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The role of music and multimedia in general education and teaching

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Abstract: This paper examines the use of music and multimedia as two key components for enriching the learning experience in general education. This multidimensional approach offers tremendous opportunities to increase student engagement and motivation by integrating powerful tools that support student-centered learning development. The integration of music and multimedia has a profound impact on stimulating critical thinking and improving memory. This study aims to shed light on how these two components can be used together to create dynamic and inclusive learning environments that enhance engagement and knowledge acquisition. The cognitive and emotional benefits of music and multimedia include stimulating creativity, improving communication and collaboration skills, and helping to create a learning environment that supports students' emotional well-being. Multimedia offers rich opportunities for illustrating concepts and creating learning situations that can be adapted to the diverse needs of students, while music creates an atmosphere that encourages deep and engaged learning. This study explores the ways in which music and multimedia can be integrated to provide a richer learning experience and prepare students for a technology-driven future. In addition to the theoretical component, a quantitative study was conducted. Data collected from surveys and the analysis of results will provide valuable suggestions for improving teaching practices.

Keywords: *Field, Multimedia, Music, Teaching, Technology.*

1. Introduction

The development of computer technologies and multimedia tools in education has led to a significant increase in the popularity of online courses in higher education [1].

The term *"multimedia"* itself suggests that, in today's teaching and learning processes, there are expanded opportunities to present subject-specific content digitally, depending on the nature of the course. This process includes the use of graphics, videos, audio elements, as well as the combination of text and visuals. All of these options can be utilized by students, both in traditional classroom settings using computers or projectors, and in online learning environments, offering a more accessible and comprehensible educational experience through multimedia.

The integration of multimedia in educational settings can significantly enhance students' active engagement and facilitate the acquisition of new skills, thereby contributing to more effective learning outcomes [2].

Moreover, multimedia-generated information can be efficiently stored, processed, and shared, ensuring both ease of access and security. Studies indicate that employing interactive multimedia tools such as videos, graphics, and animations can boost students' motivation and improve their academic performance [3].

Today, multimedia facilitates the dissemination of information to wide audiences through lectures, seminars, presentations, conferences, and other educational activities. Andresen [4] categorizes the use of multimedia in education based on the roles of teachers, students, and applications. In this context, a scenario refers to a structured sequence of envisioned events designed to support learning [4].

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Multimedia has helped simplify and improve teaching methods by enabling both students and instructors to access information more quickly and efficiently. These opportunities have become increasingly accessible and engaging for all participants, offering an educational experience that is also entertaining, thanks to the variety of effects and capabilities that multimedia provides. Research indicates that integrating music and multimedia in educational settings can foster creativity and enhance both auditory and visual perceptual skills, particularly when teaching more complex subjects [5]. This suggests that multimedia and its effects are integrated into every field of education.

Music and multimedia work together to create interactive and engaging learning environments, which can enhance student participation and improve knowledge retention [6].

While music is traditionally viewed as an art form associated with emotion, musical notes, and variation, it is also deeply connected to multimedia effects and plays an important role in the teaching and learning process.

The incorporation of multimedia and music in educational settings can enhance students' creative abilities while also improving their focus and memory retention [7].

Given that multimedia is applied in nearly every curricular subject, particular attention should be paid to the subject of Music. This field is increasingly interwoven with multimedia and technology, from recording songs in studios and notating sheet music through programs like *Sibelius*, to playing back compositions through digital software and using synthesizers or electronic pianos. These tools are having a remarkable impact on the teaching process, particularly with students in Faculties of Education, where classrooms are equipped with the ability to view multimedia content such as videos and images via projectors.

Research suggests that incorporating music and multimedia into educational activities can create more engaging and motivating learning environments, thereby enhancing student participation [8].

An important period that must not be overlooked is the era of virtual learning during the COVID-19 pandemic.

The impact of the COVID-19 situation has led to an increased uptake of online learning by students, both nationally and internationally. As a result, higher education instructors have been tasked with engaging online students, designing digital learning materials, and communicating with students mostly in asynchronous formats. University teaching staff had to adapt their courses for online delivery to accommodate students unable to attend in person. Even after on-campus instruction resumed, many continued to implement online or blended learning models [9, 10].

Since multimedia-based lessons are primarily delivered in computer labs using projectors, video recordings, and other digital elements under normal circumstances, in the following section, I will present an example of how multimedia learning was adapted during the pandemic through online teaching. A particular focus will be given to the course *Instrumental Interpretation*, which posed significant challenges for both professors and students. This was due to the fact that virtual learning was the only available option for continuing instruction in a subject that typically requires close, hands-on engagement.

The example includes a lecture in which a song was prepared through multiple steps: the song was notated using *Sibelius* software, a performance of the song was recorded and shared via audio and video, and during the virtual lesson, students who had access to synthesizers were guided in practicing and correctly interpreting the song. This case demonstrates how multimedia integration made it possible to continue effective music education under remote and constrained conditions.

Therefore, this paper aims to examine the pedagogical impact of integrating multimedia and music within the teaching and learning process, with a particular focus on music education in higher education settings. Special attention is given to the adaptation of multimedia-based instruction during the COVID-19 pandemic and the transition to online learning environments.

To achieve this aim, the study presents a qualitative case example drawn from the course Instrumental Interpretation, demonstrating how various multimedia tools, including music notation software, audio/video recordings, and synthesizers, were utilized to facilitate virtual instruction. The

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findings contribute to the ongoing discussion on how multimedia and music technologies can enhance educational practices and foster greater student engagement, creativity, and retention in both virtual and in-person classrooms.

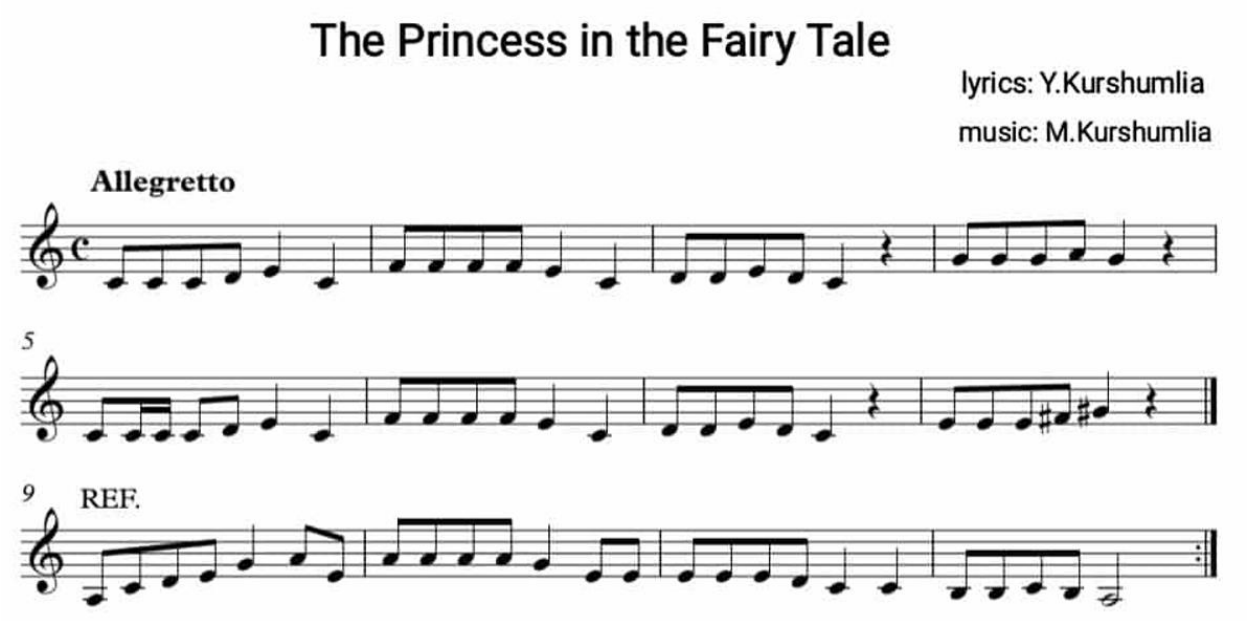

Figure 1.
Song notes written with the Sibelius program for students.

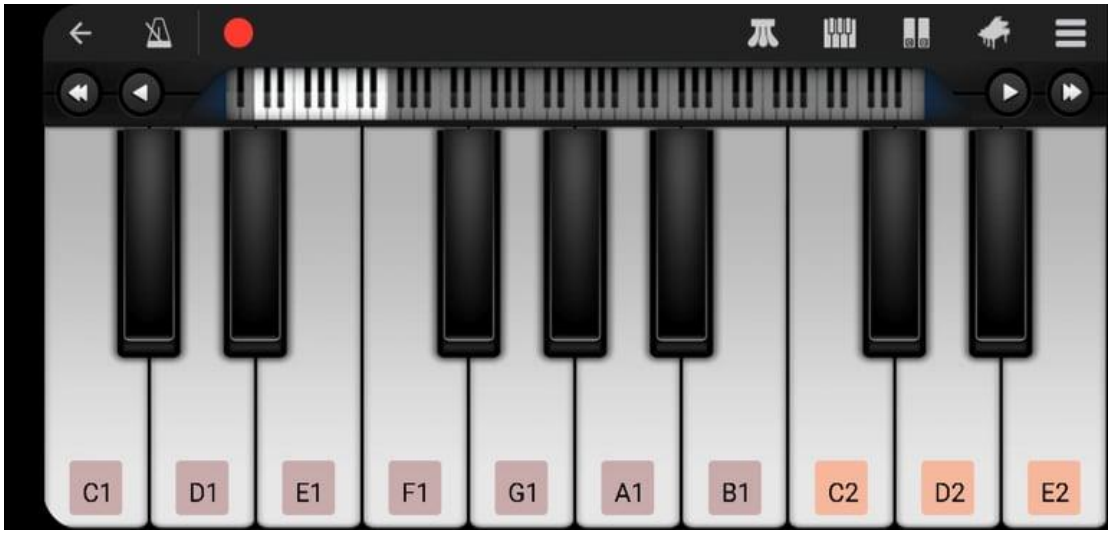

Figure 2.
Demonstration of a synthesizer for students' test with photoimaging.
Source: Perfect Piano [11].

This photo shows the use of Synthesizers and Sibelius in Virtual Learning during the COVID-19 Pandemic:

During the virtual learning period prompted by the COVID-19 pandemic, the use of Sibelius software and synthesizers played an important role in enhancing the music learning process. These

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tools provided excellent opportunities for students to practice and interpret musical scores in the context of remote learning.

A key element of the instructional materials was the musical notation created with Sibelius, which was provided to students for accurate interpretation. The software enabled the creation and sharing of musical materials, facilitating the learning of melodies and songs.

To guide students, a photo of the synthesizer keyboard was used as a visual aid, directing students on where to place their fingers for accurate melody interpretation. This process was particularly helpful for those with synthesizers at home, allowing them to practice and send video recordings for feedback via Viber or email.

Additionally, the use of online resources, such as Kurshumlia [12], has helped students gain a better understanding of contemporary accompaniment techniques [12].

The use of musical technology, through Sibelius and synthesizers, created an innovative learning environment, stimulating students' creative skills and offering opportunities for a more interactive and engaging learning experience.

2. Literature Review

Within general education, the use of multimedia resources, including music, visual stimuli, and textual content, has proven to be an effective approach to enrich learning environments and increase student engagement. Music, as a key multimedia element, can evoke emotional responses, support memory retention, and aid in understanding complex topics, especially when combined with visual and textual information. Mayer [13] highlights that thoughtfully integrating multimedia elements that combine verbal and visual information can greatly enhance learners' comprehension and long-term retention. It is crucial that these multimedia resources are carefully designed to optimize cognitive processing and minimize unnecessary cognitive load. By presenting information through multiple channels, visual, auditory, and textual multimedia serve as a powerful educational tool, helping students understand and remember content more effectively [13].

Strategic integration of technology into educational practices is essential for enhancing student learning. Carefully designed multimedia elements, including music, can stimulate both cognitive and emotional engagement, thereby improving comprehension and motivation [14].

Higher education increasingly incorporates online learning platforms, providing students with greater flexibility and new opportunities for collaboration. According to Garrison and Anderson [15], these digital learning communities promote meaningful educational engagement by facilitating interaction with both content and peers [15].

This shift from traditional classroom instruction to digitally supported learning environments enables educators to meet the needs of diverse learners while promoting deeper analytical thinking. Through the strategic use of multimedia, educators can deliver impactful experiences aligned with 21st-century learning expectations.

The digital transformation in education has fundamentally changed the delivery and experience of knowledge across all learning levels. Online learning environments, in particular, have become powerful alternatives to traditional classrooms by providing students with new opportunities to access content, collaborate with peers, and actively participate in the learning process. The incorporation of multimedia tools further enriches online learning environments by diversifying instructional methods and addressing both the cognitive and emotional needs of students. Anderson emphasizes that such enhanced platforms support personalized and interactive learning experiences, thereby improving accessibility and overall educational effectiveness [16].

The incorporation of technology into education has created new opportunities to enhance teaching and learning across various fields, including music. Digital tools and multimedia resources provide innovative approaches to engage students, making learning both interactive and accessible. Blair emphasizes that the deliberate use of technology can support diverse learners and significantly

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transform traditional educational practices, particularly by offering literacy tools tailored to culturally diverse student populations in electronic learning environments [17].

The role of technology in education has been extensively examined, with scholars offering differing perspectives on its impact on learning outcomes. Clark emphasizes that instructional strategies, rather than technology alone, primarily determine learning effectiveness. In contrast, Kozma argues that technology can fundamentally transform learning by enabling new forms of interaction and representation. Tennyson complements these views by highlighting the importance of designing educational technologies according to cognitive learning principles to optimize student achievement. Together, these perspectives indicate that effective technology integration requires a careful balance between innovative tools and sound pedagogical design [18-20].

In today's digital era, the role of educators has evolved from merely transmitting information to actively facilitating the development of students' critical skills. Teachers play a key role in fostering learner autonomy and accountability throughout the educational process. Unlike traditional education, which emphasized memorization and passive reception of knowledge, multimedia-rich learning environments require instructors to take on expanded responsibilities. These include providing pedagogical support, motivation, and guidance to inspire students in their active pursuit of knowledge, as highlighted by Andresen and Brink [21].

Modern educational settings require teaching strategies that accommodate students' diverse cognitive styles. Integrating multimedia, which combines both visual and auditory elements, helps create stimulating and adaptive learning environments. This approach not only improves conceptual understanding but also aids in long-term memory retention. Moreno and Mayer [3] argue that instructional materials engaging multiple sensory channels simultaneously increase the likelihood of higher academic achievement by reinforcing content through complementary modalities [22].

The integration of multimedia in music education presents valuable opportunities to enhance student engagement by stimulating multiple senses at once. By utilizing visual representations, audio samples, and interactive digital exercises, educators can create more immersive and meaningful musical learning experiences. This multisensory approach accommodates diverse learning preferences, including visual, auditory, and kinesthetic, and fosters a more inclusive and accessible educational environment. Jonassen and Land [22] highlight that such strategies are particularly effective in supporting learner diversity across educational contexts [23].

Creating visually engaging learning experiences significantly enhances students' motivation and concentration. Increased motivation, in turn, contributes to better information retention and higher academic performance. Schunk et al. [24] emphasize that motivation is a core component of successful learning, and multimedia-rich environments support this by offering interactive and stimulating educational experiences. Such environments help maintain learners' attention and strengthen memory, highlighting the importance of integrating multimedia into instructional design [25].

In today's fast-evolving world, fostering students' critical thinking and reflective abilities is crucial for deepening their understanding and preparing them to face future challenges. Allocating time within the learning process for reflection allows students to meaningfully connect concepts and develop problem-solving skills essential for thriving in a complex, globalized society. Henniger [23] emphasizes the importance of guiding learners in cultivating these cognitive abilities to navigate and succeed in such environments [13].

Multimedia-based learning resources can foster students' critical thinking, encouraging deeper engagement and analytical reasoning [26].

Reflecting on the integration of technology and multimedia in the educational process reveals a significant transformation in the way students engage with learning. No longer confined to passive reception in traditional classrooms, students now interact with content dynamically through multimedia tools that foster deeper cognitive engagement, analytical thinking, and multimodal interaction.

Multimedia functions not merely as a supplementary resource but as a pedagogical bridge that facilitates more meaningful and long-lasting knowledge acquisition. By addressing diverse learning

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styles and promoting active participation, it enhances both comprehension and retention. In this evolving educational landscape, students must not only acquire information but also develop the capacity for critical reflection and adaptive thinking skills that are essential for navigating the complexities of contemporary, technology-driven societies.

Students are more likely to comprehend and retain content when they actively form meaningful associations between textual and visual elements [24].

3. Methodology

This section presents the methodological approach applied in conducting the present research. To meet the study's objectives, a combination of research methods and instruments was utilized, including theoretical literature analysis and quantitative research.

In the initial phase, a theoretical analysis was conducted by reviewing various academic sources, such as books, articles, and other relevant publications from the fields of music, multimedia, and education in general. This phase served to build the theoretical foundation upon which the study is based.

In addition to the theoretical component, a quantitative study was conducted. The research subjects included professors from various academic fields and students, for whom separate questionnaires were designed. The questions in the questionnaires were constructed in alignment with the research topic and aimed to collect relevant data on the issue being explored.

The questionnaire for teachers was administered to 41 primary school educators. It included closed-ended questions, where respondents select one of the predefined answer options. Closed-ended questions are widely regarded as effective in quantitative research because they allow for easier comparison of responses and enable more structured statistical analysis [27].

4. Analysis and Results

To examine the use of music and multimedia as two key components for enriching the learning experience in general education, a questionnaire with teachers was analyzed.

Figure 1 presents the use of multimedia elements in teaching. According to the results, it is shown that most teachers use multimedia elements sometimes (25) or regularly (12) in teaching, and a smaller number of teachers rarely use multimedia elements in their teaching (4 of them). There is no teacher who never uses multimedia elements in teaching.

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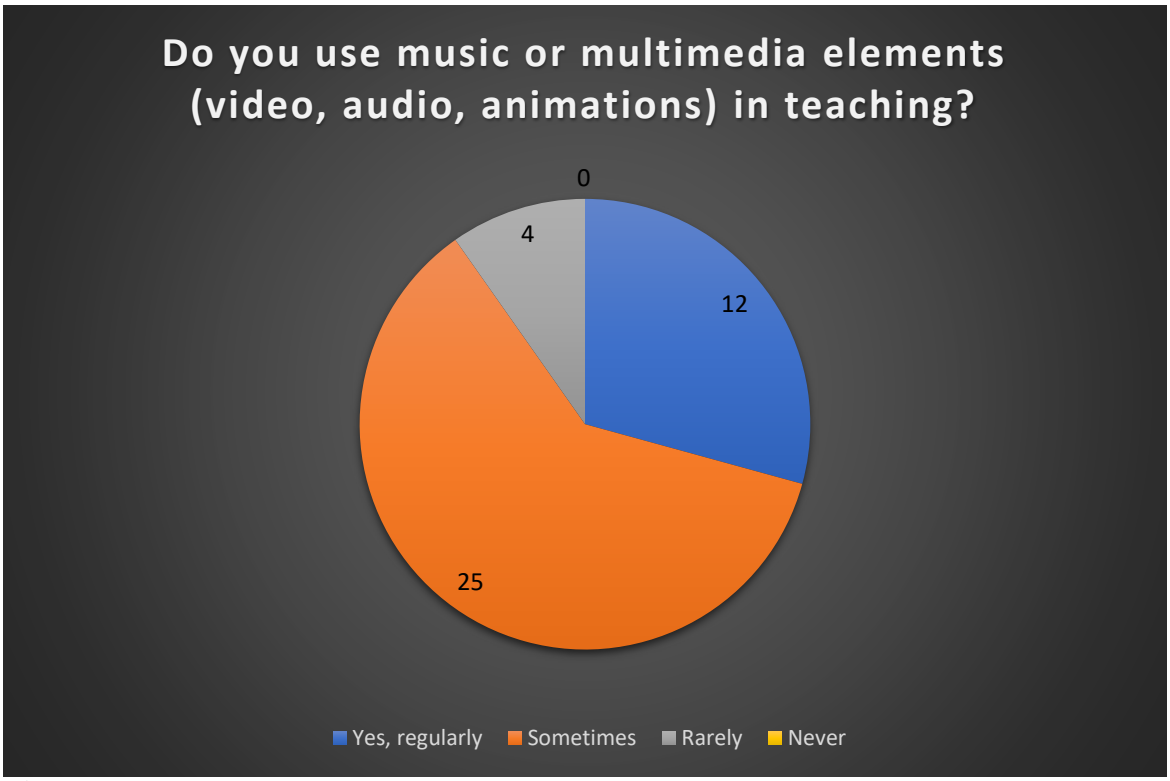

Figure 3.
Most Frequently Used Multimedia Formats by Teachers in Class.

The forms of multimedia that teachers more often use in their classes are shown in the results presented in Figure 3. The figure illustrates the distribution of different multimedia formats used in teaching. The results show that educational videos (16 instances) and audio/music materials are the most commonly used, reflecting teachers' preference for methods that engage students visually and auditorily.

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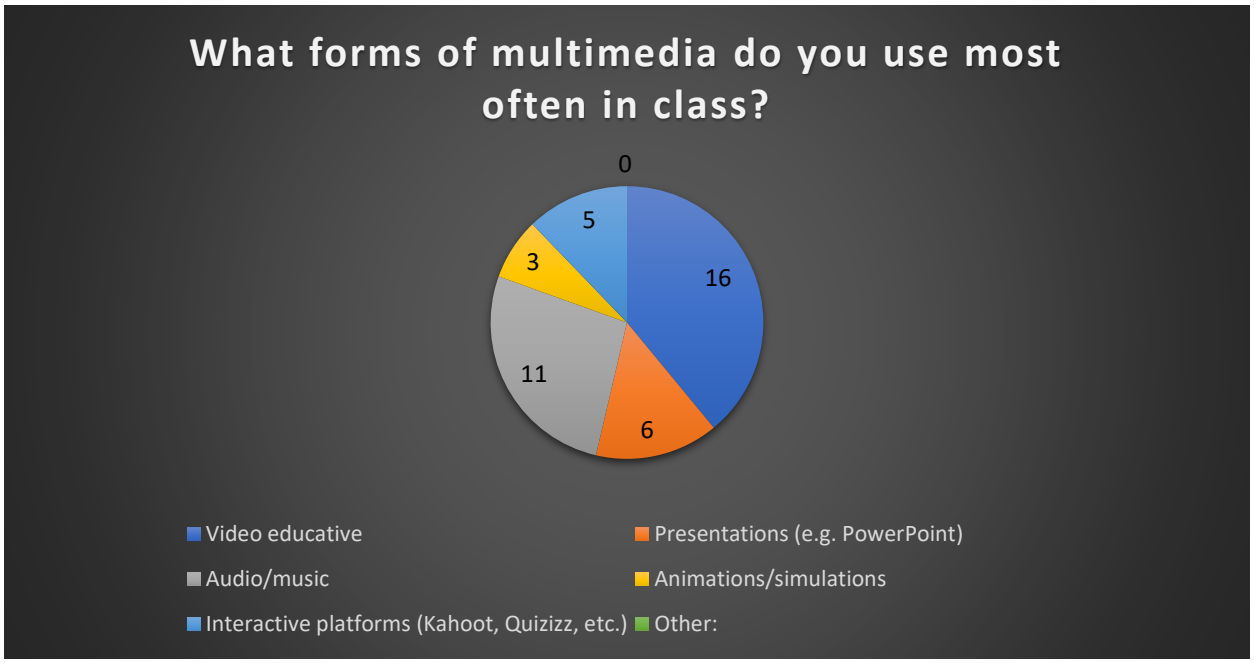

Figure 4.
The forms of multimedia are most often used in class.

Figure 4 illustrates that multimedia elements are most frequently used in the subjects of Natural Sciences and Arts. This indicates that teachers tend to integrate multimedia more often in disciplines where visual and auditory resources can effectively support conceptual understanding, practical demonstrations, and creative activities. The data suggest that incorporating multimedia in these subjects enhances student engagement, facilitates comprehension of complex concepts, and provides diverse opportunities for active learning.

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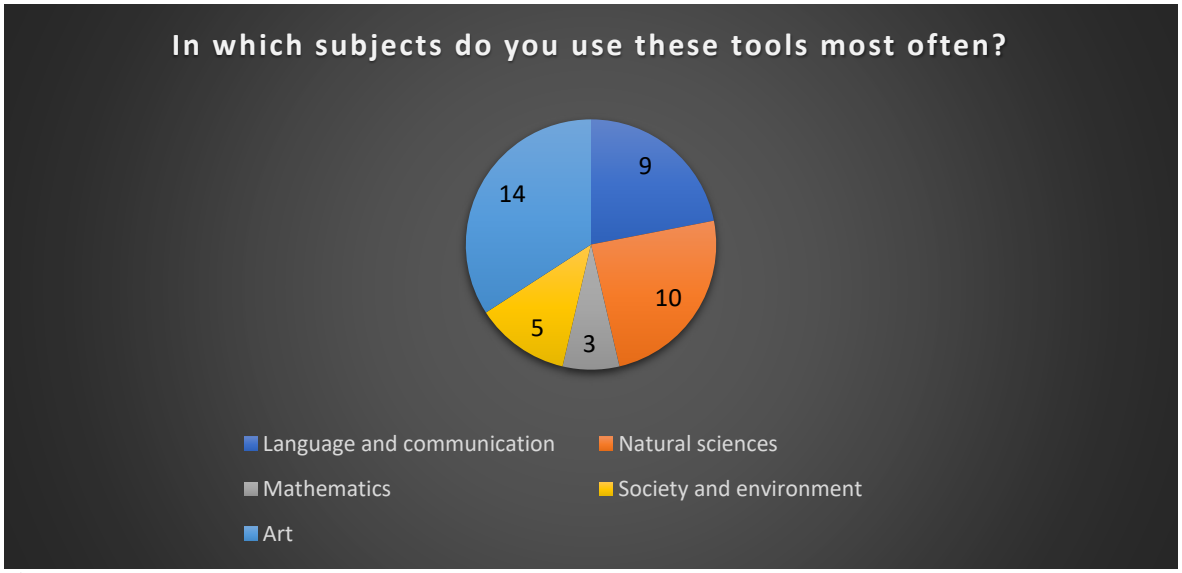

Figure 5.
The use of the tools in the subjects.

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The use of multimedia tools has a positive impact on students' motivation, concentration, and overall engagement. Figure 5 presents these results, showing that multimedia is particularly effective in subjects such as Natural Sciences and Arts, where visual and auditory elements can enhance understanding and foster active learning.

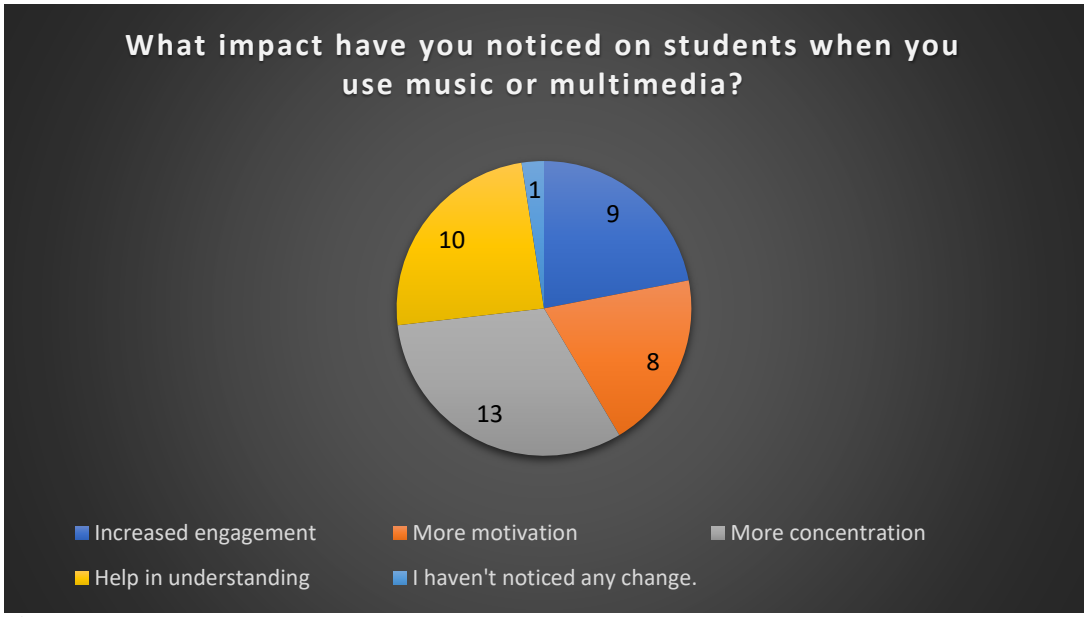

Figure 6.
The impact of music or multimedia on students.

A majority of teachers reported using music as background during exercises or group work. Figure 5 presents the results of this question, highlighting that integrating music into classroom activities can enhance the learning environment, improve students' focus, and support collaborative engagement.

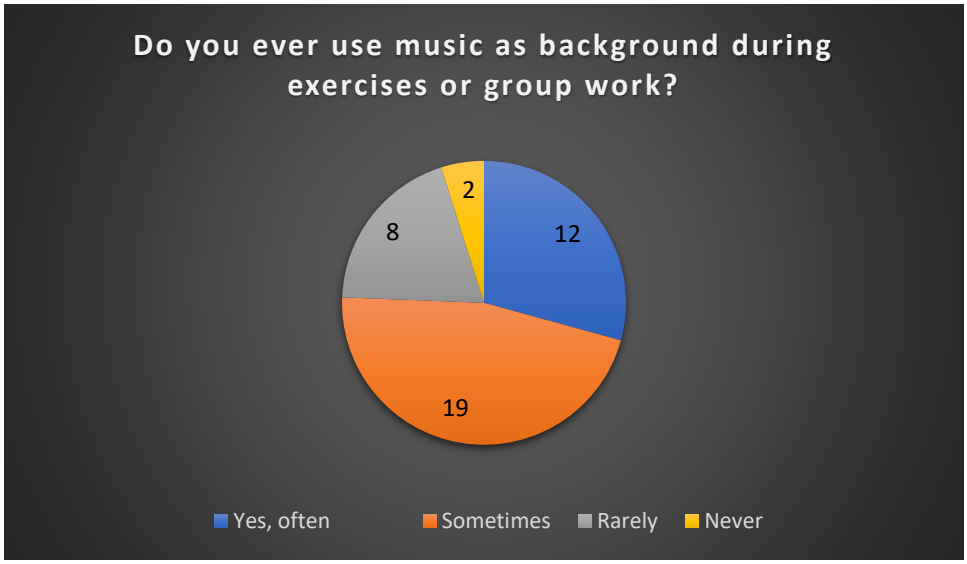

Figure 7.
The use of music as background during exercises or group work.

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Results showed that the main purpose of using multimedia tools in their classroom is to offer variety in teaching methods, to increase student involvement, and to explain concepts better. Just two teachers answered that they use multimedia tools to save time on explanations. Figure 6 presents those results.

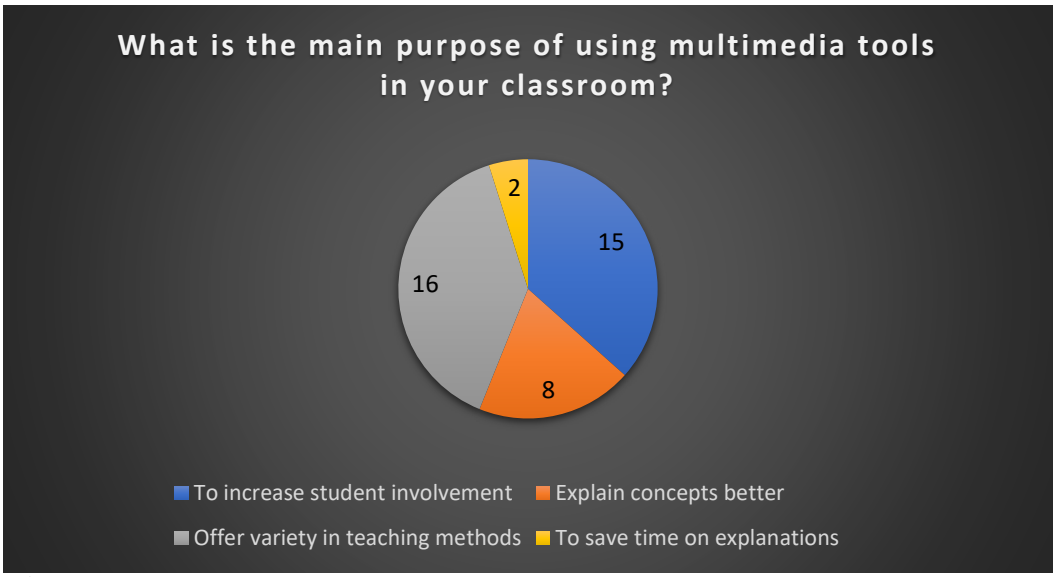

Figure 8.
The main purpose of using multimedia tools in the classroom.

According to the responses to the question about teachers' confidence in using multimedia tools effectively, the majority of teachers reported feeling highly capable, with 10 selecting "very much" as their answer. In contrast, only 3 teachers indicated that they do not feel very confident in using these tools. These results, illustrated in Figure 8, suggest that most educators perceive themselves as competent in integrating multimedia into their teaching, which may positively influence the quality and engagement of classroom instruction.

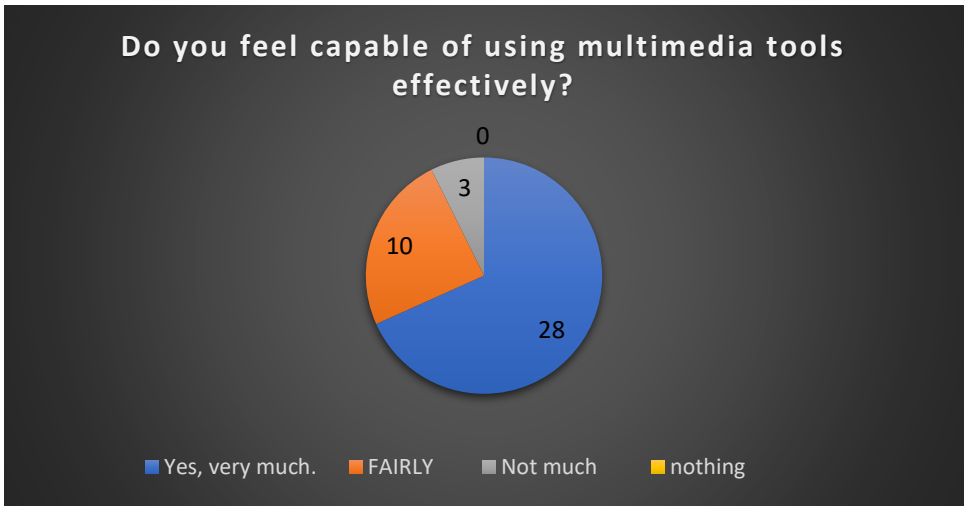

Figure 9.
Feeling capable of using multimedia tools effectively.

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The results indicate that most teachers have received training in the use of technology and multimedia in education. Specifically, 35 teachers confirmed that they had received such training, while only 6 reported that they had not. These findings are presented in Figure 9, highlighting the widespread preparation of educators in integrating technology and multimedia into their teaching practices.

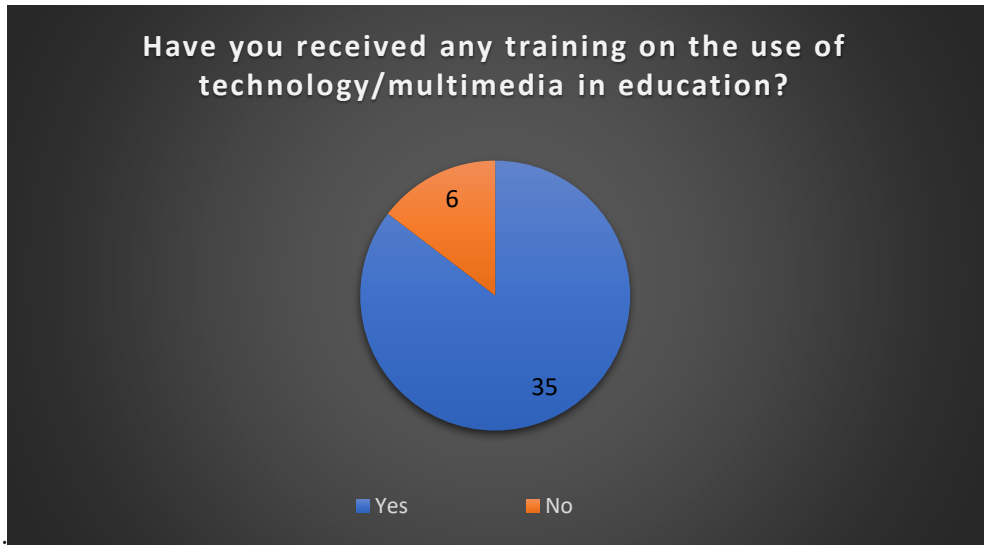

Figure 10.
Training of teachers on the use of technology/multimedia in education.

The analysis of the results showed that the most common challenges teachers face while using these tools are insufficient equipment and lack of internet access, while a smaller number of teachers cited lack of training and difficulty adapting to the curriculum. The results are presented in Figure 10.

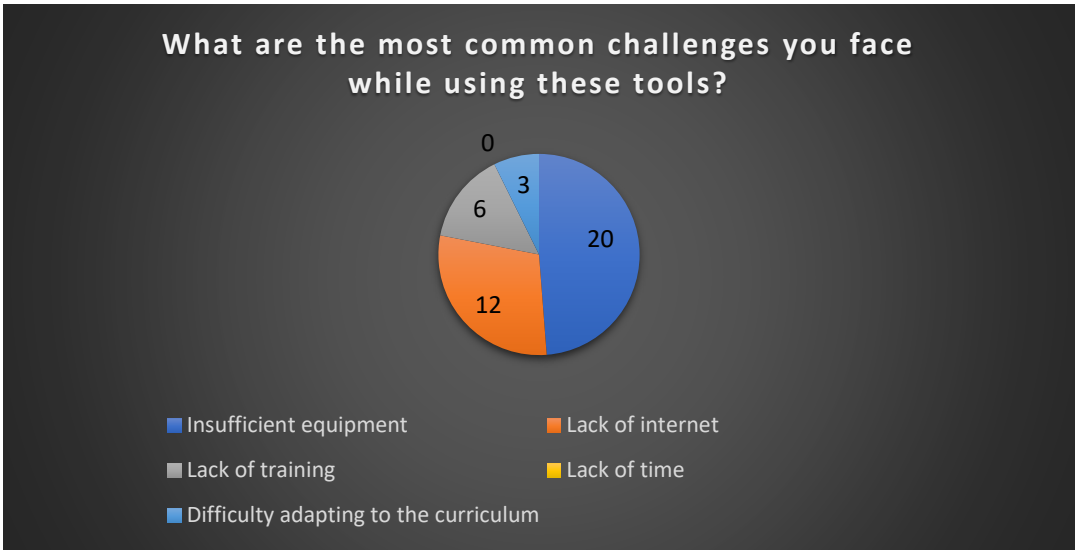

Figure 11.
The most common challenges that teachers face while using these tools.

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The majority of teachers confirmed that they would recommend the use of music and multimedia to their colleagues. According to the results presented in Figure 11, most educators recognize the benefits of integrating these tools into classroom instruction, including enhanced student engagement, improved motivation, and more effective learning experiences. This positive feedback underscores the perceived value of multimedia and music as supportive teaching resources.

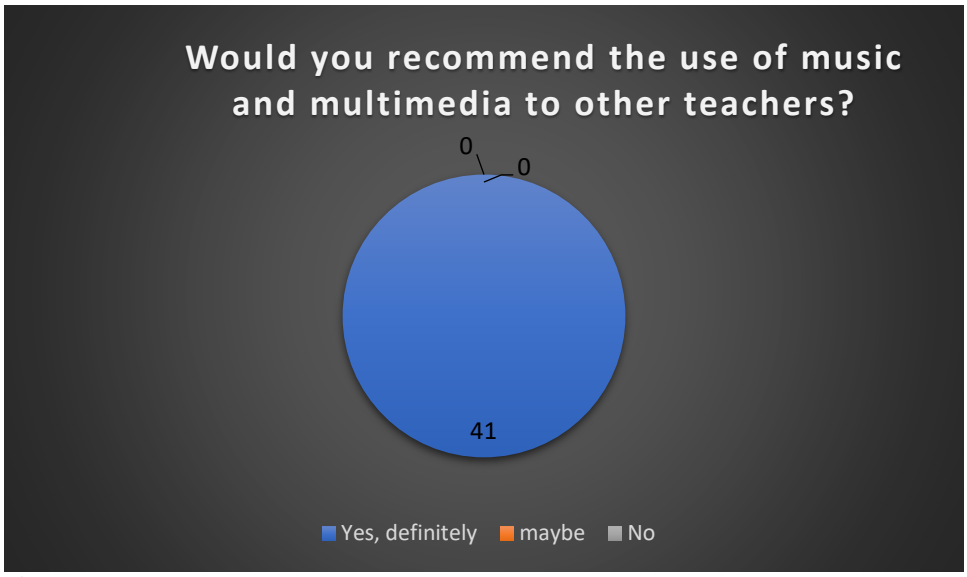

Figure 12.
The recommendation of the use of music and multimedia to other teachers.

The results presented in Figure 12 show that most teachers would recommend the use of music and multimedia to their colleagues. This suggests a widespread recognition of the positive impact these tools have on student engagement, motivation, and overall learning outcomes. Such recommendations reflect teachers' confidence in the pedagogical value of integrating music and multimedia into classroom instruction.

5. Discussion

The findings obtained from the analyses and the questionnaires administered to teachers and subject specialists across various curricular areas converge on a common conclusion: Music and Multimedia have gained a significant position in contemporary education. They represent a modern teaching approach that has been systematically integrated into the national curriculum approved by the Ministry of Education. These disciplines are embedded across multiple subjects and are considered essential for an effective and continuous teaching process.

Teachers report that this approach has been in practice for a considerable period of time and that there is a growing interest in further developing and enhancing the use of multimedia in the teaching and learning process.

The results indicate that most teachers use multimedia elements in their teaching either occasionally or regularly and would recommend incorporating music and multimedia to other educators. The use of multimedia has been shown to enhance students' motivation, concentration, and engagement in the classroom [11].

Also, the results showed that the main purpose of using multimedia tools in the classroom is to offer variety in teaching methods, to increase student involvement, and to explain concepts better.

The present research examined the pedagogical potential of integrating music and multimedia within general education, drawing on both theoretical frameworks and empirical data. By engaging

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primary school educators and students through structured questionnaires, the study identified strong support for the inclusion of music as a meaningful tool to enhance learning effectiveness and student motivation. Music, as a dynamic element of multimedia, fosters a more interactive and emotionally engaging classroom experience, bridging the gap between abstract knowledge and practical understanding.

In light of the findings, it becomes evident that music-supported multimedia instruction can play a vital role in reshaping traditional teaching models. The COVID-19 pandemic further emphasized the need for adaptable, technology-enabled pedagogies, where music and multimedia resources ensured educational continuity and created space for creative teaching practices, even in remote contexts.

To fully harness the benefits of such integration, the study highlights several actionable recommendations. These include investing in adequate technological infrastructure, embedding multimedia, particularly music, within curricula, adapting teaching strategies to address diverse learner needs, and offering sustained professional development for educators. Promoting inter-teacher collaboration and the development of innovative teaching materials are equally essential in building inclusive and future-ready learning environments.

In summary, the integration of music and multimedia is not merely an enhancement but a necessary evolution in the teaching process. When systematically and thoughtfully implemented, it contributes to a more engaging, flexible, and student-centered educational model. Such a transformation requires coordinated efforts across educational policy, curriculum design, school infrastructure, and teacher training to ensure long-term impact and relevance in an increasingly digital and interconnected world.

6. Conclusion

This study investigated the pedagogical potential of integrating music and multimedia in general education, drawing upon both theoretical foundations and empirical evidence. Engaging primary school teachers and students through structured questionnaires, the findings revealed strong support for using music as a dynamic and emotionally resonant medium to enhance learning effectiveness and student motivation.

Music, as an integral element of multimedia, facilitates more interactive, inclusive, and affective learning environments. It acts as a bridge between abstract knowledge and tangible understanding, enriching the teaching-learning process. The COVID-19 pandemic further underscored the importance of adaptive and technology-enabled pedagogies, where music-enhanced multimedia served as a critical tool for maintaining engagement and creativity during remote learning.

To leverage this integration effectively, the study recommends investing in robust technological infrastructure, embedding music-focused multimedia within curricula, diversifying instructional strategies to meet varied learner needs, and offering sustained professional development for educators. Encouraging teacher collaboration and fostering innovative pedagogical materials are equally essential to building flexible and future-oriented educational ecosystems.

In conclusion, integrating music and multimedia into general education is not merely an enhancement but a strategic pedagogical evolution. When implemented thoughtfully and systematically, it transforms traditional instruction into a more engaging, learner-centered, and contextually relevant model. Future research should explore the long-term effects of such integration across different educational levels and socio-cultural contexts to inform policy and curricular reform.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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