From Brain Gym Exercises to Classical Music

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Abstract

Conducted on the sample of 94 students aged 11 to 13, which were divided into the experimental (E) group and the control (C) group, each with 47 participating students, the present paper sought to evaluate an experimental program of music listening among elementary school children. Both groups were evenly balanced according to the following criteria: (1) number of pupils, (2) active enjoyment in music, (3) cognitive animation of music, (4) the expression of emotions toward music, (5) creativity in music, (6) general enjoyment in music, (7) preference to neo-folk music; (8) cognitive, (9) emotional, and (10) social involvement in classroom activities. The posttest results for the experimental group exhibited an incresed sgift in preference towards listening to and enjoyment in classical music. The experimental design included ten Brain Gym exercises. First, the participating students did two exercises while listening to folk songs they were familiar with. They performed simple conducting movements in the form of *Lazy Eights*, first for the folk song *„I am a little gypsy girl"*, and then the same for an aria from *Carmen*. The same pattern was used for the music piece titled *„Rain"*, and the marching beat.

Key words: folk music, neo-folk music, classical music, Brain Gym, enjoyment in music

Brain Gym exercises improve children's ability to learn (Dennison, 2006; Hannaford, 2007). Children learn more efficiently when they move (Dennison, 2006). Classroom environment is known for its bias toward left rain dominant students and static desks-in-row arrangements (Diamond i Hopson, 2006). Music, and the rhythm it has, makes students move.

This paper's theoretical stance is based on the theory of *mirror neurons* (Heyes, 2010; Kilner & Neal, 2009). Human body is relatively symmetrical, with two hands, two legs, a pair of eyes and ears, etc. Though the left and right hemispheres are mirror images, human brain exhibits symmetry across sagittal plane. Although the existence of human mirror neuron system (MNS) has been questioned, there is emerging evidence that humans have MNS (Buccino, Binkofski, Fink, Fadiga, Fogassi, Gallese, Seitz, Zilles, Rizzolatti, & Freund, 2001; Decety, Grèzes, Costes, Perani, Jeannerod, Procyk, Grassi, & Fazio, F., 1997; Gazzola, & Keysers, 2009; Heyes, 2010). Whether it is sensory or motor experience, mirror neurons are triggered alike. Brain Gym exercises are based on the principle that activation of both brain halves leads to optimal learning and facilitate proprioceptive adaptation (Dennison, 2006). In this research we introduced simple Brain Gym exercises to elementary school students. They were asked to apply the *Lazy Eights* exercise while making conducting-like movements to the tunes of a popular folk song. After that, they had to perform the same routine to the rhythmically similar aria from a famous opera. This was an example of how positive attitude towards one musical genre, by virtue of reapiting the same exercises, can be translated into a diffferent type of music.

Brain Gym exercises increase reading efficiency (Dennison & Dennison, 2007). Moreover, they have been found efficient in math exercises, they boost the level of self-appreciation, decrease agression, hyperactivity, inattention, depression and anxiety (Sànchez, 2013). Various authors have stressed the link between learning and movement (Bobo, 2009; Brown & Parsons, 2008; Cain, Caine, McClintic, & Klimek, 2008; Chomitz, Slining, McGowan, Mitchell, Dawson, & Hacker, 2009; Dennison, 2006; Diamond i Hopson, 2006; Hannaford, 2007). Conducting a research on the sample of 1841 school children, Chomitz et al. (2009) determined statistically significant relationship between physical fitness and academic achievement. Though pupils around the world are taught two PE lessons a week, this is still well below the finding which suggests that higher amounts of physical activity (one hour a day) may be associated with better academic achievement (Carlson, Fulton, Lee, Maynard, Brown, Kohl, & Dietz, 2008). Teaching environment today is constrained by the lack of space and comfortable ambience which may facilitate pupils' movement. What is more, memorization and reproduction of the teaching content, as lower-order objectives in Bloom's taxonomy, still prevail (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956). Movement activities in the classroom can activate positive emotions, raise motivation and increase the level of classroom involvement among school children.

Movement and music

School syllabi, regardless of the school subject they are designed for, can surely be implemented with some degree of classroom movement included. Brain Gym exercises come in handy for this purpose, while music education lessons provide ample opportunities for movement of pupils. Not much of the teaching content would be sacrificed if we spent some five to ten minutes of a 45-minute lesson on Brain Gym exercises. Research has pointed out that movement helps increase the number of brain cells and the mass of CNS (Jensen, 2009; Hannaford, 2007; Pereira, Huddleston, Brickman, Sousunov, Hen, McKhann, ... Small, 2007). Physical activity is related to academic achievement in children (Coe, Pivarknik, Womack, Reeves, & Malina, 2006). A simple Brain Gym exercise, such as *Thinking Caps*, can help us retrieve a piece of knowledge or information. (Dennison & Dennison, 1986; Hannaford, 2007). Other Brain Gym exercises can also facilitate classroom movement and change the dynamics of our lessons regardless of the subjects that is taught.

Music and movement activities not only develop cognitive improvement, but also activate positive emotions, and result in the increased level of classroom enjoyment (Edwards, Bayless, & Ramsey, 2008). Preschool children often sing when they move. While experimenting with different rhythmic patterns, they can walk around and express their musical creativity by only repeating random pairs of syllables or words like *mummy-daddy*, *mummy-mummy*, *daddy-daddy*, *etc* (Edwards, Bayless, & Ramsey, 2008). Just by tapping into their spontaneity, we relase their creative potential. Divergent production is condition for creativity (Robinson, 2001). Children have an inate desire to move and they do it spontaneously, usually by hopping around rather than walking - something that we cannot observe in adults very often. A sensitive teacher should always consider introducing movement in everyday lessons. More specifically, if allowed to move, rather than sit, children could start to like listening to classical music.

According to Linda Carol Edwards, there are three categories of body movement: (1) locomotor movement, (2) axial movement, and (3) combined movement (Edwards, Bayless, & Ramsey, 2008, p. 156). *Locomotor movement* takes place over some distance, e.g. walking, jogging, hopping, swimming, etc. Rather than moving from one place to another, *axial movement* involves body motion around its own axis, such as: bending, stretching, twisting, gesturing, etc. *Combined movement* brings together movement through space and body motions that involve the spine as the focal point – for example, running and looking back (twisting your upper body) at the same time (ibid.). Most Brain Gym exercises combine locomotor and axial movement. As typical axial movements, they include body movements in a rhythmic pattern. But they are also locomotor as they involve moving from one place to another. In addition, Brain Gym exercises include muscular tension, speed and power.

Music and classroom interaction

Games are often associated with pleasure and enjoyment, but children enjoy playing games without being aware of the social aspect the games have. And for playing games, children need peers. In the words of Aristotel, *"Man is by nature a social animal".* As other humans with gregarious needs, school children should be taught in classroom environments which facilitate interactive and cooperative learning. There are many methods of interactive and cooperative learning that have stood the test of time: (1) SRLM – Student Team Learning Methods, (2) JM – Jigsaw Method, (3) LT – Learning Together, (4) GPM – Group Project Methods, (5) SA – The Structural Approach, (6) CCM – Cooperative Concept Mapping, (6) CL – Collaborative Learning, (7) TM – Tribal Method, (8) GWFMA – Group Work for Multiple Abilities, (9) CS – Cooperative Scripts, (10) T – Tutoring (Abrami, Chambers, Poulsen, De Simone, d'Apollonia, & Howden, 1995). Music is often performed as a cooperative act. It is an art of arranging vocal or instrumental sounds into a rhythm or melody. Therefore, music implies interactive and cooperative work of individual performers.

Despite numerous research on relationship between music and cooperative learning, we are still missing an exhaustive overview on the efficiency of academic achievement when music and cooperative learning are brought together (Johnson, Johnson, & Stanne, 2000). Johnson et al. (2000) analyzed the efficiency of eight differnet types of cooperative learning: LT – Learning Together, AC – Academic Controversy, STAD – Student-Team-Achievement-Division, TGT –

Teams-Games-Tournaments, GI – Group Investigation, JM – Jigsaw Method, TAI – Teams-Assisted-Individualization, CIRC – Cooperative Integrated Reading and Composition. The results of this meta-analysis showed that cooperative learning methods triggered better academic achievement.

What is the nature of cooperative elearning? Cooperative learning involves students' joint effort to achieve certain educational goals (Johnson & Johnson, 1999). This type of learning requires interdependence and perception that success cannot be accomplished by individual effort only (Deutsch, 1962). This is particularly true for music. A piece of music performed by a group of artists is as good as the performance of individual musician taken together. It takes only one musician's poor performance for the whole group to sound out of tune. Gregarious motivation is inherent to adults and children alike (Alderfer, 1969). The present paper's objective is to deal with the issue of gregarious motivation in school children. They were observed while working in small groups (gregarious motivation); they moved to the rhythm of music (movement); they competed (achievement); and they did brain Gym exercises (pleasure/enjoyment).

Folk music usually features rhythm which makes people move. Pete Seeger recommends using folk songs as activity songs for children (Seeger, 1998). Some of the famous composers, like Grieg, Saint Saëns, Mendelssohn, Bartók, etc, created pieces of music which stimulate free movement (Edwards, Bayless, & Ramsey, 2008, p. 159). This is what the present paper seeks to examine – the link between music and movement. The participating students were first asked to do Brain Gym exercises, peroformed to the familiar beat of either a folk or pop song. Right after that, they repeated the same exercising routine, but this time while listening to a piece of classical music (excerpt from a famous aria).

Here we try to answer the following question: Can children be cajoled into listening to classical music by means of performing Brain Gym exercises while they are listening to their favourite pop and folk songs, and then transferring the same exercise pattern while they are listening to classical music?

Methods

Sample

Ninety-four students, 11 to 13 years of age, attending two elementary schools in Banja Luka (*„Petar Petrović Njegoš“ and „Georgi Stojkov Rakovski”*), constituted the testing pool. Out of the total number of participating elementary school children, 47 included in the study were in the experimental (E) group. The remaining 47 students were in the control (C) group. All the participants were either grade 5 or grade 6. Both groups were evenly balanced according to the following criteria: (1) number of pupils, (2) active enjoyment in music, (3) cognitive animation of music, (4) expression of emotions toward music, (5) creativity in music, (6) general enjoyment in music, (7) preference to neo-folk music; (8) cognitive, (9) emotional, and (10) social involvement in classroom activities (Table 2, initial (pretest) measure of differences between groups). The groups were not balanced in terms of the folllowing two criteria: (1) preference to pop music (*M* = 4.05 for the *E* group, as opposed to *M* = 3.46 for the *C* group) - the difference is statistically significant in favour of the *E* group (*t* = 2.34; statistically significant at 0.05 level; Table 2); and, (2) preference to classical music (*M* = 2.38 for the *E* group, as opposed to *M* = 3.00 for *C* group). The difference is statistically significant in favour of the *C* group (*t* = -3.22; statistically significant at 0.01 level; Table 2). Also, these two criteria provide an interesting angle of view regarding the research findings. If the preference to pop music is reduced, i.e. if the experimental group participants eventually show more preference to classical music in relation to the control group students, it will be an indication that the research objectives have been accomplished.

Design

The main purpose of the study was to examine the teaching methods during music education lessons. The study had two groups, the experimental (E) group and control (C) group, balanced in terms of the research criteria. The participants from the the experimental group were divided into smaller class groups. The students were asked to do Brain Gym exercise (*Lazy Eights* plus two more) to the beat of *"I am a little gypsy girl"* folk song. The groups were then asked to perform these exercises in front of the class. With creativity and improvisation being encouraged, presentations were given a score from 1 to 10 (students were not allowed to give scores for their own groups). The same three Brain Gym exercises were repeated but this time the music was different, i.e. the students were played an aria from *"Carmen"*. The students' movements were supposed to be in sync with the beat of that piece of classical music in order to perform the presentation assignment. The aria from *"Carmen"* was the part of the syllabus for the music education classes and the listening was done in an active format. It was expected, by presenting the classical music in such a way, that the participants would pick up the melody of aria, and eventually want to listen to the entire opera. This was practically a controlled effort on the teacher's part to have students listen to classical music. The same routine was followed in the ensuing four lessons, with seven Brain Gym exercises done in total. The (C) group students were taught in a more traditional-style type of lessons. The same instruments were used to measure results in both groups, at the beginning and at the end of the experiment. The variables were compared in terms of the stage of the experiment (initial - final), and between groups (experimental group – control group). All the obtained data were entered into SPSS 20 (Statistica for Windows) software, and were processed accordingly.

Instruments

This research applied four instruments: (1) **CIM** – Creativity in Music Scalar (Suzić, 2010, see in: Porobić, 2010), (2) **EIM** – Enjoment in Music Scalar (an adaptation of *Enjoyment in Sport* instrument, Suzić, 2011), (3) **SIIML** – Student Involvement in Music Lessons Scalar (Suzić, 2016), and (4) **TE**-Thermometer of Emotions (Suzić&Dubravac, 2011). Let us now turn to each scalar in detail.

CIM – Creativity in Music Scalar was comprised of 50 items distributed in 4 subtests: (1) enjoyment in music – 10 items (α = 0.81), (2) cognitive animation of music – 10 items (α = 0.83), (3) emotions – 10 items (α = 0.76), and (4) creativity – 20 items (α = 0.92). The respondents provided their answers in the format of typical five-level Likerit scale, with responses from *1 = totally disagree* to *5 = totally agree*.

EIM – Enjoment in Music Scalar was comprised of 41 items distributed in 4 subtests (1) general enjoyment of music – 23 items (α = 0,83), (2) neo-folk music – 6 itms (α = 0.84), (3) pop music – 6 items (α = 0.91), and (4) classical music – 6 items (α = 0.89). The respondents provided their answers in the format of typical five-level Likerit scale, with responses from *1 = totally disagree* to *5 = totally agree.*

SIIML – Student Involvement in Music Lessons Scalar was comprised of 18 items distributed in 3 subtests: (1) cognitive involement – 6 items (α = 0.66), (2) emotional involvement – 7 items (α = 0.85), and (3) social involvement – 5 items (α = 0.61). This instrument was also in the format of typical five-level Likerit scale, with responses from *1 = totally disagree* to *5 = totally agree.*

TE - Thermometer of Emotions was designed to measure four basic emotions: (1) happiness of joy (t = 25.50; significant at 0.001 level), (2) sadness or sorrow (t = 6.15; significant at 0.001 level), (3) fear or intimidation (t = 21.70; significant at 0.001 level), and (4) pleasure or excitement (t = 75.11; significant at 0.001 level). Just as a thermometer measures temperatures, the emotional thermometer measures levels of emotion from 0 to 100, with the participating students providing their own measures. Students were introduced to the thermometer labels beforehand (0 – freezing point, 100 – boilng point), so that they were able to gauge his or her level of emotions and provide their own answers.

Results

The staring hypothesis of the present paper has been that Brain Gym exercises can be used to shift students' musical preferences from neo-folk and pop to classical music. More specifically, active listening, propped by Brain Gym exercises, should result in higher level of evaluation of classical music in the experimental group students as oppesed to the control group students. Moreover, this study soght to answer what predetermines general enjoyment in music.

To test the hypothesis and provide an interpretation of the research results, Glass' Δ, as an estimator of the effect size, was used (Ellis, 2010; Glass, McGraw, & Smith, 1981). In general, ES (Effect Size) is measured as the standardized difference between two means (Ellis, 2010, p. 10). Here Glass's delta is defined as the mean difference between the experimental and control group divided by the standard deviation of the control group. This is so because the control group undergoes no experimental interventions, and is thus closer to real deviation (ibid.). Conventionally, ES (Effect Size) is measured as:

Glas's $\Delta = \frac{M1-M2}{SDcontrol}$ (Ellis, 2010, p. 10), adjusted here as: Glas's $\Delta = \frac{Mi-Mf}{SDcontrol}$

where:

Mi is arithmetic mean measured initially (at the beginning of experiment),

Mf is arithmetic mean measured finally (at the end of the experiment).

$SD_{control}$ is standard deviation of the control (C) group

Table 1 here.

Traditional style teaching is primarily concerned with the development of cognitive competences (Suzić, 1995), i.e. retention and reproduction of content, which are ranked as lower-order educational objectives by Bloom (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956). Not only cognitive, but also emotional, social and action competences have moral and aesthetic dimensions (Suzić, 2005). Teaching practice is still mainly focused on cognitive aspects, leaving other competences often overlooked. This is how we can account for the fact that *cognitive animation of music* recorded high scores for both the experimental group ($\Delta = 0.18$; $t = 2.02$; significant at 0.05 level; Table 1) and the control group ($\Delta = 0.26$; $t = 2.25$; significant at 0.05 level; Tabela 1). The experimental design of the present research was based on movement exercises (Brain Gym); however, it would be very unreasonable to expect that deeply rooted traditional focus on cognitive aspects of learning can be overcome over the course of only a few 45-minute lessons.

The second significant finding was that listening to *pop music* was reduced in the experimental group students, with statistically significant difference remaining at initial measure ($\Delta = 0.26$; $t = 2.04$; significant at 0.05 level; Table 1), whereas the control group measures did not record the similar pattern (Tabela 1). The most important finding is that listening to *classical* *music* in the experimantal group recorded higher values at final measurement (Δ = –0.51; *t* = –3.22; significant at 0.01 level; Table 1). The control group did not show similar results (Table 1). It is believed that the two key experimental variables that had an impact on such results were: (1) Brain Gym exercises, and (2) interactive (group) learning. Brain Gym exercises increase the efficiency of learning (Dennison, 2006; Diamond & Hopson, 2006; Hannaford, 2007), while interactive learning fosters positive emotions (Johnson & Johnson 1999). Music and rhythm make people move (Edwards, Bayless, & Ramsey, 2008). Brain Gym exercises activate human mirror neuron system, which has been interpreted by researchers as the proof of existence of MNS (Heyes, 2010). The present paper's experimental design utilized ten brain Gym Gym exercises. They were incorporated into interactive learning and performed through the group competition format. So it comes as no surprise that the experimental group students shifted their preferences in the direction of classical music.

The increased *emotional* (Δ = –0.28; *t* = –2.17; significant at 0.05 level; Table 1) and *social involvement* (Δ = –0.36; *t* = –3.54; significant at 0.001 level; Table 1) support the notion that the experiment rendered improvements in more than one aspect. The level of *emotional* and *social involvement* was higher in the experimental group students, whereas the same values for the control group significantly decreased. The values were the following: Δ = 0.41; *t* = 3.33 (significant at 0.01; Table 1) for *emotional involvement* and Δ = 0.31; *t* = 2.91 (significant at 0.01 level; Table 1) for *social involvement*. It is interesting to note that the control group recorded a drop in cognitive involvement (Δ = 0.52; *t* = 4.58; significant at 0.001 level; Table 1). This can be explained by the nature of traditional style teaching. It is often assumed that music lessons should include the listening, and comprehension check part, with students only being expected to listen to music, absorb information, and provide desired answers. However, it is vital to engage students in the learning process and to facilitate better cognitive, emotional and social response from them. If the students' main concern is how they will be able to respond to their teacher's questions regarding the musis they listen to, it is more than obvious that they will have an increased level of inhibition. Such classroom environment will surely disrupt classes and demotivate students.

Music and movement impact the learning of reading skills in preschoolers (Augustine, 2016). Movement is certainly necessary for children to discover the pleasure of learning (Dennison 2006). Movement in the present research in built around Brain Gym exercises, with an aim to redirect students' attention from neo-folk and pop to classical music.

The obtained results for the experimental group were significantly better in several important aspects than those recorded in the control group (Table 2). To measure the difference, Glas's Δ was used here as well.

Glas's $\Delta = \frac{M1 - M2}{SDcontrol}$ (Ellis, 2010, p. 10), adjusted here as: Glas's $\Delta = \frac{Me - Mf}{SDcontrol}$

where:

Me is arithmetic mean of the experimental (E) group scores,

Mf is arithmetic mean of the control (C) group scores.

$SD_{control}$ is standard deviation of the control (C) group

Tabela 2 here.

As indicated in Table 2, there is a difference between the experimental group and control group in listening to *pop music* variable both at the beginning (Δ = 0.36; *t* = 2.34; significant at 0,05 level; Table 2) and at the end of the experiment (Δ = 0.43; *t* = 2.04; significant at 0.05 level; Table 2). This should be viewed as a good indicator, because our aim was not to completely divert children's preference from pop music to classical music, but only to make classical music more appealing to them; i.e. we aimed at expanding their musical horizons by including classical music, and not only neo-folk and pop music. Some other findings are worth mentioning as well. The level of *general enjoyment in music* (Δ = 0.41; *t* = 2.31; significant at 0.05 level; Table 2), *cognitive involvement* (Δ = 0.48; *t* = 2.69; significant at 0.01 level; Table 2), *emotional involvement* (Δ = 0.46; *t* = 2.52; significant at 0.01 level; Table 2), and *social involvement* (Δ = 0.38; *t* = 2.02; significant at 0.05 level; Table 2) all recorded an increase over the course of the experiment. These findings clearly indicate that the experiment design included some important components which contributed to its overall efficiency. Besides, the negative values from Table 1 and positive ones from Table 2 hint at which components could be changed in case we decide to conduct an experiment that would span over an extended period of time.

The Brain Gym exercises used in this experiment were administered through an approach of learning that has social setting at its core, which is pivotal if the Zone of Proximal Development is to take place (Vigotski, 1996). When they listen to music while moving, children enjoy more and have stronger motivation (Augustine, 2016). If they move, children are more likely to increase their attention and discover interesting details (Cooper, 2010). Or as

Denison (2006) puts it, movement predetermines efficient learning. The movement used in this study yielded significantly beeter results in the experimental group students (Table 2).

The results obtained in the experimental and control group, at initial and final measure, clearly suggest that the students from the experimental group recorded a changed attitude towards classical music. This change of musical preference has been noted in more than on aspect.

This study also sought to answer what predetermines general enjoyment in music. Multiple regression model was used to try to answer this question (Graph 1). Five out of ten predictors explained 77% of the variance, with *creativity* variable negatively predetermining general enjoyment in music (β = –0.33; *t* = –3.08; significant at 0.004 level). This was to be expected, as we all know that creativity is rarely encouraged in music listening lessons in our schools. The emphasis is always more given to reproduction than to creativity.

Graph 1. here.

Creativity had a negative predictor value, however the following predictors (total of 4) had a positive predictor value in relation to *general enjoyment in music:* (1) *cognitive involvement* (β = 0.37; *t* = 4.20; significant at 0.001 level), (2) *emotions and music* (β = 0.44; *t* = 4.11; significant at 0.001 level), (3) listening to *classical music* (β = 0.33; *t* = 3.93; significant at 0.001 level) and (4) listening to *pop music* (β = 0.27; *t* = 3.04; significant at 0.004 level). These five predictors explain 77% of the variance, but we dare to assume that an extended period of experiment would include other predictors as well. These results suggest again that Brain Gym exercises should be welcomed by music teachers, because they encourage movement and increase the level of preference toward classical music.

The finding that movement has an impact on enjoyment in music is consistent with Edwards, Bayless, & Ramsey (2008). Music possesses the pace and rhyth, which stimulate people to move. Movement should not be seen as totally opposite from music; after all, some choirs perform while singing and moving at the same time - even classical music is sometimes listened to with some movement involved on the part of the audience. Physical activity and movement have a positive influence on academic achievement in school children (Coe, Pivarknik, Womack, Reeves, & Malina, 2006). Brain Gym exercises will definitely increase the level of classroom efficiency, even if performed as little as couple of minutes per lesson. We all know that in traditional style teaching environment teachers are mainly focused on delivering information to their students. Teachers are often working against the clock to cover the entire lesson content and very little of the entire teaching process is left to children. In case we facilitate children to have a more active role during lessons and provide for student-led discoveries, teachers will have time to introduce activities like Brain Gy exercises.

Discussion

Children and young people grow up with music today but it is fair to admit that not too many of them listen to classical music. The reasons are probably as diverse as possible, from family and peers environment to the influence of media. However, school authorities should make every effort to bring classical music closer to school children. Classical music is usually played to students during music lessons, which are designed to expose students to classical music followed by the teacher's oral presentation on the particular piece of music as defined by the subject syllabus. The emphasis is often put on the repetition and recognition of the lesson content, i.e. the teachers check the students' understanding of the music, ask questions about important parts of the melody, rhythm and pace, etc. All of this makes the children concerned about giving the right answers so their enjoyment in music is thus put on the back burner. The present paper tried to provide answers to the following question: (1) Can Brain Gym exercises help us turn students' attention from neo-folk and pop to classical music? and (2) Will classroom movement improve general enjoyment in music?

The results presented in Table 1 and Table 2 provide a solid basis for the contention that Brain Gym exercises can turn the students' attention to classical music. Although the experiment lasted for only seven 45-minute lessons (initial and final testing not included), the results in the experimental group, when compared against the results from the control group, were substantially better in many aspects. When an action is repeated sufficiently often, the number of synaptic connections increase, resulting in better myelinization (Halam, 2010; Pantev, Engelien, Candia, & Elbert, 2003). The positive practice of cooperative learning and classroom connections (Abrami, Chambers, Poulsen, De Simone, d'Apollonia, & Howden, 1995) was used in this paper's experimental design. The teacher had no longer the central role in the learning process – the students actively participated in the learning process. They were also encouraged to take part in the group competitions. Brain Gym exercises performance evaluation (grading) was carried out by the students, which contributed to the overall impression of the students' pivotal role in assessing the performance of their peers.

The second research question was: Can we increase the level of general enjoyment in music? The following were the positive predictors: (1) *cognitive involvement*, (2) *emotions and music*, (3) listening to *classical music*, and (4) listening to *pop music*; *creativity in music* was the negative predictor (Graph 1). *General enjoyment in music* recored lower scores in the control group (Table 1), whereas the results in the experimental group remained unchanged (Table 1). The process of predictor evaluation was accompanied by movement exercises. The growth of synaptic connections and myelination is increased when mirror neuron system is triggered (Heyes, 2010; Pantev, Engelien, Candia, & Elbert, 2003), which has serotonin secretion as the result (Šapiro, 1998). When paired, Brain Gym exercises and music stimulate pleasurable emotions. Music induces positive attitudes toward school environment among children, strengthens social cohesion and connectedness among students, and reinforces personal adjustment to the collective environment (Spychiger, Patry, Lauper, Zimmerman, & Weber, 1993). Enjoyment does not go along with negative attitudes. This experiment managed to yield a changed attitude toward classical music in school children, and increased the level of overall enjoymnet in classical music.

Conclusion

The aim of this experiment was to try to move school children's music preference toward classical music. By utilizing Brain Gym exercises, interactive learning through intergroup activities, classroom competition and peer evaluation, we managed to achieve the desired experimental outcome and to move the school children's focus from neo-folk and pop to classical music (including the increased general enjoyment in classical music). Aided by Brain Gym exercises, the students transferred their music experiences form neo-folk and pop to classical music. This can be seen as an innovative approach in music lessons as it introduced movement as opposed to the routine of passive music listening.

By activating both hemispheres of the brain, Brain Gym exercises are more likely to repattern the brain and make the both sides of the brain work better. Most people are either right-handed or left-handed. Although being ambidextrous is something that a person is born with, it is a skill that can be trained. By practicing to use both hands with equal facility, e.g. when writing or playing basketball, a person can achieve a certain level of ambidextrousness. Music implicitly assumes some movement; however, classical music is often played to school children in the static classroom environment. This reduces music to the cognitive domain and caters only for reproduction and memorization. If we accept the notion of *the whole body learning*, the belief that the brain works best when we go beyond the rational mind, we may us music as the medium of learning; additionally, movement should be introduced to music education lessons as it is an integral part of music.

This study is of course not without its limitations. First, the experiment was carried out in the time span of only seven 45-minute lessons. A longitudinal study, which observes the same variables over an extended period of time, would probably make the research findings more reliable. Second, the number and nature of the evaluated research components (variables) may also have been presented in a different way. For instance, *creativity in music* could have been observed through changes in the rhythm and melody, or through observation of musical improvisations made by the participating students. This could be a possible strand for future research. Other variables could also be treated in the same manner. The fourth limitation relates to the percentage of the explained variance. The obtained percentage (over 70%) is respectable but we think a higher percentage should be aimed at. The fifth limitation relates to the fact that the experimenters were the Brain Gym experts, not the music teachers. This fact might have influenced the findings of the research. However, it is hoped that an additional training in Brain Gym exercises may be beneficial for the music teachers. Once introduced to the concept of Brain Gym exercises, they would probably not hesitate to use them in their classroom environment.

The research findings in the present study indicated that it was possible to change attitude towards classical music. We do live in a culture that favors pop and neo-folk music to classical music. Of course, it is easier for children to pick up pop and neo-folk melodies than classical music, which often exhibits complexities in harmony and rhythm. However, if we strive to be good educators and role models to our school children, it is of paramount importance that we bring the world of classical music closer to them, and to offer more than just superficiality of today's popular music.

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Table 1

Differences between initial and final measure

Variable	Initial		Final		95% reliability of difference		Glass' Δ	*t*	*p*
	M_i	*SD*	M_f	*SD*	Lowest	Highest			
Experimental (E) group									
Active enjoyment in music	3.86	0.82	3.79	0.93	–0.07	0.22	0.02	1.01	0.318
Cognitive animation of music	3.20	0.86	2.98	0.86	0.00	0.43	**0.18**	**2.02**	**0.050**
Emotions and music	3.55	0.70	3.59	0.80	–0.12	0.20	–0.04	0.50	0.623
Creativity in music	3.02	0.83	3.02	0.97	–0.22	0.23	0.00	0.04	0.970
General enjoyment in music	3.58	0.61	3.45	0.62	–0.02	0.28	0.15	1.79	0.080
Neo-folk music	2.78	1.30	2.79	1.36	–0.37	0.35	–0.05	–0.06	0.953
Pop music	4.05	1.24	3.73	1.29	0.04	2.64	**0.26**	**2.04**	**0.047**
Classical music	2.38	1.30	2.92	0.97	–0.87	–0.18	**–0.51**	**–3.22**	**0.004**
Cognitive involvement	3.60	0.83	3.59	0.73	–0.20	0.21	0.03	0.07	0.945
Emotional inolvement	3.69	1.00	4.03	0.90	–0.02	–2.17	**–0.28**	**–2.17**	**0.035**
Socil involvement	3.50	0.85	3.88	0.85	–0.61	–0.17	**–0.36**	**–3.54**	**0.001**
Control (C) group									
Active enjoyment in music	3.74	0.87	3.42	1.11	0.05	0.59	**0.29**	**2.36**	**0.023**
Cognitive animation of music	3.40	1.02	3.07	1.25	0.03	0.62	**0.26**	**2.25**	**0.029**
Emotions and music	3.71	0.85	3.52	1.02	–0.09	0.48	0.19	1.36	0.184
Creativity in music	3.11	1.15	3.71	1.24	0.16	0.65	**–0.48**	**–3.32**	**0.002**
General enjoyment in music	3.46	0.72	3.09	0.88	0.16	0.58	**0.42**	**3.57**	**0.001**
Neo-folk music	3.16	1.27	3.00	1.20	–0.11	0.43	0.13	1.19	0.242
Pop music	3.46	1.23	3.20	1.24	–0.14	0.66	0.21	1.31	0.197
Classical music	3.00	0.91	2.75	1.05	–0.02	0.54	0.24	1.84	0.073
Cognitive involvement	3.64	0.80	3.09	1.05	0.31	0.79	**0.52**	**4.58**	**0.000**
Emotional involvement	3.97	0.93	3.47	1.21	0.20	0.80	**0.41**	**3.33**	**0.002**
Social involvement	3.81	0.91	3.48	1.05	0.10	0.56	**0.31**	**2.91**	**0.006**

Note: Values shown in bold are statistically significant; Negative values indicate that the control group findings recorded higher scores.

Tabela 2

Differences betweenthe experimental and control group

Variable	**E group**		**C group**		**95% reliability of difference**		**Glass' Δ**	***t***	***p***
	M_e	***SD***	M_k	***SD***	**lowest**	**highest**			
Initial measure									
Active enjoyment in music	3.86	0.82	3.76	0,87	–0.24	0.45	0.09	0.61	0.545
Cognitive animation of music	3.20	0.86	3.40	1.92	–0.59	0.19	–0.16	–1.03	0.306
Emotions and music	3.59	0.70	3.71	0.85	–0.43	0.20	–0.12	–0.72	0.476
Creativity in music	3.02	0.83	3.11	1.15	–0.50	0.32	–0.09	–0.45	0.652
General enjoyment in music	3.58	0.81	3.46	0.72	–0.15	0.40	0.14	0.89	0.379
Neo-folk music	2.78	1.30	3.16	1.13	–0.87	0.13	–0.32	–1.78	0.142
Pop music	4.05	1.24	3.46	1.23	–0.09	1.10	**0.36**	**2.34**	**0.022**
Classical music	2.38	1.22	3.00	1.27	–1.13	–0.11	**–0.49**	**–2.41**	**0.018**
Cognitive involvement	3.59	0.83	3.64	0.80	–0.38	0.29	–0.05	–0.25	0.801
Emotional involvement	3.69	1.00	3.91	0.91	–0.68	0.12	–0.18	–1.41	0.164
Social involvement	3.49	0.85	3.81	0.90	–0.68	0.04	–0.30	–1.70	0.076
Final measure									
Active enjoyment in music	3.79	0.93	3.42	1.11	–0.05	0.79	0.33	1.74	0.086
Cognitive animation of music	2.99	0.86	3.07	1.25	–0.53	0.35	–0.06	–0.39	0.695
Emotions and music	3.55	0.80	3.52	1.02	–0.34	0.41	0.03	0.19	0.849
Creativity in music	3.02	0.97	3.71	1.24	–0.15	0.76	–0.56	–1.34	0.164
General enjoyment in music	3.45	0.62	3.09	0.88	0.51	0.66	**0.41**	**2.31**	**0.023**
Neo-folk music	2.79	1.36	3.00	1.20	–0.73	0.32	–0.18	–0.77	0.446
Pop music	3.73	1.29	3.20	1.24	0.02	1.05	**0.43**	**2.04**	**0.044**
Classical music	2.91	1.1	2.75	1.2	–0.33	0.65	0.13	0.65	0.61

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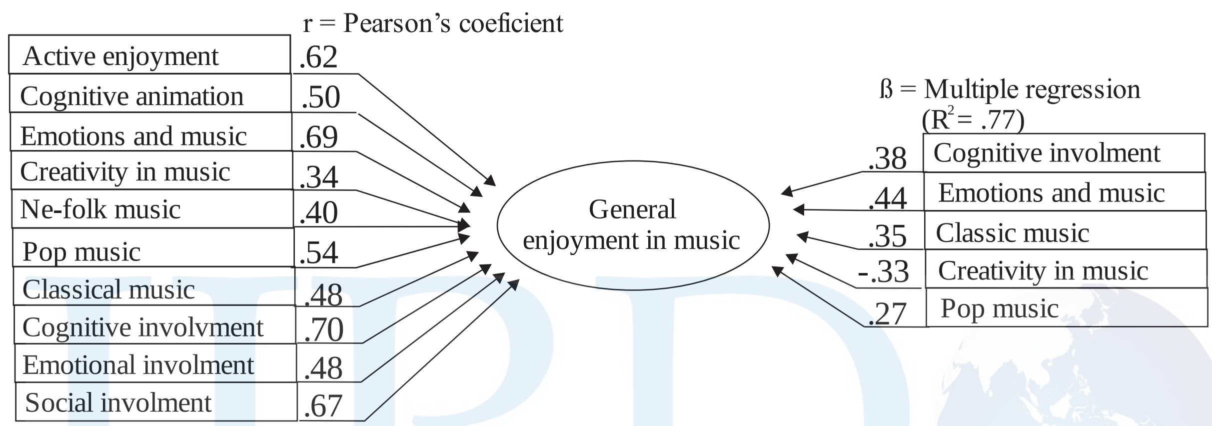
Cognitive involvement	3.59	0.73	3.09	1.05	0.13	0.87	**0.48**	**2.69**	**0.008**
Emotional involvement	4.03	0.90	3.47	1.21	0.12	0.99	**0.46**	**2.52**	**0.014**
Social involvement	3.88	0.85	3.48	1.05	0.01	0.79	**0.38**	**2.02**	**0.047**

Note: Values shown in bold are statistically significant; Negative values indicate that (C) group findings recorded higher scores.



Graph 1 Predictors of general enjoyment in music (the experimental group)