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Use of Music and Openness in a Group of Teachers-in-Training Receiving a Musical Intervention

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ABSTRACT

The effects of music education on cognitive abilities have raised great interest among scholars of education and learning. According to literature, the use of music in pedagogical practices enhances learning processes with positive impact on the intellectual and social development of students. The main objective of this study was to explore the personal experience with music of teachers-in-training while participating in a musical intervention. The intervention, included both theoretical and practical modules, was delivered during a Digital Storytelling (DST) course. Specifically, our main aim was to investigate possible relationships between the personality openness dimension of teachers-in-training, the role of music in their personal life, and rewards they perceived associated with music. 818 teachers-in-training attending the DST class in an online specialisation course at the University of Foggia were enrolled. After their informed consent was obtained, they completed an online survey including three self-report questionnaires: The Big Five Inventory (BFI; John et al., 1991), The Brief Music Experience Questionnaire (Brief-MEQ; Werner et al., 2006 and the Barcelona Music Reward Questionnaire (BMRQ; Mas-Herrero et al., 2013). The research study was approved by the Institutional Review Board of the University of Foggia. In order to test the associations among the studied variables, correlations (Pearson's *r*) and a CFA analysis were conducted using the SPSS software. Results showed that teachers who reported to positively use music daily ($r = .67$), especially enjoy in sharing music with other people, and teachers who reported to use music as a reward in terms of special connection with it ($r = .64$), also reported higher levels of openness (originality, curiosity, reflective thinking, imagination, invention, giving values to artistic and aesthetic experiences). Our results highlight the importance of including music in learning processes as a possible mediator able to enhance teachers and students' socio-emotional and cognitive skills.

Keywords: Digital Story Telling, music education, music intervention, openness, teacher-in-training

Introduction

The effects of music education on cognitive abilities have aroused growing interest in the scientific community in recent years. The study of musical disciplines is associated with a greater development of both intellectual (multiple intelligences, general and factorial intelligence) and executive functions of students (Gardner, 2016; Medina-Garrido & Mejorando, 2017; Vélez & Rico, 2017; additionally, numerous studies confirm the ability of music to trigger physiological responses, such as changes in heart rate, breathing, skin temperature and conductance as well as hormone secretion (Koelsch, 2012).

It is difficult to associate music lessons with academic achievement (Dumont et al., 2017) since there are several variables involved including personality traits that can act as advantageous factors for the development of the cognitive functions and motivation to follow music lessons (Corrigall et al., 2013). The longitudinal analysis conducted by Jaschke and colleagues (2018), for example, has shown that music education positively influences the cognitive abilities of children at 6 years of age, especially those relating to inhibition and planning. The study also reveals an effect of transfer of skills, from musical education to academic performance, mediated by executive sub-functions. Considering the beneficial effects of music on the development of children in relation to emotional intelligence, academic performance and prosocial skills (Blasco-Magraner et al., 2021) it could, therefore, be concluded that music should be used in school settings, not only as an important subject in itself, but also as an educational tool within the curricula.

The role of music on cognitive and emotional development can be explained by several factors. First of all, the human neural processing of music involves an extremely complex and widespread bilateral network of cortical and subcortical areas that integrate various functions including auditory, cognitive, motor, sensory and emotional ones (Koelsch, 2011). Furthermore, music is an essential component of many social activities and differences in music preferences tend to vary widely from person to person. The relationship between personality and artistic preferences has received considerable attention from psychologists over the years, in an effort to further delineate the predictive utility of traits on specific factions of human behavior. Understanding the relationships between music preference and personality may inform applications of music therapies.

According to Chamorro-Premuzic and Furnham (2007) people listen to music as a means of emotion regulation, cognitive stimulation, and as a background stimulus. Further, Chamorro-Premuzic and Furnham (2007) hypothesized and found evidence for individual differences in uses of music, whereby individuals rating high in trait neuroticism were found to use music as a medium for emotion regulation, whereas openness to experience correlated positively with cognitive uses of music. These findings provide a sense of coherence between trait and

behavior; individuals experiencing a high degree of negative affect as a function of trait neuroticism may be predicted to engage in music listening as a means of regulating mood states, just as those fascinated by aesthetic beauty and art may use music as a means of cognitive stimulation by actively appreciating the complexity of musical compositions. Openness to experience, indeed, has been found in several studies to be associated with cognitive and intellectually-stimulating functions of music listening and neuroticism with affect-regulating functions (i.e., regulating moods and emotions; (Chamorro-Premuzic & Furnham, 2007). Moreover, Chamorro-Premuzic and Furnham (2007) showed that intelligent and intellectually-engaged people are likely to listen to music for cognitive stimulation, and that introverted people tend to use music for affect regulation.

Other variables also influence the uses of music (North et al., 2004; Greb et al., 2019. For example, being alone while listening to music helps to reduce tension and loneliness (Tarrant et al., 2000). Singing in group and average level of attention to music are associated to higher levels of wellbeing than solo singing (Greasley & Lamont, 2011; Stewart & Lonsdale, 2016; Greb et al., 2019.

The significant effects of music on brain function have led to the implementation of specific therapies that use music as a therapeutic tool, in sectors including in psychiatric rehabilitation as well as therapies for contrast of cognitive aging, regulation of neural development of premature babies, and treatment of diversabilities (Chorna et al., 2019; James et al., 2020; Koelsch, 2011; Lordier et al., 2019; Sihvonen et al., 2020; Torppa & Huotilainen, 2019).

Technology is a tool that is capable of enhancing the association between music education and intelligence. In this the digital revolution, transliteracy mediates the breakdown of the limits of traditional educational practice to develop the potential of all learners. Technology, therefore, contributes to the evolution of education by promoting socialisation, personalised learning and high levels of motivation and involvement (Fabbro et al., 2017; Toto, 2019). For example, Lv and Luo (2021) have shown that online platforms have the potential to generate more creative approaches for music teaching and improve student performance since having online resources allows for a higher quality of both teaching and learning. The literature has, therefore, demonstrated the usefulness of not only music education but also of technology as a means of teaching it to improve cognitive, relational and psychological skills.

The association between musical education and intelligence is supported by the fact that musical ability in humans play a key phylogenetic role in the evolution of language and cognitive abilities in general. In fact, music and language share the hierarchical structure of their subcomponents and the neural bases (Yu et a., 2017); moreover, pedagogical practice that is mediated by music induces benefits on general learning, emotional communication and reflexive as well as metacognitive abilities (Biasutti, 2017). It can be concluded that music education

has a strong impact on the intellectual, social and personal development of children, young people and the elderly, and therefore on the psychological well-being of the individual throughout his life.

The current study

The main objective of this study was to explore the personal experience with music of teachers-in-training while participating in a musical intervention. The intervention, included both theoretical and practical modules, was delivered during a Digital Storytelling (DST) course. Specifically, our main aim was to investigate possible relationships between the personality openness dimension of teachers-in-training, the role of music in their personal life, and rewards they perceived associated with music.

Method

The intervention, called *'DST music and soundtracks'*, was constituted in the model of the University of Foggia (present below) (Limone et al., 2021) in a theoretical lesson on listening to music, musical intelligence and three international good practices (Toto, 2017) of technology-mediated music teaching in which students observe student treatment, behaviour and outcomes of this teaching practice. As an alternative to the latter theme, it is possible to replace it with a lesson on rhythm for which no prior knowledge of musical content is required. This first phase lasts for 2 hours.

As shown in table 1, the group of students who were subjected to a second theoretical-experiential treatment centred on the following themes:

1) In-depth study of neuro-aesthetic studies concerning the neural basis of musical appreciation with particular reference to the theories of Brattico and Pearce (2013), according to which musical aesthetic experience consists of aesthetic emotions, aesthetic judgments and manifestations of preference, and Zentner et al., (2008) who elaborated a model of nine music-induced emotions called GEMS.
2) Analysis of musical structures and characteristics that are capable of determining positive or negative sensations in a constant and universal way. Distinguishing between consonant and dissonant harmonic intervals that are the basis of tonal and atonal music, which is typical of twentieth century composers. Listening to the piece, "Duo for Bruno", by Franco Donatoni and analysing the main characteristics at compositional and stylistic level.
3) In-depth study of the role devoid of familiarity and expectations in musical appreciation: "exposure effect" (Ritossa & Rickard, 2004) and "boredom effect".

4) Analysis of the functions performed by music in films with reference to the essay, "Sound and image. Music, voice, noise and silence in films", by Vincenzo Ramaglia, edited by Dino Audino. For each function, brief theoretical explanation and viewing of extracts from some well-known film scenes is included such as predictive function in "The Shark" by Spielberg, interpretative function in "A Clockwork Orange" by Kubrick with Rossini's soundtrack, provocative function in "Bowling for Colombine" by Michael Moore with the soundtrack "What a wonderful World" by Amstrong, and function of moral connotations of the characters.

This second treatment lasted 45 minutes.

Table 1. Music tutorial for DST

1) Theoretical phase	▸ Emotional Intelligence; ▸ Musical listening; ▸ Good practice; ▸ Rhythm lesson.
2) Theoretical-experiential phase	▸ Neuro-aesthetics; ▸ Musical emotions; ▸ Musical exhibitions; ▸ Soundtrack functions.
3) First individual exercise	▸ Listening track; ▸ Elicitate emotions.
4) Second group exercise	▸ Evocation of music; ▸ Film.
5) Third group exercise	▸ Music association to Storyboard on personal history.

The third intervention opens with an individual exercise structured as follows:

Individual exercise 1 (30 minutes). Everyone listens to three minutes of the pieces that follow and mark, in the appropriate exercise file (represented in Table 2), the relative emotion felt between the following:

Table 2. Table of emotions in music

Wonder	Transcen-dence	Tender-ness	Nostalgia	Tranquil-lity	Power Joy	Tension	Sadness

The tracks used for the experiment were as follows:

- "Mars" (from "The Planets"), by Gustav Holst
- "La Primavera" (from "The Four Seasons"), by Antonio Vivaldi
- "Adagio" in G minor, by Tommaso Albinoni and Remo Giazotto
- "Night on Bald Mountain"
- "Adagio for strings", op. 11 by Samuel Barber
- "Midsommarvarka", by Hugo Alfvèn

With a break of 10 to15 minutes, a second exercise is structured in small groups of 8–10 people according to the following model: indicate, as a group, which characteristics of the music according to the listener induce the sensations described above (30 minutes). Moreover, participants were asked: Which movie or scene would you match each of the following fragments to?

- "Bonito" by Jarabe de Palo
- "Beggin" by Maneskin
- "This must be the place" by Talking Heads
- "Getting older" by Billie Eilish
- "Photograph" by Ed Sheeran
- "The passenger" by Iggy Pop

The last intervention comprises an exercise to choose a soundtrack that is consistent with a work produced in a previous workshop to write a storyboard on a personal story:

- 3rd group exercise (30 minutes): replace the media included in the storyboard with non-copyrighted media using the repositories indicated in the file "attached to exercise 3".

Participants

The research is developed in the Italian context, where the specialisation course of teachers is online, and it groups teachers on a national scale; therefore, students belong to all areas of Italy (63% from southern Italy; $n = 818$). The maximum age for the respondents was 60 and the minimum was 22. Out of all the respondents, 125 (15.28%) were males and 690 (84.72%) were females.

In fact, the teachers who were interviewed received a follow-up to all eight steps of the Foggia model, by passing an exercise phase where they worked individually to a collective phase where they worked in groups. The interviewees were an adult population belonging to different areas of Italy with an extensive training course.

The final version of the questionnaire, in addition to demographic questions on gender, age and grade of school, presented 76 Likert-type questions relating to the previous three scales with which the user could express various levels of agreement or disagreement.

Measures

The Big Five Inventory

The Big Five Inventory (BFI) was developed by John, Donahue and Kentle in 1991. The BFI in the English version consists of 44 items and allows for an efficient and flexible assessment of the five dimensions of personality. The construction of the items was derived from the definitions of the Big Five prototypes that were developed by Robert R. McCrae and Paul T. Costa in 1985. The authors postulated five big dimensions (Big Five) of personality: extroversion-introversion, agreeableness-unpleasantness, conscientiousness-neglect, neuroticism-emotional stability and open-mindedness-closed-mindedness. The items are short and they avoid complex sentence structures to maintain the advantages of brevity and simplicity and avoid some pitfalls such as ambiguous or multiple meanings and desirability. Participants rate each item on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Scores on the scale are calculated as the participant's average item response (i.e., adding all items rated on a scale and dividing by the number of items on the scale). Some items are evaluated by means of a Likert scale by inverting the score and replacing 1 with 5, 2 with 4, 4 with 2 and 5 with 1. The result then generates a total score for each personality dimension. Despite its brevity, the BFI does not sacrifice either the exhaustiveness of the contents or the good psychometric properties. Recently, the BIF-2, which contains 60 items, has also been published to measure traits at both domain and facet levels as well as control compliance bias.

The Brief Music Experience Questionnaire (brief MEQ)

The MEQ comprises a questionnaire on the role of music in the life of the subject, the items that concern his thoughts, feelings and reactions to the music and how it relates to other activities. The subject is asked to indicate, for each statement, an answer using a scale ranging from 1 (very false) to 5 (very true). The questionnaire measures individual differences in the relationship with music using a short version of 53 items built in 1995 by Paul Werner, Alan J. Swope and Frederick Heide (2006). The first version of the MEQ comprised 141 items and was developed in 1992 by them. The scales in the short version have been developed on a rational and theoretical basis and have been refined through item analysis to increase internal consistency and reduce redundancy between scales. The scales are as follows: commitment to music (centrality of the search for musical experiences in the person's life), innovative musical aptitude (ability to perform music as well as generate musical themes and works), social uplift (experience of being stimulated and raised in a group-oriented manner by music), affective reactions (affective and spiritual reactions to music), positive psychotropic effects (calming, energising and integrating reactions) and reactive musical

behaviour (behavioural responses including humming, swaying, etc. along with music). Recently the scale was used by Calma-Roddin and Drury (Calma-Roddin & Drury, 2020) to probe the innovative musical aptitude in order to explore the relationship between language and music.

The Barcelona Music Reward Questionnaire (BMRQ)

The BMRQ was developed by Mas-Herrero, Marco-Pallares, Lorenzo-Seva, Zatorre and Rodriguez-Fornells in 2013 (Mas-Herrer et al., 2013). The authors intended to study the musical experience by probing, in particular the reward associated with music. The questionnaire consists of 20 items that require responses averaged on a Likert scale ranging from 1 (absolutely disagree) to 5 (absolutely agree). The musical reward experience has been operationalised in five dimensions: musical research, evocation of emotions, mood regulation, social reward and sensory-motor reward. These factors were correlated with socio-demographic factors and measures of general sensitivity to reward and hedonic experience. The reliability calculated for the overall BMRQ is acceptable and equal to 0.92. The questionnaire was recently used by Ferreri and Rodriguez-Fornells (Ferreri & Rodriguez-Fornells, 2017) to study the relationship between music, reward and memory. The authors demonstrated that music-driven reward responses directly implicated higher cognitive functions and probably explained the individual differences in memory performance.

The research study complied with the general ethical principles of the Declaration of Helsinki and was approved by the research team's University Institutional Review Board, protocol code 40979-III.11 and approved on 16 October 2021 issued by University of Foggia.

Results

Reliability Analysis

Reliability analysis was used to check the reliability of questionnaire by Cronbach alpha C_α ranges from 0 to 1. If C_α is greater than 0.9 considered as Excellent, $C_\alpha = 0.9 > \alpha \geq 0.8$ is good, $0.8 > \alpha \geq 0.7$ is acceptable, $0.7 > \alpha \geq 0.6$ is questionable, $0.6 > \alpha \geq 0.5$ is poor and $0.5 > \alpha$ is Unacceptable.

Table 3 shows the reliability of the questionnaire which is consist of four sections that is Demographic variables, BFQ, Barcelona and Music Experience (MEQ). Demographic variables have 3 questions the C_α is 0.101 which is considered as Unacceptable, BFQ has ten Elements with C_α is 0.8444 is considered as good. Barcelona (BAR) has 20 elements with $C_\alpha > 0.8$ which is considered as Good and Music expertise have excellent value of Cronbach's alpha. Overall reliability of all questionnaires with 79 elements is excellent.

Table 3. Reliability Analysis

Variable	Items	Cronbach's Alpha	Performance
Demographic Variables	3	0.101	Unacceptable
BFQ	10	0.844	Good
BAR	20	0.846	Good
MEQ	46	0.915	Excellent
Overall Reliability	79	0.938	Excellent

Descriptive Statistics

Table 4 shows the descriptive statistics for BFQ that includes minimum, maximum, mean and standard deviation of every variable. As shown in above table maximum and minimum value of very variable is 1 and 5 except, curious about many different things and likes to reflect, play with ideas having minimum value is 2. Mean value of coming up with new ideas is 3.63 with standard deviation 0.875, mean and standard deviation of curious about many different things is 4.05 and 0.805. Mean value of people prefers work that is routine likes to reflect, play with ideas is 3.89 with standard deviation 0.772, artistic interest have mean 4.11 and 0.979 standard deviation.

Table 4. Descriptive Statistics for BFQ

	Min.	Max.	Mean	Std. Deviation
Is original, comes up with new ideas	1	5	3.63	.875
Is curious about many different things	2	5	4.05	.805
Is ingenious, adeep thinker	1	5	3.63	.885
Has an active imagination	1	5	3.77	.844
Is inventive	1	5	3.66	.843
Values artistic, aesthetic experiences	1	5	3.74	.896
Prefers work that is routine	1	5	3.80	.949
Likes to reflect, play with ideas	2	5	3.93	.772
Has few artistic interests	1	5	4.11	.979
Is sophisticated in art, music, or literature	1	5	2.87	1.034

Table 5 shows the descriptive statistics for music choice for people live in Barcelona Minimum and Maximum value for each variable is same. Mean value for "When I share music with someone, I feel a special connection with that person" is 3.96 with standard deviation 0.896, Mean value for "In my free time I hardly listen to music" is 2.13 with Standard deviation 1.275. Mean responses of "I like listen to music that contains emotion" is 4.55 with standard deviation

0.781. participants mean responses on "Music keeps me company when I'm alone" is 4.33 with standard deviation 0.781. Respondents in Barcelona thinks "Music makes me bond with other people" with mean response is 4.09 with standard deviation is 0.858.

Table 5. Descriptive Statistics for Barcelona

	Min.	Max.	Mean	Std. Deviation
Special connection	1	5	3.96	.896
I hardly listen to music.	1	5	2.13	1.275
Emotion	1	5	4.55	.781
Alone	1	5	4.33	.908
Don't like to dance	1	5	1.82	1.194
Bond with other people	1	5	4.09	.858
Inform myself about music	1	5	4.12	.938
Emotional listening to certain	1	5	4.69	.634
Calms and relaxes	1	5	4.49	.721
Makes me dance	1	5	3.99	1.075
Looking for new music	1	5	3.49	1.040
Listen to a melody	1	5	4.03	1.127
Sing or play an instrument	1	5	3.35	1.268
Helps me chill	1	5	4.39	.807
Can't help humming or singing	1	5	4.39	.871
Feel connected to the performers	1	5	4.17	.915
Quite a bit of money	1	5	2.65	1.113
Feel chills	1	5	4.45	.784
Music comforts me	1	5	4.19	.884
Can't help tapping	1	5	4.02	1.007

Table 6 shows the descriptive statistics for Brief Music Experience. Mean Value of "I frequently hear songs in my head" is 4.44 with standard deviation 0.707. Mean responses of "I feel more integrated (more "together") when I hear certain kinds of music" is 4.18 with standard deviation 0.864. The mean responses of "I often sing, hum, or whistle along with recorded music" is 4.22 with standard deviation 0.856. Mean value of "I would never want to listen to the same piece of music twice in a row" is 2.09 with standard deviation 1.081. Mean responses of "When I'm enjoying music with other people, I feel like we're speaking the same language" is 4.17 with Standard deviation 0.828. "I've had musical experiences that have changed my whole mood" with mean value 3.99 and Standard deviation is 1.005. Mean responses of the respondents on "I enjoy singing in the

shower or bath" is 3.65 with Standard deviation 1.231, for "I sometimes spend more money than I can afford to attend a musical performance" is 2.24 with standard deviation is 1.190, for "It is hard for me to keep the beat when Dancing" is 2.13 with Standard deviation 1.171. Mean responses on "Music unites my mind and my body" is 4.14 with standard deviation 0.920.

Table 6. Descriptive Statistics for MEQ

	Min.	Max.	Mean	Std. Deviation
Frequently hear songs	1	5	4.44	.707
More integrated	1	5	4.18	.864
Sing, hum, or whistle	1	5	4.22	.856
Same piece of music twice	1	5	2.09	1.081
Enjoying music with other people	1	5	4.17	.828
Musical experiences changed mood	1	5	3.99	1.005
Singing in the shower or bath	1	5	3.65	1.231
Attend a musical performance	1	5	2.24	1.190
Beat when dancing	1	5	2.13	1.171
Unites my mind and body	1	5	4.14	.920
Made me feel joyous	1	5	1.50	.883
Music that has a message	1	5	4.12	.885
Singing a beloved song	1	5	4.05	.945
Private experience	1	5	3.72	.989
Family had sung together	1	5	3.41	1.188
Patriotic songs	1	5	3.42	1.044
Childhood	1	5	3.19	1.287
Physically stirred up	1	5	1.24	.735
Important thing in my life	1	5	3.17	1.004
Forget my cares	1	5	3.80	.953
Hardly resist dancing	1	5	3.77	1.145
Sense of purpose and movement	1	5	3.96	.910
Closer to a higher power	1	5	3.60	1.075
Beat or rhythm in music	1	5	3.95	.930
Depth of my concentration on music	1	5	3.80	.996
Swaying in tune with music	1	5	3.91	1.034
Never affects my feelings.	1	5	2.08	1.132
No place in my life	1	5	1.50	.885
Helps me get out of myself	1	5	3.72	.972
Draws me strongly to dance	1	5	4.02	1.001

Table 6. Continued

	Min.	Max.	Mean	Std. Deviation
Sacrifices in my life	1	5	1.94	1.147
Certain musical performers' lives	1	5	3.23	1.183
Kinds of music	1	5	4.14	.809
Musical recordings	1	5	1.89	1.056
Music being performed	1	5	3.40	1.167
Feel so lonely	1	5	3.76	1.038
Tap my feet or hands	1	5	4.03	.939
Better able to face the world	1	5	3.62	1.036
Emotional side of music	1	5	1.74	.940
Some kinds of music	1	5	3.80	1.014
Aroused and satisfied	1	5	3.24	1.037
Sense of order	1	5	2.43	1.237
Period of my life	1	5	4.53	.687
Influence my emotions	1	5	4.16	.848
Life would be meaningless	1	5	3.13	1.256
Experiences of ecstasy	1	5	3.72	1.145

Correlation

Table 7 shows the correlation between BFQ and Barcelona variables, Correlation basically tells us a strength of the relationship between two variables from the above table the relationship between "When I share music with someone I feel a special connection with that person" and "Is original, comes up with new ideas" is 0.234 which is a weak, this variable also shows weak relationship with all the variables of BFQ , Second variable of Barcelona is "In my free time I hardly listen to music" shows the weak and negative relationship with all variables of BFQ. Researcher observed that the correlation between all variables of Barcelona with BFQ variables have weak relationship none of the pair shows the strong strength relationship.

Table 8 shows the Chi square test for BFQ variables at 5% level of significance. First variable of BFQ is original comes up with new idea shows the Chi square value is 2.475 with 4 degree of freedom whose p value is greater than 0.05 so we conclude that the variable shows the non-significant effect, all variables of BFQ Chi square shows the non-significant effect with p value is greater than 0.05 except "Prefers work that is routine" it shows significant effect with chi square value is 10.02 with p value 0.04 which is less than 0.05.

Table 7. Correlation between BFQ and Barcelona

	BFQ_5	BFQ_10	BFQ_15	BFQ_20	BFQ_25	BFQ_30	BFQ_35	BFQ_40	BFQ_41	BFQ_44
Bar_1	.234**	.277**	.299**	.262**	.204**	.320**	.086*	.279**	.228**	.301**
Bar_2	−.102**	−.112**	−0.062	−.106**	−0.065	−.160**	−.129**	−.111**	−.287**	−.124**
Bar_3	.125**	.241**	.133**	.130**	.083*	.184**	.110**	.147**	.177**	.117**
Bar_4	.145**	.190**	.167**	.138**	.152**	.139**	0.057	.140**	.193**	.151**
Bar_5	−.102**	−.137**	−0.037	−.097**	−0.065	−.159**	−.205**	−0.066	−.196**	−0.011
Bar_6	.189**	.265**	.200**	.188**	.169**	.248**	.165**	.203**	.252**	.205**
Bar_7	.214**	.287**	.226**	.236**	.197**	.287**	.186**	.170**	.364**	.250**
Bar_8	.122**	.236**	.115**	.135**	.098**	.178**	.154**	.195**	.241**	.093**
Bar_9	.137**	.218**	.130**	.158**	.112**	.183**	.161**	.182**	.232**	.120**
Bar_10	.132**	.169**	0.045	.124**	.087*	.163**	.121**	.114**	0.066	.090*
Bar_11	.288**	.274**	.251**	.217**	.250**	.320**	.094**	.233**	.244**	.305**
Bar_12	.126**	.140**	.100**	.199**	.093**	.192**	0.054	.136**	.174**	.145**
Bar_13	.231**	.254**	.176**	.198**	.160**	.309**	.137**	.168**	.203**	.303**
Bar_14	.135**	.178**	.155**	.155**	.129**	.183**	.152**	.162**	.203**	.164**
Bar_15	.134**	.189**	.156**	.202**	.101**	.185**	.158**	.179**	.182**	.136**
Bar_16	.196**	.218**	.243**	.214**	.158**	.278**	.135**	.166**	.237**	.222**
Bar_17	.206**	.195**	.229**	.163**	.185**	.327**	.084*	.126**	.196**	.382**
Bar_18	.164**	.197**	.145**	.191**	.103**	.191**	.176**	.167**	.249**	.154**
Bar_19	.157**	.193**	.198**	.204**	.192**	.221**	.086*	.175**	.208**	.216**
Bar_20	.108**	.174**	.102**	.145**	.105**	.184**	.160**	.118**	.130**	.143**

Table 8. Chi-square test for BFQ variables

Variables	Chi-Square	D.F	*p* value
Is original, comes up with new ideas	2.475	4	0.649
Is curious about many different things	2.032	3	0.565
Is ingenious, a deep thinker	3.892	4	0.421
Has an active imagination	3.547	4	0.471
Is inventive	0.8	4	0.939
Values artistic, aesthetic experiences	3.734	4	0.443
Prefers work that is routine	10.02	4	0.04
Likes to reflect, play with ideas	2.045	3	0.563
Has few artistic interests	1.325	4	0.857
Is sophisticated in art, music, or literature	5.703	4	0.222

Table 9 shows the Chi-square test for Barcelona variables at 5% significance level, Chi square value of "When I share music with someone, I feel a special connection with that person" is 6.675 with 4 degree of freedom shows the significant effect as p value is 0.015 which is less than 0.05. Chi square value of "I can't help humming or singing along to music that I like "is 8.35 with 4 degrees of freedom, shows significant effect as P value is less than 0.05 and "At a concert I feel connected to the performers and the audience" also shows the significant effect on the model with p value is less than 0.05. other all variables p value is greater than 0.05 which is non-significant for the model.

Table 9. Chi-Square for Barcelona Variables

Variables	Chi-Square	D.F	*p* value
Special connection	6.675	4	0.015
I hardly listen to music.	3.505	4	0.477
Emotion	0.503	4	0.973
Alone	4.038	4	0.401
Don't like to dance	7.168	4	0.127
Bond with other people	1.785	4	0.775
Inform myself about music	0.747	4	0.945
Emotional listening to certain	5.455	4	0.244
Calms and relaxes	2.422	4	0.659
Makes me dance	7.502	4	0.111
Looking for new music	3.656	4	0.455
Listen to a melody	3.74	4	0.422
Sing or play an instrument	6.848	4	0.144
Helps me chill	2.431	4	0.657
Can't help humming or singing	8.35	4	0.008
Feel connected to the performers	4.928	4	0.029
Quite a bit of money	3.174	4	0.529
Feel chills	3.127	4	0.537
Music comforts me	3.638	4	0.457
Can't help tapping	5.408	4	0.248

Table 10 shows the chi square test for Brief Music Experience. The Chi Square value for "It is hard for me to keep the beat when dancing" is 13.756 whose *p* value is 0.008 which is less than 0.05 so its shows the significant effect on the model. Chi square value for "I wish my family had sung together more when I was growing up" is 11.993 with p value 0.017, it shows the significant effect on the model, "I have never been physically stirred up by music" shows the chi

square value is 13.252 with p value is 0.01 is significant. Chi square value of "I am especially responsive to the beat or rhythm in music" is 14.518 whose *p* value is less than 0.05 so it also shows the significant effect, "I often find myself swaying in tune with music to which I'm listening", "Music has no place in my life", and "Certain music draws me strongly to dance" shows the significant on the model because *P* value of those variables is less than 0.05. Other variables of Brief Music Experience show the non-significant effect on the model because Chi Square Test shows the P value is greater than 0.05 level of significance.

Table 10. Chi-Square Test for Brief Music Experience

Variables	Chi-Square	D.F	*p* value
Frequently hear songs	4.345	4	0.361
More integrated	1.661	4	0.798
Sing, hum, or whistle	3.571	4	0.467
Same piece of music twice	1.096	4	0.895
Enjoying music with other people	1.567	4	0.811
Musical experiences changed mood	3.383	4	0.496
Singing in the shower or bath	7.011	4	0.135
Attend a musical performance	2.288	4	0.683
Beat when dancing	13.756	4	0.008
Unites my mind and body	6.534	4	0.163
Made me feel joyous	0.451	4	0.978
Music that has a message	0.4531	4	0.339
Singing a beloved song	1.076	4	0.898
Private experience	3.589	4	0.464
Family had sung together	11.993	4	0.017
Patriotic songs	3.645	4	0.456
Childhood	2.6	4	0.627
Physically stirred up	13.252	4	0.01
Important thing in my life	6.069	4	0.194
Forget my cares	8.408	4	0.078
Hardly resist dancing	2.116	4	0.714
Sense of purpose and movement	7.738	4	0.102
Closer to a higher power	8.367	4	0.079
Beat or rhythm in music	14.518	4	0.006
Depth of my concentration on music	2.487	4	0.647
Swaying in tune with music	9.681	4	0.046
Never affects my feelings.	7.094	4	0.131
No place in my life	9.993	4	0.041
Helps me get out of myself	1.463	4	0.833

Table 10. Continued

Variables	Chi-Square	D.F	*p* value
Draws me strongly to dance	10.565	4	0.032
Sacrifices in my life	5.472	4	0.242
Certain musical performers' lives	4.082	4	0.395
Kinds of music	4.197	4	0.38
Musical recordings	1.208	4	0.877
Music being performed	1.387	4	0.847
Feel so lonely	2.818	4	0.589
Tap my feet or hands	3.882	4	0.422
Better able to face the world	1.456	4	0.834
Emotional side of music	1.623	4	0.805
Some kinds of music	1.785	4	0.775
Aroused and satisfied	0.77	4	0.999
Sense of order	0.767	4	0.93
Period of my life	2.45	4	0.654
Influence my emotions	3.436	4	0.488
Life would be meaningless	1.128	4	0.89
Experiences of ecstasy	0.725	4	0.948

Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) is a statistical technique used to verify the factor structure of a set of observed variables. CFA allows the researcher to test the hypothesis that a relationship between observed variables and their underlying latent constructs exists. Figure 2 shows the Confirmatory Factor analysis for the model from above figure Coefficient of determination between Brief Music Experience and BFQ is 0.64 it shows the model explained 64% variability in the model, Barcelona and BFQ shows 67% variability in the model and Barcelona and Brief Music Experience shows 95% variability in the model where e1, e2 …., e15 are unobserved errors in the above model.

Table 11 shows the Comparative Fit Index (CFI) of the model from the above table for default and saturated Model TLI and CFI is 0.838 and 0.865 these two values indicates the default model is progressive, for saturated model CFI is greater than 0.93 so we can conclude that our model is acceptable. The Root Mean Square Error of Approximation is a parsimony-adjusted index (Table 12). Values closer to 0 represent a good fit. It should be $< .08$ or $< .05$. For the default model our RMSEA value is 0.069 lies between the C.I[0.063,0.076] so, it represents the good fit. And P- Value is less than 0.05 so it shows significant effect.

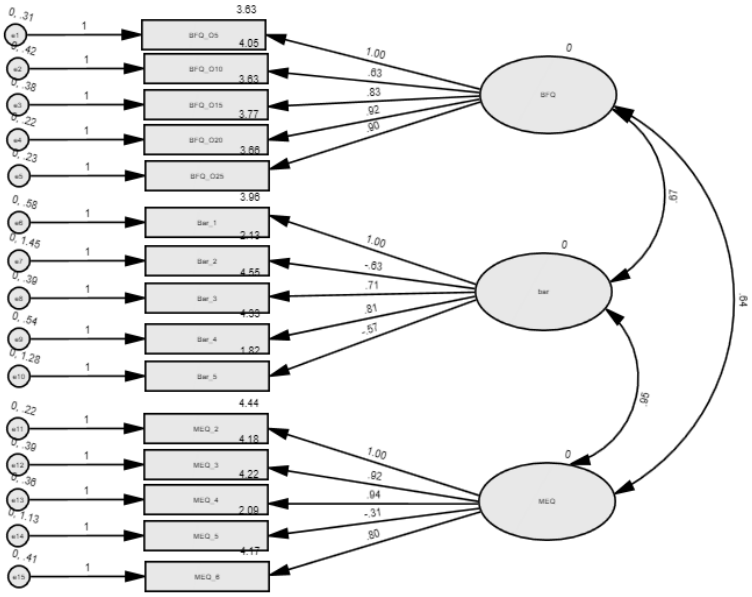

Figure 2. Confirmaty factor analysis

Table 11. Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.838	.804	.866	.838	.865
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Table 12. RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.069	.063	.076	.000
Independence model	.172	.167	.178	.000

Discussion & Conclusions

The results reported in the previous sections demonstrate that musical intervention in a digital storytelling laboratory, if properly designed, can produce important effects in learning. Specifically, the teachers in the initial training course who declare their love for routine work and reflection are particularly oriented to playing with new ideas and artistic interest. Additionally, the choice of the musical piece is linked to the dimension of sharing and social relationship between people. This treatment, although delivered as online teaching, produced the same results as face-to-face teaching (Alamos, 2019). The value that these teachers give to music in general is, however, linked to an intimate value, which they try to share in the peer group through exercises from the musical treatment. The most interesting result in the present study that should be further investigated is the very strong correlation between social relationship and creativity in generating innovative ideas. Music is, therefore, seen not as a distracting element (Soares Brito & Vieira, 2017), but as a creator (Alamino-Fernàndez, 2020) of social aggregation (Jeremić, et al., 2020). Besides, musical learning in childhood has a significant value and there is a belief that an early and familiar stimulation of music affects musical choices and knowledge in adulthood.

Furthermore, the study perspectives on musical intelligence have aligned with the current educational orientations by focusing attention on two structural dimensions of music: cognitive and emotional. The study of music must allow the development of a "unique" and original thought although, in reality, musical intelligence crosses other forms of intelligence and thought, makes them its own and at the same time contributes to develop and strengthen them (Custodio & Cano-Campos, 2017). Therefore, education through music, but also education in music. The second dimension, the emotional one, calls into question the education to affectivity since it develops reflection on the emotions themselves and their symbolic "putting into shape". Besides, education in affectivity favours decentralisation, with respect to them, since music implies knowledge, recognition and management of emotions through listening and reflection.

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