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USING MUSIC NOTATION SOFTWARE TO IMPROVE STUDENTS' MUSICAL LITERACY: THE CASE OF MUSESCORE AND SIBELIUS

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ABSTRACT

The article analyses the use of music notation software, primarily MuseScore and Sibelius, as a means of improving musical literacy among students of music schools, colleges and pedagogical higher education institutions. Musical literacy is understood as the ability to read, write and understand music in notation, including knowledge of the staff, clefs, note values, rests, dots, ties, accidentals, bar lines, time signatures and the rules of notation graphics. The article compares handwritten and computer notation, identifies the pedagogical functions of notation software (visualisation, auditory feedback, error control, editing, creative work and the preparation of teaching materials) and describes its limitations. A system of tasks is proposed for using notation software in the course of music theory and solfeggio: copying and correcting scores, writing rhythmic and melodic dictations, building intervals, chords and scales with playback checking, arranging folk melodies and composing short pieces. The article also stresses that computer notation must be combined with handwritten practice so that students master notation graphics consciously. The results may be useful for teachers seeking to integrate digital technologies into the teaching of music theory.

Introduction

Musical notation is a system for recording musical sounds by special signs called notes. Notation graphics is the set of rules for writing notes and other signs correctly, clearly and neatly. Mastering notation is the basis of musical literacy: the ability to read, write and understand music in notation. Without it, a musician cannot learn new repertoire independently, analyse a

composition or communicate musical ideas in writing. For this reason the study of the staff, clefs, note values, rests, dots, ties, accidentals, bar lines and time signatures occupies a central place in the course of music theory and solfeggio. Traditionally, students learn notation by writing by hand in music notebooks. This method has a long history and remains valuable: writing notes by hand develops attention to detail and helps memorise the shapes and positions of signs. However, it also has limitations. A student who writes a melody incorrectly often cannot hear the mistake, because the written notes do not sound; the teacher may check the work only at the next lesson; and correcting a mistake requires rewriting the whole fragment. In addition, many students today are more familiar with digital devices than with paper notebooks.

Music notation software offers new possibilities. Programs such as MuseScore, Sibelius, Finale and Dorico allow users to enter notes, see them displayed according to professional standards and immediately hear them played back. MuseScore is free and open source, which makes it accessible to every student and educational institution; Sibelius, developed by Avid, is one of the most widely used professional programs and also exists in a free basic version. The purpose of the article is to analyse the pedagogical potential of notation software for improving students' musical literacy and to propose a system of tasks for its use in music theory and solfeggio classes.

Literature review

The rules of modern music notation are presented in detail in the reference works of E. Gould and G. Read, which describe the correct writing of note heads, stems, flags and beams, the placement of accidentals, the spacing of notes and other aspects of notation graphics. The history of notation, from neumes through Guido of Arezzo's staff to mensural and modern notation, is described by R. Rastall and W. Apel. Textbooks of elementary theory by I. V. Sposobin and V. A. Vakhromeev define the basic notational concepts studied in music schools and colleges.

The use of technology in music education has been studied by P. Webster, who noted that computer-based tools are most effective when they engage students in active musical thinking. W. I. Bauer described notation software as one of the core tools of digital music pedagogy and emphasised that it supports not only writing but also composing, arranging and analysing. The TPACK framework of P. Mishra and M. Koehler stresses that teachers must integrate knowledge of technology with knowledge of content and pedagogy; simply installing a program is not enough. Studies of composition in schools show that notation software, combined with playback, helps students to test and revise their musical ideas. At the same time, teachers and researchers warn that automatic formatting may hide the rules of notation from students, so that they do not learn why notes are written in a particular way. These considerations form the theoretical basis of the present study.

Materials and methods

The study is based on an analysis of the content of the topics “Music notation and the basics of notation graphics” and “Rhythm, metre and measure” in the music theory and solfeggio

curriculum; a comparative analysis of handwritten and computer notation; an analysis of the functions of MuseScore and Sibelius relevant to education; a review of literature on music technology in education; and pedagogical modelling of a system of tasks.

Results and discussion

The comparison of handwritten and computer notation showed that each has its own advantages and limitations (Table 1).

Aspect	Handwritten notation	Computer notation
Mastering notation graphics	the student draws every sign and learns its shape and position	the program draws signs automatically; the student must understand the rules to check them
Auditory feedback	absent; depends on inner hearing	immediate playback of what has been written
Error control	only by the teacher, often later	some errors are visible immediately (e.g., incomplete measures); playback reveals wrong notes
Editing	requires rewriting	quick changes, transposition and copying
Appearance	depends on handwriting	clear and professional layout
Accessibility	needs only paper and pencil	needs a computer, tablet or phone and software
Development of inner hearing	strong, if combined with singing	may weaken if the student relies only on playback

Table 1. Comparison of handwritten and computer notation in teaching

The analysis suggests that the two forms are complementary. Handwritten notation is necessary for the conscious mastery of notation graphics and for developing inner hearing. Computer notation provides immediate auditory feedback, quick editing and a professional result. In teaching, therefore, the task is not to replace one with the other, but to determine at which stage and for which tasks each form is most effective.

On the basis of the analysis, six pedagogical functions of notation software were identified. The first is visualisation: the program displays notation clearly and allows the teacher to show the structure of music on a screen, enlarge details, colour individual notes or voices and demonstrate the correct placement of signs. The second is auditory feedback: after entering notes, the student hears them and can compare the written result with the intended sound. This is especially

important for connecting the visual image of notation with its sound, which is the essence of musical literacy. The third is error control: MuseScore and Sibelius indicate measures that contain too many or too few beats, which helps students understand the relation between note values and time signatures. The fourth is editing: students can easily correct mistakes, transpose a melody to another key or rewrite it in another clef, which makes these theoretical operations concrete. The fifth is creative work: students can compose and arrange music and immediately hear the result. The sixth is the preparation of teaching materials: teachers can create exercises, dictations and worksheets of high quality.

The software also has limitations that must be taken into account. Because the program automatically draws stems, beams and accidentals, students may not learn the rules governing them, such as stem direction depending on the position of the note relative to the middle line, or the grouping of eighth notes according to the beats of the measure. Playback in a standard piano or synthesised timbre may lead students to rely on the computer instead of their inner hearing. Furthermore, standard software does not provide special signs for some features of Uzbek traditional music, which must be added manually as text or symbols.

To use notation software effectively, a system of tasks for the music theory and solfeggio course is proposed (Table 2). The tasks are arranged from simple to complex and connected with the topics of the curriculum.

No.	Task	Topic of the curriculum	Skills developed
1	copying a short melody from a handwritten or printed source into the program and checking it by playback	staff, clefs, note values	reading notation, accuracy
2	finding and correcting deliberate mistakes in a score prepared by the teacher	notation graphics, measures, accidentals	knowledge of notation rules, attention
3	completing measures with given note values and rests in different time signatures	rhythm, metre, measure, time signatures	understanding of durations and metre

4	writing a melodic or rhythmic dictation in the program and comparing it with the original by playback	dictation, rhythm	musical hearing, self-control
5	building intervals, chords and scales and checking them by ear	intervals, chords, modes	theoretical knowledge connected with hearing
6	transposing a melody into another key or rewriting it in another clef	keys, clefs	understanding of tonality and clefs
7	notating an Uzbek folk melody and adding a doira usul on a separate line	notation, rhythm, national music	transcription, knowledge of national music
8	composing a short melody or rhythmic piece and presenting it to the class	all topics	creativity, synthesis of knowledge

Table 2. System of tasks using notation software in music theory and solfeggio classes

The first two tasks develop the ability to read notation and to recognise correct and incorrect notation graphics. In the error-correction task, the teacher prepares a score that contains typical mistakes: notes written on the wrong line, an incorrect number of beats in a measure, wrongly placed accidentals or improper beaming. Students must find and correct them. Since some of these mistakes cannot be produced automatically by the program, the teacher can create them deliberately or show scanned examples of handwritten mistakes. This task requires students to understand the rules rather than to rely on the software.

The third task connects notation with the topic of rhythm, metre and measure. Students receive empty measures in two-four, three-four, four-four and six-eight time and must fill them with given note values and rests. The program immediately shows whether a measure is complete, and the

playback lets students hear the rhythmic result. This makes the relation between note values and time signatures visible and audible.

The fourth and fifth tasks connect notation with hearing. When students write a dictation in the program, they first rely on their hearing and memory and only then listen to their version and compare it with the original. When building intervals or chords, they first sing or imagine the sound and then check it by playback. It is important that playback is used for checking, not as a substitute for inner hearing; otherwise the task loses its developmental value.

The sixth and seventh tasks extend theoretical knowledge. Transposing a melody or rewriting it in another clef helps students understand keys and clefs in practice. Notating an Uzbek folk melody and adding the doira usul on a separate line introduces students to the problems of transcription and the specifics of national rhythm, connecting the course with Uzbek musical culture. The eighth task synthesises all the knowledge acquired: students compose a short piece and present it, which increases motivation and develops creativity.

Several methodological recommendations follow from the analysis. First, handwritten work should precede computer work at the initial stage of learning notation, so that students learn the shapes and rules of signs consciously. Second, the program should be introduced gradually, starting with simple note entry and playback and moving to more complex functions. Third, playback should be used for self-checking after students have formed their own auditory image. Fourth, the free availability of MuseScore makes it the most suitable program for general use in educational institutions, while Sibelius and other professional programs can be introduced for advanced students. Fifth, teachers should create a bank of digital exercises, including Uzbek folk material, that can be shared with students through online platforms.

Conclusion

Musical literacy, the ability to read, write and understand music in notation, is a key outcome of the course of music theory and solfeggio. Music notation software such as MuseScore and Sibelius significantly expands the possibilities of teaching notation: it provides visualisation, immediate auditory feedback, error control, easy editing and opportunities for creative work, and helps teachers prepare high-quality materials. At the same time, the software has limitations: automatic formatting may hide the rules of notation graphics from students, and reliance on playback may weaken inner hearing. The proposed system of tasks, combining handwritten and computer notation and linking notation with hearing, rhythm and national music, makes it possible to use the advantages of software while avoiding its risks. Further research may concern the experimental evaluation of this system and the development of notation tools adapted to the features of Uzbek traditional music.

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