Article

Emotional Training and Modification of Disruptive Behaviors through Computer-Game-Based Music Therapy in Secondary Education

Rocío Chao-Fernández [1,*], Vicenta Gisbert-Caudeli [2] and Rubén Vázquez-Sánchez [1]

[1] Department of Specific Didactics and Research Methods and Diagnosis in Education, University of Coruña, 15071 A Coruña, Spain; ruben.vazquez.sanchez@udc.es
[2] Department of Music Didactics, Universidad Internacional de La Rioja, 26006 Logroño, Spain; vicenta.gisbert@unir.net
[*] Correspondence: rocio.chao@udc.es; Tel.: +34-981-167-000 (ext. 4600)

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Abstract: Music education research has shown interest in music therapy for integral development of the person, both in their performance and academic knowledge and in their personality. This project aims to analyze the benefits of music therapy in the comprehensive training of students with disruptive behaviors ($n = 6$). Tests designed by Gallego, Alonso, Cruz, and Lizama (1999) were conducted to assess emotional intelligence, which showed very low results. A series of activities were designed based on the use of the music videogame Musichao, the curricular content of which was adapted for this pilot experience. Subsequently, the emotional intelligence tests were applied again to determine the effectiveness of the teaching experience. The results indicate that, with the use of this videogame, significant improvements were obtained, both in the development of multiple intelligences and in self-motivation, self-awareness, self-control, and more specifically, in social skills, minimizing behaviors that were classified as inappropriate and/or aggressive, and becoming more skilled in their interactions with the surrounding environment.

Keywords: music therapy; music games; computer game; disruptive behavior; emotional intelligence; social skills; secondary education

1. Introduction

Currently, the properties that music possesses in multiple social and cultural areas are widely acknowledged [1–6], with benefits that may be less visible, taking into account physical characteristics or abilities, including neuronal plasticity [7,8] or the better response shown towards multi-sensorial actions [9,10].

Considering that educating through music is possible and beneficial as it is a motivating tool, we will therefore focus on the benefits that this learning ability gives us in its preparation for the professional world.

Authors, such as Merriam, describe that, in the mid-twentieth century, "there is no other human cultural activity that is as permeating as music, which reaches, shapes, and often controls many of human behaviors" [11] (p. 43). Although brief, this saying condenses much of the knowledge and experiences regarding the capabilities of music, as multiple investigations already exist regarding evidence of the transforming power of music, its many diverse aspects, and relationship with learning—such as visual and auditive memory [12,13], auditive perception [14–16], creativity [17], motivation [18], or cognitive development [12,15,19]—as well as personal characteristics, such as social inclusion and pro-social behaviors [15,20], psychological well-being [21–23], and personal development [24–26].

Therefore, intervention through music designed as a creative and/or artistic therapy offers the user an atmosphere based on an artistic medium, allowing the development of a symbolic language that will allow easier access to unknown feelings and a creative integration of them and their personality, giving the possibility of behavioral change.

1.1. Music Therapy and Its Application for Students Who Have Disruptive Behaviors in Education

The term "music therapy" was originally formed from two independent concepts: music and therapy, and the joining of the two has given way to multiple definitions and concepts. In order to not obscure the end of the investigation, we will focus on those most relevant.

The World Federation of Music Therapy (WFMT) in 2011 defined music therapy as:

> "Music therapy is the professional use of music and its elements as an intervention in medical, educational, and everyday environments with individuals, groups, families, or communities that seek to optimize their quality of life and improve their health and their physical, social, communicative, emotional, intellectual, and spiritual health and well-being. Research, practice, education, and clinical training in music therapy are based on professional standards according to cultural, social, and political contexts" [27] (p. 1).

Thus, music therapy offers a way to explore the human dimension in all its complexity, as it offers a wide assortment of new and solid intervention perspectives. Although this discipline has multiple contexts or fields of application, in this project we will focus on an educational context.

Over the last two decades, a huge quantity of investigations and experiences have been created, where music therapy is a central element of the intervention and where it achieves positive results in children and adolescents' quality of life; this can be seen in its application to ease autistic spectrum disorder [28–31], in episodes of anxiety or anguish [32,33], or in students with intellectual diversity [34,35].

In the case of music therapy application in the educational field, on students with low levels of emotional intelligence and disruptive behaviors, which is the case we are working on, we can find a smaller number of investigations compared to other areas; however, there are previous experiences such as those of Fernández-Batanero and Cardoso [36], Cardoso [37], Taft, Hotchkiss, and Lee [38], Pérez Eizaguirre [39], and Pasiali and Clark [40].

For this, students must be placed into character-based categories with disruptive behaviors. There are those students who—although they do not meet all the necessary diagnostic criteria in any of the behavioral disorders documented in manuals, such as the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM5) [41] or the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10) [42]—are denominated as having conduct disorder or as antisocial behavior of the child and adolescent [43]. In Spain, all schools have a counselor who is responsible for diagnosing students who have learning difficulties, so that teachers can better address the teaching–learning process.

As seen in Iborra [43], parts of disruptive behaviors—without being classified as behavioral disorders—are especially influenced by the lack of social skills and deficits in emotional skills, seeing as parts of these behaviors are mediated by the students' experiences and the lack of skills necessary to achieve a successful performance.

Therefore, we believe it is necessary to consider the concept of emotional intelligence and how essential its development is to be able to minimize those disruptive behaviors, and then to attempt to establish behaviors and skills that will allow students to adapt more efficiently. Consequently, in order to avoid further conflicts and to prevent worse incidents of unsocial behavior [44–46], we believe that the improvement of emotional intelligence through recreational musical activities can be a method for students to improve their communication channels with others, while contributing to the improvement of their academic training of contents and competences in the curriculum, thus obtaining a dual benefit.

1.2. The Musical Game as an Active Learning Method with Disruptive Adolescents

Adolescence is a period of human development where the behaviors to acquire the skills needed in daily life for social relationships are practiced. Therefore, dealing with behaviors such as courtesy, empathy, self-control, emotional focus, social agility, and assertiveness are components of social skills, and it is important for adolescents to be able to self-manage their own emotions and live in society [47]. As adolescents come into daily contact with school drop-outs, delinquency, or an increased possibility of suffering from some mental illnesses [48], it is necessary to try to offer a way of learning that improves these behaviors or antisocial acts and to do this, we must use emotional intelligence.

There are five sections that make up emotional intelligence [49]: self-knowledge, self-regulation, empathy, motivation, and social skills; this is where we find the opportunity for music and the game to offers us a means to introduce or optimize these types of intelligence. Thus, we will try to deal with the development of these skills through educational and social approaches.

Based on the published results in the Horizon report [50], the application of games as an educational tool is in constant development and in this field, information and communication technologies (ICTs) are resources that attract attention, motivation, and commitment [51]. The improvement and updated content, the search for student interaction, and the acquisition of skills that facilitate social incorporation have become the main objective in educational games. These resources manage to capture and maintain participants' attention as well as their increased involvement; by making mistakes and receiving instant feedback, learning becomes more agile and fluid [52].

The incorporation of games in the classroom directly intervenes in two fundamental aspects: motivation and commitment [53]. The objectives that motivate the game are the contents of the subject and are reinforced by playful elements [54]. Educational games created for computers are becoming more important in the teaching–learning process [55] and their benefits are evident in the emotional, cognitive, and social areas in which they give emotional experiences, motivation, and rewards, as well as new identities that lead to analysis and decision making [56].

Taking the educational perspectives of Gfeller [57] and Wigram, and Bonde and Pedersen [58], who emphasize that music therapy serves as a support for the reinforcement of expected academic behaviors, as well as for the development of strengths, feelings, and conflict resolution, and those of Schwabe and Hasse [59], who studied the development of social skills through social music therapy and the increase in perception through music and communication between peers and the environment, we believe that a musical computer educational game might be the link between students and desirable social behaviors. This would be through the establishment of behaviors for the development of pro-sociality, being able to modify inappropriate actions, and collaborate at the intra and intergroup level.

In addition, the current teaching–learning process often consists of routines and monotony and is not in line with an increasingly technified society. Schools cannot remain outside the current culture, which is impacted by music and audiovisual messages, and governed and motivated by computer environments [60]. Therefore, ICTs are revealed as ideal for transforming traditional learning environments into interactive ones, where knowledge can be built through active and collaborative learning techniques, contributing to the adaptation and renewal of teaching to new social demands, by providing innovation and creativity [61].

We know that music induces a cognitive–emotional process that interacts with the areas of the brain that modulate mood and stress [62], and there is evidence that it improves contact, coordination, and cooperation with others [63].

Although it does not affect the learning of musical contents, this would be the pretext for them to help and collaborate with each other. A study by Suldo, Thalji, and Ferron indicated a decreased rate in the academic performance of students with mental health problems, which correlated with well-being and psychopathology in high school [64].

Therefore, we will try to offer optimizable skills and abilities to each student; while they are acquiring these, we will be able to improve, in parallel, their academic results.

Hence, the main objective of this research is to find out whether the use of a music video game improves the social skills and behavior of students. Consequently, two working hypotheses are proposed that will be the basis of the research, and which are related to everything explained above.

- To determine if the ICT-based music game, Musichao, causes an improvement in social skills in students with disruptive behaviors.
- To determine if the improvement of the emotional intelligence subcomponents, conceived according to Goleman's model, can cause improvements throughout other intelligences and, if so, to what extent.

2. Materials and Methods

We checked whether the social competences of each student improved, and they were encouraged to acquire or optimize the development of their own personal skills to increase resilience against the ever present adverse social contexts.

2.1. Participants

The research was carried out throughout an entire academic year with a sample of six students from their fourth year in compulsory secondary education (hereinafter, 4th of ESO). The participants were five young men and one young woman (Table 1).

Table 1. Summary of the participants (total $n = 6$).

Sex	
Young Women	$n = 1$
Young Men	$n = 5$
Precedence	
Spain	$n = 6$
Number of school years repeated	
3th ESO	$n = 3$
Once	$n = 3$
4th ESO	$n = 5$
Once	$n = 5$

ESO = secondary compulsory education.

The age range was between 16 and 18 years (average = 17.16 years) and the students belonged to a secondary education high school in a semi-urban environment in the province of A Coruña, Spain. For more data about the participants, please review Table 1.

Initially, an exhaustive diagnosis of each student was made through the center's counselor, who, in turn, handed in a report. The report is briefly summarized here:

- Participant 1: 17 years. Repeating 4th ESO. He receives both physical and psychological abuse from his father.
- Participant 2: 17 years. Repeating 4th ESO. Several suicide attempts and similar family history.
- Participant 3: 17 years. Repeating 4th ESO. Introverted, with low self-esteem. He was never well integrated into any group. Dependency problems.
- Participant 4: 17 years. He repeated 3rd ESO. Low self-esteem, not really integrated in the group/class. Problems of failing to adapt to the basic rules of social behaviors.
- Participant 5: 18 years. Repeating 4th ESO and repeated the previous year. Introverted. It is hard for him to integrate into his group/class. He does not interrupt, but he does not participate either. Low level of motivation.
- Participant 6: 17 years. Repeating 4th ESO and repeated the previous year. A student with daily continuous disruptive behavior, which usually causes problems on a regular basis for all teaching staff. Comes from an unstructured family with an alcoholic father.

In more general terms, they are students with low levels of motivation and have important conflicts amongst them; they have hostile and disruptive behavior, which can appear without indications of prior warning—aggressive behavior, maladaptive responses, continuous interruptions in classes, suddenly leaving the classrooms, challenging attitudes with teaching staff, and a lack of interaction with classmates other than aggressive attacks or bad attitudes.

2.2. Instruments

The instruments used were distributed in two sections: student measuring instruments and the interactive educational game, created previously but adapted for this research.

2.2.1. Measuring Instruments

All diagnostic instruments were taken from the book Educational Implications of Emotional Intelligence by Gallego, Alonso, Cruz, and Lizama [65]. The following tests were used:

- The Seven Intelligences Test [65] (p. 18). The questionnaire is composed of 35 items, whose objective is to assess, in general terms, the score for each of the intelligences the student has.
- Global Emotional Intelligence Test [65] (p. 45). This test is made up of eight items with multiple choice answers, designed to make intra and interpersonal intelligence converge, according to the theory of Salovey and Mayer, and to also offer perspectives on self-awareness, self-control, self-motivation, empathy, and social skills, in order to know the ability to perceive, assimilate, understand, and regulate one's own emotions and those of others [66].
- Self-motivation test: "Do you have enough confidence in yourself?" [65] (p. 125). This test is composed of 23 items of dichotomous answers of yes/no, in which the student's self-motivation is evaluated, along with the ability to motivate themselves to pursue objectives or achievements [49].
- Self-awareness test: "Do they openly show their emotions?" [65] (p. 62). Self-awareness is the knowledge or recognition of one's emotions. Only those who know the reason why they feel can know how they will they be able to manage their emotions, moderate them, and consciously put them in order. This questionnaire is composed of 16 items with dichotomous answers of yes/no, in which a score between 0 and 16 is calculated and assessed.
- Self-control test: "What is the degree of self-control?" [65] (p. 77). According to Goleman, self-control is the ability to control emotions and adapt them to the moment and circumstances [65] (p. 40). This test has 19 items, with dichotomous answers of yes/no, with values between 0 and 19.
- Social skills test [65] (p. 180). Although the concept of social skills is difficult to determine, it can be defined as the personal ability that allows us to express our feelings, opinions, and thoughts in a timely manner, in an appropriate manner, and considering the rights of others [67]. This test consists of 20 items that assesses the participant's behavior in five dimensions: ability, inadequacy, inhibition, aggressiveness, and anxiety.

2.2.2. Procedural Instruments

As described by the measuring instruments used to obtain the variable measured results, a computer run interactive tool was also put into use. This tool, "Musichao, The Musical Educational Game", was the original idea, which was also elaborated and designed by one of the authors well before the study, to encourage the achievement of the musical competences of the third level of secondary high school (3rd ESO); it more importantly received the second prize for educational innovation in public administration. Furthermore, due to the excellent results that were achieved and publication of these results [61], a version for the fourth level of secondary high school (4th ESO) was been completed. In this case, and taking into account the characteristics of the students that were going to be working with in this project, an adaptation of it was implemented.

The game shows a main page with 59 questions organized into five blocks, each of which aims to respond to a different curricular subject. It is arranged as follows: There is a starting box, identified

with the figure of an eighth note, once the game begins, the cursor will move by throwing the dice, moving the cursor/counter to the position where the student is (or group of students). If the student fails at answering the question, there is a penalty by having the cursor/counter go back two boxes. Each box offers different groups of questions, structured in a spiral, and each identified with a different drawing, as seen in Figure 1.

**Figure 1.** Digital board "Musichao, The Musical Educational Game".

On the right-hand side of the screen, there are buttons of interest for all the players. From here, the students will be able to start the game by pressing on the "TIRAR DADO" (throw dice) key. To the right of that is a number, which comes out randomly each time the student clicks. From the top going down, we find three more boxes, where we will be able to check the total number of "CONTESTACIONES" (answers) the student has. The number of hits can be checked in the "ACIERTOS" (correct answers) box and the number of "ERRORES" (errors). Each correct answer will add 10 points and a wrong one will deduct 10 points.

Given the educational purpose of the game, for each question the student will be able to access the "CONOCER MÁS" (know more) button for each of the response options offered, as seen in Figure 2.

Figure 2. Example of the question of musical language and option "CONOCER MÁS" (know more).

In addition, we are always looking for a greater formative relevance in the questions referring to composers, musical forms, or instruments (Figure 3); whenever possible, being able to listen to a fragment of a represented musical piece, which has been included, if there are recordings, and/or in cases where the current legislation allows it.
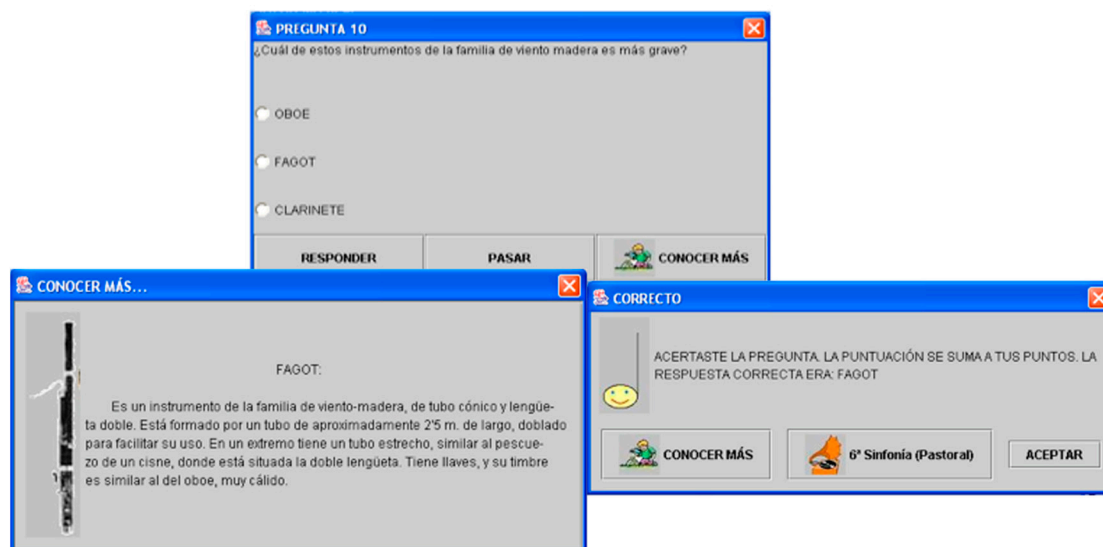
Figure 3. Example of the questions about musical instruments with the option "CONOCER MÁS and ESCUCHAR" (know more and listen).

Likewise, the teacher was able to use the tool to check on how the students evolved on each working day. It offers the possibility to visualize the results—showing the total number of answers made, the number of total correct answers, and the number of errors—of each of the participants or participating groups.

2.3. Procedure

First, for the evaluation purpose of the students' behavioral characteristics, the school's counselor carried out an evaluation of each of the students' socio-family characteristics. In order to participate in this experience, both parents of the children that were minors, as well as those whose children were of legal age, were asked for informed consent, respectively. They were informed of the objectives, the contents, as well as of the development of the research being carried out, and the possibility of them abandoning the experience at any time without any aggravation towards the participants or families. This planning is new to the center, seeing as it is a proposal to participate in this group where no change was made in the classroom other than the implementation of the game. There were also no other methodological or content changes, neither in this, nor in any other of the subjects.

Its inclusion was chosen after the analysis of other previous experiences, in which the inclusion of an educational game modifies the behavior (from more inappropriate behaviors to more adaptive ones [61,68]) and is the most effective way to promote student learning [69,70].

After this, as a pre-test, an application with a large quantity of tests, was carried out in order to evaluate both the development of multiple intelligences, as well as more specific tests about the development of global emotional intelligence, self-motivation, empathy, self-awareness, self-control, and social skills.

All tests were performed and applied by the counselor who, in turn, was in charge of assessing the results based on the standardized and validated values given for each of the tests. To do this, all the results were collected and grouped together in tables or figures.

After completing the initial tests, implementation of the "Musichao" program began alongside the official curriculum. The game was totally new for students, as they had not interacted with it before.

The game was applied during the academic year, and was distributed into three weekly sessions of 50 min each, where it was played during all the sessions for at least 10–15 min daily.

Initially, each student began working with the virtual game. Not being able to move forward, they were proposed to do it in groups, so that they could help each other to advance the contents. They could propose, in an organized way, the size of the groupings, but not the classmates, for them to learn to relate according to the communication standards established by the teacher. Likewise, they could also communicate through proposed musical elements, whether they were rhythms of body percussion, boomwhackers, Orff instruments, etc., common in the music classroom, which, as explained, constituted as music-therapeutic techniques.

It was decided to not implement this methodology with a control group as the selected group was within the population at risk of dropping out early [71]. The specialized literature [72–74] recommends going beyond the dimension of instrumental learning; however, it is necessary to apply measures that reinforce the sense of students belonging to educational centers, as well as the confidence in their chances of success and the emotional bond with the teaching staff. That is to say, it is necessary to imply the structuring of the educational intervention based on subjective elements that avoid school dropout: elements of an affective, expressive, and relative type [75].

Once finalized, the results, after the start-up of this computer application, were evaluated again through the six described tests and compared with the results previously obtained.

Then, the results were analyzed through the identification and evaluation tables of each of the tests and it was shown if each of the individual participants reached the same or different assessments in each case; as well as those improvements that might have been obtained as a group.

2.4. Analysis of the Results

In the analysis of the results, an individual study of each participant was carried out. For this, the correction tables were validated and conventionalized for each of the tests, in an attempt to faithfully reflect their different dimensions.

For this test's design, a pre-test/post-test design of a single group was performed, without a control group. Then, a measurement was made before and after the intervention to observe the differences in the group.

The reason why this type of data and results analysis were applied was due to the superior educational guidance teams (to the secondary school) to only have proven empirical tests, validated and scaled so, although the counselor's comments of the educational center and teachers of the same are considered. These tests are the main source of information and the starting point if this student becomes an early dropout student and is a center of interest for this senior orientation team.

To compare the data and analyze it together, the information was uploaded onto the statistical software SPSS v.23 (Windows version), from which both descriptive data and comparisons between the pre-test and post-test phases were extracted. Due to the abnormal distribution of the curve and the small sample size, the Wilcoxon test was used for related samples in order to compare the pre-intervention/post-intervention scores.

Likewise, to determine the size of the intervention's effect, the so-called "Average Standardized Exchange Rate" (dMR) [76] (p. 99) was used, through which the effect of the treatment was quantified, calculating the averaged differences between the pre-test and post-test quantities, divided by the typical deviation of the pre-test, multiplied by the correction factor [77]. In order to assess the effect, the dMR values were similar to Cohen's *d*, since it was considered insignificant if the value was less than 0.10, a small effect if between 0.10 and 0.30, a medium effect if between 0.30 and 0.50, and a large effect if greater than 0.50 [78]. In this article, the data are presented in absolute values, as they only need to reflect the intensity of the effect.

3. Results

To start the analysis of the results, the information of the socio-family evaluation that was carried out by the counselor was ignored, as the values were not standardized; however, they were useful to know the starting point of each of the individuals in the given sample.

Below are the results of the pre-test evaluation (it is called pre-test as they are performed prior to the intervention with the educational game), showing the results marked by each student and what were the average results of each of the standardized tests. Likewise, we will also show the results post-test (or after the intervention with the game), to make the visualization of the results easier in a grouped format.

3.1. The Seven Intelligences Test

The first results reflected, are those of the Seven Intelligences Test [65], based on the multiple perspectives of Gardner's publications [79]. For the interpretation of the results of this questionnaire, Gallego et al. stated the following: "if 4 points or more are obtained, it indicates a natural capacity in that type of intelligence. If you score 2 or less in a category it means that this type of intelligence is underdeveloped" [65] (p. 36).

All the participants showed increases in at least five of the seven intelligences (Table 2), although in some cases, that increase was not high enough to exceed the limit of 2 (see the post-test of linguistic/verbal intelligence, logical/mathematical, or visual/spatial). As in the case of the remaining ones, a greater increase was observed, reaching very interesting values and, above all, in students who, until now, had not successfully responded to the educational requirements.

Table 2. Pre-test/post-test group results of the Seven Intelligences Test.

	Linguistic/Verbal		Logic/ Mathematical		Visual/Spatial		Musical		Kinetic/Corporal		Interpers.		Intrapers.	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
P1	0	2	3	5	2	3	1	6	2	4	3	5	4	6
P2	2	3	0	2	3	3	2	5	2	3	3	4	3	4
P3	0	2	0	1	0	2	1	4	2	5	1	4	2	4
P4	2	3	2	4	4	4	1	4	3	4	3	4	3	5
P5	3	4	1	2	3	5	1	5	5	5	3	3	3	4
P6	1	2	2	2	4	5	2	5	4	4	3	6	2	4

(P1–P6 = participants/students).

Although by looking at the gross numbers, it is possible to see the increase of the different intelligences on a personal level; considering the analysis of the average (Table 3) we see how there was an increase of at least 1.10 points in the lowest intelligence, and up to 3.50 in the highest increases in intelligences are significant ($p < 0.05$) in linguistic/verbal, logical/mathematical, musical, interpersonal, and intra-personal intelligences. In the case of the remaining ones, there is an increase, but it is not significant.

Table 3. Averages (A), typical deviations (TD), test results by Wilcoxon (Z), significance (*p*), and value of "Average Standardized Exchange Rate" (dMR) (r) of the total number of students in the pre-test and post-test in the Seven Intelligences Test.

	Linguistic/ Verbal		Logic/ Mathematical		Visual/Spatial		Musical		Kinetic/ Corporal		Interpers.		Intrapers.	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
A	1.33	2.66	1.33	2.66	2.66	3.66	1.33	4.83	3.00	4.16	2.66	4.33	2.83	4.50
TD	1.21	0.81	1.21	1.5	1.5	1.21	0.51	0.75	1.26	0.75	0.81	1.03	0.75	0.83
z	2.27		2.07		1.85		2.26		1.84		2.04		2.27	
p	**0.023**		**0.038**		0.063		**0.024**		0.066		**0.041**		**0.023**	
r *	0.925		0.925		0.561		5.77		0.773		1.736		2.650	

* Effect size (r) according to Cohen: <0.10, insignificant; 0.10–0.30, small; 0.30–0.50, medium; >0.50, large. Results significant at the 0.05 level or better are given in bold.

Lastly, if we analyze the value r, for the calculation of the effect of the post-test, we see how in all cases it is large (r > 0.50); this is especially clear in the case of musical intelligence but also in social intelligences.

3.2. Global Emotional Intelligence Test

The following test for the students was the Global Emotional Intelligence Test. In this test, the correction scale establishes three different levels:

- Up to 60 points: A need to improve.
- Up to 80 points: Emotional intelligence within normal margins.
- Up to 100 points: A good degree of emotional intelligence.
- More than 120 points: A high degree of emotional intelligence.

As seen in the analysis of global emotional intelligence (Table 4), students P3, P4, and P6 started from deficit levels, increasing the values between the pre-test and post-test by 21, 25, and 15 points, respectively. For those who obtained acceptable levels, the increase was less; however, the increase of 20 points by P1 is remarkable.

Table 4. Grouped pre-test/post-test results of the Global Emotional Intelligence Test.

	Valor	
	Pre-test	Post-test
P1	80	100
P2	100	110
P3	60	81
P4	60	85
P5	100	110
P6	60	75

In the analysis of the average (Table 5), we can see how the group improves an average of 16.84 points; this increase is significant (*p* < 0.05). Greater homogeneity was also achieved amongst the participants (typical deviations (TD) pre-test 19.66 to TD post-test 15.21) and the effect analyzed between both tests is large (r > 0.50).

Table 5. Average (A), typical deviations (TD), Wilcoxon test results (Z), significance (*p*), and dMR value (r) of the total number of students in the pre-test and post-test in the Global Emotional Intelligence Test.

	Pre-Test		**Post-Test**
A	76.66		93.50
TD	19.66		15.21
z		2.20	
p		0.027	
r *		0.721	

* Effect size (r) according to Cohen: <0.10, insignificant; 0.10–0.30, small; 0.30–0.50, medium; >0.50, large. Results significant at the 0.05 level or better are given in bold.

3.3. Social Abilities Test

This last test had 20 items, in which 20 points were balanced to define and establish the level of ability, inadequacy, inhibition, aggressiveness, and anxiety of the students' social skills. Therefore, the scoring range was between 0 and 20, and reached in a single category. Thus, in pre-test measurements, we found that students have this distribution in their social skills.

This test offers a characterization of each student's social skills. Between the pre-test and the post-test (Table 6) the participants managed to modify their social skills from more pernicious or

harmful tendencies—seen as inadequate or aggressive behaviors—towards more adaptive skills. However, in some behaviors that are classified as inhibited, the expected results were not obtained in all participants.

Table 6. Pre-test/post-test results of the social skills' distribution in the social skills test.

	Skill		Inadequate		Inhibited		Aggressive		Anxious	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
P1	6	10	3	2	10	8	1	0	0	0
P2	14	17	2	1	1	1	3	1	0	0
P3	6	11	7	5	2	2	4	2	1	0
P4	6	9	7	6	2	2	4	2	1	1
P5	15	16	3	2	1	1	1	1	0	0
P6	6	10	7	5	3	3	4	2	0	0

Although the results were more difficult to verify, we see (Table 7) that the average of inadequate, inhibited, aggressive, and anxious behaviors decrease and the adaptive and skill increases. However, as pointed out earlier, significant results ($p < 0.50$) are achieved in skill, inadequate, and aggressive behaviors, but not in the inhibited and anxious ones. The degree of effect of the intervention on skill, inhibited abilities were only obtained in a small amount ($0.10 < r < 0.30$) and anxious, being large ($r > 0.50$) in the inadequate and aggressive ones.

Table 7. Average (A), typical deviations (TD), Wilcoxon test results (Z), significance (p), and dMR value (r) of the total number of students in the pre-test and post-test in the social skills test.

	Skill		Inadequate		Inhibited		Aggressive		Anxious	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
A	8.83	10.33	4.83	2.66	3.16	2.50	2.83	1.33	0.33	0.16
TD	4.40	4.50	2.40	1.21	3.43	2.25	1.47	0.81	0.51	0.40
z	2.04		2.32		1.34		2.12		1.00	
P	**0.041**		**0.026**		0.180		**0.034**		0.317	
r *	0.287		0.761		0.162		0.857		0.280	

* Effect size (r) according to Cohen: <0.10, insignificant; 0.10–0.30, small; 0.30–0.50, medium; >0.50, large. Results significant at the 0.05 level or better are given in bold.

3.4. Self-Motivation Test: Do You Have Enough Confidence in Yourself?

The third test applied was the self-motivation test. In it we found four different ranges, grouped as follows:

- Less than 5 points: Low levels of self-confidence, with low intrinsic motivation levels and significant dependence on extrinsic confidence.
- Between 5 and 9 points: Average levels of self-confidence.
- Between 10 and 14 points: High levels of self-confidence, with high levels of intra-personal trust.
- More than 14 points: Very high levels of confidence, both intrinsic and extrinsic.

As shown in Table 8, this started from a medium/high level of self-motivation. The increases between the pre-test and post-test varied between 1 and 2 points per participant, reaching the lowest levels to approach the borderline of the high levels (P3) and others, reaching or exceeding the limit of 14 points, with very high levels of motivation (P2, P5, and P6).

Table 8. Grouped pre-test/post-test results of the self-motivation test: Do you have enough self-confidence?

	Value	
	Pre-test	Post-test
P1	10	12
P2	13	15
P3	8	9
P4	9	11
P5	13	14
P6	13	14

If we check the differences between the pre-test and post-test (Table 9), the results reflect an improvement in the average of 1.50 points, and this result was significantly positive ($p < 0.05$). In checking the effect of the test, we see that its effect was quite large ($r > 0.50$).

Table 9. Average (A), typical deviations (TD), Wilcoxon test results (Z), significance (*p*), and dMR value (r) of the total number of students in the pre-test and post-test in the self-motivation test.

	Pre-Test	Post-Test
M	11.00	12.50
TD	2.28	2.25
z	2.25	
p	**0.024**	
r *	0.554	

* Effect size (r) according to Cohen: <0.10, insignificant; 0.10–0.30, small; 0.30–0.50, medium; >0.50, large. Results significant at the 0.05 level or better are given in bold.

3.5. Self-Awareness Test: Do They Openly Show Their Emotions?

The next test used with the sample was the self-awareness test. This establishes three different ranges, with a minimum value of 0 and a maximum of 16, defined as follows:

- Less than 8 points: Sensitively emotional person, with mood swings. They can show themselves to be whimsical and usually avoid negative thoughts and feelings about themselves.
- From 8 to 12 points: A person who usually struggles to keep his efforts under control. They usually have a good level of behavioral awareness, although they might really try to avoid showing their feelings.
- More than 12 points: They usually show their feelings, they have control over them, although they have no problem accepting and understanding them.

All of the participants started from the second rank (Table 10), with values between 8 and 11. The improvement of up to 3 points of P2—who reached the third rank—contrasts with P5, who did not show any improvement in the test.

Table 10. Grouped results pre-test/post-test of the self-awareness test: Do they openly show their emotions?

	Value	
	Pre-test	Post-test
P1	9	12
P2	10	13
P3	8	10
P4	11	12
P5	11	11
P6	8	9

Although it might seem that the differences are not so obvious as in the previous table, it can be seen how the average (Table 11) increases from 9.50 to 11.16, which is a significant improvement ($p < 0.50$) in the results. However, these results are not as uniform as at the beginning—the standard deviation goes from 1.37 to 1.47. In the analysis of the effect, the intervention can be considered successful ($r > 0.50$).

Table 11. Average (A), typical deviations (TD), Wilcoxon test results (Z), significance (*p*), and dMR value (r) of the total number of students in the pre-test and post-test in the self-awareness rest.

	Pre-Test	Post-Test
A	9.50	11.16
TD	1.37	1.47
z		2.04
p		**0.041**
r *		1.020

* Effect size (r) according to Cohen: <0.10, insignificant; 0.10–0.30, small; 0.30–0.50, medium; >0.50, large. Results significant at the 0.05 level or better are given in bold.

3.6. Self-Control Test: What Is Their Degree of Self-Control?

The sixth questionnaire has a dichotomous assessment that caused its range of values to be situated between 0 and 19, divided into four different ranges depending on their response.

- Less than 5 points: Very impulsive people who have many difficulties controlling themselves when they do not get answers according to their criteria. With needs to learn to how to control so they can offer an adequate response according to their environment or situation.
- Between 5 and 10 points: People who, although they are able to take into account the situation in which they find themselves on some occasions, at other times they are unable to control their emotions and provoke inappropriate behavior. Having the possibility of being trained to control their behavior.
- From 10 to 15 points: Although they tend to control and analyze situations reflexively, sometimes their emotions cause impulsive reactions. They usually have knowledge when their actions are wrong and usually correct them.
- More than 15 points: Their levels of self-control are very high, whether the situations are favorable or not. They have reconciling and calm behaviors.

The participants started from a wide range of points (Table 12), from the 6 points of P3 to the 16 of P5, and the intervention managed to raise all the results between 1 point (P5) and 3 points (P1, P2, P3, and P4); P2 and P4 reach the top rank in the post-test.

Table 12. Grouped results pre-test/post-test of the self-control test.

	Value	
	Pre-test	Post-test
P1	12	15
P2	13	16
P3	6	9
P4	9	12
P5	16	17
P6	6	8

In the analysis of the average (Table 13), it rose 2.50 points in the post-test, also improving the dispersion of the results (4.03 versus 3.76) and obtained significant results between the pre-test and post-test ($p > 0.05$). In the effect analysis, a large effect was collected between the two data sources.

Table 13. Average (A), typical deviations (TD), Wilcoxon test results (Z), significance (*p*), and dMR value (r) of the total number of students in the pre-test and post-test in the self-control test.

	Pre-Test	Post-Test
M	10.33	12.83
TD	4.03	3.76
z		2.26
p		**0.024**
r *		0.522

* Effect size (r) according to Cohen: <.10, insignificant; 0.10–0.30, small; 0.30–0.50, medium; >0.50, large. Results significant at the 0.05 level or better are given in bold.

4. Discussion

In this project, the objective was to find out if, through a different and innovative methodology, based on the use of ICTs combined with an educational game, the results in the social and behavioral skills of the target students in this study improved.

If we check the analysis of this objective, it can be verified at both the macro level of intelligence development and at the micro level, in the components of emotional intelligence, that we obtained positive results.

For this, it is possible to verify how, with the Seven Intelligences Test, we were able to obtain statistically significant results of improvement in the linguistic/verbal, logical/mathematical, musical, interpersonal, and intra-personal intelligences. While there were improvements in visual/spatial and kinesthetic/body movement intelligences, they were not significant. The evidence of this study coincides with the results of Ferrándiz, Bermejo, Ferrando, and Prieto [80] and Barrientos-Fernández, Arigita-García, and Sotelo-Martín [81], in which the development of skills of one of the intelligences interacts with the same skills and other intelligences, developing a complex framework of interrelation; those who are more developed will be the ones that help to strengthen others who are weaker [82].

Therefore, the implementation of musically therapeutic techniques, together with the interactive musical game, works for the development, not only of musical intelligence, but also in making this knowledge converge along with those of other intelligences. Although the techniques used are focused on integral development, we must not forget that studies such as those by del Moral-Pérez, Fernández-García, and Guzmán-Duque [83], Chuang and Su [84], and Li, Ma, and Ma [85] give a perspective on the format presented (video game) as it can be considered as a valuable catalyst to enhance the development of multiple intelligences in school children.

In this case, the software implemented was the catalyst for student social development. It became the pretext for them to approach the contents of the subject and modify their behaviors to other optimized ones, emphasizing the usual norms for effective communication between students: word shifts; time limits between responses; restrictive use of bad words that, together with the use of musical expression, facilitate access to the program's musical content. For example, through a free selection of musical styles, the use of musical instruments or the establishment of dialogues with musical elements, students could collaborate with other students or between groups.

This type of communication between groups—with the implementation through musical instruments—was already used in previous courses, so we do not consider it as an innovation within the exposed methodology, although it is an element that takes more value in this context.

Now, we will pay closer attention to emotional intelligence and its components. As demonstrated, important results were achieved facing the development of emotional intelligence in its global form; an increase of 16.84 points on average in the measured post-test shows that in this area there is a significant comparison to the points in the pre-test.

As demonstrated in other research [86], communication problems in children and adolescents can negatively influence emotional development and, therefore, the importance of including emotional competencies in school, so that both teachers, as well as students, reach a good personal, social,

academic, and work balance. Therefore, development is necessary as we found that there are significant associations between emotional intelligence and a better physical and mental health [87], a decrease in the use of substances [88,89], minor levels of stress [90], a reduction of aggressive behavior [91], social relationships of a higher quality [92], and less aggressiveness and much better pro-social behavior [91,93]. All of these shown variables are those that, initially, existed with the participants of this research, and we tried to minimize them by trying to increase the resources and skills of students' emotional intelligence, as well as giving them the tools for a better personal and social emotional integration.

If we directly enter into the components of emotional intelligence, we will begin by breaking down social skills. The evaluation confirmed that cooperative experiences, such as the one proposed here, increase positive social behaviors (described in the evaluation test as skill and considered as behavioral consideration, pro-social, and assertive behaviors) and decrease those social behaviors considered negative (aggressive, inhibited, withdrawn, anxious, inappropriate, or even antisocial). Similar results were found in the works of Caballo, Salazar, Irurtia, Olivares, and Olivares [94] and Delgado, Inglés, Aparisi, García-Fernández, and Martínez-Monteagudo [95], where the increase in social skills caused participants to decrease or abandon negative social behaviors, also becoming behaviors with a high prevention factor.

It is true that, in the analyses carried out, we did not obtain significant changes in the withdrawal of inhibited and anxious behaviors, so both procedures and contents have to be reviewed, as the value of the effect size, in both cases, was small.

In relation to self-motivation, we already found high values in the pre-test, where they showed medium-high and high values. As the test explains on the correction sheet, their self-confidence is strong so that the others cannot do anything bad to them; however, it is important for them to examine their strengths on a spiritual level, self-critically, and see if they have not erected a solid wall around themselves through which no one can penetrate [65]. The image that students have of their classmates who are repeating is mainly described as lazy and uninteresting [96], so the high self-perception of themselves may not be realistic, as they can create walls to prevent others from being able to "tear down" their own valuation. However, we did see positive results, improving the average value by 1.50 points.

In the analysis of self-consciousness, we obtained an increase in the general average of the test scores, and all participants achieved being in the two highest levels of the test; thus, with the exception of one, the students improved their level of awareness about themselves; however, they usually avoided showing their feelings, probably given to the difficulty of ideally managing their own actions and thoughts.

Even though this was the last section in emotional intelligence, it is still one of the most important ones. In the tests performed, we obtained an increase of 2.50 points in the joint average in the post-test as well as a significant positive result.

The relevance of this is due to the fact that disruptive, impulsive, and behavior control disorders are defined in the DSM5 [15] as disorders characterized by conditions and problems in the self-control of behavior and emotions, which they translate into conduct that violates the rights of others or leads the individual to important conflicts in the face of society [97]. Although we did not have participants with this pathology in his study, it is true that they have features or behaviors of all the aforementioned disorders, so it is necessary that this skill acquires the greatest possible value. In studies such as Mendoza and Pedroza [98] and Cuenca and Mendoza [99], part of the intervention was focused on the development of participants' self-control to reduce disruptive or antisocial behaviors where, as proven by our research, before the increase in pro-social behavior, we found a decrease in aggressive behavior.

5. Conclusions

In Europe there is a growing concern for the development of emotional and social competences [100]. Through research it has been possible to verify how emotions are subject to the evaluation made by

the person of their own emotional performance in different scenarios of social interaction; thus, it is necessary to provide tools so that the child or adolescent develops their own personal and social competences—both aspects coming together to give an increased emotional intelligence, according to Goleman [49].

If we offer prevention perspectives to those students with the most disadvantaged socio-economic characteristics, it may prevent up to 53% of students between the ages of 12 to 24 years old from repeating on more than one occasion [101] (p. 82) or even, from abandoning their studies.

Having reflected on the results obtained, we see improvements in many of the areas evaluated. Through the practice of the game, we achieved considerable relaxation, students were able to forget about their problems, they increased their social skills, and there was an increase in all the multiple intelligences, in all subcategories of emotional intelligence and linguistic/verbal, logical intelligences/mathematical, musical, interpersonal, and intra-personal, with statistically significant values.

It is essential that teachers look for new teaching techniques based on ICTs to understand their students [102]. Through this research, we found a priceless tool in the computer game, as its use was highly motivating for the students, arousing great interest and expectation. This result may be based on the combination of the computer game and the music class as an isolated event that captures their attention.

With time, and like the aforementioned investigations of Gold, Saarikallio, Crooke, and McFerran [44], Montánchez and Orellana [45], and Uhlig, Jansen, and Scherder [46], we obtained a preventive component that will help those with disruptive behaviors so that they decrease in quantity and intensity and cause no behaviors associated with disruptive disorders of impulse control and cataloged behavior to arise. For this reason, the use of music therapy techniques induced success in studies not focused on the musical field; these types of interventions are specifically designed to adapt elements of music and produce specific results.

We consider that our research, carried out through an educational computer game, with which we obtained important advances with students with disruptive behaviors, could be imported to other contexts.

As explained above, although the results found were very positive, there were limitations to this study. The design used was a pre-experimental design, that is, there was no randomization or control group. As this was the only group of students that met the conditions required to join this study, there was no opportunity to establish a control group to contrast the data between an experimental group and a control group. Likewise, the number of uncommon variables that was not measure could have an influence on the results obtained in this investigation.

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