Enhancing Student Concentration and Motivation Using Sound in the Classroom

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Abstract. In many educational settings today, students have been found to lack the concentration and motivation to learn the content in the classroom. This reduces and disrupts the efficiency of their learning process. Humans have limitations in the amount of information that they can process at one time. Sound is used in many platforms, mostly in music, movies, and television, to affect human perceptions and moods. Sound plays a huge influential part in how humans interact with the world. The purpose of this research is to study how sound can be used to influence the teaching and learning environment and to enhance their concentration and motivation to learn. A conceptual framework will be designed to aid and guide the understanding of the relationship between sound and cognitive improvements.

Keywords: Sound · Student · Motivation · Cognitive · Learning Experience

1 Introduction

Humans have limitations in the amount of information that they can process at one time [1]. Poor performance and negative attitude of students while learning is confirmed to happen in primary colleges. A research study was conducted to identify learning and teaching problems and solutions to improve performance where 198 students from 4 colleges were selected at random [2].

Students lack concentration in the classroom, disrupting and reducing the efficiency of students' learning process [3]. One of the factors that caused students to lose concentration the most was fatigue and sleepiness. Second interfering factor was teacher skills in applied demonstration of learning materials. Third factor was environmental factors such as noise, ventilation and lighting [4].

Learning in definition is gaining knowledge, or mastery through studying or experiencing. Results of learning are shown through change in behaviour where learners are able to do something they could not do before the process of learning takes place. Although it does not mean that the change needs to occur immediately after going through the experience of learning. For example, football players learn to play certain positions or tactics by watching footage and videos of gameplays during their coaching sessions, but they may not yet convert the learning into behaviour until the actual game time. This shows that learners have potential to perform differently as a result from learning,

F. Mustaffa et al. (Eds.): ICCM 2022, ASSEHR 706, pp. 59–66, 2023.
https://doi.org/10.2991/978-2-494069-57-2_8

even though their behaviour is not affected immediately. This shows that there are very important differences between learning and performance [5].

The purpose of this paper is to propose a conceptual framework. This research is initiated to study how sound can be used to help improve students' motivation to learn. It is important to increase the students' learning capabilities and improve their learning experience. Expanding the research on the effects of sound in learning is crucial to fill in previous research gaps.

2 Literature Review

Cognitive theorists view learning as involving the acquisition or reorganization of the cognitive structures through which humans process and store information [6]. Some of the main principles of the cognitive learning theory that is related to this research are, memory is supported by organizing learning material and teachers must provide tools that help the learner's brain process information. Most learning theories, specifically cognitivism, do not talk about sound. They talk about active learning techniques and motivational learning content using problem solving, elaborations of visual imagery, mnemonics, questioning, note-taking, advanced organizers such as analogies and metaphors [7]. Organizing materials by chunking into meaningful parts and using concept maps to give overview to learners [6]. But sound was never highlighted as an element that affects students' cognitive ability.

Considering these key principles and classroom implications mentioned above, we tend to forget that motivation to learners is a very influential factor in the teaching-learning environment. The students' success in learning depends on their motivation as it drives them to reach and achieve their learning goals. Motivation is one of the important elements of successful teaching. Implying that motivation is probably the most important element to achieve these goals. Learning is indeed a hard effort as it pushes the human brain to its limits and can only happen efficiently with motivation. Students' presence in class does not equal any guarantee that they want to learn. But highly motivated students are likely to be more prepared and ready to learn, thus making any class or lecture fun to teach. On the other hand, if learners are unmotivated, they are likely to learn less and make the teaching experience frustrating and painful. Due to the compulsory nature of modern education, educators can never take students' motivation for granted, thus they have an important responsibility in ensuring that students are motivated and ready to learn in class. Now think about this question; what can be done to improve and create a stimulating learning environment for learners? The aim of this research is to examine the influence of sound towards the students' motivation in learning.

In the film industry, sound is one of the most influential tools filmmakers can use to provoke emotions. Professionals agreed to the fact that a great film would definitely need to have great sound design to really move the audience. A lot of successful commercials throughout the years relied on their power and success to their sound design quality [8]. An example from the advertising world, McDonald's "I'm lovin' it" audio logo is known and recognized by everyone. Almost 93 percent of the people to be precise are exposed and used to it. It's one of the huge global campaigns that has experienced a great increase in its sales since the first time the campaign was launched and officially used [9].

A theory from previous research that has been done about music and its effects on the perception of emotional stimuli by Hanser [10]. They had a theory which was called the dimensional model of emotion. This theory shows the influence of audio in affecting human emotions. It is now one of the main models done by Russell [11] and is being used widely in the musical emotions' studies. The theory proposed that there were two orthogonal dimensions of human emotions, which are arousal and valence, which together will form four quadrants of affective space. It is described in categories of emotions used with the dimensional model in describing the effect for example, happiness and excitement corresponds to a high-level valence and a high level arousal. While sadness and depression are some of the examples of many emotional states which have low level in valence and low-level arousal. The purpose of this addition is to examine the research on how music influences human emotions. Therefore, it is in some ways similar to the current study [10].

Sound also affects human memories. It has such a huge impact on the human experience when listening to a certain sound. There are certain memories and feelings that humans associate with sound based on previous experiences [12]. Whether it is sound effects, or chord arrangements from musical instruments in music. This is why sound is very useful if used to manipulate human emotions and memories. Certain musical chords are known to have reliably triggered an emotional response. Research has shown that sounds produced in major chords are likely to produce positive feelings and emotions. While sounds produced in minor chords are likely to produce negative emotions. In addition, other sounds that we listen to in our daily lives often have their own representation of memories and meaning to the listeners [13]. Familiarity towards a sound also makes a difference to the listener's emotional impact. For example, listening to the same song or music multiple times may change its effect rather than listening to a new or unfamiliar song [14].

Sound is used in many platforms. Mostly in music, movies and television to manipulate human perceptions and moods. Sound plays a huge influential part in how humans interact with the world. It gives us the right social cues and triggers certain feelings or emotions, such as baby crying might instil alertness or sadness, and baby laughing may instil happiness instead. There is an official term used for the study of sound that is known as psychoacoustics, which includes the element of psychological and physiological responses towards any kind of sounds, speech and music.

Music has the ability to affect and stimulate the human emotions [14]. Some are being used to as therapy to reduce stress and stimulate relaxation [15]. Some music can be used to put infants to sleep such as the lullaby and some music has a calming influence on expecting moms during childbirth [16]. These studies shows that music has a tremendous positive effect on human emotions.

As human being, we tend to reach a certain state of emotion which directly affects the cognitive performance [17]. According to a theory proposed, emotions are cognitively based states that coordinate quasi-autonomous neural system functions. Emotions give a biological answer to certain issues in systems with many aims, such as transitioning between plans. Their job is to make and keep these transitions smooth, as well as to communicate them to ourselves and others. Transitions occur at critical points in a plan's development when the plan's appraisal of success shifts. Complex emotions occur at the

intersections of social plans and are generated from a small number of basic emotions [18]. Based on another theory, it is believed that an emotion is a type of memory unit that can form associations with random events. This emotion unit's activation aids in the retrieval of events connected with it, as well as priming emotional theme for usage in free association, fantasies, and perceptual categorization [19].

3 Mayer's Cognitive Theory

The Cognitive theory of multimedia learning by Mayer [1] is based on an integration of Sweller's cognitive load theory [20], working memory model by Baddeley [21], and dual-coding theory by Paivio [22]. These theories claim that the information perceived should be presented in the ways that a learner's limited working memory resources are being used as efficiently as possible. Especially in the case of multimedia instructions, where learners need to include different sources of information such as pictures, text, and words. These cognitive overloads may cause serious effects on learning. This theory provides us with useful information into why different combinations of media may have different effects on learning and comprehension. Auditory/verbal channel and visual pictorial channel is being the focus by Mayer, and he defines that multimedia presents learning materials integrating both pictures and words. The definition of multimedia is being narrowed down to two forms of pictorial and verbal due to the research based on cognitive psychology is more relevant for this definition [1]. Figure 1 is a table illustration which explains the Cognitive Theory of Multimedia Learning by Mayer.

This model is based on the three assumptions primarily made by Mayer [1]:

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.

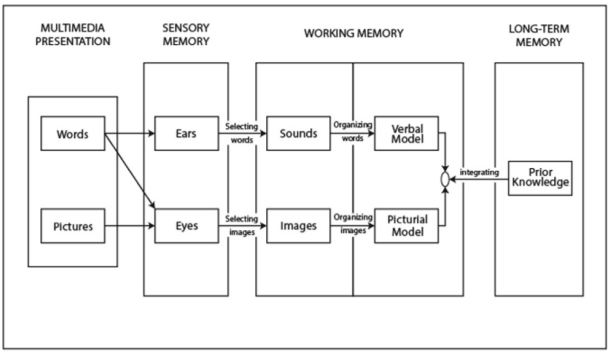

Fig. 1. Cognitive Theory of Multimedia Learning by Mayer [1].

According to the research conducted by Mayer and his team investigating the effects and nature of multimedia on human learning. His modality principle mentions that individuals learn better from visuals and audio than from visuals and on-screen text only [23]. His theory of multimedia learning has been tested by researchers all over the globe. Many used different approaches. For example, a combination of text, sound and diagram [24]. Another researcher tested the modality with cueing effect in the classroom environment. Adding visual cues to images resulted in better and higher scores, but when replacing visual text with spoken text results in lower scores [25].

4 Conceptual Framework

In this research, combining all three subjects of music, emotion and cognition, we came up with a conceptual framework that if music can affect the human emotions in a positive manor, then we may be able to deviate that emotion from obstacles and distractions, to improve the human's cognitive performance such as their motivation, mood, focus and concentration. Hence, if this is achieved, then we might reach our final objective, which is improved memory [26] (Fig. 2).

Two types of sound will be used for this research, which are **music** that is known for its effect on human emotions [11], and **silence** which was used in an experiment designed to see how diverse sound environments affect meal time, food intake, and evaluations, as well as responses to the sonic eating environment [27].

The definition of obstacles here are factors of any distractions affecting students' concentration in the learning environment. These obstacles are also the factors that may determine the increase or decrease of the effectiveness of the sounds used in this experiment. Divided into three main factors of environmental, teacher-related and student-related [4]. But, in this research we only focus on sound pollution, fatigue, sleepiness and motivation.

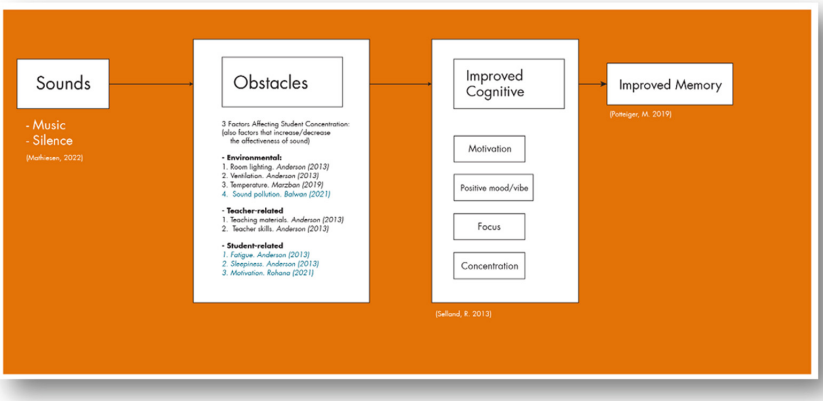

Fig. 2. Conceptual Framework of The Relationship between Sound and Cognitive Improvements.

All these obstacles can be overcome or reduced by using the right type of music, that is specifically designed to stimulate the human cognitive for the purpose of improving their experience in learning and studying. It is also known as Lofi hip hop or Chillhop [28]. It is a musical form that is uploaded and mediated through the internet. Which is currently unstudied academically to our knowledge [29].

Under improved cognitive, we aim to stimulate the students' motivation, mood, focus and concentration, to study if it results in improved memory [30] by the end of the experiment.

5 Conclusion

Can music help to improve the students' cognitive ability and improve their memory in the classroom? Based on many studies, music listening has proven to provide both long-term and short-term cognitive improvements. But this research aims to fill out the gaps of these researches that has never been done in the field of education to the best of my knowledge, specifically in the physical or online virtual classroom.

Authors' Contributions. Muhammad Tamim Faruq Khairul Ázmi conducted the research and contributed to the Introduction, Literature Review and Conceptual Framework.

Tse-Kian Neo contributed to the pedagogy and the conceptual framework and is the Supervisor.

Fajrul Norman contributed to the Sound design and the conceptual framework and is the Co-supervisor.

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