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Audio-Augmented Reality Musical Braille Pop Up Book as a Music Learning Media for the Visual Impairment Children's Self-Development

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ABSTRACT

The objectives of this research are: (1) to describe the development process of "Audio-Augmented Reality Musical Braille Pop Up Book"; (2) Analyzing the quality of "Audio-Augmented Reality Musical Braille Pop Up Book" based on comments from Braille symbol experts, music teachers, or music practitioners; and (3) Proving the effectiveness of "Audio-Augmented Reality Musical Braille Pop Up Book" in the self-development of blind children. This research has this priority, namely as a supporter of one aspect of the Sustainable Development Goals, namely the aspect of "quality education", where through "Audio-Augmented Reality Musical Braille Pop Up Book" it is hoped that it can become a source of learning and self-development for children. blind, so they can learn independently. The theory applied in the Student Creativity Program Research is the theory of Tomlinson's teaching materials. Tomlinson (Yoga, 2020) suggests that: (1) Teaching materials must have an impact, (2) Teaching materials must make students feel easy, (3) Teaching materials must make students develop self-confidence, and (4) What is taught must be visualized. The method used in preparing this product is the ADDIE Model. The product "Audio-Augmented Reality Musical Braille Pop Up Book" is the first and opening step for blind students towards independence in opening their horizons, especially in the realm of music. By understanding and being able to apply the concepts of Braille music notation, they will have the opportunity to explore their musical interests and express their soul. With the hope, in the end they will be able to produce musical works that can be heard and enjoyed by the wider community. Thus, music activities through the application of Braille music notation for blind students are not only a medium of entertainment, but also a bridge for their work to be accepted globally.

INTRODUCTION

The implementation of educational services for disabled people (especially in Indonesia) cannot be said to be good. There are still obstacles in its implementation, for example, the lack of educational facilities and infrastructure. The disabled referred to in this proposal are the blind. Blindness is the condition of someone who experiences disturbances or obstacles in their sense of sight (Wardani in Saputri, 2013). As stated by Puspitasari and Azeharie (2019), that blind students not only need to get academic education, but also non-academic education, so that the potential of these students can develop optimally. Based on a preliminary study conducted at a school for the blind or visually impaired, namely at the Special Needs School - A "YPAB" Surabaya, the main obstacle in learning Cultural Arts (Music) is that the delivery of material is also still done verbally, which is difficult for students to study independently.

Problems from a psychological standpoint at Special Needs School - A "YPAB" Surabaya, there are still many blind children who experience low self-esteem, lack of self-confidence, which causes them to find it difficult to interact with their surroundings, especially when with people who are classified as 'normal' people. Due to a lack of self-

confidence, this also results in their abilities and talents, especially in the realm of music, not being explored optimally. One of the factors is in the art of music learning material books, especially those that can be used as handbooks for blind students. The music lesson is useful for growing students' self-confidence levels and making students' mental health good. Good mental health will affect the improvement of student learning outcomes and achievements (Jazuli, 2020). This was also emphasized in the literature study on data from several sources, including: Data from the official website of the Mitra Netra Foundation, as a non-profit organization that focuses its activities on efforts to improve the quality and participation of the blind in the field of education and employment (this institution has the status of a legal entity registered with Supplement to the State Gazette dated 14/12 of 2001 number 100), in collaboration with the Indonesian Braille Electronic Community.

The phenomenon of reading Braille among blind students that occurs at this time has begun to decrease. The reason is that there is an assistive technology called "Screen Reader" with the function of playing gadgets without having to look at them. According to Sulistyowati and Rafi (2020) a screen reader or software that is useful for helping blind people use a computer. Not only on computers, Screen Reader is also available on smartphones that are integrated with the Android Accessibility Suite system which requires Android version 6 or later. The benefits of this system can help the blind to use smartphone devices. In order to be read through the system, this book is made in an e-book version which can later be scanned via a QR Code. Besides that, science and technology can also affect children's interest and enthusiasm for learning, for example, the use of Audio-Augmented Reality technology which can provide an interesting audio-visual display. The basic assumption of this research is the creation of a book that helps the process of learning the art of music that is flexible in nature which can be used by special needs school institutions for the blind at a certain level and can be widely used by blind people in need. Thus, the need for learning facilities for blind students will be optimally supported.

Music learning is an effective method for instilling national character in blind children (Maskuri in Ramadhan, 2018). Based on the results of the data study obtained by the researcher, the researcher conducted social humanities research to compile a learning material book that can be used independently by blind students entitled " Audio-Augmented Reality Musical Braille Pop Up Book as a Music Learning Media for the Visual Impairment Children’s Self-Development" It is explained in the book regarding the development of learning the keyboard instrument for blind students. In a music notation reading system, symbols, not letters, are used that represent pitch, duration, key, volume, and other elements as important information; where for musicians who are blind, they are constrained to digest the symbol, therefore music scoring needs to be transcribed into Braille music notation (Jacko, et al, 2015). The book contains material for songs to be played on a keyboard instrument, which is applied through a combination of song melodies and basic chords.

This book is in the context of cultural arts, where in one book there are several types of folk songs from representatives of several provinces in Indonesia, with the aim of providing insight into introducing the richness of Indonesian culture, one of which is the wealth of regional songs. The Braille music notation reading system has dimensions that are not integrated with ordinary inkprint reading. Because blind people cannot see and absorb music with long phrases, they must read and store each phrase in their minds, one by one (Herlein in Cunha, 2021). The book also aims to facilitate independent music learning, achieve the cognitive domain according to the Basic Competency of Special Needs Schools, students can "read and hear" song notations using their senses of hearing and touch. Apart from that, from the psychomotor domain, students can directly apply the folk song notations to the keyboard skillfully.

Student Creativity Program Activities – Humanities Social Research can also support the achievement of Main Performance Indicators of State Universities, namely attainment of indicator 1 (alumni getting decent jobs or entrepreneurship); indicator 2 (students get experience off campus); indicator 3 (lecturers have activities outside the campus); and indicator 5 (the results of the lecturer's work are used by the community) where students and lecturers collaborate to make a real contribution in the field, in this case related to learning the music for blind children. Apart from that, this activity also supports the implementation of the Merdeka Belajar - Kampus Merdeka program to develop potential reasoning and skills in the fields of education and music outside the campus.

The objectives of this research are: (1) to describe the development process of "Audio-Augmented Reality Musical Braille Pop Up Book"; (2) Analyzing the quality of "Audio-Augmented Reality Musical Braille Pop Up Book" based on comments from Braille symbol experts, music teachers, or music practitioners; and (3) Proving the effectiveness of "Audio-Augmented Reality Musical Braille Pop Up Book" in the self-development of blind children. This research has this priority, namely as a supporter of one aspect of the Sustainable Development Goals, namely the aspect of "quality education", where through "Audio-Augmented Reality Musical Braille Pop Up Book" it is hoped that it can become a source of learning and self-development for children. blind, so they can learn independently.

The product "Audio-Augmented Reality Musical Braille Pop Up Book" is expected to contribute to the development of science, namely to develop learning tools for blind children, especially in the scientific field of music arts. It is hoped that this product can also become a reference for practitioners or teachers of music arts in developing similar learning resources for the needs of blind children. In addition, self-learning which is facilitated through the provision of the "Audio-Augmented Reality Musical Braille Pop Up Book" also supports the Merdeka Belajar – Kampus Merdeka program launched by the Ministry of Education, Culture, Research and Technology.

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RESEARCH METHOD

The type of research carried out is development research that is intentional, systematic which aims to seek, find, formulate, improve, develop, produce, test the effectiveness of products, models, methods/strategies, services, certain procedures that are superior, new, effective, efficient, productive, and meaningful (Putra, 2015). The intended development is the preparation of the Audio-Augmented Reality Musical Braille Pop Up Book. The method used in preparing this product is the ADDIE Model. Prawiradilaga (2015) states that the ADDIE Model is a learning design based on a systems approach. The components contained in the ADDIE Model include: (1) Analyze: includes an analysis of material needs and the needs of students; (2) Design (design): scope of designing competency formulation, strategy; (3) Develop (develop): includes the development of teaching materials, as well as media development; (4) Implement: includes face-to-face meetings and assessments; and (5) Evaluate (assess): in terms of evaluating learning and improvement programs.

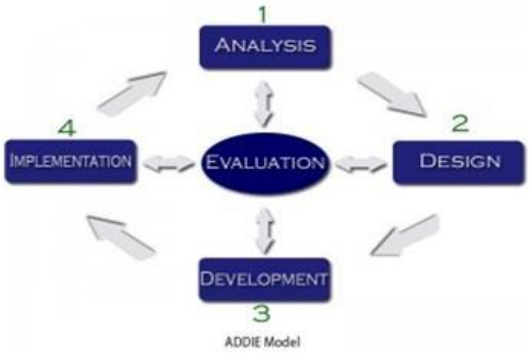

Figure 1. ADDIE Model Reiser Version.

By applying the ADDIE model, this research will start from the phases of analysis, design, development, and so on, so that a detailed, targeted, and effective songbook development product will be produced, especially for blind students.

Research data was collected starting from data about the initial conditions of the music learning process at the research location, from the initial analysis stage to the development stage, as well as data regarding the validation results from the validators about the quality of the song material book that had been developed. The validator will test the quality of the resulting book in terms of various aspects, starting from the packaging of the book (regarding the book's cover page, composition, clarity of Braille

symbols) and regarding the contents of the book (composition/grammar, stages of compiling song material). Research data was collected through several methods, including: (1) Through observation at the research location; (2) Collecting data during the book validation process in the form of analysis data on the validity of product development instruments; (3) Research data was also obtained when testing the effectiveness of product development, namely in the form of data from student activities observations as well as results of interviews with music teachers and students after using this book during the learning process of Music Lesson.

RESULTS AND DISCUSSION

The preparation of "Audio-Augmented Reality Musical Braille Pop Up Book", the concept of implementing the ADDIE Model can be explained as follows:

1. **Analyze**

   In this phase, the researcher conducted preliminary research from several sources regarding the phenomena that occurred factually in the field, namely related to the absence of a songbook that contained regional (Nusantara) songs using Braille music notation to be applied to keyboard instruments. In addition, so that students can easily recognize their musical instruments without having to buy or touch them directly, there is a pop-up book feature. Then, so that this book is also interactive and also adds enthusiasm to student learning, the latest feature, Audio-Augmented Reality, is added to the songs section. Apart from the physical form, this book will also be made into an e-book version so that it can be read through a screen reader.In this phase, the researcher conducted preliminary research from several sources regarding the phenomena that occurred factually in the field, namely related to the absence of a songbook that contained regional (Nusantara) songs using Braille music notation to be applied to keyboard instruments. In addition, so that students can easily recognize their musical instruments without having to buy or touch them directly, there is a pop-up book feature. Then, so that this book is also interactive and also adds enthusiasm to student learning, the latest feature, Audio-Augmented Reality, is added to the songs section. Apart from the physical form, this book will also be made into an e-book version so that it can be read through a screen reader.

   This research refers to the learning needs of students of Special Needs Elementary School (Blind) - A for 6th grade, semester one. The Competency Standards and Basic Competences that serve as a reference in the preparation of research products, namely Competency Standards: 2. Appreciate the process of creating music based on ideas about themes, symbols, techniques, and how to present them. Basic Competency: (2.1.) Comparing various regional music; (2.2.) Describe the experience of listening to various Indonesian and foreign music; (2.3.) Playing rhythmic and melodic musical instruments; and (2.4.) Singing regional and foreign songs with musical instruments.

2. Design

After analyzing the needs that are evident in the field, the researcher designs a product (in this case a book) that describes the basic technical material for playing the keyboard instrument, in detail, gradually, and easily understood by blind students at the age of around 10-14 years . Next, the selection of materials for finger practice songs, regional songs, and adjustments to the use of accompaniment chords from predetermined songs is carried out. Braille musical notation uses the standard Braille points used by the visually impaired to read and write music; in a sense, they use the same Braille points as they use in reading and writing (Goto in Park and Kim, 2014). In addition, Braille music notation reading provides all the information on the printed page of the music, includes notation values, dynamics instructions, and expression signs, and fingering number instructions, where all of this information must be placed on one line that can be easily touched by the fingers (Goldstein in Abramo and Pierce, 2013). Considerations which are used in the preparation of the "Audio-Augmented Reality Musical Braille Pop Up Book" there are several points, including: (1) Tone spacing or intervals; (2) rhythmic beats and musical notation rates; (3) Song material; (4) Song material is arranged sequentially, starting from 3 notation, 4 notation, 5 notation, and 6 notation, and also (5) Selection of regional songs (Indonesian songs). In compiling the "Audio-Augmented Reality Musical Braille Pop Up Book", the material is organized into several chapters, including: (1) Chapter 1: Getting to Know Braille Keyboard Instruments and Musical Notation; (2) Chapter 2: Initial Fingering Exercises; and (3) Chapter 3: Practicing Nusantara (Folklore) Songs.

3. Development

In this phase, a rough draft of "Audio-Augmented Reality Musical Braille Pop Up Book" was created, which had been written in Braille musical notation, and then printed into a physical Braille book using Art Carton A3 paper with various thicknesses.

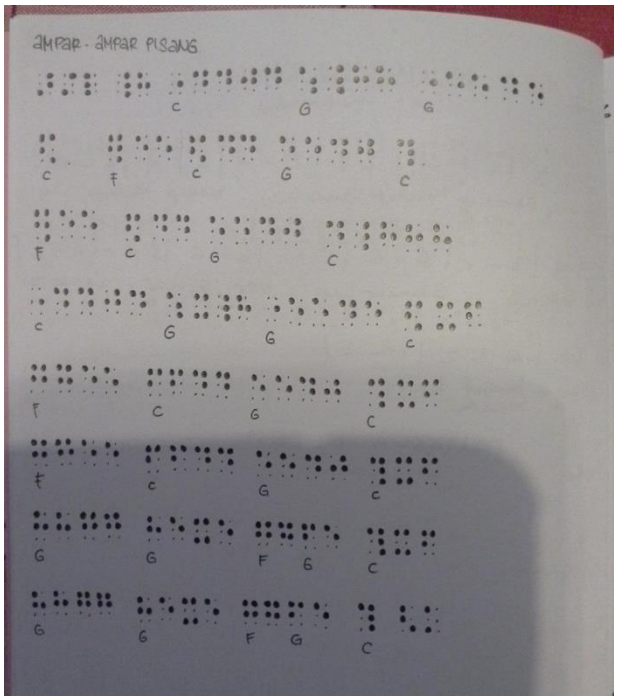

Figure 2. An example of composing song material using Braille music notation.

Then, the stage is continued with writing Braille characters on the skin of the book using MibiBraille 4th series software, in which the software has 5 (five) types of character sizes, namely size 14 (very small), 16 (small), 18 (medium/normal), 20 (large), and size 22 (very large). For this book, a character size of 18 is used, which belongs to the normal/medium category which aims to make the distance between the 6 (six) Braille dots in each character not too tight and not too far apart so that students' fingers become comfortable when feeling Braille characters and make it easier for students to in the process of reading titles, sub-chapters, and other information on the skin of the book. Book production uses the Braillo Norway Model 200 Series II electronic printer. This tool supports the book production process, starting from the typing stage to the printing stage so that quality physical condition book products can be produced.

After that, the draft of this book was submitted to the validator team to be tested from a quality perspective, to the graphic feasibility aspect that was adjusted to the Indonesian National Education Standards Agency. The validator team consists of parties who are competent in the field of Braille and Music. The quality of the product development "Audio-Augmented Reality Musical Braille Pop Up Book" is broken down into 4 (four) components, namely the feasibility of content, presentation feasibility, language feasibility, and graphic feasibility. Based on the results of the combined validation carried out by music practitioners, arts and culture teachers, Braille music notation experts, as well as teachers of blind students at Special Needs Schools, the components of Content Eligibility, Presentation Adequacy, Language

Eligibility and Graphic Feasibility are in the category of Very Good and Very Valid results.

4. Implementation and Evaluation

The product was tested directly on the students of the Special Needs School-A "YPAB" Surabaya regarding the effectiveness of the product. The effectiveness of using the product "Audio-Augmented Reality Musical Braille Pop Up Book" can be measured from each activity carried out by students during the Music learning activity. Starting from the activity of reading theoretical material in chapter 1 on the introduction of keyboard instruments and Braille music notation. Cognitively, students are directed to get to know keyboard instruments globally and types of Braille musical notation on simple beats (C1 cognitive domain). After that, students are able to recall the types of notes they have read with their sense of touch independently (C1 cognitive domain). Not only knowing and remembering, students are also able to understand the concepts and functions of Braille music notation when it is used in a song (C2 cognitive domain). Thus, students can independently apply the concept of Braille music notation in the form of simple songs, where students can read the melody of a simple song listed in the product "Audio-Augmented Reality Musical Braille Pop Up Book". This means, the level of the students' cognitive domain increases to the application stage (C3 cognitive domain).

Moving on to the next student activity, which is trying to play a simple melody of a song that has been read on a keyboard instrument. In this activity, what is developed in students is their psychomotor domain, namely at the Skilled Movements (P5) level - movements that require a learning process (Arikunto, 2009). At the level of this psychomotor domain, students are able to apply their understanding of the concept of Braille music notation into concrete actions, namely playing the song on a keyboard instrument with the correct notes position, the right beat, and the use of the correct accompaniment base chords as well.

Apart from being based on Bloom's taxonomy analysis and the results of the percentage of observations of student activity during Music learning activities, the effectiveness of using the product "Audio-Augmented Reality Musical Braille Pop Up Book" can also be shown from the opinions of students and teachers, during and after the product trial process takes place. Based on the results of interviews with several Musical teachers (the teacher is also blind), it was stated that the procurement of the product "Audio-Augmented Reality Musical Braille Pop Up Book" is very beneficial for the process of improving students' skills and skills, where the skills in playing music are expected to be used as provision for students for social and economic existence in society.

CONCLUSION

The product “Audio-Augmented Reality Musical Braille Pop Up Book” is the first and opening step for blind students towards independence in opening their horizons,

especially in the realm of music. By understanding and being able to apply the concepts of Braille music notation, they will have the opportunity to explore their musical interests and express their soul. With the hope, in the end they will be able to produce musical works that can be heard and enjoyed by the wider community. Thus, music activities through the application of Braille music notation for blind students are not only a medium of entertainment, but also a bridge for their work to be accepted globally.

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