JPPIPA 11(12) (2025)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Development of Braille Notation Using Plasticine to Improve Musical Note Reading Competence for Blind Students

Verdian Angga Saputra[1*]

[1] Arts Education Study Program, Faculty of Teacher Training and Education, Sebelas Maret University, Surakarta, Indonesia.

Received: September 30, 2025
Revised: November 07, 2025
Accepted: December 25, 2025
Published: December 31, 2025

Corresponding Author:
Verdian Angga Saputra
anggaverdian993@gmail.com

DOI: 10.29303/jppipa.v11i12.13002

Abstract: This study explains the innovation of Braille music notation using plasticine learning media. The Research and Development (R&D) method was used to conduct this research through the Borg and Gall model. The population of this study involved five blind students at SMK Negeri 8 Surakarta. This study aims to develop a plasticine media product to improve the musical arts and music-reading competence of visually impaired students majoring in music at SMK Negeri 8 Surakarta. The Design and Development phase focused on creating the plasticine media, which was validated by experts in music, design, and special education, demonstrating its validity. The validation results were then processed, and the design was revised. Product testing was conducted, and the cumulative product trial results were assessed based on content quality, appearance, and technical quality, with a score of 76.38% in the feasible category. Furthermore, a feasibility test using a questionnaire administered to five students showed very positive results, with scores of 38.2 in content quality, 16.4 in appearance, and 37 in technical quality. All scores had a two-tailed significance of 0.007 and 0.013 < 0.05. These findings indicate that learning staff notation through plasticine media can improve the learning outcomes of visually impaired students.

Keywords: Braille; Notation; Plasticine

Introduction

Inclusive education has always been a challenge for Indonesian society. Inclusive education encompasses the full placement of children with mild, moderate, and severe disabilities in regular classes. This demonstrates that regular classes provide a relevant learning environment for children with disabilities, regardless of the type or severity of the disability (Phytanza, 2023; Pratiwi et al., 2018). Inclusive education always encourages teachers to be creative in creating new teaching methods and media, so that the teaching and learning process runs according to what is desired. This research aims to develop a plasticine learning media product to improve the reading competence of blind students majoring in music arts at SMK Negeri 8 Surakarta.

SMK Negeri 8 Surakarta has students with special needs, namely blind students in the arts and music department. Blind students in the arts and music department are unique and perhaps rare in other vocational schools. Learning music is synonymous with the musical talents and abilities possessed by students. One of them is the ability to read notation (Azizah et al., 2025). Blind students majoring in music arts excel musically, but have difficulty with music theory, especially in music technology subjects. Music technology learning at SMK Negeri 8 Surakarta is a subject that utilizes computer technology in processing staff notation. However, the software used for learning does not yet have features that support students with disabilities. Whereas students with special needs require very specific teaching services, especially when they have a desire to master academic, social, and vocational fields (Anidar, 2014; Frizka, 2025; Sari et al., 2025; Supriyanto, 2023).

To assist visually impaired students in reading notation, music education has developed braille notation. However, writing musical notation is difficult and time-consuming to master (Seisoria et al., 2024).

How to Cite:
Saputra, V. A. (2025). Development of Braille Notation Using Plasticine to Improve Musical Note Reading Competence for Blind Students. *Jurnal Penelitian Pendidikan IPA*, *11*(12), 1172-1177. https://doi.org/10.29303/jppipa.v11i12.13002

Braille musical symbols also require specific mastery by teachers, but there has been no training or support provided by the government or schools. The downside of Braille notation is that it is very difficult for children with low pitch sensitivity to use. They will have a hard time finding the basic notes they want to read in Braille notation. A deeper understanding of Braille notation is required before children can read it because Braille letters and Braille notation are different (Alfitasar, 2018; Awang et al., 2024; Djari, 2025; Rahmayani & Selian, 2025).

This finding strengthens the urgency of developing learning media using plasticine to improve the competence of reading musical notes for blind students. Learning media products are innovations that can provide interactive and engaging learning experiences, presenting a more concrete learning experience, and demonstrating the object's complete construction and operation (Kustyarini et al., 2020; Muliyadi et al., 2023; Nazlidou et al., 2024; Oktaviani et al., 2021). Through plasticine, students can create and directly experience the shape of musical notes, enabling them to distinguish note values, duration, and pitch.

In addition to functioning as an interactive learning tool, this learning media is expected to improve the ability to read musical notes for blind students. The purpose of this project is to develop learning media using plasticine to improve the competence of reading musical notes for blind students of SMK Negeri 8 Surakarta. The research question in this study is: How can Braille notation learning media using plasticine improve the competence of reading musical notes for blind students majoring in music arts at SMK Negeri 8 Surakarta?

Method

The research conducted was a type of Research and Development (R&D) using the Borg and Gall development model (Sugiyono, 2020). The research subjects were teachers and 5 blind students majoring in music arts at SMK Negeri 8 Surakarta. This research consisted of seven stages based on research needs. The seven stages are: potential and problems; data collection; product design; design validation; design revision; product testing; and creation of evaluation tools and products (Semiawan, 2017; Winarni, 2018; Yusup, 2018).

Result and Discussion

The research findings are presented consisting of potential and problems; data collection; product design; design validation; design revision; product testing; and making evaluation tools and products. This research and development produced learning media using plasticine as a suitable medium for visualizing musical notes and as a medium for increasing the competency of blind students majoring in music at SMK Negeri 8 Surakarta. The development procedure used is the Borg and Gall model which was adapted into seven stages, namely:

Potential and Problems

From the results of a preliminary study conducted, it turns out that blind students at SMK Negeri 8 Surakarta have musicality in terms of recognizing notes in melodies and chords that is better than that of regular students. However, these students lack sensitivity to the note values in rhythmic melodies and chords. On the other hand, teachers do not understand well the concept of learning for students with special needs who are blind. Class teachers only carry out the learning process according to the learning plan in the Teacher's Book without understanding the concept of learning for students with special needs who are blind due to the lack of training in the learning process. Thus, there needs to be steps and innovations in learning to be used as provisions for teachers in carrying out learning in the classroom.

Data Collection

Data collection was carried out to overcome potential and problems from development. Data collection was performed through needs analysis, study of material, and devices for making media.

Needs Analysis

Needs analysis was done through interviews. Information was obtained that the Sibelius software used as a learning medium for writing staff notes had not accommodated talkback, which could be used as a translator for blind people, so that students with special blind needs in the music department have difficulty in learning music technology, resulting in decreased student enthusiasm in participating in music technology learning. Regarding this situation, it is necessary to develop learning media to help students with special needs who are blind to understanding staff notation in music technology subjects. The media developed is a tool made of plasticine to imitate musical notes in three dimensions so that they can be felt by blind students.

Material Assessment

Based on the analysis, it is known that the benefits of using media in the learning process create enthusiasm for learning, more direct interaction between students and learning resources, thereby raising students' curiosity and increasing students' motivation to learn, and improving learning achievement.

In addition, at the material review stage, it would be presented to students, media devices, and their use were determined. The material chosen in this research is class XI music material on technology for inputting and editing notation.

Product Design

After collecting data, the next step is to create learning media that will be used by blind students to learn musical notes. The process of making and designing learning media from plasticine is presented in the following picture:

a) Prepared materials

Plasticine; Clipboard; Five sticks; solation.

b) How to create learning media

Prepare a clipboard; Cut five sticks based on the length of the clipboard; Arrange the cut sticks to form a staff (staves); To attach the stick to the clipboard, use insulation tape to stick them on the clipboard firmly; Once everything has been created, the media is ready to be used to form clefs, notes, time lines, and so on, using plasticine (night wax).

c) Learning media design results

Figure 1. Results of learning media design

Design Validation

In the next development stage, media validation was carried out by material experts. The following is an explanation of expert validation as follows:

a) Material validation (draft 1)

The material validation aims to examine the suitability of the material in music notation learning media using plasticine. Aspects and criteria for material experts can be seen in the Table 1.

Table 1. Aspects and Criteria for Experts Material

Aspect	Criteria
Content Feasibility	Conformity with Competency Standards and Basic Competencies
	Provide new knowledge
	Material accuracy
	Encourage curiosity
	Presentation technique
Language	Ease of understanding the material
	Learning presentation
	Coherence and flow continuity
	Attractiveness presentation
Performance	Can utilized in an individual nor group

The assessment feasibility results of learning media for music notation using plasticine on the linguistic aspect by material experts can be seen in Table 3. The feasibility assessment results of learning media for music notation using plasticine on the performance aspect by material experts can be seen in Table 4.

Based on the design validation results above, several changes and revisions were made based on input from experts. The actions taken on the media design are shown in Figures 2 and 3.

Table 2. Results Validation Expert Material on Aspect Content Eligibility

Evaluation Aspect	No	X1	X2	X3	Σ Per No	Σ Per aspect	Score Maximum	Score (%)	Category
Content Feasibility	1	3	3	2	8	35	48	72.90	Feasible
	2	3	3	3	9				
	3	4	3	3	10				
	4	4	2	2	8				

Table 3. Results Validation Expert Material on Language Aspect

Evaluation Aspect	No	X1	X2	X3	Σ Per No	Σ Perspective	Score Maximum	Score (%)	Category
Language	5	3	2	3	8	33	48	68.75	Feasible
	6	3	3	3	9				
	7	3	2	2	7				
	8	4	2	3	9				

Table 4. Results Validation Expert Material on Performance Aspect

Evaluation Aspect	No	X1	X2	X3	Σ Per No	Σ Perspective	Score Maximum	Score (%)	Category
Performance	9	4	3	3	10	21	24	87.50	Very Feasible
	10	4	3	4	11				

The results of the validation carried out by three media experts show that the learning media is included in the feasible category to be tried out. Besides providing assessments, media experts also provided suggestions as follows: (a) The distance between the timelines is too narrow, so blind students may have difficulty placing the plasticine according to the required note. (b) The size of the musical notes should be adjusted to the distance or spacing of the timelines.

Figure 2. Display before media expert revision

Figure 3. Display after media expert revision

Based on the expert assessment results, the overall score reached 76.38%, meeting the criteria of being feasible. Therefore, the plasticine-based learning media can be tested further.

Product Trial

Field trials of musical notation learning media using plasticine are presented in the figure 4.

Figure 4. Blind students majoring in music at SMK Negeri 8 Surakarta try learning media products

Based on Table 5, data on the feasibility of learning media can be obtained from the student side. Data from students were obtained from a questionnaire developed by researchers and filled in by blind students majoring in music arts at SMK Negeri 8 Surakarta. The questionnaire contained 25 instrument items and used a Likert scale with the highest value of 4 and the lowest value of 1 for each question. The questionnaire consisted of three aspects with a composition of 10 content quality aspects, five appearance aspects, and 10 technical quality aspects. Once the score interval for each aspect was known, the next step was calculating the score based on each aspect and then converting the score into a category. The assessment score for each respondent can be seen in Table 6.

Table 5. Blind Student Response Data

Respondent	Rated aspect			Total
	Content Quality	Display Aspects	Technical Quality	
Student 1	38	17	36	91
Student 2	39	16	38	93
Student 3	37	18	35	90
Student 4	38	16	37	91
Student 5	39	15	39	93

Table 6. Blind Student Response Data

Aspect	Average	Percentage	Category
Content quality	38.2	95.5%	Very Feasible
Display aspects	16.4	82%	Feasible
Technical quality	37	92.5%	Very Feasible
Total	91.6	91.6%	Very Feasible

All aspects have an average score of 91.6 with a percentage of 91.6%, which falls into the very feasible category. Positive responses were observed, where many students reported that the existence of learning media for beam notation using plasticine helped them understand the material. Visually impaired students in class XI majoring in music at SMK Negeri 8 Surakarta became more interested and actively participated in learning activities using plasticine-based beam notation learning media.

Conclusion

Based on the results of the research and discussion, it can be concluded that: 1) Plasticine braille notation is a development product of a long process of music technology subjects at SMK Negeri 8 Surakarta. 2) Plasticine braille notation is a possible alternative to become a new teaching medium for inclusive students with special needs who are blind. 3) Plasticine braille notation can encourage blind students to develop their potential, especially in terms of reading, understanding,

and making notation so that they can work according to their creative abilities in the field of music.

Acknowledgments
The author would like to thank the supervisors at Sebelas Maret University, Surakarta, especially the Arts Education Study Program, for their assistance and support in completing this article. He also thanks the editors of the Journal of Science Education Research (JPPIPA) for their hard work in making this article possible.

Author Contributions
Conceptualization, methodology, validation, formal analysis, investigation, resources, data curation, writing—original draft preparation, writing—review and editing, visualization, supervision. All authors have read and agreed to the published version of the manuscript.

Funding
This research received no external funding.

Conflict of interest
The authors declare no conflict of interest.

References

Alfitasar, R. (2018). *Meningkatkan kemampuan Sight Singing Pada Pelarihan Paduan Suara Dengan Media Notasi Braille di SLB N-A Bandung*. Retrieved from http://repository.unpas.ac.id/id/eprint/37285

Anidar, J. (2014). Layanan Pendidikan bagi Anak Berkebutuhan Khusus. *Jurnal Al-Taujih*, 12–28. https://doi.org/10.15548/atj.v2i2.944

Awang, A., Rani, I. F. A., Hock, K. E., Ramly, N. A., & Kamil, R. (2024). Innovative Approaches in Teaching Early Braille Reading Skills: a Theory and Practice Study. *Journal of Contemporary Social Science and Education Studies (JOCSSES) E-ISSN-2785-8774*, *4*(2), 177–200. https://doi.org/10.5281/zenodo.13371193

Azizah, F., Huda, A., Hendriyani, Y., & Fadhilah. (2025). Development of E-LKPD with Problem Based Learning (PBL) Learning Model in Informatics Subject at High School. *Jurnal Penelitian Pendidikan IPA*, *11*(9), 90–96. https://doi.org/10.29303/jppipa.v11i9.11404

Djari, T. R. W. (2025). Penerapan NVDA berbasis metode SAS dalam meningkatkan kemampuan membaca permulaan Braille bagi anak tunanetra di SLB Negeri 01 Bantul. *Literal: Disability Studies Journal*, *3*(01), 12–26. https://doi.org/10.62385/literal.v3i01.161

Frizka, N. (2025). Pemandangan Anak Berkebutuhan Khusus Tunanetra. *Nian Tana Sikka*, *3*(1), 124–134. Retrieved from https://ejournal-nipamof.id/index.php/NianTanaSikka/article/view/651/777

Kustyarini, K., Utami, S., & Koesmijati, E. (2020). The Importance Of Interactive Learning Media In A New Civilization Era. *European Journal of Open Education and E-Learning Studies*, *5*(2). https://doi.org/10.46827/ejoe.v5i2.3298

Muliyadi, L., Doyan, A., Susilawati, Hamidi, Hakim, S., & Munandar, H. (2023). Training on Using PhET Virtual Media on Newton's Law of Gravity for Class X Students at Islamic Senior High School of Syaikh Abdurrahman Kotaraja, East Lombok. *Unram Journal of Community Service*, *1*(1), 15–18. Retrieved from https://journals.balaipublikasi.id/index.php/jcss/article/view/68

Nazlidou, I., Efkolidis, N., Kakoulis, K., & Kyratsis, P. (2024). Innovative and Interactive Technologies in Creative Product Design Education: A Review. *Multimodal Technologies and Interaction*, *8*(12), 107. https://doi.org/10.3390/mti8120107

Oktaviani, S., Priyantoro, D. E., & Hasanah, U. (2021). Penggunaan Media Plastisin Dalam Mengembangkan Motorik Halus Di Kb Nurul Arif. *IJIGAEd: Indonesian Journal of Islamic Golden Age Education*, *2*(1), 31–53. https://doi.org/10.32332/ijigaed.v2i1.3781

Phytanza, D. T. P. (2023). *Pendidikan Inklusif, Konsep, Implementasi, Dan Tujuan*. Batam: Rey Media Grafika.

Pratiwi, A., Lintangsari, A. P., Rizky, U. F., & Rahajeng, U. W. (2018). *Disabilitas dan pendidikan inklusif di perguruan tinggi*. Universitas Brawijaya Press.

Rahmayani, I., & Selian, S. N. (2025). Tantangan Anak Tuna Netra dalam Pembelajaran. *Jurnal Ilmiah Literasi Indonesia*, *1*, 145–158. https://doi.org/10.63822/p5zbct63

Sari, R., Setyo, B., & Marhayati, N. (2025). Inovasi Layanan Inklusif di Pondok Pesantren Khusus Islam untuk Anak Berkebutuhan Khusus sebagai Model Pendidikan Berbasis Kebutuhan. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *8*(2), 1842–1855. https://doi.org/10.54371/jiip.v8i2.6999

Seisoria, M. T., Ediyanto, E., & Safiul Ummah, U. (2024). A Training Person Need Analysis for Music Teachers Readiness to Teaching Music Vocational for Visually Impaired Student: A Review. *Journal of Comprehensive Science (JCS)*, *3*(10), 4675–4685. https://doi.org/10.59188/jcs.v3i10.2630

Semiawan, C. R. (2017). *Metode Penelitian Kuantitatif*. Jakarta: Grasindo.

Sugiyono. (2020). *Metode Penelitian Kuantitatif, Kualitatif, dan Kombinasi (Mixed Methods)* (2nd ed.). Bandung: Alfabeta.

Supriyanto, S. (2023). Pengelolaan Layanan Keterampilan Vokasional Siswa Tunarungu. *Jurnal Inspiras Manajemen Pendidikan*, *8*(3), 167–177.

Retrieved from https://ejournal.unesa.ac.id/index.php/inspirasi-manajemen-pendidikan/article/view/35509

Winarni, E. W. (2018). *Teori dan Praktik Penelitian Kuantitatif*. Bumi Aksara.

Yusup, F. (2018). Uji Validitas dan Reliabilitas Instrumen Penelitian Kuantitatif. *Jurnal Tarbiyah: Jurnal Ilmiah Kependidikan*, *7*(1), 17–23. https://doi.org/10.18592/tarbiyah.v7i1.2100