# Audio Test for Musicality:
# Designing A Technology-Based Instrument for Measuring Music Learning Outcomes

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**Abstract**

*The Musicality Assessment Test is a notation-based examination covering three concepts: ear training, listening, and reading. Due to the incorporation of these three conceptual domains, the musicality test can only be effectively conducted when the test questions are presented in audio format. The aim of this study was to innovate the testing process as a means of assessing music learning outcomes through an audio-based format. This study employed qualitative descriptive method, and utilized Sibelius and Cubase software as technological tools. The design phase began with the preparation of the structured test instrument, followed by the recording process using Sibelius software. This involved recording questions related to rhythmic, pitch, interval, melodic, scale, and harmonic notation, which were then transformed into MIDI format. Cubase software was employed for combining human voice with MIDI in the recording process. The testing instrument was meticulously crafted as an innovative product, ready for trial to measure the musicality abilities of test takers. The test tool was designed as an innovative product, poised for use in assessing the musicality skills of test takers.*

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## INTRODUCTION

In the field of music education at all levels, the common goal is to cultivate artistic appreciation through the development of musical awareness, the ability to intellectually and culturally interpret music, and to provide a foundation for music education at the tertiary level (Wicaksono, 2009).

One of the objectives of the Music Education Study Program at State University of Semarang is to

produce graduates specializing in teaching music for elementary to secondary education levels, with a Bachelor's degree (S1) qualification, who are outstanding, professional, skilled, and sensitive to socio-cultural sustainability. Achieving these goals depends on educators' ability to provide effective and innovative teaching within the learning process.

The success of learning process is closely tied to the roles of educators, whether they are instructors, teachers, or lecturers. The synergy between educators and students determines the success of learning and significantly impacts educational attainment. To optimize the learning process, one aspect involves improvements based on evaluations (Fatzuarni, 2022).

Evaluation plays a crucial role in the education process. According to Mastuti (2016), the evaluation process begins with measurement in the form of assessment. Given the importance of measurement tools in learning outcomes, the Music Education Study Program at State University of Semarang, lacking a measurement tool for music learning outcomes, now requires innovation for the optimal education process. One form of innovation is the musicality test.

The musicality test developed in 2022 is an evaluation tool for assessing music learning outcomes, currently existing as a set of written test questions or written documents (Salafiyah et al., 2022). Therefore, the test cannot yet be piloted with prospective test-takers, including music teachers, instructors, and music students. Given that the initial design of the test questions covers musical sounds such as rhythm, pitch, interval, melody, and harmony, the musicality test can be implemented and tested when presented in an audio format. Thus, audio is a crucial aspect of the

Musicality Test. In light of this issue, the researchers propose the design of an audio musicality test as a tool for measuring music learning outcomes. When discussing audio, technology plays a crucial role in its design process.

## METHOD

This research employed qualitative approach. Subandi (2006) states that qualitative methodology involves a perspective on disciplined inquiry, often applied to educational research. The research method focused on designing the audio test, comprising two stages. Firstly, the utilization of Sibelius software involved recording musical notation questions and transforming them into MIDI format. Secondly, the use of Cubase software involved recording the integration of human voice with MIDI. The musicality test questions were strategically packaged as audio questions with the aim of facilitating test takers.

## FINDINGS AND DISCUSSION
### Exploration of Audio Test Design

The initial exploration is conducted at the outset to gather insights into the essential steps that need to be systematically undertaken to obtain structured recordings yielding optimal and test-worthy results.

Through this exploration, it is determined that not all questions need to be recorded for the trial; rather, a maximum of one question per indicator is sufficient. This implies that audio questions still cover all existing indicators. In conclusion, the audio test questions to be recorded amount to 20, covering the following: identifying rhythmic patterns in 2/4,

3/4, 4/4, 6/8-time signatures; recognizing note values of 1/16, 1/8, ¼, ½, and whole notes; identifying rest symbols or silences of 1/16, 1/8, ¼, ½, and whole rests; recognizing pitches; identifying intervals; identifying melodies; identifying harmonies; identifying major scales; and identifying minor scales.

The following are the steps in the process of designing the musicality audio test:

### Recording music notation questions in MIDI format

At this stage, questions involving rhythm, interval, melody, and harmony are sorted and selected. An alternative and straightforward method is to write audio music questions using Sibelius software. According to Sinaga et al., (2019), Sibelius is highly effective in facilitating the process of writing music notation, arranging, and recording the written results into MP3, MP4, and Midi formats.
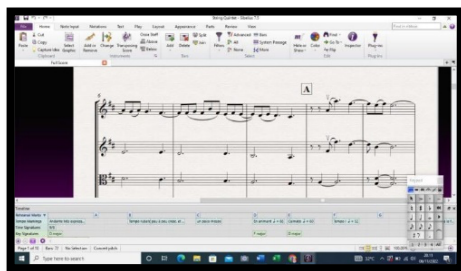


Figure 1: Sibelius software as a tool for recording audio in MIDI format

By writing music notations in Sibelius software and then exporting them to MIDI format for each question, covering the following indicators:

### Identifying rhythmic patterns in 2/4, 3/4, 4/4, and 6/8-time signatures

The characteristic of rhythm is the duration of notes (Putra et al., 2021). The rhythmic section involves understanding the lengths of beats, covering 8 questions. To be able to identify rhythm, a sufficient understanding of the sense of beat/tempo is required. There are 3 items of rhythmic questions, namely numbers 1, 2, and 3. In these questions, a metronome accompaniment is provided to assist test takers in identifying rhythmic patterns.



### Identifying note values of 1/16, 1/8, ¼, ½, and whole note

Part of the time element, note values are also referred to as musical notes (Fallen & Yudi Sukmayadi, 2023). Note values pertain to the understanding of listening to rhythmic elements within a time signature. To be able to identify note values, a sufficient understanding of the sense of beat/tempo is required. There are two items of note value questions, namely numbers 4 and 5. In these questions, a metronome accompaniment is provided to assist test takers in identifying note values.

A sample question:



### Identifying rest symbols or silences: 1/16, 1/8, ¼, ½, 1 ½, and whole rest

Regarding rest symbols, this pertains to understanding the listening aspect of silent note values within a melodic sequence in a time signature. To be

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able to identify rest symbols, a keen sense of hearing is required. There are two items of rest symbol questions, namely numbers 4 and 5. In these questions, a combination of melodic sounds and silences is provided to assist test takers in identification.

A sample question:



### *Identifying pitches or notations*

Notation includes both the duration and the pitch played (Maulana Hakim & Rainarli, 2019). This question pertains to understanding the listening aspect of a single sounding note. To be able to identify a note, a sufficient understanding of pitch is required. There are two items of note-listening questions, namely numbers 6 and 7. In these questions, a musical scale accompaniment is provided to assist test takers in identifying the sound of the note.
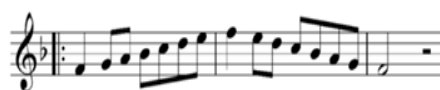
The musical scale accompaniment is played twice.



A sample question:



### *Identifying intervals*

This question involves understanding the listening aspect of two sounding notes. To be able to identify intervals, a sufficient understanding of pitch is required. There are two items of note-listening questions, namely numbers 8 and 9. In these questions, a musical scale accompaniment is provided to assist test takers in identifying the interval sounds.

The musical scale accompaniment is played twice.



A sample question:



### *Identifying melodies*

This question involves understanding the listening aspect of a series of notations or melodies that sound within a time signature. To be able to identify melodies, a balanced and adequate mastery of pitch and rhythmic sense is required. There are three items of melody-listening questions, namely numbers 10, 11, and 12. In these questions, a musical scale accompaniment is provided to assist test takers in identifying the sounding melodies.

The musical scale accompaniment is played twice.

A sample question:



### Identifying harmony

This question involves understanding the listening aspect of three notes sounded together, creating harmony. To be able to identify harmony, a mastery of musical sense and sharp listening skills are required. There are three items of harmony-listening questions, namely numbers 13, 14, and 15. In these questions, a musical scale accompaniment is provided to assist test takers in identifying the sounding intervals.

The musical scale accompaniment is played twice.



A sample question:



### Identifying major key tonic

This question involves understanding the listening aspect of a sequence of major key tonic notes being played. To be able to identify the major key tonic, a mastery of musical sense and sharp listening skills are required. There are two items of questions guessing the sequence of major key tonic notes, namely numbers 16 and 17. In these questions, a musical scale accompaniment is provided with the natural major key scale, or Do = C, to assist test takers in identifying the sounding intervals.

The musical scale accompaniment is played twice



A sample question:



### Identifying minor scale

This question involves understanding the listening aspect of a sequence of minor scale tones being sounded. To be able to identify the minor scale, a mastery of musical sense and sharp listening skills are required. There are three items of questions guessing the sequence of minor scale tones, namely numbers 18, 19, and 20.



### Recording combination (Voice and Musical Notation)

In the stage of recording human voices, the script includes the initial part, which involves reading the procedure for the test, informing test takers of the rules during the test, and reading the instructions for the test questions.

Figure 2: The process of recording the spoken questions by Nafik Salafiyah, assisted by music laboratory staff Andika Kurniawan, in the Karawitan Studio (B7-143)

Moving on to the stage of combining voice and MIDI musical notation, the test questions are processed using Cubase software.
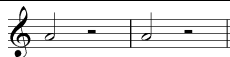
According to Laksono (2018), the emergence of Cubase as a flexible music scoring or dubbing software facilitates the creation of music packaging for recordings or arrangements.



Figure 3: The mastering process of test questions using Cubase technology

Here is an example of a combined test question:

| Audio test question | Sound Source |
|---|---|
| Number 6 | *Voice* |
| Listen to the sound of the scale below | *Voice* |
| | *Midi* |

| It is the sound of the note: | *Voice* |
|---|---|
| | *Midi* |
| a. Do<br>b. Mi<br>c. La<br>d. Si | Answer options on the answer sheet |

## CONCLUSIONS

The musicality test, previously in the form of a written draft, is now packaged in audio format. The design process begins with the preparation of the question instruments, followed by the recording process of the questions based on technology by utilizing Sibelius software. The recording stages include musical notation questions related to rhythm, pitch, interval, melody, scales, and harmony, which are then transformed into MIDI format. Cubase software is utilized in the process of combining human voice with MIDI. The testing tool is meticulously crafted as an innovative product ready to be tested to measure the musical abilities of test takers.

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