

Enhancing Students' Cognitive Memory Using Music in the Classroom

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Abstract

In the current educational settings till this day, students are facing certain distractions that disrupt and reduce their learning process efficiency. These distractions also affect the students' concentration in their learning environment. Music is known to have many capabilities to become one of many solutions to help students override these distractions as/ a huge influential part in the ways that humans interact with their surroundings. Sound is used in so many platforms to persuade human emotions, mostly in music, advertising, movies and television. The purpose of this research is to study how music can be used to influence the teaching and learning environment and to enhance students' cognitive memory so they can learn more efficiently. The research design we will be using is a mixed method. It will consist of Likert scale surveys, a Quasi-experimental research design to measure the participants' attitude and performance respectively and an open-ended questionnaire to gauge the participants' feedback. The sample design that will be used in this study is convenient sampling with random selection. The study will be performed on a cohort of private University students enrolled in Diploma of Creative Multimedia that were conveniently sampled. Finally, the results will be analyzed with the findings discussed to confirm the conceptual framework presented in this paper.

Keywords: Sound, Music, Student, Cognitive, Learning Experience, Classroom

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Introduction

There is a limit to the amount of information that humans can process at once (Mayer, 2014). In primary college learning, students' poor performance and negative attitudes have been identified. A research study was conducted with 198 randomly selected students from four universities to identify learning and teaching problems and solutions to improve performance (Betiku, 2001).

Students lack concentration in the classroom, disrupting and reducing the efficiency of their learning process (Stuart & Rutherford, 1978). Fatigue and drowsiness were among the factors that reduced students' concentration the most. A second disruptive factor was the teacher's skill in demonstrating application of the learning material. A third factor was environmental factors such as noise, ventilation, and lighting (Anderson, 1987). The same obstacles faced were again mentioned by (Mayer, 2001) and still exist today even more than 20 years later with more additional modern-day problems.

Learning, by definition, is the acquisition of knowledge or proficiency through study or experience. Outcomes of learning are reflected in behavioral changes, enabling people to do things they couldn't do before the learning process took place. However, this does not mean that changes should be made immediately after the learning experience. For example, soccer players learn to play specific positions and tactics by watching gameplay footage and videos during coaching sessions, but they don't translate what they learn into action until actual match time. No. This shows that even if a learner's behavior is not immediately influenced, it may behave differently as a result of learning. This shows that there is a very important difference between learning and performance (Qvortrup et al, 2016).

The purpose of this paper is to propose a conceptual framework. This study was initiated to investigate how music can be used to improve students' cognitive memory in learning. It is important to enhance students' learning ability and enhance their learning experience. Expanding research on the effects of sound and music on learning is crucial to filling gaps in existing research.

Literature Review

Cognitive theorists view learning as the acquisition or reorganization of cognitive structures that allow people to process and store information (Letchworth & Everett, 1990). Some of the main principles of cognitive learning theory relevant to this research are that memory is aided by the organization of learning materials and that teachers must provide tools to help learners' brains process information. Most learning theories, especially cognitivism, don't talk about sounds. They talk about active learning techniques and motivational learning content using sophisticated organizers such as problem solving, visual image elaboration, mnemonics, questions, notes, analogies and metaphors (Donovan et al, 1999). They organize the material by breaking it down into meaningful parts and using Concept maps to provide an overview to the learner (Letchworth & Everett, 1990). However, sound has never been identified as a factor influencing students' cognitive performance.

Given the above key principles and implications for education, it is easy to forget that learner motivation is a factor that greatly influences the teaching and learning environment. A student's learning success depends on their motivation as it drives them to reach and achieve their learning goals. Motivation is one of the most important factors for successful teaching.

We hypothesize that motivation is perhaps the most important factor in achieving these goals. Learning is indeed a daunting task as it pushes the human brain to its limits and without motivation it cannot be done effectively. Just because you have students in your class doesn't mean they want to learn. However, highly motivated students are more likely to be prepared and ready to learn, making classes and lectures more enjoyable. However if they are unmotivated, making the classroom experience frustrating and painful. Due to the compulsory nature of modern education, educators cannot take student motivation for granted. As such, you have an important responsibility to ensure that your students are motivated and ready to learn in the classroom. Think about this question. What can be done to improve and create a stimulating learning environment for learners? The purpose of this study is to investigate the effect of music on students' cognitive memory in their classroom.

In the film industry, sound is one of the most influential tools a filmmaker can use to evoke emotion. Experts agreed that a good film needs good sound design to truly wow their audiences. Many successful commercials have relied on its success for power and sound design quality over the years (Lafs, 2022). As an example from the advertising industry, McDonald's audio logo "I'm lovin' it" is well known and recognizable. To be precise, almost 93% of people are exposed and used to it. This is one of the big global campaigns that saw a significant increase in sales since the campaign was first launched and officially put into use (Franus, 2007).

Theories from previous studies on music and its influence on the perception of emotional stimuli by (Hanser & Mark, 2013). They had a theory called the dimensional model of emotion. This theory shows the influence of audio on human emotions. It is now one of Russell's leading models (Russell, 2003) and is widely used in the study of musical emotion. This theory proposed that human emotions have two orthogonal dimensions: arousal and valence, which together form the four quadrants of the emotional space. It is accounted for by the emotional categories used in the dimensional model to describe effects. For example, happiness and excitement correspond to high valence and high arousal. Sadness and depression are examples of many emotional states that exhibit low valence and low arousal. The purpose of this supplement is to review research on how music affects human emotions. It is therefore somewhat similar to the current study (Hanser & Mark, 2013).

Sound also affects human memory. It has a huge impact on the human experience of hearing a particular sound. There are certain memories and emotions that people associate with sounds based on past experiences (Boothby, 2017). Whether it is sound effects, chord arrangements for musical instruments in music. For this reason, sounds are very useful for manipulating human emotions and memories. Certain musical chords are known to reliably provoke emotional responses. Research has shown that sounds produced by major chords are more likely to evoke positive emotions and feelings. On the other hand, the sounds produced by minor chords can evoke negative emotions. In addition, other sounds we hear in our daily lives often represent unique memories and meanings for listeners (Horowitz, 2012). Familiarity with the sound also makes a difference in the emotional impact on the listener. For example, listening to the same song or piece of music multiple times can change its impact instead of hearing new or unfamiliar songs (Sloboda, 1991). Sound is used on many platforms. It manipulates human perception and mood, mostly in music, film, and television. Sound has a huge impact on how people interact with the world. It gives us appropriate social cues and triggers certain feelings and emotions such as: For example, a baby's cry evokes attention or sadness, while a baby's laughter evokes happiness instead. There is an official term for the study of sound known as psychoacoustics, which includes elements of the

psychological and physiological responses to all kinds of sounds, speech and music. Music has the ability to influence and stimulate human emotions (Sloboda, 1991). Some are used as a remedy to reduce stress and promote relaxation (Hanser, 1985). Some music, like lullabies, can be used to lull babies to sleep, while others have a calming effect on pregnant women during labor (Hanser et al, 1983). These studies show that music has tremendous positive effects on human emotions.

As humans, we tend to reach certain emotional states that directly affect our cognitive abilities (Pessoa, 2008). According to one proposed theory, emotion is a cognitive-based state that regulates sub autonomic nervous system function. Emotions provide biological answers to specific questions in multipurpose systems such as transitioning between Plans. Its job is to keep these transitions smooth, maintain them, and communicate them to yourself and others. Transitions occur at key points in plan development when the measure of the plan's success changes. Complex emotions arise at the intersection of social plans and are generated from several basic emotions (O'Connor et al, 1999). Another theory holds that emotions are a type of memory unit that can form associations with random events. Activation of this affective unit aids retrieval of relevant events and prepares emotional themes for use in free association, fantasies, and perceptual taxonomy (Bower, 1981).

Mayer's Cognitive Theory

Mayer's (Mayer, 2014) cognitive theory of multimedia learning is based on a synthesis of Sweller's cognitive load theory (Chandler, 1991), Baddeley's working memory model (Baddeley, 1992), and Paivio's dual coding theory (Paivio & Clark, 2006). These theories argue that perceived information should be presented in a way that makes the most efficient use of the learner's limited working memory resources. In multimedia teaching, where different sources of information such as words need to be incorporated. This cognitive overload can seriously affect learning. This theory provides useful information about why different combinations of media have different effects on learning and comprehension. Auditory/Linguistic Channels and Visual Imagery Channel is Mayer's focus, and he defines multimedia as providing learning materials that integrate both images and words. The definition of multimedia narrows down to two forms, pictures and words, as research in cognitive psychology is more relevant to this definition (Mayer, 2014). Figure 1. is a table explaining Mayer's cognitive theory of multimedia learning.

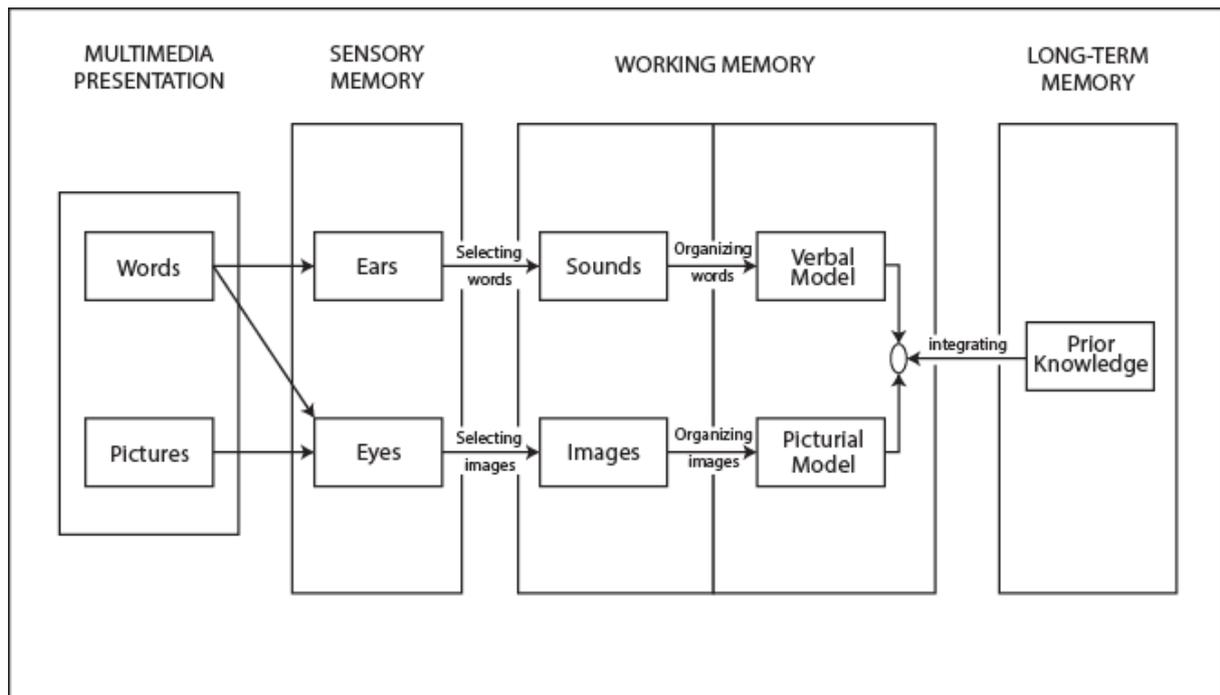


Figure 1: Cognitive Theory of Multimedia Learning by (Mayer, 2014).

This model is based on the three assumptions primarily made by (Mayer, 2014):

- i Visual and auditory experiences and information is processed through separate and distinct information processing channels.
- ii Each information processing channel is limited in its ability to process experience and information.
- iii Processing experience and information in channels is an active process designed to construct coherent mental representations.

Research conducted by Mayer and his team examines the effects and properties of multimedia on human learning. His modality principle states that individuals learn better not only from sight and on-screen text, but also from sight and hearing (Mayer & Moreno, 2003). His theories on multimedia learning have been validated by researchers around the world. Many people used different approaches. For example, a combination of text, speech and graphics (Beacham & Alty, 2006). Another researcher tested the cueing effect modality in the classroom. Adding visual cues to images resulted in higher scores, whereas replacing visual text with spoken text resulted in lower scores (Tabbers et al, 2004).

Conceptual Framework

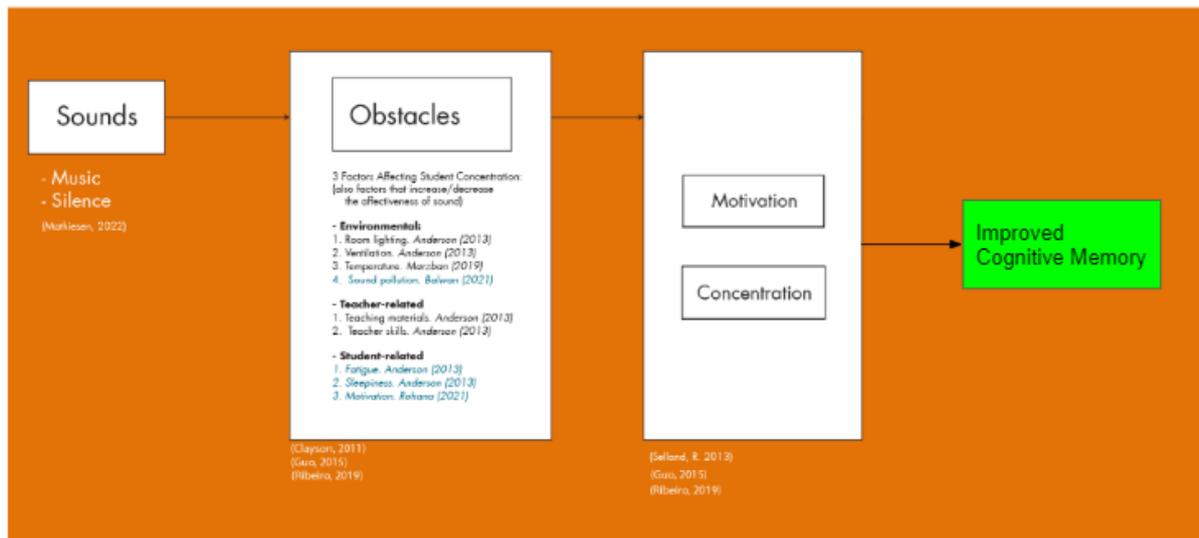


Figure 2: Conceptual Framework of The Relationship between Sound and Improved Cognitive Memory

This research combines all three-subject matter of music, emotion, and cognition to provide a conceptual framework that if music can positively affect human emotions, it might be possible to keep those emotions deviated from obstacles and distractions to improve the human's cognitive performance such as their motivation, mood, focus and concentration. If this is achieved, the ultimate goal of improving memory may be achieved (Schellenberg et al, 2013).

There are two different types of sounds used. Music, which is known to influence human emotions (Russell, 2003), and silence, which was previously used in other experiments to examine how different sound environments affect meal times, food intake, as well as responses to sonic dining environments (Mathiesen et al, 2022).

The definition of disability here refers to distraction factors that affect a student's ability to concentrate in a learning environment. These impairments are also factors that determine the increasing or decreasing of the music effectiveness used in this experiment. The main factors fall into three categories: environmental, teacher-related, and student-related (Anderson, 1987). However, this study only looked at noise pollution, fatigue, sleepiness, motivation and concentration.

All of these obstacles can be overcome or mitigated through the deliberate use of the right kind of music. Designed to stimulate human cognition and enhance learning and studying experience. One of the music genres we test is also known as lo-fi hip hop or chill hop (Winston & Saywood, 2019). A music format that is uploaded and transmitted over the Internet. To our knowledge, this is not currently being investigated academically (Alemoru, 2018). Another genre that we use is the classical music by Beethoven's "Moonlight Sonata", Vivaldi's "Spring", Chopin's "Nocturne in E Flat Major" (Asprou, 2020). The reason as to why classical music is used for the testing is because it has a good track record in previous experiments done by other researchers.

Under cognitive enhancement, we aim to stimulate students' motivation and concentration, in order to investigate whether this leads to improved memory performance at the end of the experiment (Ford et al, 2019).

Experimental Design Diagram

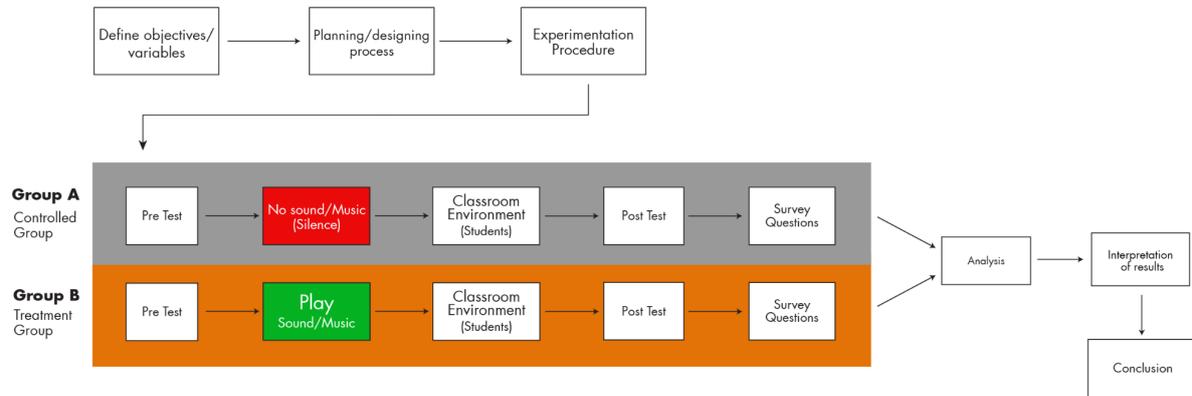


Figure 3: Flow of the experimental design diagram used in conducting experiments on two groups of students.

This experiment involves 50 first year students in The Faculty of Creative Multimedia, MMU, which are divided into two groups, each into a control group and a treatment group. All subjects take their concentration and memory index using the exact same pre-test and post-test, each retrieval of data has a rest interval of one week. In taking the second test, the treatment group worked on the test instrument while listening to a certain type of music played through a monitor speaker in the background that had been prepared and set up properly in the classroom. Then the data obtained are then tested for normality, validity, and reliability, and the correlation and significance are processed using the SPSS application. A similar experiment was conducted by another researcher using binaural beats on school students in Indonesia (Azalia, 2020).

Conclusion

The study, therefore, has provided that music can improve cognitive performance in students and help improve memory in the classroom. A number of studies have shown that listening to music leads to long-term and short-term cognitive improvements. However, this study aims to fill a gap in this research. This has, to my knowledge at the point of executing this research, never been done in the field of education in Malaysia, especially in physical or virtual online classrooms.

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