

Active Methodologies in Elementary Music Teaching: Game-Based Learning with Boomwhackers



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Abstract

The need to develop cognitive, motor and emotional benefits in the primary education music classroom makes it necessary to provide future teachers of the Degree in Education with tools and methodologies capable of motivating students. This action research article, which poses the research question: can musical games improve learning through the development of musical skills using boomwhackers? presents the work developed with students of the Degree in Primary Education during the 2022 and 2023 courses applying game-based learning with boomwhackers to develop the curriculum of the didactic subject of music education in Primary Education. As Lafuente (2019) defends, project work is essential to improve performance and motivate students. In addition, it is necessary to link musical experiences in the classroom with the interests and experiences of the students (Giráldez, 2019), using learning based on games with practical instruments like boomwhackers. The boomwhackers game-based learning project enhances active and participatory music learning. More than 90% of participants plan to use game-based learning and boomwhackers in their future teaching practice in primary education.

Keywords

musical education; learning; games; higher education.

Metodologías activas en la enseñanza musical en primaria: aprendizaje basado en juegos con boomwhackers

Resumen

La necesidad de desarrollar los beneficios cognitivos, motores y emocionales en el aula de música de educación primaria hace necesario dotar a los futuros docentes del Grado en Educación con herramientas y metodologías capaces de motivar a los estudiantes. Este artículo de investigación-acción, que se plantea como pregunta de investigación: ¿pueden los juegos musicales mejorar el aprendizaje a través del desarrollo de habilidades musicales usando *boomwhackers*?, presenta el trabajo desarrollado con alumnado del Grado en Educación Primaria durante los cursos 2022 y 2023 aplicando aprendizaje basado en juegos con *boomwhackers* para desarrollar el currículo de la asignatura Didáctica de la Educación Musical en Educación Primaria. Como defiende Lafuente (2019), el trabajo por proyectos es fundamental para mejorar rendimientos y motivar al alumnado, además es necesario vincular las experiencias musicales en el aula con los intereses y experiencias de los estudiantes (Giráldez, 2019), utilizando el aprendizaje basado en juegos con instrumentos prácticos como los *boomwhackers*. El proyecto de aprendizaje basado en juegos con tubos sonoros mejora el aprendizaje musical activo y participativo. Más del 90% de los participantes planean usar el aprendizaje basado en juegos y *boomwhackers* en su futura práctica docente en educación primaria.

Palabras clave

educación musical; aprendizaje; juegos; educación superior.



Metodologias ativas no ensino de música no ensino fundamental: aprendizagem baseada em jogos com *boomwhackers*

Resumo

A necessidade de desenvolver benefícios cognitivos, motores e emocionais na aula de música do ensino básico torna necessário dotar os futuros professores da licenciatura em Educação de ferramentas e metodologias capazes de motivar os alunos. Este artigo de investigação-ação, que coloca a questão de investigação: os jogos musicais podem melhorar a aprendizagem através do desenvolvimento de competências musicais utilizando *boomwhackers*? apresenta o trabalho desenvolvido com alunos da licenciatura em Ensino Básico durante 2022 e 2023 aplicando a aprendizagem baseada em jogos com *boomwhackers* para desenvolver o currículo da disciplina didática de educação musical em ensino primário. Como defende Lafuente (2019), o trabalho de projeto é essencial para melhorar o desempenho e motivar os alunos, além disso, é necessário vincular as experiências musicais em sala de aula com os interesses e experiências dos alunos (Giráldez, 2019), utilizando a aprendizagem baseada em jogos com instrumentos práticos como os *boomwhackers*. O projeto de aprendizagem baseado em jogos com tubos de som melhora a aprendizagem musical ativa e participativa. Mais de 90% dos participantes planejam utilizar a aprendizagem baseada em jogos e *boomwhackers* na sua futura prática docente no ensino primário.

Palavras-chave

educação musical; aprendizado; jogos; educação superior.

1 Introduction

Music is an essential part of education, while the benefits of music education in elementary and secondary education have been widely studied and debated (De Moya Martínez, 2022; Restrepo, 2022).

Through music education, students develop their communication, expression and socialization, so that they are able to develop their cognitive, motor and emotional skills (Muñoz, 2018). Future teachers must have a solid musical education in order to provide their students with quality musical learning, since, through the work developed in the music classroom, learning can be improved (Alonso, 2003), while developing their cognitive, motor and emotional skills. Music education can also help students develop their critical thinking, creativity, coordination, and self-esteem (Del Barrio, 2017).

The teacher specializing in the didactics of musical expression must create environments that allow students to establish meaningful connections with music and for this they must have a wide range of didactic resources, fleeing from the little or no practical master class. It cannot be taken for granted that all music classes will succeed in stimulating listening, performance, the development of musical culture, or individual and

shared creation. Some classes, far from bringing students closer to these objectives, are counterproductive. In fact, according to Dr. Andrea Giráldez (2019), interest in music decreases as students' progress in their learning process.

On the other hand, in the primary school music classroom, music is usually one of the preferred subjects in the first school years, although it tends to be rejected in the third cycle, being a typical response for all students the one collected in the study by Carbajo Martínez and Lacárcel Moreno (2005, p. 17): "[...] this is for me what it is for, I am not going to be a musician". This is due, in part, to the lack of stimuli in the classroom and the disconnect between school music and music that exists outside the classroom. Therefore, facing this challenge implies, among others, linking the experiences offered in the classroom with the musical experience provided by the students themselves, with their most common motivators: play.

The union of songs and musical games has been widely studied in the methods of Martenot or Suzuki, as José Ibáñez (2020) has shown in his studies. While Game-Based Learning (GBL), as a motivating element in the educational context, is currently one of the most utilized active methodologies, as it enables students to become protagonists of their own learning (González González, 2015; Morales *et al.*, 2020).

BPA has gained popularity in various educational fields, including music education. This approach combines the elements of games and education to create an interactive and immersive learning experience for students. In the context of music education, BPA has proven to be very beneficial as it engages students, improves critical thinking skills, and increases motivation. Furthermore, the use of practical instruments, such as boomwhackers, further enhances the effectiveness of game-based learning in music education.

Boomwhackers, or sound tubes, are tubular percussion musical instruments, generally manufactured in bright colors, according to the international code, for each musical note, and different lengths for each tuned sound, corresponding to a specific musical note. These instruments, developed in the 1990s, have gained popularity in education due to their ease of use and ability to engage students in meaningful musical experiences.

Sound tubes provide students with the opportunity to explore basic musical concepts, such as rhythm and melody, in a playful and engaging way. Its simplicity and

accessibility allow even the youngest students to actively participate in the creation of music, which promotes motivation and self-esteem.

This article analyzes how it is possible to combine the didactics of music through the BPA, developing the curriculum of the subject with future teachers through the use of *boomwhackers* and current music.

In addition, the results of the learning mediated by BPA and sound tubes are presented, an analysis developed in the subject "Didactics of Music Education in Primary Education", during the years 2022 and 2023 with the students of the Degree in Primary Education of the University of Almería.

2 Methodology

The main objective of the research carried out in the classroom is to demonstrate that the implementation of active methodologies, specifically BPA, can increase motivation, attention and, therefore, performance, making future teachers the protagonists of their learning. Project work increases motivation and improves performance (Lafuente, 2019), with the instruments called sound tubes having been integrated as connecting elements between the different sets.

The main objective has been formulated as a research question: can musical games improve learning through the development of musical skills using *boomwhackers*?

Active methodologies are a teaching approach that focuses on the student and on achieving their training in a certain discipline through an active and constructive process. In contrast to traditional teaching, where students are limited to passively receiving a series of concepts and knowledge presented by teachers, active methodologies act on the interconnection between teachers, students and teaching material (Rodríguez López, 2022). Active methodologies have a series of characteristics that distinguish them and make them effective in the educational context. These characteristics are fundamental for a methodology to be considered active and promote meaningful and participatory learning by students: significance, current context, being creative, pursuing student autonomy and developing from systematic collaboration, among others.

Collaborative learning is a strategy employed by educators to facilitate the learning process and improve student achievement. According to Peterson and Anderson (2001),

collaboration is defined as teamwork among individuals who collaborate in achieving a shared vision and common goals.

Within this approach, participatory action research stands out as an invaluable form of research due to its ability to involve participants as researchers and generate representative and relevant results (Walton et al., 2012). This study methodology has distinctive characteristics that differentiate it from other types of research, according to Northway (2010):

- It emphasizes the community as the center of research.
- There is a commitment to balance power between the researchers and the subjects involved.
- The role of the principal investigator takes a non-traditional form.
- Participants are actively involved in all stages of the research.
- The creation of useful knowledge is sought.
- A commitment to take action based on the results obtained is fostered.

2.1 Research design

From these principles, action research has been proposed in the subject "Didactics of Music Education in Primary Education" through a learning project based on musical games with sound tubes.

Research design in the context of action research is characterized as an approach oriented towards educational change and the solution of practical problems in the educational field.

It has been based on the following premises:

- Active participation of students in all stages of the research.
- Orientation towards practice and educational improvement to generate the learning of future teachers while providing them with tools that improve their future pedagogical practices.
- The process has been flexible at all stages to accommodate the advancement of cooperative groups. Following the studies of Rodríguez López (2022), cooperation has been used to facilitate the development of the phases of the project and create an environment in the classroom similar to the society in which they will develop at the end of their higher education.

- The researcher has assumed the role of facilitator and guide, supporting students in identifying problems, making decisions and developing teaching material.

The phases developed were as follows:

- a) Problem definition: Elementary school students are reluctant to participate in activities in which music is not modern.
- b) Design of the change proposal: together with the participating students, we reflect on the need to implement new musical instruments, new learning games and a cooperative methodology in the classroom. To achieve this, it is agreed to develop a GBL (Game-Based Learning) and have the use of boomwhackers as the central axis of the musical games. It is agreed that the main objective of the BPA is the creation of motivating didactic-musical material and secondary the acquisition of basic knowledge of rhythm, tone and harmony. Students have a battery of initial games to get to know the instrument and become familiar with its use. It is agreed to use the co-assessment using Google forms.
- c) Implementation of the proposal: 23 working groups are formed, consisting of four participants each, and two groups consisting of five participants each. The initial set of musical games with boomwhackers is presented, and all participating groups rotate to familiarize themselves with all the didactic material.
- d) Evaluation: a deadline is set for the creation of a second batch of didactic-musical material, group presentation to the rest of the participants and subsequent co-evaluation. Individually, a self-assessment is carried out using a Google form with five items about the BPA and the didactic possibilities of the sound tubes.

2.2. Population and sample

Following the specifications of Fox (1981) regarding sample size, it is stated that the invited sample consisted of 145 participants, with 102 participants accepting and producing data.

In Table 1, the frequency of participation by sex is presented, while the age of the participants was between 18 and 25 years.

Table 1 – Gender of the sample

	Frequency	Percentage
Men	37	36:27%.
Women	65	63 72%
Total	102	100%

Note: Frequency of accepting sample.
Source: Author, 2023.

3. Results and Discussion

The 25 groups formed throughout the 2022 and 2023 academic years have actively participated in the entire development of the BPA designed to improve hearing, tuning, rhythm, group interpretation and, ultimately, develop the curriculum of the subject in a more playful and participatory way.

For the development of the initial phase, up to five different musical games were developed with the participating groups in which the sound tubes were used and the objective was the development of the ear and acquiring basic notions of harmony.

- Game 1: “Hunting Notes”
 - Objective: to improve musical memory and teamwork.
 - Description: A group of diatonic boomwhackers is placed in the center; it is necessary to have three octaves. Students have limited time to memorize their placement and the sounds they make. Then, with their eyes closed and in teams, they must remember and play back the sequence of notes by playing the tubes in the correct order.
- Game 2: “Simon Says”
 - Objective: To develop musical hearing and the ability to follow directions.
 - Description: the class is divided into two large homogeneous teams. One of the groups of students is responsible for performing simple melodies, diatonic and within the central octave. Two sequences of musical notes are created with the boomwhackers behind the rest of the groups.
 - . The other teams must replicate the sequences by touching the colored tubes in the correct order. The team that previously played the two melodies and therefore followed “Simon's” musical instructions accurately becomes the next leader.

- Variant: you can start by offering Simon teams' visual melodies already created, and then move on to more autonomous work.
- Game 3: "What does it sound like?"
 - Objective: to foster creativity, active listening and instrumental expression.
 - Description: Students are divided into teams. A team should represent a song using only the *boomwhackers*, without singing or using words. The other teams must guess the song they are performing. Points are awarded for guessing correctly and for the originality of the representation.
 - Variant: You can start by offering teams melodies of songs in visual format, then move on to more autonomous work with scores in traditional notation.
- Game 4: "Sound Tube Orchestra"
 - Goal: Experiment with harmony and group coordination.
 - Description: Students are organized in an orchestra using the sound tubes. They are assigned a specific musical part and must play their notes at the right time to create a collective harmony. They practice until they achieve a harmonious and coordinated interpretation.
 - Variant: this game can be accompanied by commercial or own rhythmic bases, with or without musicmovigram.
- Game 5: Boomwhacker composer"
 - Objective: to stimulate creativity and musical composition.
 - Description: Students work individually or in small groups to compose a piece of music using the sound tubes. They must experiment with different sequences of notes and rhythms to create an original composition. Then, they present their works to their peers.
 - Variant: Once all the compositions have been interpreted, several can be chosen to form a single theme with several voices. Each team must modify and adapt their creation to harmonize in the new theme.

After the first phase of the action research, the participants had to answer a short questionnaire – see Table 2 – and then created different musical games in which modern music played a fundamental role. Some of the group creations are reproduced:

- Team 1: "Rhythm in motion"

- Students must create a rhythm using the percussion instruments and then add a melody using the sound tubes. They can experiment with different rhythmic patterns and melodies and then present their creations to the rest of the class.
- Team 2: "Color Orchestra"
 - Each student is assigned a boomwhacker of a specific note and small non-tuned percussion instruments are provided to the entire class. The teacher acts as conductor of the orchestra and guides the students to play their instruments and sound tubes at different times, creating a musical composition together. Students should pay attention to the principal's cues and coordinate their interpretations to achieve a harmonious melody.
- Team 3: "Rhythm Hunting"
 - Students must move through the space and play the instruments or sound tubes according to the rhythm set by the teacher. The speed and style of rhythm can be varied to challenge students and improve their ability to listen and coordinate.
- Team 4: "Group composition"
 - The class is divided into small groups and each group is given a selection of non-tuned small percussion instruments and sound tubes. Each group must collaborate to create a musical composition using the different sounds and rhythms of the instruments. They can experiment with different musical combinations and structures and then present their compositions to the rest of the class.
- Team 5: "Rhythmic dance"
 - Students should play the instruments and follow the rhythm while performing coordinated movements. They can be guided with different rhythmic patterns and movements, encouraging the connection between music and body movement.

Sound tubes, which are easy to use, can be used by students of all ages and levels of musical ability. The use of boomwhackers in the music classroom can be an excellent tool to encourage game-based learning while putting into practice the pedagogical principles of the Orff and Willems methods, among others.

In this project, proper and fair evaluation of students was prioritized. Special attention was paid to the planning and review of the process to ensure a faithful assessment of the taxonomy established by Bloom in 1956 and subsequently revised in 2001 and 2019. This taxonomy identifies five key cognitive processes: remembering; understanding; applying; evaluating and analyzing; and creating, presented in a hierarchical structure from the simplest to the most complex.

During the project, students worked in cooperative teams, leading to assessment of most proficiency tasks in groups. A rubric was implemented to monitor the performance of each engagement team as it was considered an objective and effective assessment tool to ensure that all parties understand expectations.

The evaluation approach was not limited to a quantitative rating, but also sought to obtain a qualitative rating to provide a complete view of the work developed.

A future game-based learning project with boomwhackers based on this research could include activities such as the creation of scores using colors, the interpretation of popular songs to bring folklore closer to the music classroom, improvisation and music composition. Students could work in groups to create their own songs and present them to the rest of the class, thus improving rhythmic and percussive musical abilities, while active listening.

In addition, the dynamics followed have been attractive to students in view of the results – see Table 2 – and it is expected that the application in the primary education music classroom will show similar results of participation and learning.

Table 2 - Results obtained in the items

Items	Gender			
	H		M	
	Yes	No	Yes	No
Did you know about the Boomwhackers?	7,84%	32,74%	16,27%	43,13%
Have you used visual scores before?	2,94%	27,64%	7,64%	61,76%
Do you think BPA is a motivating methodology?	14,76%	5,82%	66,07%	13,33%
Will you include the use of boomwhackers and musical games in your classroom practice?	17,64%	2,94%	73,52%	5,88%

Source: Author, 2023.

4 Final considerations

In conclusion, a game-based learning project with boomwhackers can be an excellent way to promote active and participatory learning in the music classroom. Students can improve their musical skills while having fun and working as a team. In addition, the use of sound tubes is inexpensive and accessible to all students, allowing them to practice and improve their skills anytime, anywhere.

It is known that more than 75% of the sample had never worked with boomwhackers and challenge-based learning is also considered as a methodology capable of motivating students, specifically 80.83% of the participants say so.

It is highly relevant that more than 90% of the population plans to use ABJ and sound tubes in their future teaching in the elementary school music classroom.

This study, limited in time, has a really small sample, although, in view of the results obtained, it is interesting to be able to develop it in other faculties of education and/or music classes, both primary and secondary, since the benefits provided by the music game are always necessary in the development of the course curriculum.

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