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MUSIC AS AN INFLUENTIAL FACTOR IN LEARNING

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Abstract

Music and non-music skills are often traditionally and automatically related, even though conflicting attitudes recur cyclically. Thoughts about how music affects learning, or the academic skills of pupils and students, constitute a chapter of their own. This overview study tries to answer the following research questions: In what psychological context are music and learning currently being investigated? What school subjects (or abilities and skills) are related to music in current research studies and for what purpose? What musical activities (reception, interpretation, production) are frequently researched in relation to learning? The study's objective is to summarise the current results of research into the relationship between music and learning, including a discussion of further possible research topics that could be promising with regard to making the academic learning of pupils and students easier. In the overview study, topics are presented that connect relatively different areas, i.e. learning non-music-related knowledge, abilities or skills, and the various uses of music. There are studies on music as part of the learning environment, on using music to study foreign languages, and on music affecting a person's emotional or social component in order to make learning easier. With regard to the aforementioned, school is a suitable place to apply these findings. To teachers, music offers an interesting opportunity to involve it in their instruction methods; to pupils, it offers an opportunity to use it to increase the effectiveness of their own learning.

Keywords: Music, learning, memory, skills, academic achievement, cognitive functions

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1. Introduction

For several decades, the influence of music on various abilities and skills has been a topic that encourages researchers to apply yet another treatment or approach. So far, the results have definitely not been unambiguous; they have even led to disputations of whether it is even meaningful to look into this relationship any further or whether it is a blind alley (Sala & Gobet, 2017).

2. Problem Statement

Therefore, even at this time, one can encounter relatively numerous studies in this area that try to bring new arguments to either confirm or refute existing findings, to contribute to the substantiation of the influence of music and other activities, or to give new impetus or provide a new application.

3. Research Questions

With the help of this overview study, we are looking for answers to the main research question: What are the topics and trends in the current research into the relationship between music and learning? Research sub-questions follow: (1) In what psychological context is music currently being investigated in relation to learning? (2) What school subjects (except for music education) are related to music in the current research and for what purpose? (3) What musical activities (reception, interpretation, production) are frequently researched in relation to learning? As mentioned earlier, this is a topic that has traditionally been researched. Our study focuses on the last decade and the research studies that have been carried out during that time. Therefore, not all findings are present, even though they may be of key importance and perceived as unquestionable with regard to this issue.

4. Purpose of the Study

In this article, learning is perceived in the wider sense of the word, not only as the acquisition of knowledge, but also as learning skills, developing abilities and gaining experience that can be used in various situations and areas of life. Our long-term objective, though, is to use music's possible potential mainly in education, in all age categories.

5. Research Methods

Literature from the years 2007 to 2017 was researched based on the combination of the following keywords: "music", "learning", "teaching", "effect", "memory", "skill", "achievement", "background" and "language". The selection only included studies written in English, but there was no limitation as to their region of origin. The keywords were restricted to the article title or its abstract. Not only empirical studies were included, but also meta-analyses and overview studies. An advanced search was conducted of the following databases: Web of Science, Scopus, Academic Search Complete, Business Source Complete, JSTOR Journals, SAGE Journals, ScienceDirect, ERIC and ProQuest.

The studies were included based on the following criteria:

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• They were related to learning in general (see above) or to learning at school or academic learning, i.e. their results can be applied in the educational area or the studies were carried out directly in a school environment. This led to the exclusion of studies focused on the areas of commerce, advertising, work, etc.

• They did not apply only to music education or music studies, but overlapped – even implicitly – with other areas and subjects. Therefore, studies that were primarily focused on music education were excluded.

Altogether, 56 studies were included that were in accordance with the objectives, research questions and criteria of this article.

6. Findings

The sub-chapters are ordered according to the research questions to which answers are being sought based on current studies. First, through the lens of psychology, topics are searched for that appear in contemporary research studies that deal with relationships between music and learning. School subjects and corresponding abilities that are related to music (save for music education) in research studies follow. The last sub-chapter consists of musical activities that appear in research studies on their relation to learning.

6.1. The Psychological Context of Investigating the Relationship between Music and Learning

In this section, contemporary-research topics related to music and learning are presented. For the most part, these are topics that have already been investigated, but since no accordance has yet been found, the research studies are not only repeated but also create new designs, also due to new methods that can be applied for these purposes.

- **The Influence of Music on Cognitive Functions**

The influence of music on cognitive functions has been a permanent fixture in this context and has been so over the past ten years. With regard to the focus of this study, one needs to emphasise the influence of music on memory, which appears most often in the research, mainly in connection with verbal learning. The positive influence of music training on verbal memory was confirmed in primary-school pupils in a study by Roden, Kreutz & Bongard (2012), but better performance when recalling words of a verbal, auditory, tactile or abstract character was also found through experimentation (Taylor & Dewhurst, 2017). There is an interesting finding by Cohen et al. (2011), who focused on visual and auditory memory tested by appropriate stimuli – auditory memory tested by auditory stimuli (and not verbal stimuli with an auditory meaning) and visual memory tested by visual stimuli. Compared to the control group, participants who were actively involved in music and had formal music education showed better performance in terms of auditory memory, but according to this study, their music training had no influence on their visual memory, which is in contrast to the findings of Jacobson et al. (2008) who, in addition to auditory memory, found better performance in terms of visual memory among trained musicians. In their study involving musicians and a control group, Franklin et al. (2008) studied verbal

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memory, and their results showed that musicians have an advantage in this function. In the case of background music in young-adult participants, its influence on verbal learning was not confirmed (Küssner, de Groot, Hofman & Hillen, 2016). Apart from studies focused on exposure to music before or during actual learning, the effects of music to which individuals are exposed in the retention phase were also investigated (Judde & Rickard, 2010). Liu et al. (2015) focused on activities during breaks and compared remaining in silence, listening to classical music, and playing a computer game, with the last activity proving to be more beneficial than the others, particularly for visual learning. In a research study by Portowitz, Peppler & Downton (2014), fulfilling tasks of a musical character with the help of a computer program was reflected in general learning skills, especially in one's working memory, the ability to create a work strategy, and readiness to analyse complex structures. Working memory as a significant variable when investigating the effect of background music on learning was also tested by Christopher & Shelton (2017), whose research study showed it to be a factor affecting the extent to which an individual could be distracted by background music.

- **The Influence of Music on Brain Activity and Plasticity**

This sub-chapter is related to the previous one, but is different as regards the methods used to obtain information. This group of studies focuses on looking for the essence of similarities between music- and non-music-related activities or on describing and explaining the mechanisms that cause music to have an influence on learning. Most frequently, examination methods, mainly EEG, are used to explain such mechanisms. For instance, this is the case in a study by Peterson & Thaut (2007), who found stronger frontal interhemispheric coherence during musical verbal learning through an EEG test. Cheung et al. (2017) investigated verbal memory encoding by means of an EEG test and compared individuals with one year of music training against a control group without it. They found that during verbal information encoding, theta-frequency intrahemispheric coherence was increased and positively affected the performance of verbal memory.

- **The Influence of Music on Remedying or Compensating for Disorders**

There is a group of studies that investigate music as a compensatory and facilitative factor in various autism-spectrum disorders (Carnahan, Musti-Rao & Bailey, 2009; Simpson, Keen & Lamb, 2013; Schwartzberg & Silverman, 2016). Music training is reflected positively in the verbal memory of individuals with Williams-Beuren syndrome (Dunning, Martens & Jungers, 2015), but with regard to our focus there are relevant studies focusing on the education of individuals with specific learning disorders (Cogo-Moreira et al., 2012; Welch & Ockelford, 2015; Habib et al., 2016), in which music always seems to be a beneficial tool for improvement.

- **Music as a Motivational Agent for Learning**

Using songs in the teaching of foreign languages has been found to be motivating, with students showing increased interest and focusing their attention on working in class better (Aquirre, Bustinza & Garvich, 2016; Alinte, 2013). Increased motivation can then have an impact on better absorption of language phenomena in instruction, thanks to the activation of involuntary memory (Akhmadullina,

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Abdrafikova & Vanyukhina, 2016). When using musical elements in the instruction of non-music-related subjects, teachers can achieve favourable motivation and better pupil attitudes towards such subjects (An et al., 2014)

- **The Influence of Music on Emotional Mood**

Sue et al. (2017) identified positive effects from hearing music while reading. Their research involved the reading of e-books with background music present. Their results showed a positive contribution to one's emotional sphere, as, among other things, readers' learning anxiety decreased, leading to an increase in the reading rate. Other research studies which focused primarily on the learning of foreign languages deal with anxiety. The use of music seems beneficial for decreasing anxiety in the foreign-language classroom (Dolean & Dolean, 2014). When testing the basic components of suggestopedia, the influence of music on emotions, but mainly on cognitive functions, was not demonstrated (Shimbo, 2008).

- **The Influence of Music on Social and Personal Areas**

Kokotsaki & Hallam (2007) analysed music students' answers to questions related to the benefits perceived in participative music-making. The answers most frequently applied to the social area, particularly to the satisfaction of social needs (belonging, co-operation, social contact), but also to personal advantages (increased self-confidence, finding part of one's identity, etc.). The inclusion of songs in the instruction of foreign languages is usually assessed positively by the participants, who subjectively perceive their positive impact on the atmosphere in class and the level of co-operation among students, with the songs supporting the building of relationships in the group (Alinte, 2013; Akhmadullina, Abdrafikova & Vanyukhina, 2016).

- **The Influence of Music (Especially the Playing of an Instrument) on Motor Functions**

This music-related influence on an individual's development is investigated in relation to instrumental activities, i.e. the playing of a musical instrument. The influence on fine motor skills is confirmed in a study by Gzibovskis & Marnauza (2012), who demonstrated improved motor skills in terms of precision, speed and stability while learning to play the drums. Of course, the influence of music on gross motor skills and motor adroitness has also been investigated. For instance, Aghdasi et al. (2015) looked into the influence of fast, energetic music on the development of motor skills. No significant differences were found between the participants and the control group, which performed movement training without music.

- **Music as a Method of Learning**

Even though this entire chapter includes mainly the psychological context of music and learning, one cannot omit a group of studies that use music as a specific learning method, i.e. that work with verbal material being acquired directly through music, such as in a study by Purnell-Webb & Speelman (2008) in which various musical and psychological means, such as rhythm, melody and familiarity, were

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investigated. Learning with the help of a rhythm (at best a familiar one), or with the help of a melody, turned out to be effective in their study. Another experiment compared learning a text in a foreign language with the help of listening to a song or a poem and demonstrated that being exposed to a printed text while listening to a song was more effective (Rukholm, 2015). The method of listening to songs and analysing their lyrics is used especially in relation to foreign languages (Morales, 2008). However, music is also applied in even more distantly related subjects, such as mathematics (Hudáková & Králová, 2016).

6.2 The Use of Music in School Subjects

The influence of music training on overall academic achievement was investigated in adolescents, comparing students from music and non-music classes. The influence of music training is related to performance in individual school subjects; in a study by dos Santoz-Luiz et al. (2015), the largest difference between the monitored and control groups was found in L1 and natural sciences, while the smallest was detected in L2 and mathematics.

- **Foreign Languages**

Of all the school subjects, music in relation to learning a foreign language appears most often in the research. Sometimes it is with the help of listening to a song (Rukholm, 2015; Morales, 2008); sometimes the students sing as well (Aquirre, Bustinza & Garvich, 2016; Alisaari & Heikkola, 2016; Alinte, 2013; Ingraham, 2010) or use easy-to-handle instruments (Paolino & Lummis, 2015); and sometimes music is used as part of the learning environment. The effect on one's cognitive and auditory abilities is relatively clear, but there are still many questions, the answers to which would help us to understand and fully use music in the learning of foreign languages (Zeromskaite, 2014).

- **Native Language**

As native language and music are two methods that allow one to communicate and express oneself, their connection and simultaneous investigation are self-evident (Engh, 2013). The use of musical activities as part of pre-schoolers' phonological training can be beneficial for phonological awareness and make later reading practice easier (Herrera et al., 2011).

- **Mathematics**

Mathematical skills were tested in a study by Christopher & Shelton (2017) who found that they are negatively affected by popular music being played in the background. In the long run, there was no mathematical improvement in younger school-aged children who were subject to music training (Hua & Weiyi, 2014); however, when testing mathematical skills in pre-schoolers subjected to the Montessori method enriched with extra music lessons, it was found that after half a year of training, their mathematical skills improved significantly (Harris, 2017). In the case of younger school-aged children, music training was shown to be beneficial for the development of mathematical skills in a study by Courey et al. (2012). Using integrated musical-mathematical methods, An et al. (2014) found a better attitude towards mathematics and its usefulness than in those who were learning mathematics using the traditional textbook method.

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- **Other School Subjects**

Other school subjects are barely present in relation to music. The exceptions include physics (Ramsey, 2015), chemistry (Crowther & Davis, 2013; Last, 2009) and geography (Smiley & Post, 2014), and music is used primarily to boost motivation or interest, as a mnemonic aid, or as a method to liven up instruction that is otherwise sometimes less creative and entertaining (Crowther, 2012).

6.3 Types of Musical Activities Used for Learning

Of the musical activities used for sensorimotor, verbal, conceptual and social learning, listening to music, mainly with music being part of the learning environment, is the most prevalent. Another frequently occurring activity is music-making or longer-term contact with music within the framework of music training.

- **Listening to Music, Music Perception**

In a range of studies, background music is investigated as a factor that can shape one's learning environment. It appears from the research that music is an agent that can support but also subdue or complicate learning. It then depends on a host of variables, such as the type of music, the type of personality involved, and the type of activity being executed. There are also studies that reach the conclusion, for instance based on repeating an experiment, that background music does not have an effect on learning or that this influence is significantly unstable (Küssner, de Groot, Hofman & Hillen, 2016). A specially composed piece of music was used in a study to monitor its tempo and consonance and, using EEG, their effects on activation of the brain's cortical areas. The authors did not find that background music had an effect on verbal learning (Jäncke & Sandmann, 2010). Based on a meta-analysis, similar results were achieved by Kämpfe, Sedlmeier & Renkewitz (2011) who, however, looked at many areas of human activity (commerce, sports, transportation, etc.) and point out discrepancies in the research methodology of individual studies that can distort results and lead to erroneous conclusions. On the other hand, according to Chef et al. (2016), music known to participants was beneficial to their verbal memory. For instance, explanations as to why music could be useful in learning include the following: music has an excitation effect; it stimulates intentional attention; or it functions as a mnemonic aid. It is no surprise that apart from positive or neutral impacts, there are studies based on research that identify background music as having negative impacts, not only in children or adolescents, but also in older adults (Reaves et al., 2015). In the case of negative findings, the reasons include distribution or range of attention, negative influence on short-term memory or meta-cognitive abilities, etc.

Research studies that focus on listening to music in relation to learning use various materials. Participants are exposed to compositions from the area of artistic, prevailingly instrumental music. In connection with a known experiment (Rauscher, Shaw & Ky, 1993), current studies still use Mozart's Sonata for Two Pianos, KV 448 (Liu et al., 2015; Su et al., 2017), but researchers also use other composers and their compositions, for instance Mussorgsky's Night on Bald Mountain, the third movement of Beethoven's Symphony No. 6 (Judde & Rickard, 2010), or Bach's Brandenburg Concerto No. 4 in G major, BWV 1049 (Küssner, de Groot, Hofman & Hillen, 2016), other Baroque composers such as Handel and his Water Music (Shimbo, 2008), or have special compositions made for research

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purposes that correspond to their criteria (Jäncke & Sandmann, 2010). With regard to the fact that students most frequently choose non-artistic music as their background music, it is apt or even more applicable to investigate this genre. Here, the selections mostly include rock compositions and contemporary, mainstream popular songs (Morales, 2008; Chef, 2016; Christopher & Shelton, 2017), but folk songs are also included (Ingraham, 2010).

- **Music-Making, Music Interpretation**

This category is relatively specific, as it focuses mainly on musicians who are able to play an instrument or sing (Kokotskaki & Hallam, 2007); however, taking a broader view, one can include other individuals who are not musically trained but can still sing or play easy-to-handle musical instruments (Paolino & Lummis, 2015). In this category, one can also include studies focused on more or less concrete methods of instruction based on body percussion (Carretero-Martínez et al., 2014). All these cases showed positive impacts from music-making.

- **Music Production, Composition**

Composition is the most difficult musical activity, requires long-term training, and is related to active music training and enormous musical experience. These are not the only reasons behind the fact that this activity, due to its exclusivity, does not appear in the research in connection with other, non-music-related learning.

- **Music Training**

As this is not a separate musical activity, but an entire programme consisting of various musical activities, we include music training as a separate section. Playing a musical instrument, individually or as part of a larger ensemble, is a frequent factor investigated in connection with overlaps in and transfers to other areas. Individual and smaller-group music training (Roden, Kreutz & Bongard, 2012; Cheung et al., 2017), or more complex training, which apart from instrumental lessons and participation in a vocal or orchestral ensemble also included training of selected musical abilities (dos Santos-Luiz et al., 2015), was realised. Better results in academic achievement and an influence on executive functions and short-term memory were found in individuals subjected to orchestral musical instrument training; the longer the training, the greater its effects on the monitored functions and academic achievement (Holochwost et al., 2017). Some current studies are based on comparing non-musicians with musicians who had formal music education at music schools and conservatories (Jakobson et al., 2008; Cohen et al., 2011).

7. Conclusion

This overview study is a summary of current findings from the field of research investigating the relationship between music and learning. It found that “traditional” topics, already discussed in the past, return cyclically and are re-opened even today, for instance the influence of music on memory or other cognitive functions. There have been studies on music’s influence on motor functions, the psyche’s emotional and motivational sphere, and social and personality traits, and also on the compensatory possibilities of using music in some disorders or states that under normal circumstances can complicate

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learning (e.g. specific learning disorders). Among the school subjects in which music can be used in some way, foreign languages have been looked into the most, but native-language learning and mathematics also appear. Other school subjects are an exception. The most frequently occurring musical activity in relation to learning is listening to music, followed by music-making, either through singing or simple instrumental activities. Investigations into the influence of longer-term music training are also popular. Some older research studies are followed methodologically, while others have a brand new design, which sometimes complicates their comparisons and generalisations. However, new topics also appear or some themes from recent history are further elaborated. In terms of the age of the investigated persons, the research focuses primarily on children and adolescents. The least frequently studied age range is between middle age and old age, which offers opportunities for further research. The quantitative approach to research prevails significantly, especially comparing groups of individuals, one of which is a control group used to distinguish the influence of the main variable, i.e. music. Some research studies are relatively complicated in their structure and contain several variables that are investigated and evaluated through appropriate methods, while others have a simple foundation that can provide a certain transparency but cannot distinguish the influence of other possible variables that could enter into the results and that are not recorded. More frequently appearing variables are music type, socioeconomic status, IQ, age, individual musical components, and personality type. The latter ones were investigated, for instance, by Judde & Rickard (2010) using the BIS/BAS scales, but Eysenck's theory has also been used (Küssner, de Groot, Hofman & Hillen, 2016), and differences have been sought between introverts and extraverts (Cassidy & MacDonald, 2007).

One can expect that analogically to other scientific disciplines, in the case of human psyche, especially in learning, there is a synergetic effect, i.e. mutual influencing and enhancing of the effects of various input factors and variables, be they genetic dispositions, one's life path so far, plans and goals, personality properties and traits, motivation, influence by a group, music preferences, musical experience, etc. This is only confirmed by contradictions in the results and low general concordance based on scientific proof. On the other hand, one can also think about whether the described positive effects on learning could not be achieved by activities other than musical ones as well. Taking the opposite path, i.e. determining the influence non-musical activities have on musical ones, would also be interesting.

From our point of view, it seems to be most effective to use music in education for general cognitive development, for the learning of foreign languages, and for its social and emotional effects. However, there are definitely still many blank spots on the map of context between music and learning that need to be filled with knowledge and understanding.

References

Aghdasi, M. T., Najmabadi, Z., Jahedi, M., & Asl, S. M. (2015). Motivational Effects of Music on Performance and Learning a Chain Skill in Children. International Journal of Science Culture and Sport (IntJSCS), 3(4), 67-75.

Akhmadullina, R. M., Abdrafikova, A. R., & Vanyukhina, N. V. (2016). The Use of Music as a Way of Formation of Communicative Skills of Students in Teaching English language. International Journal Of Environmental & Science Education, 11(6), 1295. doi:10.12973/ijese.2016.400a

Alinte, C. (2013). Teaching Grammar Through Music. Journal Of Linguistic Intercultural Education, 67.

Alisaari, J., & Heikkola, L. M. (2016). Increasing Fluency in L2 Writing with Singing. Studies In Second Language Learning And Teaching, 6(2), 271-292.

An, S. A., Tillman, D. A., Boren, R., & Wang, J. (2014). Fostering Elementary Students' Mathematics Disposition through Music-Mathematics Integrated Lessons. International Journal for Mathematics Teaching & Learning.

Carnahan, C., Musti-Rao, S., & Bailey, J. (2009). Promoting Active Engagement in Small Group Learning Experiences for Students with Autism and Significant Learning Needs. Education & Treatment Of Children, 32(1), 37-61.

Carretero-Martínez, A., Romero-Naranjo, F. J., Pons-Terrés, J. M., & Crespo-Colomino, N. (2014). Cognitive, visual-spatial and psychomotor development in students of primary education through the body percussion–BAPNE Method. Procedia-Social and Behavioral Sciences, 152, 1282-1287.

Cassidy, G., & MacDonald, R. A. (2007). The effect of background music and background noise on the task performance of introverts and extraverts. Psychology Of Music, 35(3), 517. doi:10.1177/0305735607076444

Chew, A. S. Q., Yu, Y. T., Chua, S. W., & Gan, S. K. E. (2016). The effects of familiarity and language of background music on working memory and language tasks in Singapore. Psychology of Music, 44(6), 1431-1438.

Cheung M-c, Chan AS, Liu Y, Law D, Wong CWY (2017). Music training is associated with cortical synchronization reflected in EEG coherence during verbal memory encoding. PLoS ONE 12(3): e0174906. https://doi.org/10.1371/journal.pone.0174906

Christopher, E. A., & Shelton, J. T. (2017). Individual Differences in Working Memory Predict the Effect of Music on Student Performance. Journal Of Applied Research In Memory & Cognition, 6(2), 167. doi:10.1016/j.jarmac.2017.01.012

Cohen, M. A., Evans, K. K., Horowitz, T. S., & Wolfe, J. M. (2011). Auditory and visual memory in musicians and nonmusicians. Psychonomic bulletin & review, 18(3), 586-591.

Cogo-Moreira, H., Andriolo, R., Yazigi, L., Ploubidis, G., de Avila, C., & Mari, J. (2012). Music education for improving reading skills in children and adolescents with dyslexia. Cochrane Database Of Systematic Reviews, (8),

Courey, S. J., Balogh, E., Siker, J. R., & Paik, J. (2012). Academic music: music instruction to engage third-grade students in learning basic fraction concepts. Educational studies in mathematics, 81(2), 251-278.

Crowther, G. J. (2012). The SingAboutScience.org Database: An Educational Resource for Instructors and Students. Biochemistry And Molecular Biology Education, 40(1), 19-22.

Crowther, G. J., & Davis, K. (2013). Amino Acid Jazz: Amplifying Biochemistry Concepts with Content-Rich Music. Journal Of Chemical Education, 90(11), 1479-1483.

Dolean, D. D., & Dolean, I. (2014). The Impact of Teaching Songs on Foreign Language Classroom Anxiety. Philologica Jassyensia, 10513-518.

dos Santos-Luiz, C., Mónico, L. S., Almeida, L. S., & Coimbra, D. (2016). Exploring the long-term associations between adolescents' music training and academic achievement. Musicae Scientiae, 20(4), 512-527.

Dunning, B. A., Martens, M. A., & Jungers, M. K. (2015). Music lessons are associated with increased verbal memory in individuals with Williams syndrome. Research In Developmental Disabilities, 36565-578.

Engh, D. (2013). Why Use Music in English Language Learning? A Survey of the Literature. English Language Teaching, 6(2), 113-127.

Franklin, M. S., Sledge Moore, K., Yip, C. Y., Jonides, J., Rattray, K., & Moher, J. (2008). The effects of musical training on verbal memory. Psychology of Music, 36(3), 353-365.

Gzibovskis, T., & Marnauza, M. (2012). Development of young adults' fine motor skills when learning to play percussion instruments. Music Education Research, 14(3), 365-380. doi:10.1080/14613808.2012.685453

Habib, M., Lardy, C., Desiles, T., Commeiras, C., Chobert, J., & Besson, M. (2016). Music and dyslexia: a new musical training method to improve reading and related disorders. Frontiers in psychology, 7.

Harris, M. A. (2007). Differences in Mathematics Scores between Students Who Receive Traditional Montessori Instruction and Students Who Receive Music Enriched Montessori Instruction. Journal For Learning Through The Arts, 3(1),

Herrera, L., Lorenzo, O., Defior, S., Fernandez-Smith, G., & Costa-Giomi, E. (2011). Effects of phonological and musical training on the reading readiness of native- and foreign-Spanish-speaking children. Psychology Of Music, 39(1), 68. doi:10.1177/0305735610361995

Holochwost, S. J., Propper, C. B., Wolf, D. P., Willoughby, M. T., Fisher, K. R., Kolacz, J., & ... Jaffee, S. R. (2017). Music Education, Academic Achievement, and Executive Functions. Psychology Of Aesthetics, Creativity & The Arts, 11(2), 147-166. doi:10.1037/aca0000112

Hua, Y., Weiyi, M., Diankun, G., Jiehui, H., & Dezhong, Y. (2014). A Longitudinal Study on Children's Music Training Experience and Academic Development. Scientific Reports, 1-7. doi:10.1038/srep05854

Hudáková, J., & Králová, E. (2016). 11. Creative Interdisciplinary Math Lessons by Means of Music Activities. Review of Artistic Education, 12(2), 290-296.

Ingraham, B. F. (2010). The use of American Folksongs and Poetry in Spoken ESL Instruction. International Journal Of Learning, 17(7), 79

Jakobson, L. S., Lewycky, S. T., Kilgour, A. R., & Stoesz, B. M. (2008). Memory for verbal and visual material in highly trained musicians. Music Perception: An Interdisciplinary Journal, 26(1), 41-55.

Jäncke, L., & Sandmann, P. (2010). Music listening while you learn: No influence of background music on verbal learning. Behavioral & Brain Functions, 61-14.

Judde, S., & Rickard, N. (2010). The effect of post-learning presentation of music on long-term word-list retention. Neurobiology Of Learning & Memory, 94(1), 13-20. doi:10.1016/j.nlm.2010.03.002

Kämpfe, J., Sedlmeier, P., & Renkewitz, F. (2011). The impact of background music on adult listeners: A meta-analysis. Psychology Of Music, 39(4), 424. doi:10.1177/0305735610376261

Kokotsaki, D., & Hallam, S. (2007). Higher education music students' perceptions of the benefits of participative music-making. Music Education Research, 9(1), 93-109. doi:10.1080/14613800601127577

Küssner, M. B., de Groot, A. B., Hofman, W. F., & Hillen, M. A. (2016). EEG Beta Power but Not Background Music Predicts the Recall Scores in a Foreign-Vocabulary Learning Task. Plos ONE, 11(8), 1-16. doi:10.1371/journal.pone.0161387

Last, A. M. (2009). Combining Chemistry and Music to Engage Student Interest: Using Songs to Accompany Selected Chemical Topics. Journal Of Chemical Education, 86(10), 1202-1204.

Liu, S., Kuschpel, M. S., Schad, D. J., Heinz, A., & Rapp, M. A. (2015). Differential Effects of Music and Video Gaming During Breaks on Auditory and Visual Learning. Cyberpsychology, Behavior & Social Networking, 18(11), 647-653. doi:10.1089/cyber.2015.0140

Morales Neisa, C. (2008). Using rock music as a teaching-learning tool. Profile Issues in TeachersProfessional Development, (9), 163-180.

Paolino, A., & Lummis, G. W. (2015). Orff-Schulwerk as a pedagogical tool for the effective teaching of Italian to upper primary students in Western Australia. Babel (00053503), 50(1), 12.

Peterson, D. A., & Thaut, M. H. (2007). Music increases frontal EEG coherence during verbal learning. Neuroscience Letters, 412(3), 217-221. doi:10.1016/j.neulet.2006.10.057

Portowitz, A., Peppler, K. A., & Downton, M. (2014). In Harmony: A Technology-Based Music Education Model to Enhance Musical Understanding and General Learning Skills. International Journal Of Music Education, 32(2), 242-260.

Purnell-Webb, P., & Speelman, C. P. (2008). Effects of music on memory for text. Perceptual and Motor Skills, 106(3), 927-957.

Ramsey, G. P. (2015). Teaching Physics with Music. The Physics Teacher, 53(7), 415-418.

Rauscher, F. H., Shaw, G. L., & Ky, K. N. (1993). Music and spatial task performance. Nature, 365, 611.

Reaves, S., Graham, B., Grahn, J., Rabannifard, P., & Duarte, A. (2015). Turn off the music! Music impairs visual associative memory performance in older adults. The Gerontologist, 56(3), 569-577.

Roden, I., Kreutz, G., & Bongard, S. (2012). Effects of a school-based instrumental music program on verbal and visual memory in primary school children: a longitudinal study. Frontiers in Psychology, 3.

Rukholm, V. N. (2015). Singing to Speak: An Examination of Adult L2 Learners and Vocabulary Learning Through Song. Italica, 92(1).

Sala, G., & Gobet, F. (2017). When the music's over. Does music skill transfer to children's and young adolescents' cognitive and academic skills? A meta-analysis. Educational Research Review, 20, 55-67.

Schwartzberg, E., & Silverman, M. (2016). Effects of a music-based short story on short- and long-term reading comprehension of individuals with Autism Spectrum Disorder: A cluster randomized study. Arts In Psychotherapy, 4854-61. doi:10.1016/j.aip.2016.01.001

Shimbo, K. (2008). The effects of music, relaxation and suggestion on tertiary students' affect and achievement in learning Japanese as a foreign language. Australian Review Of Applied Linguistics, (2), 16.1.

Simpson, K., Keen, D., & Lamb, J. (2013). The use of music to engage children with autism in a receptive labelling task. Research In Autism Spectrum Disorders, 7(12), 1489-1496.

Smiley, S. L., & Post, C. W. (2014). Using Popular Music to Teach the Geography of the United States and Canada. Journal Of Geography, 113(6), 238-246.

Su, Y.-N., Kao, C.-C., Hsu, C.-C., Pan, L.-C., Cheng, S.-C., & Huang, Y.-M (2017). How Does Mozart's Music Affect Children's Reading? The Evidence from Learning Anxiety and Reading Rates with e-Books. Educational Technology & Society, 20 (2), 101–112

Taylor, A. C., & Dewhurst, S. A. (2017). Investigating the influence of music training on verbal memory. Psychology of Music, 0305735617690246.

Welch, G. F., & Ockelford, A. (2015). The importance of music in supporting the development of children with learning disabilities. International Journal Of Birth & Parent Education, 2(3), 23-25.

Zeromskaite, I. (2014). The potential role of music in second language learning: A review article. Journal of European Psychology Students, 5(3).International Maritime Organization (2010). International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978/1995/2010. Please replace this text with References list of your paper (Delete the example).