсаков, Николай, *Основы оркестровки*. [Rimsky-Korsakov, Nikolai, *Principles of orchestration*], Государственное музыкальное издательство, Москва, Ленинград, 1946, p. 8.

⁹ Rushton, Julian. “The art of Orchestration”, p. 94.

¹⁰ Lavengood, Megan, “A Musicological Approach to the Analysis of Timbre.” *Timbre 2018: Timbre is A Many Splendored Thing*, Program and abstracts, 4-7 July, 2018, Montréal, Québec, p. 115.

¹¹ Cassidy, Jane W., and Schlegel, Amanda L. “The role of initial attack and performer expertise on instrument identification.” *International Journal of Music Education*, Vol. 34(2), 2016, pp. 186-187.

For example, Christine Condaris declares that the study of pedagogy in the development of aural skills is “hugely undeveloped” and puts the skill of the identification of the instruments by ear as the first item in a list of 9 aural abilities which should be obtained by music education students. Notably, the author claims that the students should “name instruments playing simultaneously, even at the same volume and pitch level”,¹² which is quite a high standard for hearing ability. It can be presumed that attention towards the necessity to train future music teachers to recognize instrumental timbres differ in higher education institutions of different countries.

Two tests on recognising the instrumental timbre by future music teachers

The results of the study performed in 1999-2003 were presented in the publication by the author of this article in 2004¹³. 57 full-time students – future music teachers at Šiauliai University (Lithuania) participated in this research. Respondents had to indicate the names of sounding instruments while listening to the recordings. Excerpts from the orchestral and chamber compositions were chosen for this test. The character of the musical texture was similar in all recordings: a melody with an elementary accompaniment, however, the instruments intended to be recognised played solo, their timbres were not significantly influenced by the accompanying instruments and could be distinguished clearly. The instruments played in the most common part of their range but not in extreme registers. The results are presented in Table 1.

Table 1

Instrument	Correct indications
1. Flute	56
2. Oboe	13
3. Clarinet	39
4. Bassoon	29
5. Horn	28

Instrument	Correct indications
6. Trumpet	51
7. Trombone	21
8. Violin	53
9. Viola	24
10. Cello	33

Timbres of instruments recognized by respondents in the 2001-2003 research (N=57)

¹² Condaris, Christine. “Correlating Methods of Teaching Aural Skills with Individual Learning Styles.” *Athens Journal of Humanities & Arts*, 2019, Volume 6, Issue 1, p. 1.

¹³ Urniežius, Rytis. “Organognostika muzikos mokytojų rengimo sistemoje” (“Organognostics in the system of music teachers training”). *Tiltai, Priedas: mokslo darbai*, Nr. 20, *Muzikinis ugdymas mokykloje: tradicijos ir inovacijos*, 2004, pp. 63-68.

The relationship between recognized and unrecognised timbres of instruments was respectively **60,88%** and **39,12%**¹⁴. This percentage of recognition of timbres should be treated as low considering that the sounding excerpts were long and only the most popular and widely known instruments sounded¹⁵. Besides, only senior (the 3rd and the 4th years) students were involved.

In addition to the test for the full-time students, in 2003 the same test was delivered to the part-time students – already experienced music teachers at that time. In the latter case, the percentage of recognized and unrecognised timbres was significantly better: 86,4% and 13,6% respectively. Moreover, the discussion with part-time students revealed that almost all of them paid much attention to the cognition of musical instruments, their means of expression and developing the ear for instrumental timbre while working with their pupils. Also, a conversation with part-time students revealed a demand for an instrumentation discipline in the curricula of music teachers studies. Some of these students directly expressed a regret that such discipline was not established in the time of their studies (unfortunately the results of this conversation were not recorded thus they are not documented). Thus the researcher concluded that the vacancy in the teachers' knowledge about the instruments and the ability to distinguish their timbre cannot be filled without a special higher education course.

Seventeen years after the above-described research was carried out, it appeared topical to examine the competence of the future music teachers once again in the context of a contemporary time. The recent test (which was too modest to be called research) was delivered to the students at the beginning of 2021. Yet over the past years, notable changes have been made in the curriculum of the Music Teachers study programme of Šiauliai University¹⁶: several years after the results of the 1999-2003 test were published, the discipline of instrumentation and the instrumental arrangement was implemented. The second-year students obtained an opportunity to learn about musical instruments and the ways of their application. Although

¹⁴ The analysis of the results of the above-described research encompassed more aspects, for instance, some respondents indicated the wrong instruments (confusing of the instruments of suchlike timbres were more frequent than those of different timbres).

¹⁵ Obviously, in that case, there was no reason to investigate the students' possibilities of recognising less frequently heard instruments, also the same instrument playing with or without vibrating or even presenting sounds with cut-off attacks and decays – as it was performed in sophisticated experiments which took place in some recent researches. In such cases, the respondents would be much more disorientated.

¹⁶ Since the 1st of January 2021 Šiauliai University became a department of Vilnius University; currently, the higher education institution in Šiauliai town is called Vilnius University Šiauliai Academy.

the course is short (one semester), the basis for music teachers to feel more confident in recognizing and handling musical instruments was established. To check the efficiency of this course, two groups of students were questioned: the first group (G1) consisted of 13 first-year students who had not studied instrumentation course up to that time, and the second group (G2) consisted of 14 second-year and third-year students who had already completed the course.

This test also included only the most common professional instruments and only the main representatives of instruments families, i. e., students listened to the timbre of the clarinet but not bass clarinet, flute but not piccolo or alto flute, etc. Unlike in the 1999-2003 test, the timbre of the instruments was isolated, i. e. no other simultaneously playing instruments could be heard in the recordings. The sounding excerpts were sufficiently long: the duration of the seven excerpts was from 40 to 50 seconds, four excerpts lasted for 30-40 seconds, and only one passage (trumpet) was 23 seconds long. A large part of the range of each instrument and its different registers were demonstrated in the recordings. The musical excerpts were presented in random order.

The results of the test are presented in Table 2.

Table 2

Instrument	Correct indications	Instrument	Correct indications
1. Flute	11	7. Trombone	4
2. Oboe	6	8. Tuba	10
3. Clarinet	7	9. Violin	11
4. Bassoon	2	10. Viola	6
5. Horn	3	11. Cello	9
6. Trumpet	13	12. Double bass	11

**Timbres of instruments recognized by the first-year students (G1)
in the 2021 test (N=13)**

The percentage of correct indications is **59,6%**. It should be assessed as low, especially considering the conditions named above.

The results of testing the students who had already studied the instrumentation course (G2) are presented in Table 3.

Table 3

Instrument	Correct indications	Instrument	Correct indications
1. Flute	14	7. Trombone	7
2. Oboe	11	8. Tuba	13
3. Clarinet	10	9. Violin	13
4. Bassoon	10	10. Viola	11
5. Horn	8	11. Cello	13
6. Trumpet	12	12. Double bass	14

Timbres of instruments recognized by the second-year and the third-year students (G2) in the 2021 test (N=14)

As it could be expected, the results of the students who have recently studied the discipline of instrumentation and instrumental arrangement are significantly higher than of the students who have not studied this discipline yet: the percentage of correct indications is **80,9%**. Naturally, the most common instruments (flute, violin, trumpet, cello, double bass) were distinguished most successfully. Wind instruments were identified less successfully than strings, however, of interest is a good recognition of tuba.

Of course, the small quantity of respondents does not allow to make any weighty conclusions. Also, the contingent of each group might be not homogeneous: some of the first-year students could be already experienced in working with musical instruments; on the other hand, some elder students might have been not very diligent learners who did not acquire all the necessary knowledge during their instrumentation lectures. Yet the trend of a positive influence of instrumentation course (at least at this particular higher music education institution) can be observed.

Discussion / Conclusions

The conclusions of this article seem simple, clear and unambiguous: timbre is one of the main means of expression in music, thus the cognition of musical instruments – the devices which are the main implementors of this means of expression – should be an essential part of the future music teacher education; the acquiring of the knowledge in this field could be achieved with the help of a special course in the music teacher study programmes. Although the scale of the test in 2021 was too small for coming to important conclusions, it likely underpins the proposition which arises naturally: music education students who studied the course of instrumentation are much better aware of the musical instruments than those who had not.

The teacher should not appear ignorant when pupils ask about the instruments or instrument groups they hear performing one or another composition. And it is believable that pupils will certainly ask such questions: in many cases, inexperienced listeners (children among them) would pay more attention to timbre and dynamics rather than to melody or rhythm¹⁷. The findings presented in this article could serve as an inducement to increase the attention to the item especially in the countries where the cognition of musical instruments is not among the most important tasks of music education. It can be assumed that ideally the teachers' ear for timbres should be developed up to the level when they would be able to distinguish not only the main representatives of all instruments groups but also less common variations of their construction (bass clarinet, alto flute) as well as other instruments in all their variety (plucked strings, pitched percussion, etc.).

The necessity of distinguishing timbres of acoustic instruments is obvious even considering the variety of electronic sounds: the majority of these sounds produced by computer or keyboard synthesizer have their predecessors in the "real" instruments world. Many names of electronic timbres come from acoustic instruments names. Therefore a person (music teacher in this case) who work with electronic instruments have to correlate the quality of a particular timbre with its primary sources (acoustic instruments). This ability can even allow assessing the quality of electronic equipment from the point of similarity of an electronic timbre to the original one.

The establishing of effective methods of instrumental timbre recognizing for future music teachers is a topical task for music educators at higher education institutions. Meanwhile, it is important to notice one important factor that enhances the recognition of timbres: the familiarization with instruments construction, especially the technique of their sound-producing. The instrumentation and arranging course presented for Vilnius University Šiauliai Academy Music Pedagogy programme students include not only aural identification of instruments timbres but also acquaintance with their technical characteristics. The main goal of this knowledge is to enable students to employ instruments in their arrangements or compositions, however, the secondary effect of the study of instruments nature is a better aural recognition of their sound. The perceiving, for example, the way the double-read of oboe works and correlating it with the characteristic of its timbre (dependent on the inherent nature of the reed) would leave an imprint in the memory of a student: the material determinants would be associated with the character of the sound. Such integrated knowledge

¹⁷ Piličiauskas, Albertas, *Muzikos pažinimas. Objektas, būdai ir adekvatumas. (The Cognition of Music. Subject, Method and Adequacy)*. Vilnius, Vaga, 1984.

would allow identifying the sound of an instrument hopefully unmistakably. The research carried out in 2002¹⁸ revealed that music students who play an orchestral instrument are much more successful in distinguishing instrumental timbres than their colleagues who play the piano, guitar or sing. Apparently, playing in an orchestra inevitably puts its participants in a position when observing orchestral instruments at close range allows noticing numerous aspects of their sound-producing and subtleties of their mechanisms. Such experience develops a “feeling of instruments” which enables orchestra members to distinguish timbres in different conditions much better than their colleagues who do not attend orchestra rehearsals.

The significance of instruments technical characteristics determinant was not underpinned by the empirical data, however, the contents of the instrumentation discipline at Šiauliai Academy includes the basics of instruments construction, thus the respondents of the G2 group were aware of these characteristics. It would be relevant to explore the importance of instruments technical qualities knowledge for timbre recognizing more comprehensively in the future.

REFERENCES

- Buzás, Zsuzsa, and Dudás, Eleonóra. “Testing the Knowledge of Musical Instruments of 10-14-year-old Students in an Online Test Environment.” *The Wind Music Research Quarterly / Mitteilungsblatt der IGEB*, 2021 March, International Society for Research and Promotion of Wind Music, pp. 27-32, <https://www.igeb.net/uploads/1/1/4/6/114653395/2021march.pdf>.
- Cassidy, Jane W., and Schlegel, Amanda L. “The role of initial attack and performer expertise on instrument identification.” *International Journal of Music Education*, Vol. 34(2), 2016, pp. 186-195.
- Condaris, Christine. “Correlating Methods of Teaching Aural Skills with Individual Learning Styles.” *Athens Journal of Humanities & Arts*, 2019, Volume 6, Issue 1, pp. 1-14.
- Cutler, Timothy S. *Orchestration and the Analysis of Tonal Music: Interaction between Orchestration and Other Musical Parameters in Selected Symphonic Compositions, c. 1785-1835*. Doctoral dissertation. Yale University, 2000, UMI ProQuest Digital Dissertations, <http://wwwlib.umi.com/dissertations/>.

¹⁸ Srinivasan, Asha, and Sullivan, David, and Fujinaga, Ichiro. “Recognition of isolated instrument tones by conservatory students.” *Proceedings of the 2002 International Conference on Music Perception and Cognition*. April 2002, <https://www.researchgate.net/publication/260402276>.

- Lavengood, Megan, "A Musicological Approach to the Analysis of Timbre." *Timbre 2018: Timbre is A Many Splendored Thing*, Program and abstracts, 4-7 July, 2018, Montréal, Québec, pp. 115-116.
- Music Dictionary*, 2017. <https://www.dolmetsch.com/defsi1.htm>.
- Piličiauskas, Albertas, *Muzikos pažinimas. Objektas, būdai ir adekvatumas. (The Cognition of Music. Subject, Method and Adequacy)*. Vilnius, Vaga, 1984.
- Rushton, Julian. "The art of Orchestration." *The Cambridge Companion to the Orchestra*. Ed. by Collin Lawson, Cambridge University Press, 2003 (first published), 2005 (reprinted), 2009 (digital) pp. 92-126.
- Srinivasan, Asha, and Sullivan, David, and Fujinaga, Ichiro. "Recognition of isolated instrument tones by conservatory students." *Proceedings of the 2002 International Conference on Music Perception and Cognition*. April 2002, <https://www.researchgate.net/publication/260402276>.
- Stock, Jonathan P. J. "Orchestration as Structural Determinant: Mozart's Deployment of Woodwind Timbre in the Slow Movement of the C Minor Piano Concerto K. 491." *Music & Letters*, 1997, vol. 78, no. 2 (May), pp. 210-219.
- The Free Dictionary by Farlex*, 2003-2021, <https://www.thefreedictionary.com/instrumentation>.
- Urnėžius, Rytis. "Arrangement Competences of Music Teachers: Readiness to Meet Unexpected." *Musicologica Brunensia*, vol. 55 no. 2, 2020, pp. 139-147.
- Urnėžius, Rytis. "Organognostika muzikos mokytojų rengimo sistemoje" ("Organognostics in the system of music teachers training"). *Tiltai, Priedas: mokslo darbai*, Nr. 20, *Muzikinis ugdymas mokykloje: tradicijos ir inovacijos*, 2004, pp. 63-68.
- Римский-Корсаков, Николай, *Основы оркестровки*. [Rimsky-Korsakov, Nikolai, *Principles of orchestration*], Государственное музыкальное издательство, Москва, Ленинград, 1946.

