

## 순단 음악 학습 기술의 적응으로서 악보 표기법의 활용

### Utilization of Music Notation as an Adaptation of Sundanese Music Learning Technology

아비자르 알기파리 사이플\* · 유디 수크야마디\*\*

Abizar Algifari Saiful · Yudi Sukmayadi

**Abstract** Music notation in Sundanese music learning has not been implemented for too long. Only in the Mang Koko era was the implementation of this learning technology optimised for educational activities. The activity of reading and writing music notation is important to be familiarised and developed. The goal is to strengthen the scientific paradigm in Sundanese music. The implementation is done at the level of Sundanese music practice and research. The research method used is qualitative with a case study design. Data were collected through several techniques, namely interviews, literature studies, and documentation studies. Furthermore, the data were analysed using content analysis techniques. The findings of this study, namely music notation is one of the steps in the adaptation of Sundanese musical learning technology carried out during the Mang Koko era. His educational and socio-cultural background has formed a paradigm and concept of thinking that the use of music notation is an important step for the development of students in learning Sundanese music comprehensively.

**Key words:** music notation, Sundanese music, Mang Koko, music learning technology

**초록** 인도네시아 순단어 음악 학습에서 악보 표기법은 오랫동안 구현되지 않았으며, 망 코코 시대에 이르러서야 교육 활동에 최적화된 이 학습 기술이 구현되었다. 악보를 읽고 쓰는 활동은 익숙해지고 발전시키는 것이 중요하다. 목표는 순단 음악의 과학적 패러다임을 강화하는 것이며, 이를 위한 구현은 순단 음악 연습 및 연구 수준에서 이루어진다. 연구 방법은 사례 연구 설계를 통한 질적 연구로써, 인터뷰, 문헌 연구, 문서 연구 등 다양한 기법을 통해 데이터를 수집하였으며, 또한 콘텐츠 분석 기법을 사용하여 데이터를 분석했다. 이 연구의 결과, 악보 표기법은 망 코코 시대에 수행된 순단어 음악 학습 기술의 적응 단계 중 하나이며, 그의 교육적, 사회문화적 배경은 학생들이 순단 음악을 종합적으로 학습하는 데 있어 악보를 사용하는 것이 중요한 단계라는 사고의 패러다임과 개념을 형성하였다.

**주제어:** 악보 표기법, 순단 음악, 망 코코, 음악 학습 기술

\* First author, E-mail: abizaralgifari@upi.edu

Researcher, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi No.229 Bandung, Indonesia

\*\* Corresponding author, E-mail: yudi.sukmayadi@upi.edu

Researcher, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi No.229 Bandung, Indonesia

## I . Introduction

Constraints in reading music notation, especially in the Sundanese community, remain an unresolved challenge to date (Julia, Isrokatun, Pramajati, Siti & Aisyah, 2019, p. 2065). The core problem lies in the low understanding and skills of reading music notation. One of the efforts to overcome it requires critical-reflective action steps that require collaboration between various related parties. Close co-operation between the music community, educators, local cultural experts and supporting institutions is key in facing this challenge (MacRitchie, Zicari & Blom, 2018, p. 17). Taking a holistic approach, incorporating innovative learning methods, and building a deeper understanding of local culture and music can help overcome difficulties in reading notation (Samat, Baharum & Andin, 2022, p. 565). These measures will not only enhance appreciation of traditional musical heritage, but also enrich understanding of cultural richness and encourage future generations to preserve and cherish the sustainability of these traditions.

Raden Mahyar Angga Kusumadinata (RMAK) (9 April 1979) and Koko Koswara (Mang Koko) (5 October 1985) are two Sundanese karawitan artists who started an important trail in the customisation of music notation writing. However, the role of implementing this notation in education is more often held by Mang Koko. Nonetheless, RMAK's creativity in his work has had a significant impact, especially in the development of *serat kanayagan* (damina notation). His works in notation writing enriched the knowledge of Sundanese traditional music, creating a more developed notation format. While Mang Koko, with his focus on the implementation of notation in education, brought a broader understanding of how notation could be used as an effective educational tool in preserving and teaching traditional music to the next generation (Schuiling, 2019, p. 457). Their collaboration marks an important journey in the acculturation of music notation in the arts and education.

Research on the utilisation of music notation in Sundanese karawitan learning technology, particularly through the Mang Koko case study, is important because it reveals the impact of technology integration in preserving and developing culture. This study shows how essential the use of technology is in conveying cultural heritage, especially in traditional music education. The urgency of this research lies in increasing understanding of the methods of adapting music notation in learning environments, as well as how this expands the reach of learning Sundanese traditional music. Through this understanding, we can recognise the important role of music notation as an adaptation tool that enables wider inclusion of cultural heritage as well as the enrichment of students' understanding of the uniqueness of Sundanese culture.

An in-depth understanding of the integration of music notation and technology in Sundanese karawitan learning is important because it can direct the evolution of more adaptive and inclusive teaching methods. Through exploring the role of technology in supporting the adaptation of music notation, this research encourages an improved approach to music education that is more responsive to preserving the richness of cultural heritage. The urgency of this research is not only limited to the educational aspect, but also in maintaining, appreciating and enriching Sundanese cultural identity in the midst of ever-evolving technological advances. This provides a solid foundation in passing on the musical traditions and uniqueness of Sundanese culture as a whole, while opening up space for the development of new ways that combine tradition and innovation in the era of modern technology.

The aim of this study is to trace and verify the extent to which the use of music notation during the Mang Koko era was used to improve musical literacy in the Sundanese musical community. There appears to have been a process of adaptation undertaken, as music notation was only traced during the time of the musicologist, Raden Machjar Angga Kusumaditana (RMAK). His musicological approach shaped a notation system that was presumably influenced by the block notation of Western (European) music. This statement is based on his musical meetings and discussions with ethnomusicologist Jaap Kunst (Netherlands). The exchange of knowledge, at least, shaped RMAK's perspective in reading musical phenomena in Sundanese culture, and this became the notation system used by Mang Koko in transmitting his works to the public.

## **II. Literature Review**

### **1. Music Notation**

Music is not just sound; it represents the complexity of our lives. It conveys emotions, stories, even cultural values in a symbolic system (Higgins, 2012; McPherson, Lopez-Gonzalez, Rankin & Limb, 2014; Trainor, 2010). Musical notation, whether in the form of verbal descriptions or graphic symbols, not only records melody and harmony, but also becomes a secondary translation of the experience itself (Casey, 2015; Pike, 1967). Music as a universal language offers a way for us to convey and understand emotions that are difficult to express in words. Notation becomes a bridge between musical expression and understanding across domains (Gromko, 1994; Poli,

2004). By paying attention to notation, one can understand how notes and rhythms describe reality, unifying the human experience in a world full of diversity and complexity. Music is a mirror of our world, and notation is the key to unlocking and exploring the meaning behind it (Swanwick, 2001, p. 232).

Music notation is an analogous visual representation of sound expression in music (Sadie, 1998, p. 333). It can be written notes that record with precision every note heard or as a series of symbols that give visual instructions to the musician. When we listen to music, this notation becomes a kind of visual representation in our minds, allowing us to imagine the sound we are listening to or even play it in our minds. For musicians, music notation is the key to deciphering the complexities of music, providing clear instructions on how a piece should be played or sung. It is a universal language for musicians, allowing those from different backgrounds to understand and interpret music in the same way.

Notation is a window into the complexity of a piece of music. It is not just a series of symbols, but also a visual representation that outlines essential details. In notation, visual patterns are embedded that describe the harmony, rhythm and dynamics of the music. It provides a comprehensive view of how these elements are organised, grouped and even interact with each other. With notation, readers can pick up on nuances that may be difficult to hear or see directly when listening to a piece of music. It becomes a visual translation that allows for a deeper understanding of the structure and complexity of the composition. By looking at notation, one can experience the mathematical beauty of music, seeing how the patterns and relationships between elements create a harmonious and evocative piece. Notation is the key to reading and deciphering the visual language of great musical works (Arthurs & Petrini, 2023, p. 11).

Music notation is not just a series of symbols or notes on a sheet, but also a window that reveals the unique identity of each piece of music (Karabaşoğlu, 2015, p. 3837). Within the notation, there is more than just information about the notes being played or sung. It is a map that illustrates the structure, dynamics, and even emotions contained in each composition. By looking at the musical notation, one can understand more about the composition: whether it is a melancholic melody, an electrifying rhythm, or an enthralling harmony. Notation provides a deep insight into the identity of music, visually revealing its richness and complexity. It becomes a window into the artistic world, allowing for diverse interpretations while retaining the essence present in each piece.

Musical manuscripts go beyond being physical sheets containing notation symbols. Behind the lines and notes, manuscripts hold a rich cultural heritage. Not only about how the notes

are arranged, but also about the text or lyrics that accompany them. They contain stories, poems, or messages that are the soul of the music itself. Through manuscripts, we can understand the cultural context in which the piece was created, the writing style that reflects the era, as well as the historical aspects that influenced its creation. Each curve and notation is not only a musical clue, but also a window into the thoughts, feelings and lives of the people at a particular time. Musical manuscripts become invaluable archives that carry more than just a physical record, but also bring valuable cultural values to life (Castellanos, Garrido-Munoz, Rios-Vila & Calvo-Zaragoza, 2022, p. 1).

## 2. Learning Technology

Learning technology is a conceptual framework, a field of practice, and a profession that aims to facilitate learning by addressing learning challenges through the utilisation of learning resources and elements of learning systems (AECT, 1977, p. 3). This approach involves the development and management of learning systems, both in organisational and personnel management contexts. Through learning technologies, there is an optimised use of tools, methods and resources that enable adaptation to individual learning needs (Antonenko, Dawson, Cheng & Wang, 2020; Major, Francis & Tsapali, 2021; Thalmann, 2014). The focus is on solving learning problems by bringing innovations in the design, implementation and evaluation of learning systems, enriching the learning experience and facilitating the achievement of learning objectives in a more efficient and effective way.

The components of learning technology according to AECT include theory and practice, focus on design, development, utilisation, management and evaluation, and emphasise learning processes and resources. The aim is to facilitate, stimulate, and encourage the learning process and provide convenience in learning. Learning success is measured by fixed relative changes in knowledge, skills and attitudes as a result of experience. By integrating learning theories, design principles, technology, and continuous evaluation, learning technology creates a motivating, efficient, and effective learning environment, supports students' comprehensive development, and facilitates the achievement of predetermined learning objectives (Gafur, 2009, p. 3).

The exploration of technology is done to develop the human paradigm for all activities (Brown, 1999, p. 16). Technological changes have greatly influenced the development of music in various fields (Calkins, 2023, p. 5; Faure-Carvalho, Gustems-Carnicer & Guaus Termens, 2022, p. 606). Music originating from local cultures has also adjusted to the development of the environment

and technology (Sakai, 2013, p. 333). Reading music notation is one of the important evolutions in the learning technology of Sundanese karawitan. The use of notation provides a bridge between oral tradition and written understanding, facilitating a more structured transfer of knowledge. With the adoption of notation, learning becomes more universal, allowing wider access to the richness of Sundanese music. It also facilitates the documentation and preservation of cultural heritage, encouraging more effective teaching across multiple platforms. This not only preserves the heritage, but also encourages new generations to learn, appreciate and develop traditional music by blending old traditions with new approaches that are more inclusive and structured.

### **3. Sundanese Music**

The history of music notation in Sundanese society shows a relatively recent adaptation. The influence of Western music in Indonesia has fuelled the importance of music notation (Kunst, 1949; van Zanten, 1989). In the context of Sundanese karawitan, the use of notation has a number of advantages and disadvantages in both practice and theory. Despite being an urgent need, familiarisation with notation reading in this context still requires a careful balancing of oral practical experience and notation reading skills. This process requires an integrated approach, combining listening practice and notation comprehension. By strengthening this approach through training and learning, communities can better appreciate and integrate music notation in traditional musical heritage, maintaining harmony between oral tradition and written knowledge (Regelski, 2023, p. 15).

## **III. Method**

This research uses a qualitative method with a case study approach (Creswell, 2017; Yin, 2019). Music notation in the context of this research is a technological development of Sundanese karawitan learning. The research focused on one of the periods of a Sundanese karawitan reformer, Mang Koko. This is because it was during his time that music notation in Sundanese karawitan was more massively socialised to Sundanese artists, academics and the public. This can be seen in the *Swara Cangkurileung* magazine published by the Cangkurileung Foundation led by Mang Koko. Data collection was conducted using several techniques, namely interviews, literature studies, and documentation studies. Interviews were conducted with three main sources,

namely artists, administrators of Yayasan Cangkurileung), and researchers. The literature study focused on a literature search related to learning technology, music notation, Sundanese karawitan (Wanda Anyar), Mang Koko, and Sundanese karawitan learning. The documentation study focused on reviewing photographs and music manuscripts. The data sets were analysed using content analysis techniques (Krippendorff, 2018; Prior, 2014).

The data collected from observations, interviews, literature studies, and documentation studies were analysed in the stages of content analysis. These stages are unitising, sampling, recording/coding, reducing, inferring, and narrating. Literature observations and documentation in the form of songs by Mang Koko are included in the unitising stage. The observation results were simplified and reduced to several parts (sampling) based on the priority of material related to the adaptation of learning technology in the form of music notation. The data set was re-curated based on the urgency of the research. This stage is called Recoding/coding. After that, proceed with the inferring stage which aims to provide conclusions and reveal the data and explained narratively at the narrating stage.

## IV. Results

Kawih is the dominant form of music composed by Mang Koko. Kawih is a vocal sound art with lyrics of *sisindiran*, poems or rhymes with or without being accompanied by instruments (Rosidi dkk, 2000, p. 334). Sundanese Kawih can be divided into eight types, namely: (1) *Lalagoean gamelan*; (2) *Lalagoean pantoen*; (3) *Lalagoean tembang*; (4) *Lalagoean beloek*; (5) *Kakawihan paranti nimang sareng ngejong boedak*; (6) *Poepoedjian*; (7) *Kakawihan baroedak*; (8) *Lalagoean nyawer* (Kusumadinata, 1927, p. 109). Kawih songs are lighthearted, carefree, joyful, lively, and emphasise a more open idiom (Wiratmadja, 1996, p. 17). Kawih emerged and developed among the people (Ayatrohaedi, 1987). Kawih is divided into two aspects, namely musical and literary aspects (Mulyana, 2005, pp. 43-44). Since one of the musical characteristics of kawih is that it is *tandak* (in tempo), the implementation of reading and writing music notation is important.

The customisation of music notation in Sundanese karawitan has far-reaching implications for preserving, understanding and developing the richness of traditional music. With notation in place, Sundanese music can be recorded in a structured manner, overcoming the limitations of oral transmission which is prone to information loss. This ensures the continuity and accuracy of

teaching traditional music composition. In addition, notation also facilitates more in-depth research and documentation regarding the development of Sundanese music. The ability to record details allows for deeper study of musical structures, enriches understanding of Sundanese musical techniques, and broadens students' horizons in learning traditional music. The use of notation is not only to preserve cultural heritage, but also to develop a deeper understanding and inspire creativity in the interpretation and innovation of Sundanese traditional music. This makes music notation an important tool in preserving and developing a valuable musical heritage.

Understanding music notation has an important impact on the learning approach of Sundanese *karawitan*. Through the introduction and use of notation, students can comprehensively deepen their understanding of musical structures, develop insights into music theory, and expand their interpretation of musical works. Notation skills also open up opportunities for further exploration and creativity in interpreting and developing Sundanese musical works. This means that notation familiarisation is not just about preserving cultural heritage, but also introducing students to deeper experiences and enriching their understanding of the richness of traditional music. Thus, music notation becomes an important tool in maintaining and developing knowledge and appreciation of Sundanese traditional music, opening space for innovation, creativity and a deeper understanding in learning and preserving cultural heritage.

## **1. Mang Koko's Educational Background as a Music Educator**

Mang Koko attended a Dutch school, HIS (Holands Inlandsche School), equivalent to elementary school, and graduated in 1932. He then continued his education to MULO (Meer Uitgebruid Lager Onderwijs), equivalent to junior high school, and successfully graduated in 1936 (Ruswandi, 2016a, p. 93). Education in Dutch institutions during that period played an important role in the development of education. Her decision to complete her education in an era where access to formal education was limited shows her strong determination. Graduating from those schools reflects an important first step in her educational journey. The principles instilled from that formal education may have been a solid foundation that supported him in his future endeavours. Education formed the foundation that has inspired her passion for further learning and achieving higher educational goals.

Mang Koko showed a deep interest in music by learning Western instruments such as the guitar and violin (Koswara dkk, 1992). His talent in playing these instruments far exceeded the average student in his school environment. This skill is clear evidence of a deep talent in the

arts, especially in music. The combination of his ability to play traditional and Western instruments broadened his horizons to a variety of sounds. This achievement indicates that Mang Koko has a broad and comprehensive understanding of the nuances of music. The combination of the two musical traditions creates a rich dictionary of sounds, enriches his artistic experience and illustrates a great dedication to the exploration of music in its various forms. This has led Mang Koko to have a bimusical musical orientation (Hastanto, 2012, p. 3).

At the Konservatori Karawitan Bandung (Kokar), his contributions focused on enriching knowledge and practice in Sundanese karawitan. While at the Akademi Seni Tari Indonesia Bandung (ASTI), he helped broaden the understanding of the essence of Sundanese traditional music (Swindells, 2004, p. 36). His involvement not only taught basic techniques, but also encouraged exploration and innovation in the teaching of traditional music. Mang Koko's role as a prime mover in the development of Sundanese musical knowledge at both institutions has played a vital role in preserving and advancing the cultural heritage of Sundanese music. His dedication to the education and teaching of Sundanese musical traditions has had a significant impact in expanding the younger generation's understanding of the richness of Sundanese cultural heritage. Indeed, Mang Koko's creative process predominantly originates and boils down to these two educational institutions. In addition to concentrating on art education and educating future artists, it is also an agent of improving the quality of an artist so that it has Mang Koko pioneered novelty in kawih through an innovative approach with modifications in vocal techniques and waditra (musical instruments). His work not only follows tradition, but also enriches the heritage with the use of new techniques. His vocal modifications bring variations in vocal expression, perhaps with the insertion of tonal variations, rhythms or vocal styles that have not been prevalent in previous kawih. In addition, his explorations in the waditra enrich compositions with more experimental use of traditional musical instruments or in previously unexplored contexts. These innovations give a new dimension to kawih, expanding its spectrum in both vocal and instrumental aspects (Satriana, 2016). Mang Koko's creativity in changing and adapting these techniques has made a valuable contribution in maintaining the freshness and relevance of kawih in the Sundanese musical context (Herdini, 2012; Ruswandi, 1997, pp. 64-65, 2020, p. 58, 2021, p. 13; Satriana, Haryono & Hastanto, 2014, p. 41, 2015, p. 15; Wardhani, 2011, p. 149). He created no less than 398 pieces of music, both vocal (sekar) and instrumental (gending) (Ruswandi, 2016b, p. 99).

Mang Koko did not rely solely on his own talent; he was influenced and guided by other artists around him. His collaboration with Uyéng Suwargana in the late 40s influenced his kawih

work for children, leading to the book *Resép Mamaos*. In terms of composing children's songs, his relationship with Daéng Sutigna, Uyéng's brother, brought a more systematic approach. Mang Koko created songs tailored to children's voice ranges and created *Taman Cangkurileung* in three volumes in 1954. His meeting with M.O. Kusman in 1958 resulted in the creation of a children's game song, *kaulinan barudak*, which was later recorded as *Taman Bincarung* (Rosidi dkk, 2000, p. 397).

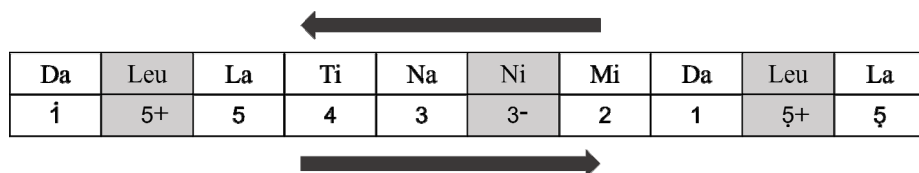
Collaboration with these artists not only enriches the variety of his works, but also serves as an important foundation in the creation of music for children. Mang Koko's dedication to creating accessible and relevant works for children is reflected in the books that resulted from these collaborations. These works not only enrich the repertoire of children's music in the Sundanese tradition, but also retain traditional values while bringing innovation and new appeal to the younger generation. This collaboration became an important milestone in her career, guiding her creativity towards greater inclusivity and wider impact, enriching the world of children's music and presenting works that blend the richness of tradition with a spirit of innovation for the future.

His educational background and socio-cultural environment play a big role in shaping Mang Koko's paradigm in his work and decision-making. His educational experiences and interactions within his socio-cultural environment influence the way he sees the world of art and life as a whole. A trained ear, a high degree of creativity, and a deep understanding of multiculturalism helped develop his musical paradigms and skills, both as an educator and a learner (Carrillo, Tarango & González-Moreno, 2023, p. 12; Uptis, 2001, p. 53). This statement is in line with what happened to Mang Koko as an artist and educator. This not only affects his approach to creating music, but also the way he interacts with and teaches cultural diversity in the context of music education. A broad understanding of the socio-cultural context through education and life experience is a foundation that enriches the way Mang Koko presents works and develops talents in the field of music, especially in the context of education.

## 2. Characteristics of Mang Koko's Notation System

Based on the theory of the music notation system compiled by Raden Machjar Angga Koesoemadinata, Mang Koko continues the music notation system which can be seen in the way he documents musical works. Basically, not many changes have occurred in the way music notation is written. However, Mang Koko's creativity is more in the exploration of musical elements (Sundanese karawitan) so that it becomes the identity of his work (Ruswandi, 2016b;

Saiful & Sukmayadi, 2023; Satriana, 2016). The musical notation used by Mang Koko is numerical notation contextualised with Sundanese musical tones (da-mi-na-ti-la). The following is a table of tone writing and mentioning.



Da	Leu	La	Ti	Na	Ni	Mi	Da	Leu	La
1̇	5+	5	4	3	3-	2	1	5+	5

[Figure 1] The tones used in the sundanese music notation system

There are two types of tones used in the musical notation of Mang Koko's songs, namely fundamental tones and insert tones. The fundamental tone consists of tones 1 (da), 2 (mi), 3 (na), 4 (ti), and 5 (la). While the insertion tone consists of the tones 5+ (leu) and 3- (ni). The pitch of a tone is characterised by the addition of a dot (.) above or below the pitch number. If the dot is above the note, the note is one octave lower than the note with no dot. Meanwhile, if the dot is below the note, the note is one octave higher than the note with no dot. These tones are the dominant ones that appear and are used in Mang Koko's songwriting. As for the atmosphere or feel of the song, it is influenced by certain tonal arrangements or in Sundanese karawitan called *laras* and *surupan*.

To write it down in melodic sentences, Mang Koko uses bars as a clue to the use of rhythm, the basis for arranging rhythm patterns, and optimising the process of reading music notation. The usual rhythm used by Mang Koko in his songs is 4/4 and 3/4. The term rhythm is not usually written in music notation, but it can be seen from the number of beats and note values in each song. There are a number of terms that are adapted to the context of Sundanese music, such as the mention of tempo. The types of tempo commonly used include *anca* (slow), *antare* (medium), *kering* (fast), and *gandang* (medium and staccato). The following is an overview of the notation system in Sundanese music.

## Hayu Ngapung Ngawang-Ngawang

Laras: Pelog/Degung

Gerakan : Anca

Surupan: 1=Tugu (Barang)

<b>Pangkat</b>	0	4	3	5	2	2 1	2 1	2
<b>Lagu:</b>				1				2
<b>AS:</b>	.	0 2	1 5	4	. 4	3	4 5	5
		<i>Ha - yu</i>	<i>ba - tur</i>		<i>u - rang</i>	<i>nga -</i>	<i>pung</i>	

[Figure 2] An example of the application of music notation writing in sundanese karawitan

### 3. Reading and Writing Habituation in an Oral Culture

Amidst the richness of oral culture, creating the habit of reading and writing is often a significant challenge. Oral culture is essentially based on the transmission of knowledge through stories, oral messages and experiences passed down directly from one generation to the next. While this practice maintains cultural uniqueness and strengthens local identity, it can also be a barrier to the development of written literacy. This condition is related to the lack of encouragement or access to reading materials or literature, which in turn can affect one's interest and ability to develop written literacy. Environmental limitations that favour oral stories over written texts can hinder literacy progress in communities that rely heavily on oral cultural heritage.

Cultural changes and technological influences have changed the outlook towards written literacy in a culture that is still heavily dominated by oral traditions. Formal education and technological innovations opened up wider access to written education. Schools and digital media have become important platforms for introducing reading and writing literacy to people who were previously more inclined towards oral culture. Awareness of the importance of reading and writing skills in an increasingly connected global context is driving efforts to expand the practice of written literacy amidst cultures that prioritise oral traditions. The balance between a rich oral cultural heritage and the drive to improve written literacy is key to developing holistic communication skills and a broader understanding of the world for current and future generations.

In the context of music, notation functions similarly to letters in language. Musicians do not read each note in isolation, but rather recognise musical patterns formed from collections of notes

(Wolf, 1976, p. 146). This analogy highlights the similarities between notation in music and letters in words: both require reading skills that must be learnt and honed. Once reading skills are established, the notes are no longer parsed individually, but rather connected to each other to form a cohesive melody. The process of reading notes in music demands an understanding of the relationships between notes, just as letters form words. That's why learning to read notation is an important first step in understanding music, as this proficiency allows musicians to capture and convey the overall message through a piece of music.

In the context of traditional arts, especially Sundanese traditional arts, teaching has long been done through an oral system known as '*ngabeo*'. The concept of '*ngabeo*' describes a way of teaching like teaching speech to a parrot (Setiaji, 2020, p. 5). In this custom, knowledge is transmitted orally from teacher to student, emphasising the importance of intensive listening and imitation. The analogy with the parrot illustrates how skills and knowledge in traditional arts are passed down, where pupils are taught to listen, imitate and re-practise what they have heard from their teachers. This system emphasises the central role of listening, repetition and imitation in the learning of traditional arts, signalling the richness of orally transmitted cultures and illustrating how local wisdom and cultural values are preserved and transmitted across generations.

Most music education occurs orally, through intensive listening and absorption through the surrounding environment (Wade, 2004, p. 17). Music teaching, especially orally, places the teacher as the primary reference point; they become the source of knowledge and technique, oversee the quality of the music, and provide direction in the course of one's musical life. The relationship between teacher and student varies in the oral tradition, where the teacher plays an important role, as well as in the written tradition. In the written tradition, teachers may be reluctant to give verbal explanations, preferring that students listen, watch and practice. However, in both oral and written traditions, the role of the teacher remains central; they guide, inspire and provide the foundation for students' musical understanding and development, making the teacher-student relationship the core of effective music education.

When Mang Koko acted as a teacher and an important figure in traditional Sundanese arts education institutions, the introduction of writing and reading music notation began to receive attention in various educational activities. Mang Koko's role and influence brought about an important shift in the paradigm of traditional arts education. In a culture that previously prioritised oral tradition, Mang Koko's presence brought a new impetus to introduce music literacy in the form of notation. Through his in-depth role in formal and non-formal institutions, Mang Koko not only taught practical music skills, but also introduced the importance of understanding music

notation as a written tool in preserving and teaching Sundanese cultural heritage. This step marked a significant shift in traditional Sundanese arts education, paving the way for the introduction and familiarisation of reading and writing music notation as an integral part of music education in the region.

#### **4. Implementation in Sundanese Music Learning**

The concept of aesthetics embedded in a culture has a great impact on the way individuals process information and interpret certain things (Locher, 2011, p. 706). Aesthetics is a framework of values that influences perceptions of beauty, artistic values, and views on things that are considered important or interesting in a culture. The way a culture interprets and values beauty and artistry becomes the foundation for understanding and interpreting works of art, including music. For example, in certain cultures, the concept of beauty may be rooted in harmony, symmetry, or even a certain complexity that affects the way people read or interpret musical artworks. Thus, an understanding of a culture's aesthetics provides deep insight into the culture's perspective on beauty and art, and how it shapes the way people think and read things in a particular cultural context. The same goes for learning music notation.

The implementation of learning music notation requires a deep understanding of the cultural context in which it is taught (Jungjohann, Schurig & Gebhardt, 2023, p. 426; Persellin, 2006, p. 47; Young, Mohr & Landreth, 2020, p. 360). Each culture has its own unique music education patterns, values and systems. Therefore, in introducing and familiarising music notation, it is important to adapt it to the particularities of that culture (Terry, 1994, p. 110). In the context of a culture rich in oral traditions such as traditional Sundanese arts, the introduction of music notation requires a sensitive approach to existing teaching methods. This includes considering how music notation can complement, rather than replace, the oral system that has long been at the core of music education in that culture. Learning music notation should be a tool that enriches understanding and teaching, while supporting the oral heritage that has become a strong cultural identity. In this context, customisation in integrating music notation becomes an important aspect of sustainable music education.

**3. PARABOT PATUKANGAN**

Laras : Polog at Degung      Gerakan : Kering  
Patek : Loloran

Pangkat : 3 2 1 | 5 5 4 5 |

0 5 5 5 | 2 3 4 5 |  
Pa-rapug pa-ra-bot tu-kang

0 2 2 2 | 3 4 3 2 |  
Pa-la-ta-tah jeung si-pa-tan

0 2 1 5 | 1 2 3 | 0 2 3 0 2 3 |  
Nu ma-ka-an ka-li: dok-dak! dok-dak!

0 1 2 1 3 4 5 | 0 2 5 0 2 5 | ||  
Nu keur nga-raga: ji: sruk-erek! sruk-erek!

2. Gegur, kikir jeung rapai  
Digunakeun tur talis  
Nu ka luar asup: blas-blas! blas-blas!  
Digawe tur gupug: blug-blug! blug-blug!

**26. TARTIB DINA DAHAR**

Laras : Madenda      Gerakan : Sedeng  
Surupan : 4 = Tugu      Patek : Sanga  
5 = Loloran      Pupuh : Asmarandana

Pangkat : 2 2 3 3 2 2 3 | 5 2 1 5 |

0 1 5 | 1 5 4 3 3 4 5 |  
Ba-ru-duk Ba-pa-pe-pe-ling

0 1 5 | 1 5 4 3 3 4 5 |  
La-mun hi-dep eu-keur da-har

0 2 2 2 2 | 2 2 1 2 3 |  
Po-ma u-lah ba-ri ngo-mong

3 2 1 5 | 1 2 2 |  
(jeung ba-ri ngo-mong)

0 2 3 | 4 3 5 4 3 2 |  
Li-an ti ku-rang u-ta-ma

0 2 3 | 4 3 5 4 3 2 |  
E-ta teh ngan-dung ba-ha-ya

0 2 1 2 3 | 5 4 3 4 5 1 |  
Ka-be-se-han tu-loy ba-tuk

1 5 4 3 | 2 3 4 5 | . . |  
Nye-lek ma-lah o-sok u-tah

[Figure 3] An example of the implementation of the utilisation of music notation in a children's song collection book entitled Sekar Mayang.

Establishing an audience of musical knowledge is important at the beginning to provide an overview and agreement of the musical symbols to be used (Sloboda, 1978, p. 14). The importance of understanding students and their learning environment is a major factor in designing music learning (Bernard & Talbot, 2023, p. 30; McGeown, Bonsall, Andries, Howarth & Wilkinson, 2020, p. 604; Odena & Scharf, 2022, p. 483). Each student has a unique cultural background, experiences and preferences. In the context of music education, knowledge of each student's cultural leanings and musical abilities influences effective teaching strategies. For example, in the case of Mang Koko who chose damina (numeral) notation over block notation in teaching Sundanese music. This adjustment not only allows students to understand more quickly, but also creates a learning environment that suits their understanding and needs. By considering these factors, teachers can design a more personalised approach, spark student interest and deliver more effective learning. A deep understanding of students and their context is the foundation for responsive and inclusive music learning.

In music learning, notation can be interpreted through various symbols (Pramling, 2009, p. 288). Referring to the previous context, Mang Koko prefers damina (number) notation over block notation. This adaptation of damina notation is a response to the tendency of Sundanese culture to approach and understand notation using number symbols. Number symbols proved to be easier for Sundanese learners to understand. This choice not only facilitates faster comprehension, but also reduces difficulties in adaptation, saving time to master notation techniques. This adjustment

was an effective step in building a bridge between a strong oral tradition and the introduction of music notation, enabling a more optimised music learning process in a rich and diverse cultural environment such as traditional Sundanese arts.

Evidence that music notation has been used as a learning technology adaptation process in Sundanese karawitan, especially during Mang Koko's era, is reflected in a number of literature products that Mang Koko has compiled. The title of artist and educator mandated to Mang Koko influenced the process of compiling music literature products. In the preparation process, Mang Koko always stands on the educational qualifications of his readers; the same is true when he is composing songs. It is known that there are four classifications of Mang Koko songs, namely Bincarung (elementary school grades 1-4), Cangkurileung (elementary school grades 5-6), Setia Putra (junior high school), and Ganda Mekar (high school and general). Presumably the grouping of songs also affects the process of compiling Sundanese music literature. Each level in Mang Koko's song classification has its own song collection book. The book entitled Resep Mamaos is intended for the Bincarung song level. The book entitled Swara Cangkurileung is intended for the Cangkurileung song level. The book entitled Setia Putra is for the Setia Putra song level. Finally, the book titled Ganda Mekar is for the Ganda Mekar song level. During the Mang Koko era, these books were used as learning media in schools. At each song level, more than one book was produced.

## V. Discussion & Conclusion

Research into the utilization of music notation as an adaptation measure in Sundanese karawitan learning technology revealed that the integration of music notation in traditional learning has contributed significantly to enriching teaching methods. The case study of Mang Koko was highlighted, showing how important technological adaptation is in presenting cultural heritage through music education. Results show that the use of music notation as an adaptation tool has widened students' access to Sundanese traditional music learning, enabling more inclusive teaching and enriching the understanding of cultural heritage. Getting used to writing and reading notation in Sundanese musical learning is indirectly a cultural preservation activity, especially in Sundanese traditional music. Based on these findings, it is recommended that the application of music notation in Sundanese musical learning technology continues to be developed and refined. Further adoption of technology that supports the use of music notation is needed, as

well as training for music educators to better understand and integrate this technology in their teaching methods. In addition, further research can be conducted to explore the long-term impact of using music notation in traditional music education. Thus, Sundanese music learning can continue to evolve in line with technological developments, while still maintaining the authenticity and richness of Sundanese culture.

## References

- AECT. (1977). *The Definition of Educational Technology*. Bloomington: Author.
- Antonenko, P. D., Dawson, K., Cheng, L., & Wang, J. (2020). *Using technology to address individual differences in learning. in handbook of Research in educational communications and technology* (pp. 99-114). Heidelberg: Springer International Publishing. [https://doi.org/10.1007/978-3-030-36119-8\\_6](https://doi.org/10.1007/978-3-030-36119-8_6)
- Arthurs, Y., & Petrini, K. (2023). Musicians' views on the role of reading music in learning, performance, and understanding. *Musicae Scientiae*, 28(1), 102986492211491. <https://doi.org/10.1177/10298649221149110>
- Ayatrohaedi. (1987). *Masyarakat Sunda Sebelum Islam*. Lembaga Penelitian Universitas Indonesia.
- Bernard, C., & Talbot, B. C. (2023). Music teachers' experiences with implementing diversity, equity, and inclusion. *Music Educators Journal*, 109(3), 26-33. <https://doi.org/10.1177/00274321231159652>
- Brown, A. R. (1999). Music, media and making: Humanising digital media in music education. *International Journal of Music Education*, 33(1), 10-17. <https://doi.org/10.1177/02576149903300103>
- Calkins, T. (2023). Race, music, and technological change: The shifting music retail landscape of Milwaukee county. 1970-2010. *City, Culture and Society*, 34, 100534. <https://doi.org/10.1016/j.ccs.2023.100534>
- Carrillo, R., Tarango, J., & González-Moreno, P. A. (2023). Music literacy in higher education in Mexico: Current conceptions and teaching practices. *International Journal of Music Education*. <https://doi.org/10.1177/02557614231199193>
- Casey, R. (2015). Developing a phenomenological approach to music notation. *Organised Sound*, 20(2), 160-170. <https://doi.org/10.1017/S1355771815000047>

- Castellanos, F. J., Garrido-Munoz, C., Ríos-Vila, A., & Calvo-Zaragoza, J. (2022). Region-based layout analysis of music score images. *Expert Systems with Applications*, 209, 118211. <https://doi.org/10.1016/j.eswa.2022.118211>
- Creswell, J. W. (2017). *Research design: Pendekatan kualitatif, kuantitatif, dan Mixed*. Indonesia: Pustaka Pelajar.
- Faure-Carvalho, A., Gustems-Carnicer, J., & Guaus Termens, E. (2022). Music education in the digital age: Challenges associated with sound homogenization in music aimed at adolescents. *International Journal of Music Education*, 40(4), 598-612. <https://doi.org/10.1177/02557614221084315>
- Gafur, A. (2009). Teknologi pembelajaran: Konsep dan aplikasinya untuk pembelajaran Pendidikan Kewarganegaraan. *Civics*, 6(1), 1-15.
- Gromko, J. E. (1994). Children's invented notations as measures of musical understanding. *Psychology of Music*, 22(2), 136-147. <https://doi.org/10.1177/0305735694222003>
- Hastanto, S. (2012). *Kajian musik Nusantara-2*. Indonesia: ISI Press Surakarta.
- Hardini, H. (2012). Karya inovatif Tokoh-Tokoh Karawitan Sunda di Kota Bandung 1920-2008. Doctoral dissertation, Universitas Padjadjaran.
- Higgins, K. M. (2012). Biology and culture in musical emotions. *Emotion Review*, 4(3), 273-282. <https://doi.org/10.1177/1754073912439762>
- Julia, J., Isrokatun, I., Pramajati, H., Siti Sukaesih, N., & Aisyah, I. (2019). Improving the song notation reading comprehension and skill of prospective elementary school teachers: An action research study in Indonesia. *Universal Journal of Educational Research*, 7(10), 2057-2067. <https://doi.org/10.13189/ujer.2019.071003>
- Jungjohann, J., Schurig, M., & Gebhardt, M. (2023). Classroom effects are as large as grade-level effects on curriculum-based measurement maze reading scores of secondary school students with and without special educational needs. *Journal of Research in Reading*, 46(4), 411-429. <https://doi.org/10.1111/1467-9817.12436>
- Karabaşoğlu, C. (2015). Tradition of notation in the history of Turkish music. *Procedia - Social and Behavioral Sciences*, 174, 3832-3837. <https://doi.org/10.1016/j.sbspro.2015.01.1121>
- Koswara dkk, T. B. (1992). *Reformer of Sundanese Karawitan "Mang Koko" (Haji Koko Koswara)*. Yayasan Cangkurileung Pusat.
- Krippendorff, K. (2018). *Content analysis: An introduction to its methodology* (4th ed.). Thousand Oaks, CA: Sage Publishing.
- Kunst, J. (1949). *Music in Java: Its history, its theory, and its technique*. Netherlands:

Springer-Science+Business Media, B.V.

- Kusumadinata, R. M. A. (1927). *Elmoening Kawih Soenda*. Indonesia: Poesaka Soenda.
- Locher, P. (2011). Contemporary experimental aesthetics: State of the art technology. *I-Perception*, 2(7), 697-707. <https://doi.org/10.1068/i0449aap>
- MacRitchie, J., Zicari, M., & Blom, D. (2018). Identifying challenges and opportunities for student composer and performer peer learning through newly-composed classical piano scores. *British Journal of Music Education*, 35(2), 153-175. <https://doi.org/10.1017/S0265051717000304>
- Major, L., Francis, G. A., & Tsapali, M. (2021). The effectiveness of technology-supported personalised learning in low- and middle-income countries: A meta-analysis. *British Journal of Educational Technology*, 52(5), 1935-1964. <https://doi.org/10.1111/bjet.13116>
- McGeown, S., Bonsall, J., Andries, V., Howarth, D., & Wilkinson, K. (2020). Understanding reading motivation across different text types: Qualitative insights from children. *Journal of Research in Reading*, 43(4), 597-608. <https://doi.org/10.1111/1467-9817.12320>
- McPherson, M. J., Lopez-Gonzalez, M., Rankin, S. K., & Limb, C. J. (2014). The role of emotion in musical improvisation: An analysis of structural features. *PLoS ONE*, 9(8), e105144. <https://doi.org/10.1371/journal.pone.0105144>
- Mulyana, A. R. (2005). *Gurit lagu Kawih Sunda*. Indonesia: STSI Surakarta.
- Odena, O., & Scharf, J. (2022). Music education in Northern Ireland: A process to achieve social inclusion through segregated education? *International Journal of Music Education*, 40(3), 471-486. <https://doi.org/10.1177/02557614221075835>
- Persellin, D. C. (2006). The effects of vocal modeling, musical aptitude, and home environment on pitch accuracy of young children. *Bulletin of the Council for Research in Music Education*, No. 169, 39-50.
- Pike, A. (1967). The phenomenological analysis and description of musical experience. *Journal of Research in Music Education*, 15(4), 316-319. <https://doi.org/10.2307/3343947>
- Poli, G. De. (2004). Methodologies for expressiveness modelling of and for music performance. *Journal of New Music Research*, 33(3), 189-202. <https://doi.org/10.1080/0929821042000317796>
- Pramling, N. (2009). External representation and the architecture of music: Children inventing and speaking about notations. *British Journal of Music Education*, 26(3), 273-291. <https://doi.org/10.1017/S0265051709990106>
- Prior, L. (2014). Content analysis. In P. Leavy (Ed.), *The oxford handbook of qualitative research*. Oxford University Press.

- Regelski, T. A. (2023). Idea bank: Practice makes perfect: A praxical approach. *Music Educators Journal*, 109(4), 15-17. <https://doi.org/10.1177/00274321231168937>
- Rosidi dkk, A. (2000). *Ensiklopedi Sunda, alam, manusia, dan Budaya, termasuk budaya Cirebon dan Betawi*. Indonesia: PT Dunia Pustaka Jaya.
- Ruswandi, T. (1997). *Bulletin kebudayaan jawa barat Kawit nomor 49: Peranan Mang Koko dalam penggalian Karawitan Sunda*. Indonesia: Dinas Kebudayaan Jawa Barat.
- \_\_\_\_\_ (2016a). Kreativitas Mang Koko dalam Karawitan Sunda. *Panggung*, Vol. 26(1). <https://doi.org/http://dx.doi.org/10.26742/panggung.v26i1.165>
- \_\_\_\_\_ (2016b). Kreativitas Mang Koko dalam perkembangan Karawitan Sunda. Doctoral dissertation, Universitas Pajajaran.
- \_\_\_\_\_ (2020). Mang Koko dalam inovasi gamelan salendro. *Jurnal Paraguna*, 7(1), 49-59.
- \_\_\_\_\_ (2021). Kreativitas Mang Koko dalam sekar jenaka grup kanca indihiang. *Budaya Etnika*, 5(1), 3-13.
- Sadie, S. (1998). *The new grove dictionary of music and musicians* (Vol. 13). Oxford: Grove's Dictionaries of Music Inc.
- Saiful, A. A., & Sukmayadi, Y. (2023). Guntur galunggung song: Text and symbolic meaning review. *Dewa Ruci: Jurnal Pengkajian Dan Penciptaan Seni*, 18(2), 95-112. <https://doi.org/10.33153/dewaruci.v18i2.4569>
- Sakai, W. (2013). Self-determination and music education in technological cultures. *Procedia - Social and Behavioral Sciences*, 82, 330-337. <https://doi.org/10.1016/j.sbspro.2013.06.270>
- Samat, J., Baharum, A., & Andin, C. (2022). Identifying elements of gamification for reading music notation in music education. In *2022 13th International Conference on Information and Communication Technology Convergence (ICTC)* (pp. 563-567). IEEE. <https://doi.org/10.1109/ICTC55196.2022.9952727>
- Satriana, R. (2016). *Karawitan Sunda gaya Mang Koko dan pengaruhnya terhadap perkembangan Karawitan Sunda*. Universitas Gadjah Mada.
- Satriana, R., Haryono, T., & Hastanto, S. (2014). Kanca indihiang sebagai embrio kreativitas Mang Koko. *Resital*, 15(1). <https://doi.org/https://doi.org/10.24821/resital.v15i1>
- Satriana, R., Haryono, T., & Hastanto, S. (2015). Aplikasi konsep laras dan surupan pada Kawih Kacapian gaya Mang Koko. *TEROB*, 6. <https://doi.org/https://doi.org/10.20111/st.v6i1.76>
- Schuiling, F. (2019). Notation cultures: Towards an ethnomusicology of notation. *Journal*

- of the Royal Musical Association, 144(2), 429-458. <https://doi.org/10.1080/02690403.2019.1651508>
- Setiaji, D. (2020). Dongkari: Interpretasi penembang terhadap pembentukan ornamentasi vokal tembang Sunda Cianjuran. *Sorai: Jurnal Pengkajian Dan Penciptaan Seni*, 13(1), 51-62.
- Sloboda, J. (1978). The psychology of music reading. *Psychology of Music*, 6(2), 3-20. <https://doi.org/10.1177/030573567862001>
- Swanwick, K. (2001). Musical development theories revisited. *Music Education Research*, 3(2), 227-242. <https://doi.org/10.1080/14613800120089278>
- Swindells, R. (2004). Klasik, Kawih, Kreasi: Musical transformation and the Gamelan Degung of Bandung, West Java, Indonesia. Master thesis, University of London.
- Terry, P. (1994). Musical notation in secondary education: Some aspects of theory and practice. *British Journal of Music Education*, 11(2), 99-111. <https://doi.org/10.1017/S0265051700000991>
- Thalmann, S. (2014). Adaptation criteria for the personalised delivery of learning materials: A multi-stage empirical investigation. *Australasian Journal of Educational Technology*, 30(1). <https://doi.org/10.14742/ajet.235>
- Trainor, L. (2010). The emotional origins of music. *Physics of Life Reviews*, 7(1), 44-45. <https://doi.org/10.1016/j.plrev.2010.01.010>
- Upitis, R. (2001). Spheres of influence: The interplay between music research, technology, heritage, and music education. *International Journal of Music Education*, os-37(1), 44-58. <https://doi.org/10.1177/025576140103700105>
- van Zanten, W. (1989). *Sundanese music in the Cianjuran style: Anthropological and musicological aspect of Tembang Sunda*. New York: Foris Publications U.S.A., Inc.
- Wade, B. C. (2004). *Thinking musically: Experiencing music, expressing culture*. New York: Oxford University Press.
- Wardhani, D. (2011). Etude kacapi gaya Mang Koko sebagai bahan ajar di SMKN 10 Bandung. Master thesis, Universitas Pendidikan Indonesia.
- Wiratmadja, A. S. (1996). *Mengenal seni Tembang Sunda*. Provincial Office of Education and Culture of West Java, Wahana Iptek.
- Wolf, T. (1976). A cognitive model of musical sight-reading. *Journal of Psycholinguistic Research*, 5(2), 143-171. <https://doi.org/10.1007/BF01067255>
- Yin, R. K. (2019). *Studi kasus: Desain dan metode*. Indonesia: PT Rajagrafindo Persada.
- Young, C., Mohr, K. A. J., & Landreth, S. (2020). Improving boys' reading comprehension

with readers theatre. *Journal of Research in Reading*, 43(3), 347-363. <https://doi.org/10.1111/1467-9817.12307>