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Technology-Based Instruction in Teaching Music

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A B S T R A C T

This study investigated the effectiveness of technology-based instruction in teaching Afro-Latin American and popular music to Grade 10 students at San Ildefonso National High School in the Philippines. Traditional music education often faces challenges such as limited specialized teachers and students' difficulties in understanding musical symbols and concepts, leading to lower achievement. In the Philippine context, music was identified as one of the lowest-performing areas in the Regional Diagnostic Assessment, with only 1.09% of Grade 10 students reaching the Minimum Proficiency Level. The least learned competency was the ability to perform Afro-Latin American and popular music with correct pitch, rhythm, style, and expression. Using a quasi-experimental quantitative research design, this study involved a control group receiving traditional instruction and an experimental group utilizing technology-based tools, including tutorial videos and mobile offline applications (e.g., Real Piano Simulation). Pre-test results revealed no significant difference between the two groups, indicating comparable initial proficiency levels in music performance. Post-test results, however, showed a highly significant difference. The experimental group demonstrated substantial improvement, with 43% of students achieving a "Proficient" level and their mean score increasing from 21.6 to 30.05. In contrast, the control group showed minimal improvement, with no students reaching the "Proficient" level.The findings conclude that technology-based instruction significantly enhances students' musical performance, fostering greater engagement, providing immediate feedback, and enabling personalized learning. This approach is recommended for teachers, school administrators, and curriculum developers to improve music literacy and address learning gaps in secondary education.

Keywords: Technology-based instruction, Music , Music Performance, Grade 10 Learners

Music education plays a vital role in fostering creativity, cultural appreciation, and cognitive development. A May 2015 article from *The Age* highlighted global advancements in music education, while also revealing serious gaps in Australia's system—only 23% of schools employed specialized music teachers, and 63% offered no music instruction at all. These challenges reflect a broader issue in music education worldwide.

Woodward and Sikes (2015) found that students who engage in music performance tend to score higher on creativity tests, particularly when using sound stimuli. Their findings emphasize that musical training can significantly enhance overall creative thinking skills. However, they also noted that many secondary students struggle with understanding musical symbols, terms, and concepts, leading to lower achievement in music subjects.

In the Philippine context, the junior high school music curriculum aims to develop students' appreciation for both local and global music traditions. However, connecting complex content standards to actual classroom instruction often overwhelms both learners and teachers. Labrador (2016) noted that even many music graduates in higher education lack adequate mastery of Philippine and Asian music, further complicating the teaching process.

To address learning gaps, the Department of Education issued a regional memorandum titled *2022 Simultaneous Administration of Several Assessments Regionwide*. One such initiative, the Regional Diagnostic Assessment, aimed to identify students' mastery levels across subjects. Results from San Ildefonso National High School revealed that music was among the lowest-performing areas within MAPEH. In Grade 10, only 9 out of 824 students (1.09%) reached the Minimum Proficiency Level (MPL), with the rest falling below expectations.

Further analysis identified the least learned competency: the ability to perform selections of Afro-Latin American and popular music with correct pitch, rhythm, style, and expression. Students scored particularly low on test items linked to this skill.

In response, this action research proposes an intervention using a technology-based approach in teaching music. This method aims to enhance students' understanding of essential musical elements and improve their performance of Afro-Latin American and popular music. By integrating digital tools and interactive media, students will be better equipped to engage with music concepts and develop performance proficiency.

This approach is expected to support not only student learning but also inform teachers' remedial strategies and contribute to broader efforts in improving music literacy. Ultimately, it offers a promising framework for addressing learning loss and enhancing the effectiveness of music instruction in secondary education.

REVIEW OF RELATED LITERATURE

Diagnostic Test

To assess students' prior knowledge in music, a 60-item diagnostic test was administered during the Regional Diagnostic Assessment on September 21 to 22, 2023. This test serves not only as a benchmark for understanding student readiness but also as the foundation for the intervention and action research proposed by the researchers.

According to Mandinach & Gummer (2020), diagnostic assessments are essential tools that help teachers identify what students already know and where they may be struggling. This insight enables educators to adjust their teaching strategies and make instruction more responsive to individual learning needs. When used effectively, diagnostic tools allow teachers to build on students' strengths and provide focused support in areas of difficulty.

Music Literacy

Music education is often associated with singing and playing instruments. However, these activities are underpinned by a complex cognitive process. At its core, music literacy involves reading and interpreting musical notation, understanding rhythm and harmony, and decoding the symbolic language of music. Unlike other forms of art, music uses a distinct system of symbols and concepts that students must understand to fully engage with the subject.

Developing music literacy equips students to understand and apply the language of music in and beyond the classroom. Through musical practice, learners develop skills in sound-symbol association, word recognition, and decoding. These are essential for reading and performing music. A lack of understanding in this area can limit a student's ability to participate meaningfully in musical activities and impact their confidence and creative expression.

Therefore, music instruction must actively promote music literacy. When students struggle to decode musical elements, their ability to appreciate, perform, and analyze music is affected. This gap not only hinders academic progress but may also reduce students' enjoyment of and engagement with music.

One major challenge faced by music educators is the limited time devoted to music in lower secondary education. Due to a crowded curriculum and the inclusion of short "taster" courses in the arts, students may not receive consistent or in-depth instruction. Despite these limitations, educators are still expected to guide students toward musical literacy in preparation for more advanced studies.

The significance of music in students' lives is widely recognized. Campbell (2018) describes music as a uniquely human form of expression that fosters social connection and creativity. Music can also be a vehicle for cultural exposure and understanding. According to Anderson and Campbell (2010), lyrics and musical representations of different cultures can help students explore diverse worldviews. In subjects like social studies, music can be used to enrich discussions and promote cultural awareness.

In the Philippines, the Commission on Higher Education (CHED, 2012) emphasizes the role of teachers as catalysts and facilitators of learning. Music instruction at the junior high school level requires assessment tools that are different from those used in other subjects. These tools are essential for monitoring student growth and developing musical skills and creativity.

To ensure that learning outcomes are meaningful, music education must align with the competencies set by the K to 12 curriculum. These include appreciation, analysis, and performance, which reflect students' development in both cognitive and artistic domains (Department of Education, 2016).

It is also important to consider students' learning styles when designing instruction. Learners have different preferences for how they receive and express information. Francis Xavier Engineering College (2017) points out that effective teaching should incorporate varied strategies to address these differences. Sambhram Institute of Technology (2017) adds that students may thrive when instruction aligns with their individual cognitive, interpersonal, and creative strengths.

Technology as an Instructional Aid

Technology has become a vital part of modern education. It encourages collaboration, enhances student engagement, and provides flexible learning opportunities. Students can interact with peers, participate in virtual lessons, and communicate more easily with teachers. They can also submit assignments online and receive timely feedback from their instructors.

In music education, technology plays a particularly transformative role. Today's learners, often referred to as "Digital Natives," have grown up using computers, mobile devices, and digital platforms. This familiarity with technology allows educators to introduce innovative tools into the classroom. These include music notation software, interactive tutorials, recording apps, and virtual instruments.

Technology enables students to learn at their own pace through asynchronous instruction. It also provides opportunities for personalized learning. The accessibility of digital music tools makes them an effective resource for engaging students and expanding their musical knowledge. With the help of technology, students can explore the tools and techniques used by contemporary musicians and composers.

Instruments in Teaching Music

Learning to play an instrument is one of the fundamental components of music education. Instrumental instruction provides hands-on experience that enhances students' understanding of musical concepts, techniques, and expression. According to Akbulut (1999), learning an instrument contributes not only to musical skills but also to the development of personality traits such as discipline, self-direction, and perseverance.

Through instrument education, students gain a deeper appreciation for music and build the confidence needed to perform. It encourages ongoing learning and fosters a connection to music that can last a lifetime. Instrumental training also offers learners a chance to explore their preferences and grow both intellectually and artistically.

Conceptual Framework

Figure 1 depicts the paradigm of the study which will serve as the reference for conducting this research. The independent variable is the Technology Based- Approach in Teaching, whereas the dependent variable is the students' academic performance in Music, as shown in the figure. The possible relationship between the two variables is shown by the single head at the middle.

As per careful analysis, the researchers found out that the majority of the students have difficulty in familiarizing and performing the selections of Afro-Latin American and popular music in appropriate pitch, rhythm, style, and expression. They considered an approach called Technology Based-Teaching in Music, which the researchers developed to assist learners in addressing the said concern.

Objectives

The general objective of the study is to address the level of proficiency in familiarizing and perform selection of music with appropriate elements of Grade 10 students at San Ildefonso National High School by implementing Technology-based instruction in teaching music. Specifically, the study aims to:

1. How may the pre-test and post-test result of the control and experimental groups be described?
2. Is there a significant difference between the pre-test and post-test result of the control and experimental group?

METHODOLOGY

Research Design

The study used the experimental method of quantitative research design. Ross & Morrison (2016) mentioned that the experimental approach was formally introduced into the educational profession at the turn of the century. The experimenter's interest in the impacts of environmental change, or "treatments," necessitated the employment of standard methodologies to examine the experimental variables. This standardization produced good internal validity when comparing the experimental and control groups on the dependent or "outcome" variable (experimental control). When internal validity was high, changes across groups could be reliably attributed to the therapy, excluding competing hypotheses attributed to non-treatment sources.

Sources and materials

Conducting this research determined the Grade 10' level of proficiency in familiarization and performing selections of Afro-Latin American and popular music in appropriate pitch, rhythm, style and expression. So, the resources needed in conducting this research are the following:

1. **Instruments** such as tutorial videos, mobile offline applications (Real Piano Simulation), and musical instruments.
2. **Outputs** such as instructional materials, assessment tools to be provided by the teacher participants from the San Ildefonso National High School.
3. **Data charts** will be utilized in analyzing gathered data.

Intervention/s to be done/used

The researchers will utilize intervention materials such as tutorial videos, mobile offline applications (Real Piano Simulation) and musical instruments. The basis for the said intervention was taken from the result of the Regional Diagnostic Assessment (RDA) last September 21-22, 2023.

Data collection techniques

After the research proposal has been approved, the researcher will administer the pre-test to the two-participant group. The researcher taught MAPEH (music) using a variety of strategies; the experimental group employed generated materials such as mobile app (real piano simulation) video tutorials, while the control group was taught the traditional way. The researcher will administer the post-test following the grading period to assess whether the new teaching technique he proposed was effective in teaching music.

Sampling procedure

This research study utilized purposive sampling method because based on the result of RDA among Grade 10 students, we found out that 9 out of 824 students achieved minimum proficiency level. Using the purposive sampling technique, two sections will be selected from the 23 total sections. The first section will be the control group, which will utilize modules and power point presentation while the experimental group will use technology-based instruction such as mobile application (real piano simulation), video tutorial and musical instruments (keyboard and guitar). This sampling method will be used because the aim is to identify the level of proficiency in performing selections of Afro-Latin American and popular music in appropriate pitch, rhythm, style, and expression of Grade 10 students at San Ildefonso National High School by implementing technology-based instruction in teaching music.

Statistical analysis

This study utilized t-test analysis to determine the effectiveness of the new proposed technique in teaching music.

RESULTS AND DISCUSSION

Table 1

Pre-Test Level of Proficiency of Grade 10 Students in Familiarization and Performance of Afro-Latin American and Popular Music

	Control Group		Experimental Group	
Range	Frequency	Percentage	Frequency	Percentage
41-50	0	0%	0	0%
31-40	0	0%	0	0%
21-30	15	50%	14	47%
11-20	15	50%	16	53%
0-10	0	0%	0	0%
Mean	20.53		21.6	
SD	4.19		4.32	
Verbal Interpretation	Approaching Proficiency		Approaching Proficiency	

Legend: Advanced (41-50); Proficient (31-40); Approaching Proficiency (21-30); Developing (11-20); Beginning (1-10)

Table 1 presents the pre-test scores of Grade 10 students from both the control and experimental groups prior to the implementation of intervention activities. The data reflect students' initial proficiency levels in familiarizing with and performing Afro-Latin American and popular music using appropriate pitch, rhythm, style, and expression.

In the control group, 15 students (50%) scored between 21–30, and another 15 (50%) scored between 11–20. Similarly, in the experimental group, 14 students (47%) scored between 21–30, and 16 students (53%) scored between 11–20. Notably, no students in either group achieved a score classified as "Proficient" (31–40) or "Advanced" (41–50), nor did anyone fall into the "Beginning" (0–10) category. The mean score of the control group was 20.53 with a standard deviation of 4.19, while the experimental group had a slightly higher mean of 21.6 and an SD of 4.32. Both groups were interpreted as "Approaching Proficiency."

These results imply that prior to any intervention, the students generally lacked mastery in performing music selections, particularly in applying technical elements such as pitch accuracy, rhythm consistency, appropriate style, and expressive delivery. The fact that all students remained within the "Approaching Proficiency" and "Developing" ranges highlights a clear instructional gap in students' musical performance abilities.

Furthermore, the similarity in mean scores and distribution between the two groups suggests that they started at nearly the same baseline, strengthening the validity of any post-test comparison that follows. The absence of students in the proficient and advanced levels emphasizes the need for targeted instruction, particularly strategies that can address varied learning styles and engagement—such as technology-based interventions.

Copioso and Lapada (2024) emphasize that when the control and experimental groups exhibit similar baseline knowledge, as reflected in their pretest scores, it ensures a fair assessment of the intervention's effectiveness. This similarity supports the notion that both groups are initially equal, making it easier to determine whether any observed changes in learner performance are due to the intervention.

According to recent studies, traditional teaching methods have notable limitations and highlight the necessity of integrating technology to enhance learning outcomes. Özdemir (2022) explains that traditional lectures often fail to address the diverse learning needs of students, whereas digital tools provide more personalized and engaging learning experiences.

In the field of music education, Darma and Sari (2021) point out that conventional methods mainly focus on theoretical knowledge but do not effectively develop practical skills and creativity; the use of multimedia resources such as digital simulations and online tutorials can address these shortcomings. Furthermore, Fu (2023) found that interactive mobile applications used in music theory instruction significantly increase student engagement and skill mastery compared to traditional approaches. Collectively, these studies support the shift toward technology-enhanced teaching strategies to improve both student motivation and academic achievement.

Table 2

Post-Test Level of Proficiency of Grade 10 Students in Familiarization and Performance of Afro-Latin American and Popular Music

	Control Group		**Experimental Group**	
Range	**Frequency**	**Percentage**	**Frequency**	**Percentage**
41-50	0	0%	0	0%
31-40	0	0%	13	43%
21-30	19	63%	17	57%
11-20	11	37%	0	0%
0-10	0	0%	0	0%
Mean	23.37		30.05	
SD	4.35		4.52	
Verbal Interpretation	Approaching Proficiency		Approaching Proficiency	

Legend: Advanced (41-50); Proficient (31-40); Approaching Proficiency (21-30); Developing (11-20); Beginning (1-10)

Table 2 presents the post-test scores of Grade 10 students from both the control and experimental groups following the implementation of intervention activities. The data reflect students' proficiency levels in familiarizing with and performing Afro-Latin American and popular music using appropriate pitch, rhythm, style, and expression.

In the control group, the majority of students remained in the "Approaching Proficiency" range (21–30), with 19 students (63%) scoring within this bracket. Meanwhile, 11 students (37%) fell into the "Developing" category (11–20). No students achieved scores that placed them in the "Proficient" (31–40) or "Advanced" (41–50) levels, nor were any students classified as "Beginning" (0–10). The control group's mean score was 23.37 with a standard deviation of 4.35, and their overall performance was interpreted as "Approaching Proficiency."

Conversely, in the experimental group, a notable improvement was observed. Thirteen students (43%) achieved scores within the "Proficient" range (31–40), and the remaining 17 students (57%) fell within the "Approaching Proficiency" range (21–30). No students scored in the "Developing," "Beginning," or "Advanced" ranges. The mean score for the experimental group was higher at 30.05, with a slightly greater standard deviation of 4.52. Despite this significant increase in scores, the verbal interpretation for the group remained "Approaching Proficiency," though it was close to transitioning into the "Proficient" level.

These results imply that the intervention positively impacted the experimental group's ability to perform music selections, particularly in enhancing their application of pitch, rhythm, style, and expressive techniques. The appearance of students in the "Proficient" category in the experimental group, contrasted with their complete absence in the control group, underscores the effectiveness of the implemented strategies.

Moreover, the increased mean score and upward shift in the proficiency levels of the experimental group suggest that the intervention effectively addressed the instructional gaps identified during the pre-test. This outcome highlights the value of incorporating dynamic and interactive strategies—such as digital tools and performance-based activities—into music education. These approaches have proven to be more effective than traditional instruction alone in fostering students' musical development. For instance, Darma and Sari (2021) found that using platforms like YouTube as audio-visual learning media significantly enhanced students' interest and motivation in music classes.

Similarly, mobile applications such as Yousician, Flowkey, and Music Theory with Piano Instruments offer structured lessons and real-time feedback, supporting differentiated instruction and promoting autonomous learning (Fu, 2023). Interactive technologies like NoteWorks, Rhythm Cat, and GarageBand have also demonstrated positive impacts on students' mastery of foundational music skills (Ginting & Rambe, 2023).

In addition, Sarmiento (2023) reported that the use of traditional and improvised musical instruments in Grade 7 classes notably improved students' practical skills and deepened their appreciation for music. Complementing these findings, Lin and Yu (2023) conducted a study across various educational contexts and confirmed that instructional video tutorials significantly improved student learning outcomes, reinforcing their potential as effective tools for enriching music instruction.

Table 3.

Pre-Test Differences in Proficiency Levels of Grade 10 Students in Performing Afro-Latin American and Popular Music

	Mean	**t-value**	**p-value**	**Decision on H_o**	**Interpretation**
Control	20.53	-0.9	0.34	Accept	Not significant
Experimental	21.6				

Legend: $p < 0.05$ = significant

**= Highly Significant

Table 3 presents the pre-test comparison of proficiency levels between the control and experimental groups of Grade 10 students in performing Afro-Latin American and popular music. The control group obtained a mean score of **20.53**, while the experimental group had a slightly higher mean of **21.6**. A statistical analysis yielded a **t-value of -0.9** and a **p-value of 0.34**, which exceeds the 0.05 level of significance. As a result, the null hypothesis (**H_o**) is **accepted**, indicating that there is **no significant difference** between the two groups' pre-test scores.

These findings suggest that both groups began the study with **comparable proficiency levels**, particularly in their ability to perform music selections with appropriate pitch, rhythm, style, and expression. The lack of a significant difference confirms that the students had a **similar baseline understanding and performance capacity** in Afro-Latin American and popular music before any instructional intervention.

This statistical equivalence is critical in experimental research, as it strengthens the **internal validity** of the study. It ensures that any subsequent improvements observed, particularly in the experimental group, can be **reliably attributed to the intervention** rather than to initial differences in ability. Recent research highlights the significance of ensuring comparable baseline scores when assessing the impact of instructional methods. Findings showed that both groups demonstrated equivalent performance levels before the implementation of the strategy.

According to the study of Killian (2019), it is claimed that music education must evolve with the changing technological landscape to remain relevant and effective. The study implies that the integration of technology into music classrooms, through tools such as digital instruments, apps, and production software, not only enhances student engagement but also supports differentiated learning. These innovations allow students to interact with music in more dynamic and personalized ways, helping them develop both theoretical understanding and practical skills in a manner that traditional methods alone may not fully support.

Table 4.

Post Test Differences in Proficiency Levels of Grade 10 Students in Performing Afro-Latin American and Popular Music

	Mean	**t-value**	**p-value**	**Decision**	**Verbal Interpretation**
Control	23.37	-6.23	0.000	Reject	Significant
Experimental	30.5				

Legend: $p < 0.05$ = significant

**= Highly Significant

Table 4 displays the post-test comparison of proficiency levels between the same groups after the intervention. The control group had a post-test mean score of 23.37, while the experimental group achieved a substantially higher mean of 30.5. A t-test revealed a t-value of -6.23 and a p-value of 0.000, which is far below the 0.05 significance level. Consequently, the null hypothesis is rejected, and the difference in post-test scores is considered highly significant.

These results indicate that the intervention applied to the experimental group was effective in enhancing their musical performance skills. Unlike the control group, which showed only minimal improvement, the experimental group demonstrated substantial gains in proficiency, likely in areas such as rhythm accuracy, pitch control, stylistic delivery, and expressive interpretation.The significant difference validates the use of the instructional approach

implemented in the experimental group. This could include performance-based tasks, digital tools, or learner-centered strategies that promote active engagement and skill application.

This body of research implies that music instruction grounded in interactive, practical, and innovative approaches is more effective in producing meaningful learning outcomes than traditional methods alone. Given that both groups in the experimental study began at the same level, the significant improvement observed in the experimental group underscores the transformative potential of well-designed, targeted interventions in music education. Such strategies should be more widely implemented to bridge the gap between musical theory and classroom performance.

For instance, Uludag and Satir (2023) found that students who learned basic music theory through mobile technologies outperformed those taught via traditional methods. Mobile-enhanced activities not only improved achievement scores but also increased students' motivation, engagement, and musical development. Similarly, Liu (2023) highlighted that music games foster active participation in music cognition, enhancing student enthusiasm and transforming the typically passive atmosphere of music classrooms into a more dynamic and effective learning environment.

Keeler's (2020) study supports these findings, indicating that playing rhythm-based video games such as *Guitar Hero* (traditional) and *Beat Saber* (VR) can significantly improve rhythm performance. These games may serve as valuable tools for educators aiming to strengthen students' rhythmic skills. However, while digital game-based learning offers clear benefits, Weatherly et al. (2024) point out challenges related to availability, cost, and accessibility of digital tools. They emphasize the need for further research on open-access and free resources to ensure broader, equitable implementation.

In addition to digital interventions, traditional hands-on approaches remain vital. Uminar (2023) demonstrated that using percussion instruments significantly enhanced the musical intelligence of young children. In her study of Group B1 students at RA Baitul Umi Pajaresuk Pringsewu, children showed marked progress after participating in percussion activities. This suggests that integrating tactile, performance-based experiences—such as playing percussion instruments—can play a crucial role in fostering musical development in early childhood education

SUMMARY, CONCLUSION, RECOMMENDATION

SUMMARY

This study aimed to determine the effectiveness of technology-based instruction in teaching Afro-Latin American and popular music to Grade 10 students. Utilizing a quasi-experimental design, the study involved two groups: a control group that received traditional instruction and an experimental group that was taught using technology-based tools, such as tutorial videos and music simulation applications.

Pre-tests were administered to both groups to assess their initial performance levels in Afro-Latin American and popular music. Results showed that students in both groups were generally at the "Developing" and "Approaching Proficiency" levels. Following a four-week intervention period, post-tests were conducted.

Findings revealed that the experimental group showed significant improvement in their performance, with 43% of students reaching the "Proficient" level. Their mean score increased from 21.6 (pre-test) to 30.05 (post-test). In contrast, the control group had a minimal increase in mean score, from 20.53 to 23.37, and none of the students reached the "Proficient" level.

These results suggest that technology-based instruction is more effective than traditional methods in enhancing students' musical performance, particularly in pitch accuracy, rhythm, expression, and style.

CONCLUSION

The study concludes that **technology-based instruction significantly enhances student performance** in Afro-Latin American and popular music. The use of digital tools fosters better engagement, provides immediate feedback, and allows for personalized learning, resulting in higher proficiency levels. The integration of technology in the music classroom proves to be an effective teaching strategy for 21st-century learners, especially in performance-based subjects.

RECOMMENDATION

Based on the findings and conclusion of this study, the following recommendations are made:

1. **Teachers** should incorporate technology-based instructional strategies in teaching music to increase student engagement and improve performance skills.
2. **School administrators** should provide access to digital tools, music applications, and professional development for teachers to support the integration of technology in MAPEH subjects.
3. **Curriculum developers** should consider embedding technology-based activities in the music curriculum to promote 21st-century learning.
4. **Students** are encouraged to explore and use educational technology tools for independent practice and skill enhancement.

5. **Future researchers** may replicate this study with a larger sample size, different music genres, or in other grade levels to validate and extend the findings.

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