

## Interdisciplinary Studies in Music Research the Substance of Study and Implications of Fine Arts, Mathematics, and Philosophy



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**ABSTRACT:** Interdisciplinary studies in music education research can integrate various disciplines that can help enrich the understanding of fine arts, mathematics, and philosophy. In terms of fine arts, this approach can help students understand the relationship between fine arts and music to enrich their experience in understanding and producing works of art. In terms of mathematics, mathematical elements found in music theory can be applied in music education, so that students can understand how mathematical principles can be applied in the arts. In terms of philosophy, an understanding of ontology, epistemology as well as axiology can help students consider the meaning and value of musical artworks. Interdisciplinary study in music research implies that students can gain a richer and more multidimensional learning experience, and develop skills and understanding that are holistic and beneficial to their future lives.

**KEYWORDS:** interdisciplinary studies; music; visual arts; mathematics; philosophy.

### 1. INTRODUCTION

Interdisciplinary studies in music art research are approaches that integrate various fields of knowledge, such as fine arts, mathematics, and philosophy, to broaden understanding of music as a complex art. In previous research Kandinsky finds that art and music produce similar effects, including emotions and spiritual experiences, resulting in the sense that these two disciplines are interrelated and can create profound and universal experiences for the viewer or listener. I Wayan Karja's previous research examines the use of distinctive colors, patterns, and shapes in Karja's paintings, including the use of circles and lines that symbolize musical rhythms and natural elements that are important in Balinese culture such as the sun, stars, and moon. The research by Shah and Saloni, "An Exploration of the Relationship between Mathematics and Music" examines the role of mathematics in music with a focus on the contributions of Pythagoras and J.P. Rameau, two of the biggest contributors in this field. Pythagoras and the Ancient Greeks in general were very important and critical figures in detailing the relationship between mathematics and music. Jeremy Edwin Scarbrough the University of Mississippi: Philosophical naturalism is the view that all reality can be explained naturally. This view results in a separation between the values of facts in language which is biased toward universal and objective values. In this view, empirical observations are considered determinants of truth, while values are reduced to personal emotions or human social and cultural constructs.

Fine arts, as a field of visual arts, can contribute to the understanding of music in terms of form, color, and space. For example, using visualization in the form of graphic notation can help to better understand the structure of music. Mathematics can also contribute to music arts research. For example, music theory and harmony can be analyzed using mathematical concepts such as ratios and proportions. Philosophy also has an important role in expanding understanding of the art of music. By considering questions of beauty, values, and meaning, philosophy can help understand the meaning and socio-cultural context of a piece of music.

This interdisciplinary approach implies that researchers can have a richer and more multidimensional view of understanding music as an art, art as color, and color as sound. Color is light and energy, colors are visible because they are reflected through all kinds of particles, molecules, and objects. Various wavelengths can be categorized as light (Karja, 2021). In addition, the research results obtained from this interdisciplinary approach can have practical implications, such as increasing the understanding of human mental and psychological health related to music. This can assist in the development of more effective music therapy and health restoration. Overall, an interdisciplinary approach to music arts research can open new opportunities for enriching the understanding of music as a complex and multidimensional phenomenon.

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## 2. RESEARCH METHODS

Research approach The qualitative study method in the study of music is a research approach that focuses more on understanding and in-depth interpretation of the experiences and perceptions of individuals or groups towards music. Research Type This study uses a qualitative type Case study Phenomenology, Ethnography, Grounded Theory Research Scope and Analysis Unit Musicology, Music Psychology, Music Anthropology, and Music Education. There are two main sources of data, which is Primary data and secondary data. Statistical analysis, qualitative analysis, historical analysis, and interpretive analysis

## 3. DISCUSSION

Substance of Study and Implications of Fine Arts . In the context of the interdisciplinary art of music, art, and music influence each other and work together to create deep and multidimensional artistic experiences. Through the integration of these two disciplines, we can explore and understand works of art in a more holistic and in-depth way (Katharina Mulherin: 26-10-2021).



**Figure 1. Kandinsky (1866 – 1944) (Influential painter and art theorist of origin Russia)**  
(Source: [www.alamy.com](http://www.alamy.com))

Kandinsky notes that art and music can produce the same effects on observers and listeners as the emotions they generate and the spiritual experiences they induce. Therefore, he views art and music as interdisciplinary artistic disciplines that combine forces to produce a deeper and more universal experience for the audience or listeners. Examples of Arnold Schoenberg and John Cage adopting an abstract approach inspired by Kandinsky and abstract art in general. Arnold Schoenberg was a composer and music theorist best known for developing the serial music system, or dodecaphony. Schoenberg saw music as an art that had to move towards a freer and more abstract expression. In his work, Schoenberg incorporates nontraditional elements such as atonality, complex harmonies, and fragmented musical structures. He tried to free music from reliance on tonality and create a more expressive and emotional sound.

Schoenberg's approach can be linked to abstract art, such as that developed by Wassily Kandinsky. Kandinsky, an artist and art theorist, believes that art must break free from representations of real-world objects and express emotions and ideas through form, color, and line. Kandinsky describes art as "tongues" that communicate through abstract visual elements. Schoenberg shared Kandinsky's views on music, viewing music as a language that can express emotions and ideas through abstract elements such as notes, intervals, and musical structures. John Cage, on the other hand, is an experimental composer known for his work exploring concepts of coincidence, silence, and sounds that are considered non-musical. Cage is interested in abstract ideas in art and music, and he often tries to break down the conventional boundaries of what can be considered music. One of his most famous works, "4'33", is a work composed entirely of silence, in which the musicians simply sit on stage without playing any instruments. Cage wanted to highlight the presence of natural sounds and coincidences as an art form, and thus, he adopted a very abstract and experimental approach in his work.

Although Schoenberg and Cage both take an abstract approach to their music, it is important to note that they differ in how they apply it. Schoenberg focused more on developing complex and systematic musical structures, while Cage leaned more towards using accidental elements and experimenting with non-traditional sounds. However, their similarity in adopting an abstract approach inspired by abstract art has become an important point of contact in the history of the development of contemporary art (Federico Giannini 18/04/2016)



**Figure 2. I Wayan Karja (Source: Life as Art Asia, 2016).**



**Figure 3. Balinese color wheel**



**Figure 4. Time and color (Photo taken by the author, 2020).**

In the color study of I Wayan Karja's painting which depicts musical notation, the colors used can reflect the tones or sounds contained in the music. For example, bright and light colors can represent high tones, while darker colors can represent low tones. Karja also uses distinctive patterns and shapes in his paintings, such as circles and lines that symbolize the rhythm and dynamics of music. His works also often depict natural elements, such as the sun, stars, and moon which are important in Balinese culture. The art of music and painting have a close relationship in terms of the use of artistic elements such as color, rhythm, harmony, and so on. Karja's artwork which reflects the richness of Balinese culture and a unique world view can be an inspiration in the study and implementation of the art of music. The visualization of sound and color is also implemented in painting based on a cosmology concept (Karja, 2020). Both art and music are used in painting practice to heal (Karja, 2022).

**Study Substance and Mathematical Implications.** In the field of musical structure, mathematics can be used to analyze the recurring patterns of melody, harmony, and rhythm in music. Mathematics can help identify hidden musical structures or complex mathematical patterns that underlie certain musical compositions. Overall, interdisciplinary studies in music research and the implications of mathematics in music can help improve our understanding of how music is created, analyzed, and enjoyed. This research can also open doors for the development of new technologies and applications in the music industry.

One example of the use of mathematics in music is in the analysis of harmony. Harmonies involve combining notes to create a harmonious sound. Mathematical concepts such as intervals, chords, and other music theories are used to understand the harmonious relationship between the notes. (Dr. David Ryan, Edinburgh, UK: 04/1/2017)

<b>Unison</b>	<b>Same Note</b>	<b>C - C</b>
<b>Second Minor</b>	<b>½ Tone</b>	<b>C - Db</b>
<b>Second Major</b>	<b>1 Tone</b>	<b>C - D</b>
<b>Third Minor</b>	<b>1 ½ Tones</b>	<b>C - Eb</b>
<b>Third Major</b>	<b>2 Tones</b>	<b>C - E</b>
<b>Fourth Perfect</b>	<b>2 ½ Tones</b>	<b>C - F</b>
<b>Fourth Augmented</b>	<b>3 Tones</b>	<b>C - F#</b>
<b>Fifth Diminished</b>	<b>3 Tones</b>	<b>C - Gb</b>
<b>Fifth Perfect</b>	<b>3 ½ Tones</b>	<b>C - G</b>
<b>Fifth Augmented</b>	<b>4 Tones</b>	<b>C - G#</b>
<b>Sixth Minor</b>	<b>4 Tones</b>	<b>C - Ab</b>
<b>Sixth Major</b>	<b>4 ½ Tones</b>	<b>C - A</b>
<b>Seventh Minor</b>	<b>5 Tones</b>	<b>C - Bb</b>
<b>Seventh Major</b>	<b>5 ½ Tones</b>	<b>C - B</b>
<b>Octave</b>	<b>6 Tones</b>	<b>C - C</b>

**Interval:** The interval is the distance between two notes. In music theory, intervals are measured in the number of semitones. Some examples of interval formulas used in music are Octave interval: Which consists of 12 semitones or 8 notes that are 7 notes apart. Unison interval: Zero semitone interval, meaning two notes are of the same pitch. Quarter interval: Consists of 5 semitones or 3 notes 2 notes apart. Major third interval: Consists of 4 semitones or 2 notes apart.

**Chords:** Chords are combinations of three or more notes played simultaneously. Some examples of a commonly used chord formulas are Major chord: It consists of a root note, a major third note, and a perfect fifth note. Minor chords (minor chords): Consists of a root note, a minor third note, and a perfect fifth note. Diminished chords (diminished chords): Consists of a root note, a minor third note, and a diminished fifth note. Augmented chords: Consists of a root note, a major third note, and an augmented fifth note.

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Scale: a series of tones arranged in a certain order. Some examples of commonly used scale formulas are Major scale: The formula is 1-1-½-1-1-1-½, where 1 represents a whole step (2 note intervals), and ½ represents a half step (1 note interval). Minor scale (natural minor scale): The formula is 1-½-1-1-½-1-1. pentatonic scale: The formula is 1-1-1½-1-1½. Blues scale: Formulas vary, but one example is 1-½-1-1-½-1½.

These formulas help in understanding the harmonic relationship between notes in music. By understanding these formulas and patterns, musicians can create harmonious combinations and understand the structure of music more deeply. (Composition, Jazz Advice, and Tips, Playing Techniques, Rhythm, Scales: By Eric Nov 18, 2011 ) In a mathematical context, permutations can be used to create unique melodic variations, rhythmic patterns, or note sequences in song creation. The following is an example of a permutation mathematical formula that can be used in song creation:

	With repetition	Without repetition
❖ <b>Permutation:</b> Order is important.	$n^r$	$n_{Pr} = \frac{n!}{(n-r)!}$
MS Excel Formula >>	PERMUTATIONA(n,r)	PERMUT(n,r)
❖ <b>Combination:</b> Order is NOT important.	$\frac{(r+n-1)!}{r!(n-1)!}$	$n_{Cr} = \frac{n!}{(n-r)!r!}$
MS Excel Formula >>	COMBINA(n,r)	COMBIN(n,r)

### Permutation/Combination Summary.

(Source <https://www.qualitygurus.com/>)

Permutations of notes within a scale: In songwriting, permutations can be used to create variations of a melody by changing the order or combination of notes within a scale. For example, if we have a scale with 7 notes, Using the 7 factorial or 7! we can create 5040 different permutations of this note sequence. This permutation results in the number of possible tone arrangements, namely 5040 tone arrangements. By combining these permutations, we can create unique melodic variations. (<https://bobbysternjazz.com/>)  
-nP<sub>k</sub> = If we want to make a song with the first verse consisting of 3 syllables, and each syllable uses 3 different tones from the 7 basic notes, then we can explain the number of tonal arrangements with the concept of permutations.

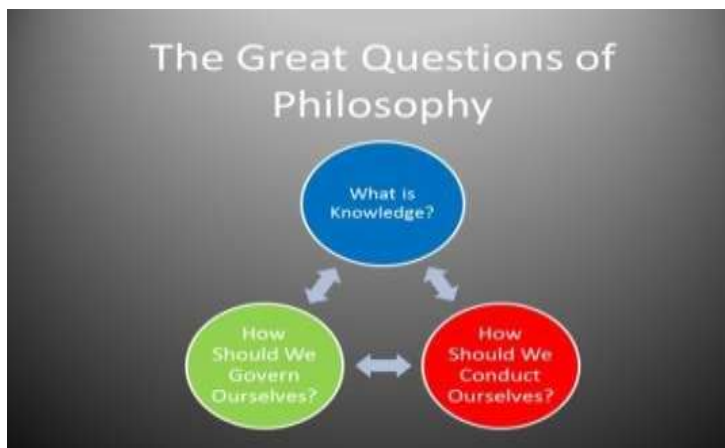
In this case, the number of elements (n) is 7 because we have 7 notes, and we want to compose 3 different notes for each syllable. Therefore, we use the permutation formula where n = 7 and k = 3:  $P(7, 3) = 7! / (7-3)! = 7! / 4! = (7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1) / (4 \times 3 \times 2 \times 1) = 35 \times 6 = 210$ . Thus, there are 210 possible chord arrangements if we choose 3 different notes from the 7 chords for each syllable in the first stanza of the song.  $7P_3 = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 210$  pitch arrangement (7-3)! 4! 4!  
Permutations of rhythmic patterns: Rhythmic patterns In music there is also the possibility of being expanded using permutations. For example, if we have a set of notes that have a certain length and rhythmic value, we can use permutations to vary the rhythmic pattern by changing the order or repetition of the notes. Permutation of musical instruments: In ethnic or traditional music, variations of musical instruments can add richness and uniqueness to song creation. Permutations can be used to arrange different sequences or combinations of musical instruments in that musical arrangement.

Permutation of song structures: Permutations can be applied in assembling song structures, such as arranging the order of song parts (intro, verse, chorus, bridge, etc.). By using permutations, musicians can create variations of different song structures to explore different narratives or emotions that the music wants to convey. The application of mathematical permutations in song creation allows musicians to explore unlimited variations and combinations of musical elements. By using the permutation formula, they can create unique pieces of music and explore the cultural richness and creativity in their creation process.

The substance of the Study and Philosophical Implications. In the context of philosophy, interdisciplinary studies allow philosophical reflections on the essence and values of music in human life. Philosophy provides a deep framework for questioning and understanding the existence of music, its role, and its function of music in society, as well as the ethical and aesthetic implication of music. The three basic interdisciplinary paradigms of understanding philosophy can be used to review music art material in 3 principles.

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The art of music through its nature. The study of scientific ontology in the art of music aims to explore the essence and existence of the art of music as an ontological phenomenon. The ontological approach in this study can reveal how music art interacts with other ontological aspects and provide a deeper understanding of the role and meaning of music art in the context of reality and human existence.



(source: <https://www//psychologytoday.com/>)

The essence that underlies the existence of the art of music can be understood through several different perspectives and philosophical approaches. The following are some of the ideas that are often discussed in the study of the philosophy of music: Emotional Expression and Communication: One of the central properties of music is its ability to express and communicate human emotions and experiences. Music can be a means of expressing feelings, provoking emotions, or communicating messages without words. Aesthetic Experience: The art of music involves a distinctly aesthetic experience. Music has the power to evoke feelings of beauty, delight, and transcendence. Its essence can be found in its unique aesthetic qualities, such as harmony, rhythm, melody, and dynamics.

Creation and Imagination: The art of music involves human creative activities in creating and processing sounds. The essence of the art of music is related to the process of creation and interpretation, in which imagination, innovation, and individual expression play an important role in achieving unique and original musical works. Social Togetherness and Connection: Music also has a strong social aspect. Through the art of music, humans can relate, share experiences, and form cultural and community identities. The essence of the art of music can be found in its ability to bring people together, create emotional bonds, and broaden our understanding of self and others. (DeNora, T. (2000). It is important to note that the nature of the existence of the art of music is complex and can vary depending on individual perspectives and cultural contexts. The essence of music art can also be related to different philosophies and worldviews. Therefore, approaches and interpretations regarding the nature of the art of music will vary from different philosophical and cultural perspectives.

The art of music through theory and knowledge. Epistemological studies in the art of music aim to understand the basic knowledge of the art of music, how to obtain it, and its validity in a scientific context. The epistemological approach helps reveal research methods, limitations, and potential in developing knowledge about the art of music and considers the relationship between theory and practice in the context of the art of music. (Anwar (1085), Bandyopadhaya (1991), Biswas (1995), Gazalba (1988: 49-92), Graham (1997).

The art of music involves the use of sound and musical elements such as melody, harmony, rhythm, and dynamics to create an aesthetic experience and artistic expression. Knowledge and theory about the art of music cover various aspects related to the structure of music, music history, music analysis, music psychology, and cultural and social contexts. Here are some theories and knowledge related to the art of music: Musical Theory: This includes an understanding of musical elements, such as musical notation, scales, chords, musical structure, and the relationship between melody, harmony, and rhythm. The musical theory also involves an understanding of formal and harmonic conventions in musical composition. History of Music: Knowledge of music history allows us to understand the development of music from ancient times to the present. It involves the study of musical genres, styles, famous composers, and important events in the development of music. Musical Analysis: Musical analysis helps to break down and understand the structure of music by examining musical elements in detail. This involves identifying the motifs, phrases, musical forms, harmonies, and other elements that make up a piece of music. Psychology of Music: Knowledge of the psychology of music involves an understanding of how music influences human emotions, perceptions, and experiences. It includes the study of emotional reactions to music, musical perception, musical memory, and their relation to human development and mental health. It is. Cultural and Social Context: Knowledge of cultural and social context allows us to understand how music is formed, received, and practiced in a particular society. It includes the study of the role of music in cultural identity, musical traditions, the role of

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musicians in society, and the social dynamics associated with music. Understanding and theory in the art of music provide an important framework for appreciating, analyzing, and creating music. Such theory and knowledge help in studying and explaining musical elements, understanding the context and history of music, analyzing musical works, and appreciating the influence of music on the human experience.

The art of music through the values contained therein. The study of axiological science in the art of music involves an understanding of the values associated with the art of music and their application in cultural, social, and individual contexts. Axiology is a field of philosophy related to research about values, ethics, and beauty. The following are some aspects that are relevant in the study of the axiology of knowledge in the art of music: Aesthetic Value: An axiological study in the art of music considers the aesthetic values associated with the beauty of music. This involves assessing the aesthetic qualities, artistic expression, and pleasure derived from the musical experience. Questions such as what makes music beautiful, how aesthetic qualities are assessed, and what is considered an important artistic achievement can be the focus of this study.

Ethics in the Art of Music: The axiological study of science in the art of music also involves ethical considerations in the context of music. This includes questions about copyright, originality, respect for musical works and their creators, and the social responsibility of musical artists. Ethical considerations also include questions about how musical art can morally influence listeners or society.

Cultural Values and Identity: The art of music is closely related to culture and identity, and the axiological study of the science of music considers cultural values and their influence on musical works. This involves understanding how music reflects and shapes cultural identity, as well as how cultural values are reflected in music. Questions such as how music respects and represents certain cultures and how cultural values are articulated through music can be the focus of this study.

The Social Role of Music: The art of music also has an important social role, and the axiological study of the science of music considers the social values associated with music. This includes research into how music can influence social relationships, build community, or convey political or social messages. Questions such as how music can unite individuals with diverse backgrounds or how music can be used as a tool for social change can be the focus of this study. Axiological studies in the art of music help identify and understand the values associated with the art of music, both in terms of aesthetics, ethics, cultural values, and social roles.

### **4. CONCLUSION**

Interdisciplinary studies in music art research involving fine arts, mathematics, and philosophy are as follows: Fine Arts: The interdisciplinary study of music and visual arts opens up opportunities for visual exploration in music and the use of design elements such as color, shape, and texture to create a richer auditory experience. The collaboration of music artists with visual artists can also generate new and innovative forms of artistic expression. Mathematics: The interdisciplinary study of music and mathematics can reveal the structure of music from a mathematical point of view. This research may involve analyzing chords, harmony, rhythm, and musical composition using mathematical principles such as number theory, fractals, or graph theory. The application of mathematics in music can also help us understand the beauty and complexity of musical works.

Philosophy: The interdisciplinary study of the art of music and philosophy opens up space for reflection and analysis on the meaning and purpose of music itself. Philosophical questions such as what makes music art, what role emotions play in musical experience, or how music influences human perception and consciousness are debatable. Philosophy can also provide a framework for understanding the social and political functions of music.

This interdisciplinary study implies that there is an opportunity to create and apply more complex, innovative, and diverse musical works of art. Collaboration between artists from various fields can also result in a more holistic and multi-dimensional art experience. Furthermore, this interdisciplinary research can provide new insights into human nature, creativity, and the relationship between art, science, and philosophy.

### **SUGGESTION**

Some suggestions for continuing interdisciplinary studies in music art research involving fine arts, mathematics, and philosophy: Collaboration between artists: Encouraging collaboration between music artists, visual artists, mathematicians, and philosophers can pave the way for new explorations and incorporation of perspectives from various fields. This can create more innovative and multidisciplinary pieces of musical art. Case studies: Conducting case studies of musical works that incorporate elements of fine arts, mathematics, and philosophy can provide a deeper understanding of the interactions between these fields. Analysis of these works can provide new insights into creativity and the process of art creation. Follow-up research: Continuing in-depth research in related fields, such as the influence of music visualization on listener experience, the mathematical analysis of musical structure, and exploration of the philosophy of music arts can broaden our understanding of the interactions between music, visual arts, mathematics, and philosophy. Interdisciplinary meetings: Holding interdisciplinary meetings or conferences involving experts and practitioners from various fields can be a productive forum for sharing knowledge, ideas, and the latest research results. This can

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promote collaboration and exchange of ideas between experts in the fields of music, fine arts, mathematics, and philosophy. It is. Interdisciplinary education: Promoting an interdisciplinary educational approach that incorporates music, fine arts, mathematics, and philosophy in the curriculum can provide opportunities for students to develop a holistic understanding and diverse skills. It can encourage critical thinking, creativity, and cross-disciplinary collaboration. By following these suggestions, interdisciplinary studies in music arts research can continue to develop and make valuable contributions to our understanding of art and people.

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