

How can musicians get inspired to create VR immersive music spaces? ----An Analysis of Transdisciplinary Approaches

Introduction

1) Background and significance

The immersive platform provided by VR technology breaks the traditional way of creation, encourages musicians to explore inspiration, and changes music creation.

This study focuses on how emotions, cognition, and sensory experiences interact to inspire musicians' creative inspiration. It combines disciplines such as psychology, musicology and VR technology and uses transdisciplinary methods to address complex challenges. VR music redefines the form of music creation through gesture interaction and emotional feedback and will become a transformative tool to promote innovation in digital art and music.

2) Problem Study

How do musicians gain creative inspiration through users' behavioural and emotional feedback in VR environments?

How do multi-sensory stimulations (such as touch, vision, and hearing) in VR music spaces work together to influence musicians' creative inspiration?

What are the specific applications and contributions of interdisciplinary approaches in this research?

3) *Objectives*

This study explores how an interdisciplinary approach can enhance creative inspiration in VR immersive music spaces. The objectives are fourfold:

- a) Understand emotional perception and investigate how emotional responses in VR environments influence musicians' creativity, drawing on psychological theories.
- b) Research VR technology: The role of VR technology in shaping dynamic, immersive music spaces.
- c) Cultural and artistic dimensions: Explore how musicology and cultural studies in VR and culture can contribute to authentic and meaningful music experiences.
- d) Develop an interdisciplinary framework: Integrate insights from psychology, cognitive science, musicology, and VR technology to propose an integrative model for designing user-centred VR music spaces.

By achieving these goals, this study integrates the gap between technological capabilities and artistic creativity and provides a powerful solution for future VR innovations in the field of music.

4) *Structure*

- a) Introduction: This essay outlines the research on VR creative inspiration, emphasizing emotion, technology and transdisciplinary integration.
- b) Theoretical basis: This essay cites theories such as symbolic interactionism, emotion perception model, and musicology to lay the foundation for this study.
- c) Transdisciplinary: Overview of the transdisciplinary approach adopted in this

study, illustrating how insights from multiple disciplines can be integrated to solve the research problem.

- d) **Case Study:** This essay examines real-world examples, such as Björk Digital and DJ gesture control platforms, of the application of interdisciplinary approaches in VR music.
- e) **Conclusion and Future Outlook:** This section summarizes the study's contributions and proposes future directions for research and development in VR music creation.

What is Transdisciplinary?

1) Definition

In the field of research, transdisciplinary will change the methodological paradigm of approaching problems in both academic and practical settings. Transdisciplinary is a principle of scientific research that typically addresses a particular problem broadly rather than adopting a single approach to solving the problem, as in other disciplines. Transdisciplinary boundaries are an approach that breaks with the traditional disciplinary approach by merging the methods, knowledge and practices of different fields and social actors to enable them to respond to the challenges of a complex real world. Its integrative content is a cognitive operation that has the potential to create a new and hitherto non-existent link between different mental and social practices and communicative entities in the context of a specific problem (Jahn et al., 2012). As Nicolescu (2002) aptly points out, transdisciplinary is very different from

multidisciplinary and interdisciplinarity in that it aims to understand the contemporary world in an impossible way within the framework of disciplinary studies. This highlights that transdisciplinary studies aim to develop academic knowledge to understand and solve multifaceted real-world problems. A promising and developing new research principle has been validated by transdisciplinary (Mittelstraß, 1999).

2) *The Origins of Transdisciplinary*

Two of the most crucial figures in the development of the whole lineage of transdisciplinary, Jean Piaget and Basarab Nicolescu, present two completely different but opposing views on this approach to transdisciplinary. Where Piaget laid the philosophical foundations for transdisciplinary by introducing the concept, Nicolescu expands on this by exploring the intellectual depth of the idea and how it can be applied in practice.

Transdisciplinary has its origins in the 1968 OECD symposium, where the Austrian philosopher Erich Jantsch raised the need for a globalised approach; however, the theoretical concept of transdisciplinary was first introduced in 1970 by the Swiss psychologist Jean Piaget, who argued that transdisciplinary is the highest form of interdisciplinary integration, which removes the strict boundaries between disciplines (Mokiy and Lukyanova, 2021). The concept of transdisciplinary proposed by Piaget breaks down the view of traditional theoretical scholarship, whereby transdisciplinary emphasises the unity of knowledge and a deeper understanding of the real world.

Although Piaget's first concept of trans disciplinarity opened the way for a theoretical foundation for transdisciplinary fields, his theory was abstract. It cannot be practically applied without a straightforward methodology to support it.

As transdisciplinary continued to evolve, the concept of transdisciplinary was again expanded in depth in Basarab Nicolescu's seminal 2002 book, *The Transdisciplinary Manifesto*. In his work, Basarab Nicolescu, a Romanian physicist and philosopher, and one of the most influential figures in the development of transdisciplinary, emphasised that transdisciplinary is crucial in understanding the complexity of the contemporary world, which breaks away from being wholly unexplained and unintelligible within the framework of traditional disciplines (Nicolescu, 2002). Thus, Nicolescu gives more strong philosophical arguments and practical, real-world applications for research in transdisciplinary fields.

3) *With his combination and adaptation of Piaget, Nicolescu proposes three core principles for transdisciplinary:*

Multiple realities: Reality encompasses physical, social, cultural and spiritual dimensions.

Logic of Inclusion: He proposes a logic of coexistence and complementarity from different perspectives.

Complexity: solving complex real-world problems through transdisciplinary research drawing on dynamic and interrelated knowledge frameworks.

Unlike Piaget, Nicolescu is more focused on practical applications. He believes that science and society should learn from each other to connect knowledge production and societal needs through the bridge of transdisciplinary.

4) Summarising and synergising

Firstly, Piaget's transdisciplinary proposal emphasised the cross-fertilisation of disciplines and the interconnections between scholars, and he opened up an essential path for research in transdisciplinary fields. Subsequently, Nicolescu derived from Piaget's transdisciplinary by suggesting practical applications of transdisciplinary and the need for competence in how to deal with complex social challenges. They contributed a theoretical and practical basis for transdisciplinary, emphasising the integration of scientific, social and cultural knowledge. As a result, this theoretical framework becomes an essential option for addressing the nexus between the connected and multifaceted challenges of modern society.

Where Transdisciplinary Contributions to the Study of Creative Inspiration in Virtual Reality Immersive Music Spaces.

With the help of a transdisciplinary approach to studying how musicians are inspired to create in immersive virtual reality, which encompasses knowledge between many different disciplines, it will be explored integrally from various fields. The four

disciplines of VR technology, psychology and cognitive sciences, musicology, and art and design together make differently through transdisciplinary theoretical frameworks, technological innovations, and creative thinking in this study. From these different disciplinary visions, other knowledge can be explored to explain how virtual reality music spaces inspire musicians.

1) Virtual Reality

The core pillar of this research is Virtual Reality (VR) technology, which provides musicians with a new multi-sensory immersive and interactive platform to create and discover new inspirations that are different from those of traditional compositions and which has a rich multi-sensory system that enables dynamic interaction with virtual elements through multi-sensory mobilisation. In VR music space, there is a rich sensory system through multi-sensory mobilisation to achieve dynamic interaction with virtual elements, thus triggering inspiration generation.

However, the contribution of virtual reality technology in this study is that it allows musicians and users to experience VR music in an immersive, multi-sensory musical space, where the musical experience can be inspired by technologies such as spatial audio, haptic dynamics, and visual generation, which demonstrates the importance of spatial audio in enhancing the VR experience (Chang et al., 2023)

In addition, VR technology can replicate real-world audio effects to give musicians

and users a sense of spatial realism, and musicians can create unique melodies and timbral effects with VR technology. Haptic and motion tracking technologies enable real-time interaction, allowing users to manipulate virtual instruments or change sound effects through gestures and real-time interaction with their bodies (Slater and Sanchez-Vives, 2016), thus providing musicians with real-time motion capture of the user to stimulate creativity.

The combination of VR technology and music creation has dramatically changed the nature of music. Musicians can use VR to create personalised virtual music and simulate different performance scenarios. This highly malleable VR music space not only replicates traditional music creation methods but also creates unique sound effects with the help of VR technology. VR technology provides a brand new creation mode for music creation. Through the interactive experience of immersive music space, musicians can break through the traditional limitations in the VR music space and create more possibilities for the future.

2) Psychology and Cognitive Science

Psychology and cognitive science play an unusual role in VR immersive music spaces by helping musicians and users understand the impact of the mental and emotional states that inspire their creations. Among these is a theory of 'flow states' developed by Csikszentmihalyi (1990), which states that the user is immersed in the musical space and enjoys the music with full attention. However, virtual reality environments

can expel external distractions and give the user an immersive musical experience that induces the formation of flow states and provides a fully immersive creative space for musicians.

However, emotional perception can also contribute significantly to inspiration, with visual and auditory effects in VR spaces evoking feelings of pleasure, nostalgia or excitement that can trigger creative breakthroughs. For example, specific colours, shapes or sounds can inspire musicians by altering their emotional state (Bailenson, 2018). Merleau-Ponty's concept of embodiment emphasises how users can naturally interact with VR environments through sensory stimuli such as spatial sound, dynamic visuals and haptics, thus fostering spontaneous creativity (Toadvine, 2016).

On the other hand, cognitive science focuses more on minimising barriers to the operational experience in VR systems by simplifying interfaces, ensuring that musicians and users can quickly adapt and focus on the experience. Psychology and cognitive science, therefore, provide the emotional and mental conditions necessary for musical innovation by optimising the VR music space to give the best multi-sensory experience for the user, thus inspiring musicians.

3) *Musicology*

Musicology is a study of music scholarship that provides essential insights into how musicians can create immersive musical spaces in virtual reality. It combines

theoretical, cultural, and practical aspects to strongly argue for building musical spaces in virtual reality.

The central contribution of musicology is that it lays the foundation for this study's music theory and structure. Studying musical elements such as melody, rhythm, and harmony contributes to integrating different musical frameworks and practices into the virtual environment. Musicology emphasises the need for interactive and dynamic systems in addition to static forms of musical expression, which informs the design of virtual reality soundscapes and virtual musical instruments that resonate with the creative goals of musicians (Yates, 2001).

A rich generation of innovative and inspired compositions in different cultural and historical music contexts adds cultural diversity and historical authenticity to this research. By combining traditional styles of instruments with virtual musical spaces, it is possible to collide to tap into different cultural contexts while preserving and reinterpreting historical music. Comparing the cultures embedded in various musical styles is universal in expressing different emotional responses, but the expression of emotional responses depends on culturalisation (Morrison & Demorest, 2009). It emphasises that VR music spaces need to strike a balance between universality and cultural specificity and that VR environments must be inclusive and rooted in authentic musical traditions. In this way, musicology creates a rich cultural space that inspires musicians to innovate while drawing on various influences in their

compositions.

Therefore, how VR music environments affect musicological constructs in emotions and creativity provides valuable insights into the design of VR systems (Tan, 2015).

Based on these contributions, musicology also provides a strong argument for VR environments to bring technological innovations and grind the artistic and cultural dimensions of music.

4) Art and Spatial Design

The artistic design of VR music space focuses on visual, spatial, and interactive elements, which create a sense of immersion and participation. The integration of these different elements can promote music creation, build a bridge between function and inspiration, and let VR space resonate artistically with musicians.

Spatial design is one of the most important contributions to this field. By carefully crafting virtual spaces with specific aesthetic qualities, it is possible to give the user an authentic emotional response that inspires creativity in musicians. Musicians use tools on the VR platform to adjust the colour changes of music and visual space in real-time during the performance, further promoting the integration of music with other sensory colour arts. When spatial visual colours affect our emotions and behaviours, they evoke our current emotions, thus creating a different musical atmosphere. For example, warm colours such as red and yellow can inspire energy

and excitement, making music upbeat by allowing musicians and users to dance to the music in a musical space; however, more incredible colours such as blue and grey tend to have a calming and soothing effect and are more suited to self-healing and relaxation for users (Gupta, 2024). Spatial design techniques can create expansive, immersive environments that give musicians a sense of being in a unique and infinite creative space.

Emphasising the disciplines of spatial design helps to create visuals in VR music spaces that inspire musicians and ensures that these environments are pleasurable and multisensory for the user.

5) Conclusion

Combining the four disciplines brings profound significance to the research of VR music creation. In VR music spaces, psychology and cognitive science analyze and explain the emotional changes in user experience; musicology establishes a framework for music theory to inspire musicians' creative inspiration; art and spatial design enhance the beauty and functionality of VR spaces and increase creative exploration. These disciplines are combined with the help of a transdisciplinary theoretical framework to optimize the application of VR technology in music creation to respond to complex challenges effectively.

The Need for Transdisciplinary Contributions in Virtual Reality Music

Composition

Music creation in VR immersive music spaces involves the interplay of emotions, technology, and dynamic behaviours. It interrelates these research dimensions and poses complex challenges that a single discipline cannot adequately address and defend. Therefore, transdisciplinary collaboration approaches are essential to inspire musicians to create in VR spaces. The fusion of insights from different aspects and disciplines creates an adaptable and meaningful VR music space, which is also the necessity of research with the help of transdisciplinary methods, emphasizing the focus on emotional, technical and behavioral complexities.

1) Understanding the Complexity of Emotion Perception

Emotional perception is an indispensable part of VR music creation, which reflects the emotional state of the musician in the immersive space. The immersive music environment brings a multi-sensory experience to the user, which will stimulate the user's unconscious emotions and behavioral changes in the music space, thereby reflecting the inner emotions through visual and musical changes in the space, and inspiring the generation of creative inspiration for the musician. In this process, inspiration needs to be drawn from multiple disciplines.

From a psychological perspective, theories help explore the emotional factors users experience in a VR music spaces and how these emotions stimulate creativity. Csikszentmihalyi's (1990) flow state theory explains how deep

concentration and engagement enhance emotional involvement in immersive environments. Similarly, immersion—the profound engagement felt when entering a virtual world (Coomans and Timmermans, 1997)—allows musicians and users to generate genuine emotional states, which psychology can interpret. Musicology provides a theoretical framework by explaining how musical elements like rhythm, melody, and harmony combine to evoke specific emotional responses (Yates, 2001). Understanding the structure of music can provide musicians with expert guidance, expand creative options and allow inspiration to resonate on a deeper level.

If it is only a single discipline, a VR music space may only elicit a general emotional response and lack the dynamic interaction between the musician and the user. Systems designed solely from a psychological perspective may focus on eliciting specific emotions but fail to integrate these emotions into interactive musical expression. Therefore, there is potential for combining emotions and music in VR music spaces through transdisciplinary integration to stimulate creativity and enhance the immersive experience.

2) VR Complex Technical Understanding

The most significant contribution of this study is the support of VR technology, which brings an unprecedented series of transdisciplinary methods of spatial audio, real-time rendering and real-time adjustment to the music environment. Therefore, an immersive music space was created for this study. However, technological advances

must be accompanied by artistic and emotional musicians to achieve the desired results.

Virtual reality technology gives an emerging interactive platform for dynamic interactions. VR environments that simulate concert halls, serene natural landscapes, or abstract spaces allow musicians to explore how different environments affect their creativity. For example, a musician in a VR forest might find inspiration in the dynamically changing visual and soundscape associated with their emotional state or musical composition. (Slater & Sanchez-Vives, 2016). Combining the discipline of musicology with VR technology can ensure that the technical features of the VR music space are consistent with musical principles, creating a multifunctional environmental experience that is both technologically rich and artistically meaningful (Tan, 2015).

A single-disciplinary approach alone can produce environments where technical complexity is prioritised over usability or creative relevance. For example, a virtual reality system may employ advanced spatial audio but lack the stimulating sources for corresponding musician inspiration. Therefore, by combining VR technology with musical perspectives, a transdisciplinary theoretical approach can ensure that technology enhances rather than hinders creativity.

3) Understanding Dynamic Behavior

The behavioral interactions between musicians and users in VR music spaces include music exploration, interaction, and collaborative creation. Therefore, it is necessary to combine multiple disciplines to analyze the meaning behind these behaviors in order to create a system that conforms to the natural creative workflow. Cognitive science mainly explores how musicians perceive and interact with dynamic environments, and emotional feedback loops can support their exploration. Adding musicological theory to this foundation, we delve into how musicians construct their creative structures and how to change the system to complement their unconscious behaviours.

Without a transdisciplinary theoretical approach, VR systems may become unnecessarily cumbersome, and musicians may not be able to create music correctly. When designing a system without understanding the behaviour of musicians, it may prioritize how to make interactions simple rather than creating intuitive and convenient VR tools, which again limits the ability of musicians to develop freely.

4) Conclusion

The complex combination of emotion, technology and behavior reflects the necessity of transdisciplinary research in VR music creation. And combining these disciplines can show the novelty, rapidity and emotional appeal of transdisciplinary research in VR system technology, making it one of the important tools for the development of music creation. As Csikszentmihalyi (1990) and Slater and Sanchez-Vives (2016) emphasise, immersive environments can promote deep emotional engagement, and

transdisciplinary efforts ensure that these environments remain meaningful and inspiring for musicians.

The meanings and differences between multidisciplinary, interdisciplinary and transdisciplinary

Interdisciplinarity: Interdisciplinarity is the transfer of methods from one discipline to another, bringing together multiple knowledge disciplines to share information under the coordination of disciplines at higher levels of the knowledge structure (Nicolescu, 2014). By integrating methods, theories, and practices from different disciplines to solve complex problems comprehensively, beyond juxtaposition, transdisciplinarity is very useful for problems that require a deeper understanding that arises from the interaction of multiple perspectives (Stenner and Taylor, 2008).

Following these disciplinary approaches, Stenner and Taylor (2008) argue that multidisciplinary is the ability to coordinate problem-solving from different disciplinary perspectives. It brings together different knowledge disciplines, but they are not shared separately in multidisciplinary. In a multidisciplinary field, each discipline focuses on its appropriate field, and its role is to enrich research with the results of the integrated knowledge between these disciplines to solve real-world problems better. Moreover, each discipline does not need to change due to its contribution to multidisciplinary research, but it can change.

1) Differences that exist between transdisciplinary, multidisciplinary and interdisciplinary

Transdisciplinary, multidisciplinary, and interdisciplinary approaches differ regarding disciplinary cooperation, knowledge integration, and goals. Transdisciplinarity integrates the integration of knowledge from different communities or fields of interest and transcends academic boundaries. The aim is to integrate all knowledge to co-create a realistic, feasible and transformative solution that can quickly address real-world challenges, redefine frameworks and solve societal complexities. At the same time, multidisciplinary means that multiple disciplines work independently to solve a common problem, contributing their expertise but not sharing or integrating their approaches. Interdisciplinarity integrates knowledge, methods, and theories from multiple fields to create holistic solutions. Disciplines interact and integrate their perspectives to generate a unifying framework that transcends individual boundaries, and it is ideal for solving interrelated challenges that require synergy.

In conclusion, these three analyses from all perspectives learn that transdisciplinary transcends boundaries altogether and generates innovative, real-world impacts, multidisciplinary and thus increased perspectives, and interdisciplinary integrates perspectives.

How Transdisciplinary Approaches are Used in Virtual Reality Music

Composition Research

Trying to understand the complexity of how musicians are inspired in VR immersive music spaces is illustrated with the help of a transdisciplinary approach. This approach integrates knowledge from academic disciplines such as psychology, musicology, and computer science and non-academic insights from practitioners such as musicians and VR technicians. It aims to co-create systems that dynamically respond to emotional, interactive and creative workflows. This section derives how to apply this research by combining the transdisciplinary contributions to this research explored above, highlighting their integration with symbolic interactionism and affect theory, and arguing for them about the practical parallels of realisation.

1) Emotional feedback and real-time mechanisms

One of the fundamental contributions of psychology and emotion theory lies in understanding how emotions affect their musical creation. Therefore, VR technology is used to design a dynamic system that allows musicians and users to adapt to the musical space and capture their emotional states in their space. The concept of the Arousal-Valence Model is used to design a virtual reality music space system that captures the emotional state of dynamically adapted musicians, modelled as a two-dimensional affective model using arousal and valence; both aspects can effectively describe the range and type of musical emotions (Kim et al., 2011).

Feeling immersive and utterly oblivious to the state of enjoying music in a VR music space is combined with emotion classification based on its modalities to identify changes in the emotions of users and musicians in the VR space.

In addition, flow theory argues that the importance of fostering creativity is maintaining emotional engagement and emphasizes that an adaptive environment is the way to achieve balance (Csikszentmihalyi, 1990). emotional state to adjust to scene changes in real-time; for example, when a musician is in a slump in his or her musical space, the VR space can gradually soften the rhythmic melody of the music, and the visual lighting thus becomes cooler to adapt to the mood change. Real-time adjustments to sound effects, visual effects, and interactive elements are made based on the user's emotional changes in the VR music space, which helps inspire more inspiration for musicians.

1.1) Reality Case

Beat Saber is a VR rhythm game that combines music and interactivity, where the player experiences the emotion and rhythm of the music by cutting cubes (Games, 2019). The game presents emotional dimensions through a highly immersive environment, which also utilises an 'arousal-pleasure' model, with fast-paced music at the conclusion, stimulating the player into a state of heightened arousal. In contrast, soft music creates a relaxing atmosphere. The multisensory fusion of sight, sound, and movement and the real-time feedback mechanism provide the player with a complete emotional experience cycle. Therefore, in conjunction with this study in terms of music composition, the design of Beat Saber provides important insights. In VR, musicians are inspired by the user's body rhythms, multisensory experience and emotional feedback, and the transdisciplinary combination of VR technology and

psychology brings new perspectives and possibilities for music creation by exploring the relationship between dynamic emotions and musical expression.

2) *Symbolic Interaction Theory in VR Music Composition*

Symbolic interactionism is a sociological theory concerned with how individuals create and interpret meaning by interacting with symbols in their social environment (Blumer, 2012). The theoretical framework, originated by George Herbert Mead and further developed by Herbert Blumer, emphasises the dynamic relationship between symbols, human behaviour and the process of meaning construction. Symbols do not have specific concrete forms (such as gestures, objects, words or scenes) but have different meanings, whether ordinary or independent and are often used as a medium for communication and interaction. Sociological theory holds that individuals create meaning by interacting with symbols, objects, behaviors or concepts with cultural or personal meanings (Carter and Fuller, 2015).

The transdisciplinary approach provides a powerful theoretical framework for combining symbolic interactionism with VR technology, which is used to understand how musicians interact with VR environments by creating music through user gesture symbols in VR music environments. Symbolic interaction in VR music creation is a symbolic behaviour that combines abstract concepts with concrete outputs. For example, users can inspire musicians by generating different visual and auditory symbolic images through gestures in VR music environments, and musicians can

create music by adjusting rhythms, extending notes or modifying rhythms through gestures, with each gesture representing a specific musical element. This dynamic interaction allows musicians to use more imagination in their creations and establish a deeper connection with their works.

At the same time, symbolic interaction can also be reflected in the virtual reality environment and combined with culture and personal memory to inspire inspiration.

For example, a virtual Chinese garden with small bridges, flowing water and traditional pavilions can evoke emotional resonance and cultural identity, thereby inspiring creativity in traditional styles. Similarly, musicians can create personalized artistic conceptions of their works with objects or themes with sentimental value to further enhance emotional engagement.

1.1) Case Study

The DJ gesture control platform powerfully advocates symbolic interactionism by emphasizing how gestures and symbols can enable intuitive and meaningful interactions. The platform emphasises real-time interaction, with gestures symbolising musical changes, such as changes in tempo or pitch, with the platform reinforcing the connection between actions. It does this through gestural symbolism, even though modified auditory and visual feedback is consistent with this study's requirements for VR music composition. Thus, this example demonstrates the value of integrating symbolic gestures, dynamic feedback and immersive environments.

3) How to Get Creative Inspiration in the VR Music Space Collaborating with Non-Academic Stakeholders

Transdisciplinary collaboration with non-academic stakeholders is essential for developing practical, user-centred ways to inspire musicians to get inspired to create in VR environments. By integrating the diverse insights of musicians, developers, and industry collaborations, transdisciplinary research ensures these have more possibilities and inspire musicians in immersive VR music spaces.

Feedback from musicians plays a critical role in refining gesture control, sound and interface design. Musicians are influenced by users' behavioural or visual changes in the VR music space, which can inspire new creative ideas—for example, observing changes in the emotional response of the virtual audience, such as increased engagement through brighter colours or more substantial sound effects. Yellow has a pleasing effect in VR environments, grey has a calming effect, and blue rooms have a relatively neutral effect (Xu et al., 2022). So, the different variations in the VR music space stimulate musicians to generate more creative inspiration.

Developers use their expertise to continuously improve and update the current state of the art of VR music and spatial audio to enable precise interactions and immersive multi-sensory experiences. Collaboration with other industries extends the field of research by expanding VR music and spatial technologies into industries such as

education or healthcare, thus integrating a transdisciplinary approach.

4) Conclusion

Transdisciplinary Applications in VR Music Creation integrates psychology, music theory, technological innovation and practitioner expertise to create a VR music space that inspires musicians and supports the creative process. Corresponding research questions are analysed from each of the different perspectives, and real-life examples are included to demonstrate the transformative potential of these applications.

Through transdisciplinary research, virtual reality music has been demonstrated to enable musicians to create music that advances our understanding of VR technology and creativity and promotes the development of artistic expression in virtual spaces.

Case Study

Björk Digital utilises a transdisciplinary approach to music, visual art and VR technology to facilitate immersive multisensory experiences. Each VR piece on Björk's Vulnicura album blends spatial audio and visual experiences to evoke deep emotional engagement. Songs like 'Black Lake' (björk, 2015) use volcanic landscapes to symbolise heartbreak, while 'Notget' (björk, 2017) uses visuals to transform.

Moreover, participants can explore and rebirth themes through sound and vision through visual tracking and dynamic environments. Its transdisciplinary approach combines the emotional tone of musicology, the symbolic design of visual art and the interactive immersion of VR.

In conjunction with this project study, Björk Digital demonstrates how transdisciplinary collaboration can facilitate user-centred innovation. This practical example provides a theoretical basis for this research on the effectiveness and transdisciplinary integration of emotional expression, symbolic interaction and multisensory feedback in VR music spaces, and it redefines the creative experience through multidisciplinary synergy.

Limitations and Future Perspectives

This study explores how musicians can be inspired in virtual reality immersive musical spaces, utilising dynamic environments that integrate spatial audio, immersive visual effects and symbolic interactions. VR provides a creative platform where users are immersed in a musical space, where their gestural dynamics and emotions directly influence the VR space and allow musicians to experiment with different soundscapes, rhythms and melodic effects.

Limitations include technical constraints such as accuracy in motion recognition, delay in real-time feedback, and musicians unfamiliar with the operation of VR systems. High development costs and limitations for some people with mental illnesses may also prevent widespread use. From a creative perspective, over-reliance on technology may stifle organic experimentation and reduce spontaneity in the creative process.

Prospects include improving gesture recognition, integrating artificial intelligence into personalised adaptive systems, and making VR technology more straightforward. VR technology allows musicians and users to collaborate and create music in real-time in a VR music space. By addressing current limitations and improving interactivity, virtual reality technology will greatly change the future development of the arts and likewise open new paths for music creation and collaboration in the VR music space.

Conclusion

This research offers transformative potential for VR music composition research from an interdisciplinary perspective by integrating psychology, musicology, VR technology, and art and spatial design. Each discipline makes a unique contribution to the immersive environment of Music Space that inspires creativity. Psychology and cognitive science reveal how emotional states affect the creative process and employ theories such as flow and emotional feedback loops. Musicology lays the groundwork for integrating musical structures, cultural contexts and soundscapes to provide meaningful inspiration for musicians. Through VR technology to create compositions, which thus breaks the traditional boundaries of creation, users and musicians are provided with a new emotional interaction of real-time feedback and immersive multi-sensory music space experience. The field of art and design mainly enhances visual senses in VR music space to ensure real-time participation and exploration of users and musicians.

Therefore, transdisciplinary theoretical methods integrate the theoretical frameworks and practical applications of different disciplines to shorten the direct gap and solve the complex challenges encountered in VR music creation. Examples such as Björk Digital and the DJ Gesture Control Platform demonstrate the synergies between disciplines, showing how emotional, gestural and cultural elements can drive innovation. However, dynamic recognition, high cost, and accessibility limitations are areas for improvement. Collaboration with AI simplified interfaces and other areas of collaboration expand the possibilities of VR music creation in the future.

By combining emotional, cultural, and technological dimensions, a new creative tool has been created for this research VR music space. VR music technology is redefining the future of music and music creation in the music field. This paper highlights the role of interdisciplinary approaches in demonstrating and addressing real-world challenges and inspiring new forms of creative musical expression.

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