Volume 4 Number 2 (2026)
July- December 2026
Page: 2355-2367

EDUJAVARE: International Journal of Educational Research
ISSN: 3031-2884
https://edujavare.com/index.php/edujavare
DOI: 10.70610/edujavare.2211

Designing the ConductMaster Card for Music Teachers through Barcode Integration and Creative Design in Music Teaching

Fensy Sella[1*], Hafizhah Insani Midyanti[2], Hikmah Sari[3]

[1] Universitas Pendidikan Indonesia, Indonesia; fensysella@upi.edu
[2] Universitas Pendidikan Indonesia, Indonesia; dicemidyanti@upi.edu
[3] Universitas Pendidikan Indonesia, Indonesia; hikmahsari2@upi.edu

Article history Submitted: 2026/10/26; Revised: 2026/10/28; Accepted: 2026/11/02

Abstract

The ConductMaster Card is a learning medium developed to help music teachers learn basic conducting techniques independently. The medium combines a music pedagogy approach with communicative visual design and barcode technology that links each card to conducting video tutorials. This study employed the ADDIE development model (Analyze, Design, Develop, Implement, and Evaluate) with music teachers in Bandung, West Java. Implementation was carried out in two cycles comprising four meetings, three held online and one held face to face. Data were collected through interviews, questionnaires, observation, and documentation, and were analysed descriptively. Feedback from the first cycle showed that teachers needed conducting guidance for angklung teaching, so Kodály hand sign material was added in the second cycle. The results show that the ConductMaster Card helps teachers understand time signature patterns and conducting gestures more easily and in a way that suits their classroom context. Teachers considered the medium practical and relevant for both self-directed learning and structured training. The ConductMaster Card is therefore suitable as a supporting medium for teaching conducting to school music teachers, and further studies are recommended to measure its effect on teachers' conducting skills quantitatively.

Keywords Barcode Integration; ConductMaster Card; Creative Design; Music Education

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INTRODUCTION

Music education in schools plays an important role in developing creativity, artistic skills, and an understanding of music, both theoretically and practically (Correa et al., 2025; Huang, 2023). Through music education, students are not only trained to appreciate works of art but are also given opportunities to express themselves, develop aesthetic sensitivity, and improve their cognitive and affective abilities (Gao & Li, 2024). In the Indonesian curriculum, music learning is part of the Arts and Culture subject, which encompasses musical

appreciation, creation, and expression (Bertina et al., 2024). These three components are interrelated in shaping a comprehensive and meaningful learning experience. Music also trains concentration, coordination, and the ability to work collaboratively in groups; therefore, teachers need learning media that can support these processes.

Although music education has become part of the curriculum, school music instruction still tends to focus on notation, singing, and playing musical instruments, while conducting skills—the ability to lead an ensemble or choir—are often overlooked. Conducting, however, requires technical understanding and sensitivity to musical expression, which teachers need when guiding music groups at school. Recent studies indicate that rhythmic accuracy, meter, and facial expression are the most important aspects in assessing the conducting gestures of prospective music teachers (Gustems Carnicer, 2025). As orchestral activities, choirs, and musical performances become increasingly common in Indonesia, these skills are becoming more relevant for music teachers so that they can facilitate students' participation in a wider range of musical practices.

Previous studies have generally focused on developing tutorials or training in basic conducting techniques in the form of modules, instructional videos, or face-to-face training for university students and community groups (Gutama & Hakim, 2022; Widodo et al., 2023). These approaches have contributed to conducting instruction but have not specifically addressed the needs of school music teachers. Meanwhile, card-based media have proven useful in school music learning. A notation card game played in groups increased seventh-grade students' interest in rhythm and helped them understand note values and rhythmic patterns in 4/4 meter (Sella et al., 2023). This finding indicates that cards can serve as practical learning media for symbolic and procedural music content.

Conducting competence is part of music teachers' professional readiness because teachers are expected to lead school choirs and ensembles, manage rehearsals, and communicate musical ideas through gestures (Raimova, 2021). However, not all teachers have opportunities to receive advanced training after entering the profession, making independently accessible learning resources an important need. The development of video-based learning resources for music teachers in Singapore has shown that recordings of teaching practices can be used in teacher professional development programs, both online and in blended formats (Bautista et al., 2019). These findings indicate that visual and audiovisual media have the potential to bridge the limitations of face-to-face training for teachers.

Developments in digital technology have created opportunities to connect printed media with audiovisual content. The use of QR codes in music learning has supported instrumental practice in the classroom (Palazón & Giráldez, 2018) and complemented project-based teaching materials for dance music (Irwansyah & Prastiawan, 2023). Digital media have also been used in traditional music learning, for example, virtual museums as a means of studying traditional Indonesian musical instruments (Sukmayadi et al., 2026). However, no visually designed medium connected to video tutorials specifically intended to help teachers learn conducting independently has yet been identified. Therefore, the novelty of this study lies in

the design of the ConductMaster Card, a learning card that integrates creative design and barcode technology to support music teachers in learning and teaching conducting in a practical and contextual manner.

The context of music learning in West Java also needs to be considered. Angklung is widely taught in schools and is often combined with the Kodály method, which uses hand signs to indicate pitch. A literature review shows that the application of Kodály hand signs in angklung learning improves students' playing skills and makes learning more interactive and enjoyable, although its success depends on teachers' mastery of music theory and teaching skills (Rahmawati et al., 2025). The application of this method to seventh-grade students also helps them read notation and play the angklung more easily (Sukma, 2022). Therefore, music teachers in West Java need leadership skills that encompass not only meter patterns but also the hand signs commonly used in angklung instruction.

The ConductMaster Card contains sequenced material on basic conducting techniques, such as meter patterns, dynamics, and body expression. The cards are equipped with visual illustrations and barcodes linked to supporting materials in the form of video tutorials and audio. Based on this explanation, this study aims to design an informative and engaging ConductMaster Card that meets music teachers' needs, apply creative design elements to increase user engagement, and describe the results of its implementation evaluation.

METHOD

This study is a development study employing the ADDIE model (Analyze, Design, Develop, Implement, and Evaluate). The model consists of five interrelated stages, each with specific objectives and outcomes (Adeoye et al., 2024; Zamsiswaya et al., 2024). The study was conducted in two cycles involving 10 music teachers in Bandung, West Java, in August 2025. The first-cycle sequence is presented in Figure 1.

The ADDIE model was selected because the product needed to be revised based on user feedback. Each stage produces an output that serves as the basis for the next stage, and evaluation is conducted in every cycle so that the media can be improved gradually (Adeoye et al., 2024). In this study, the first cycle served to test the initial card concept, while the second cycle was used to refine the material based on teachers' actual needs in the field. The researchers acted as both media designers and facilitators during implementation.

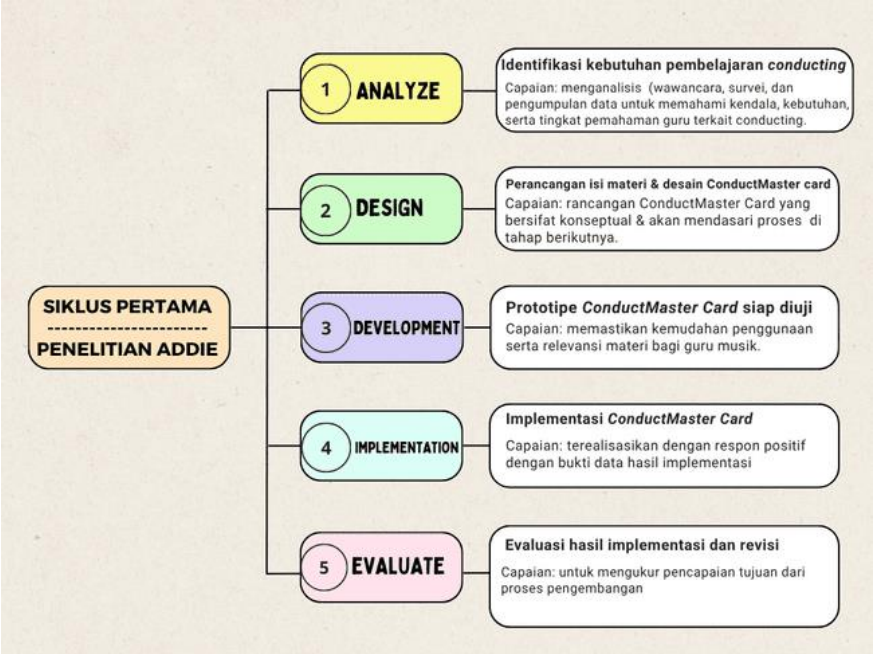


Figure 1. First Cycle of the ConductMaster Card Design

In the first cycle, the analysis stage was conducted to identify the importance of developing the ConductMaster Card as a self-directed learning aid for music teachers. A needs analysis was carried out through interviews and surveys to understand teachers' difficulties, needs, and levels of understanding of conducting. The design stage produced a conceptual design comprising the learning content, visual layout, and instructions for using the cards. During the development stage, this design was transformed into a ConductMaster Card prototype containing the material, visual design, and barcode feature. The prototype was then implemented with music teachers, both for independent learning and group training, and subsequently evaluated based on teacher feedback.

The first-cycle evaluation showed that the initial material covered only simple meter patterns, whereas most music teachers in West Java teach angklung at school and need Kodály hand-sign movement patterns. This finding became the basis for the second cycle, which included the development, implementation, and evaluation stages, as presented in Figure 2.

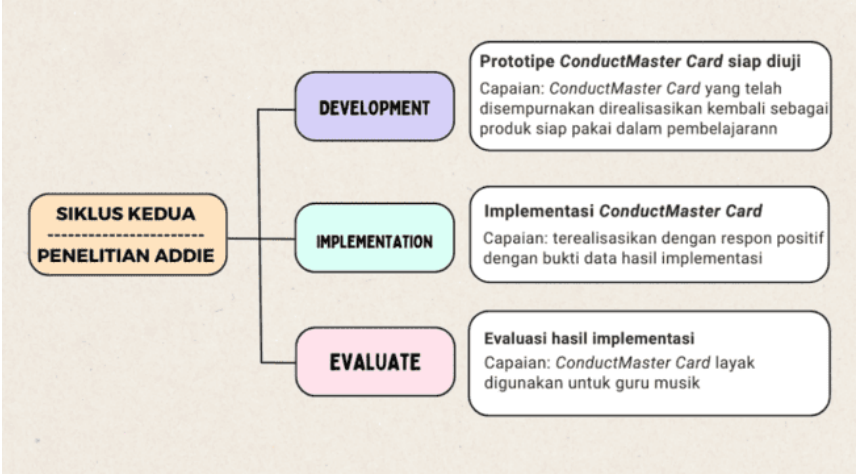


Figure 2. Second Cycle of the ConductMaster Card Design

In the second cycle, Kodály hand-sign material for angklung learning was added to the cards. The revised medium was tested again with music teachers through independent learning and guided training, including teaching practice and classroom simulations using the barcode links to video tutorials. The final evaluation was used to ensure that the card content and features met teachers' needs, resulting in the final version of the ConductMaster Card.

Data were collected through interviews, questionnaires, observation, and documentation over four meetings. Details of the data collection techniques, sources, and areas of focus are presented in Table 1.

Table 1. Data Collection Techniques

Technique	Data Source	Data Focus	Stage
Interview	Music teachers	Teachers' difficulties, needs, and experiences related to conducting	Analysis and evaluation
Questionnaire	Music teachers	Teachers' initial understanding and responses to the cards' content, design, and features	Analysis and evaluation
Observation	Implementation activities	How teachers read the cards, practice meter patterns, and scan the barcode	Implementation
Documentation	Designs, prototypes, and activities	Card designs, revision notes, and photographs and recordings of activities	All stages

Source: Researcher documentation

The data were analyzed descriptively and qualitatively through data reduction, data display, and conclusion drawing (Miles et al., 2014). Data trustworthiness was examined by comparing the results of interviews, questionnaires, and observations in each cycle.

RESULTS AND DISCUSSION

Results

Design and Development of the ConductMaster Card (Analyze, Design, and Develop)

The design and development of the ConductMaster Card were carried out through the first three stages of the ADDIE model: analysis, design, and development. These three stages formed the basis for producing a medium relevant to music teachers' needs in understanding basic conducting techniques, both independently and in instructional contexts.

The analysis stage began by identifying the problems faced by music teachers in West Java. Based on interviews and questionnaires, teachers' knowledge of conducting was limited in terms of theory, practice, and how to teach it to students. Many teachers had never received formal conducting training and did not fully understand meter patterns or hand-movement techniques. In addition, no medium was available to help teachers learn conducting independently and apply it easily in the classroom. The results of this analysis indicated the need for a visual medium that is easily accessible and supports conceptual understanding and practical skills simultaneously.

The design stage began with the development of a media concept suited to the characteristics of music teachers, particularly those who had never received conducting training. The concept emphasized visualizing hand movements in 2/4, 3/4, and 4/4 meter patterns, as well as presenting concise, easy-to-understand information. Visual elements such as arrows, hand illustrations, and movement directions were arranged systematically to provide a clear representation of conducting beat patterns. A barcode (QR code) linked to a tutorial video was added to each card, allowing teachers to access the material flexibly without relying on face-to-face training. The placement of visual elements, color selection, and layout were designed to be attractive while remaining informative. This stage produced an initial design that served as a reference for the physical production of the cards. The card packaging is shown in Figure 3.

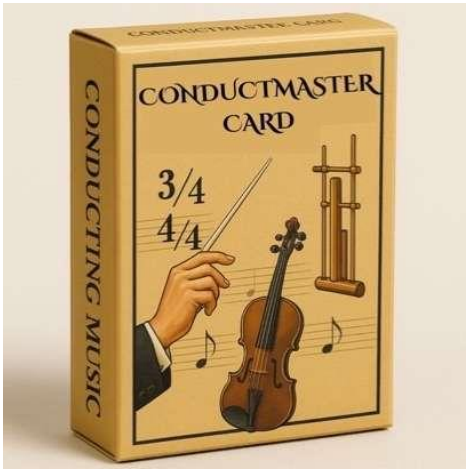


Figure 3. ConductMaster Card Packaging

The development stage involved transforming the conceptual design into a ConductMaster Card prototype. The cards were printed on durable material in a size that was comfortable to hold and included illustrations of hand movements, meter symbols, movement names, and QR codes that could be scanned to access demonstration videos. The videos featured an instructor explaining and demonstrating conducting patterns slowly and step by step. The prototype was then tested on a limited basis with music teachers. The feedback covered visual clarity, the effectiveness of the explanations, and ease of use, leading to the simplification of text on the cards and the addition of Kodály pattern content for angklung learning.

An example of the card contents is shown in Figure 4. The 4/4 meter card contains a meter symbol, the sequence of movement directions—down, left, right, and up—a numbered beat-pattern diagram, and a QR code linking to a tutorial video. The Kodály hand-sign card contains hand signs for notes from do to high do, an illustration of a teacher leading an angklung performance, and a QR code linking to tutorials, exercises, and examples of Indonesian folk songs.

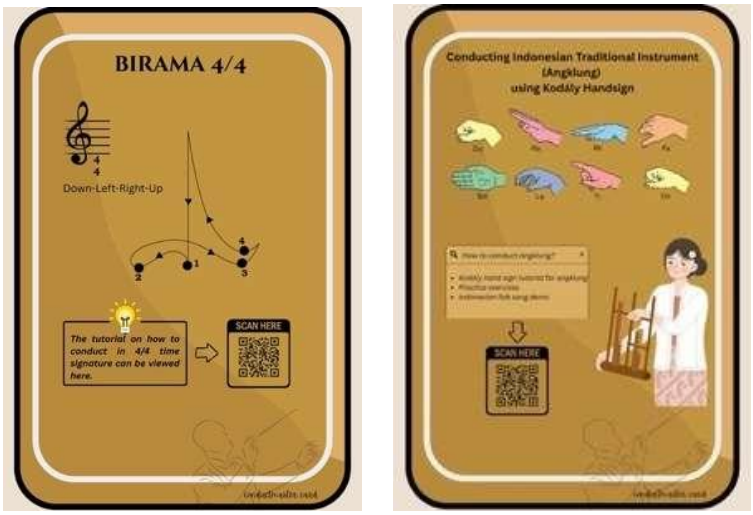


Figure 4. Examples of ConductMaster Card Contents: 4/4 Meter Card (left) and Kodály Hand-Sign Card for Angklung (right)

The main components of the final version of the ConductMaster Card and their functions for teachers are summarized in Table 2.

Table 2. ConductMaster Card Components

Component	Content	Function for Teachers
Meter patterns	Diagrams of 2/4, 3/4, and 4/4 meter beat patterns	Understanding the direction and sequence of beats
Movement illustrations	Hand illustrations, arrows, and movement directions	Imitating movements visually
Brief information	Meter symbols and movement names	Recognizing conducting symbols and terminology
Barcode (QR code)	Links to tutorial videos and audio	Viewing complete movement demonstrations repeatedly

Component	Content	Function for Teachers
Kodály hand signs	Hand-sign guide for angklung learning (second cycle)	Leading angklung playing in the classroom
Packaging	Card storage box	Storing and carrying the cards conveniently

Source: Researcher development results

Implementation of the ConductMaster Card with Music Teachers in Bandung

The ConductMaster Card was implemented in four meetings with music teachers in Bandung. The first two meetings were part of the first cycle and were conducted online via Zoom. The first meeting introduced the initial concept of the ConductMaster Card, including visualizations of meter patterns, hand-movement symbols, and the barcode feature linking to audiovisual materials. The second meeting was used for discussion and collecting feedback on the content and function of the cards. During this session, teachers shared their field-based needs related to teaching angklung at school and suggested that the card content be adapted to the Kodály hand-sign approach.

This feedback became the basis for implementing the second cycle. The third meeting was held online to introduce the revised version of the ConductMaster Card, which included a Kodály hand-sign guide, and teachers were given time to study the changes independently. The fourth meeting was held face to face as a guided practice session. During this session, teachers practiced using the cards directly, from reading the symbols and following conducting movements to scanning the barcode to access tutorial videos. The practice was also linked to classroom teaching simulations, particularly for angklung songs suited to the Kodály approach.

A summary of the four meetings conducted in the two cycles is presented in Table 3.

Table 3. Implementation of the ConductMaster Card

Meeting	Cycle	Mode	Activity	Outcome
1	I	Online (Zoom)	Introduction to the concept, content, and card features	Teachers understand the function of the cards and how to use them
2	I	Online (Zoom)	Discussion and feedback collection	Suggestion to add Kodály hand signs for angklung
3	II	Online	Introduction to the revised version and independent learning	Teachers study the Kodály material independently
4	II	Face to face	Guided practice and teaching simulation	Teachers practice meter patterns and scan the barcode

Source: Researcher documentation

Evaluation of the ConductMaster Card Implementation

The first-cycle evaluation showed that teachers' initial responses to the card content and design were fairly positive. The main feedback from teachers was the need for specific guidance on Kodály hand-sign movement patterns. The researchers then improved the

ConductMaster Card by adding this material and adjusting the card design to make it more applicable to the local context.

The second-cycle evaluation showed that teachers responded positively to the visual clarity of the cards, the ease of accessing tutorial videos, and the relevance of the material to their teaching needs. Teachers tried reading and practicing meter patterns using the cards, both individually and in groups. Several teachers stated that the medium could be used not only for learning conducting but also as a teaching aid when instructing students in the classroom. Teachers also considered the cards easy to use and said that they encouraged them to continue practicing conducting techniques. Teacher feedback and follow-up revisions during the two cycles are summarized in Table 4.

Table 4. Teacher Feedback and Follow-Up Revisions

Aspect	Teacher Feedback	Follow-Up Action
Material	The initial material covered only simple meter patterns and was not yet suited to angklung learning	Add a Kodály hand-sign guide in the second cycle
Card text	The explanations on the cards need to be more concise	Simplify the text on the cards
Visual clarity	The movement illustrations were considered clear and helpful	Retain the hand illustrations and arrows
Video access	*The barcode makes it easier for teachers to view movement demonstrations*	Retain the tutorial video link on each card
Use	The cards can be used as a teaching aid for students	Position the cards for independent learning and classroom instruction

Source: Interviews, questionnaires, and observations

The evaluation results from the two cycles revealed a change in the function of the medium, from merely providing meter-pattern guidance to becoming a medium suited to teachers' instructional practices. In the first cycle, teachers considered the cards useful but not yet fully relevant to the musical activities at their schools. After the revisions, teachers used the cards not only to learn meter patterns but also to prepare for leading angklung activities in the classroom. This change indicates that teacher involvement in the evaluation process plays an important role in producing media that are genuinely used. All ADDIE stages in the development of the ConductMaster Card are summarized in Figure 5.

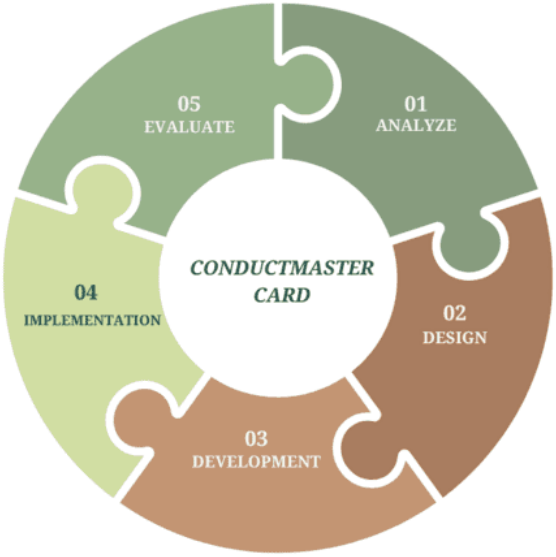


Figure 5. ADDIE Model Stages in the ConductMaster Card

Discussion

The findings of this study indicate that music teachers' need for conducting media is related not only to conventional meter patterns but also to the musical practices they teach every day. The addition of Kodály hand-sign material in the second cycle made the cards more suitable for the context of angklung learning in West Java. This is consistent with findings that applying the Kodály method in angklung learning helps seventh-grade students read notation and play the angklung more easily (Sukma, 2022). Other studies also emphasize that the success of the Kodály method in angklung learning depends heavily on teacher competence (Rahmawati et al., 2025); therefore, providing a hand-sign guide on the cards directly supports this competence. Thus, conducting media for school teachers should be designed based on actual musical practices in the field.

The integration of barcodes linking to tutorial videos is a major strength of the ConductMaster Card. Conducting movements are difficult to understand through still images alone, so videos provide complete movement demonstrations that can be replayed at any time. This finding supports studies showing that QR codes can connect printed materials with audiovisual examples in classroom music practice (Palazón & Giráldez, 2018) and receive positive responses when used in arts teaching materials (Irwansyah & Prastiawan, 2023). The visualization of meter patterns on the cards is also relevant to rhythm and meter, which are considered the most important aspects of conducting gestures (Gustems Carnicer, 2025).

The choice of a physical card format equipped with barcodes also offers advantages over fully digital media. Teachers can carry and open the cards at any time without having to search for materials on the internet, while videos can be accessed whenever teachers need movement demonstrations. The cards can also be placed at the front of the classroom as reminders of meter patterns when teachers lead students in singing or playing the angklung. Thus, print and digital media complement each other, consistent with the use of QR codes to connect printed materials with examples of musical practice (Palazón & Giráldez, 2018).

Unlike previous studies targeting university students or community groups (Gutama & Hakim, 2022; Widodo et al., 2023), this study positions school music teachers as the primary users. Implementing ADDIE in two cycles made it possible to revise the medium based on user feedback, reflecting the model's strength in producing systematic and easily adaptable media (Adeoye et al., 2024; Sari et al., 2021).

In terms of professional development, the ConductMaster Card gives teachers the opportunity to learn according to their own schedules and pace. Combining physical cards and videos allows the medium to be used for both independent learning and guided training, similar to video-based learning resources for music teachers used in online and blended professional development programs (Bautista et al., 2019). This is important because conducting competence requires repeated gesture practice and cannot be acquired through theoretical explanations alone (Raimova, 2021). Face-to-face meetings in the second cycle remain necessary so that teachers can practice the movements and receive direct feedback.

Practically, this study shows that learning media for music teachers need to combine concise visuals, audiovisual movement demonstrations, and material closely related to the repertoire taught at school. Visuals help teachers understand patterns quickly, videos demonstrate movements that are difficult to explain in words, while local material such as angklung enables the medium to be applied directly in the classroom. This principle can be adapted to the development of media for other musical skills that require movement demonstrations, such as instrumental performance techniques or vocal training.

This study also has limitations. The data were limited to responses and observations during implementation with music teachers in one region; therefore, the effect of the ConductMaster Card on improving teachers' conducting skills has not been measured quantitatively. Further research could use an experimental design or standardized gesture-assessment instruments, such as the conducting gesture assessment scale developed by Gustems Carnicer (2025), to measure the impact of this medium more objectively.

CONCLUSION

The ConductMaster Card was developed as a learning medium to help music teachers understand conducting techniques independently. The medium was designed by integrating communicative visual design and barcode technology to provide access to tutorial videos, using a music pedagogy approach that emphasizes active and contextual learning experiences. Implementation in two cycles comprising four meetings with music teachers in Bandung showed that the cards are practical, easy to use, and relevant to teachers' needs, particularly after Kodály hand-sign material for angklung learning was added. The ConductMaster Card is suitable as a supporting medium for both independent learning and structured training. Future studies are recommended to measure the effect of this medium on teachers' conducting skills quantitatively and to develop materials for a wider variety of meter patterns and ensembles.

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