

## THE EFFECT OF THE AUDIO STIMULUS TYPES ON STUDENTS' CONCENTRATION LEVEL

**Megasari Kurnia\***

Industrial Engineering Department, Hasanuddin University, Makassar, Indonesia

**Ilham Bakri**

Industrial Engineering Department, Hasanuddin University, Makassar, Indonesia

**Retnari Dian Mudiastuti**

Industrial Engineering Department, Hasanuddin University, Makassar, Indonesia

**Nadzirah Ikasari Syamsul**

Industrial Engineering Department, Hasanuddin University, Makassar, Indonesia

**Priscillia Ingrid Tanditasik**

Industrial Engineering Department, Hasanuddin University, Makassar, Indonesia

\*E-mail correspondence: [msarikurnia@gmail.com](mailto:msarikurnia@gmail.com)

### ABSTRAK

*Konsentrasi sangat penting untuk membantu melihat dan memahami objek yang sedang difokuskan. Apabila mahasiswa dapat berkonsentrasi, maka segala sesuatu dapat terekam dengan baik dalam memori otak. Apabila konsentrasi mahasiswa mengalami hambatan dalam kegiatan belajar, maka akan terjadi hambatan untuk mencapai tujuan. Penelitian ini bertujuan untuk menganalisis pengaruh dan hubungan antara tingkat konsentrasi saat diberikan stimulus audio yang berbeda. Metode yang dapat digunakan secara kuantitatif untuk melihat konsentrasi belajar adalah metode reaction time dan memory recall terhadap 30 mahasiswa. Data yang diperoleh diolah dengan menggunakan uji statistik, yaitu uji T dan uji ANOVA untuk menguji perbedaan rata-rata sampel dari variabel yang berbeda dan menarik kesimpulan dengan mencari kelompok data yang berbeda. Berdasarkan hasil uji T, pemberian ketiga stimulus audio pada laki-laki tidak memberikan perbedaan rata-rata kecepatan reaksi yang signifikan. Sementara itu, pada responden perempuan, hanya stimulus lagu favorit yang memiliki perbedaan rata-rata yang signifikan. Tidak ada perbedaan yang signifikan pada kemampuan mengingat memori terhadap stimulus audio. Pada responden laki-laki, stimulus instrumental merupakan stimulus yang paling efektif, sedangkan untuk perempuan, stimulus lagu favorit merupakan stimulus yang paling efektif.*

**Kata Kunci:** *Konsentrasi, Stimulus Audio, Waktu reaksi, Penarikan Memori*

### ABSTRACT

*Concentration is essential in order to help to perceive and understand the object that is being focused. If students can concentrate, everything can be recorded properly in the brain's memory. If student concentration experiences obstacles in learning activities, there will be obstacles to achieve goals. This study aims to analyze the influence and relationship between concentration levels when listening to different audio stimuli. The methods that can be used quantitatively to see learning concentration are reaction time and memory recall methods for 30 students. The data obtained are processed using statistical tests, that is the T test and ANOVA test to test the*

*differences in sample means from different variables and draw conclusions by finding different data groups. Based on the results of the T test, giving the three audio stimuli to men did not provide a significant average difference in reaction speed. Meanwhile, for female respondents, only the favorite song stimulus had a significant average difference. There is no significant difference in memory recall ability to audio stimulus. For the male respondents, the instrumental stimulus was the most effective stimulus, while for the female, the favorite song stimulus was the most effective.*

**Keywords :** *Concentration, Audio Stimulus, Reaction Time, Memory Recall.*

## 1. INTRODUCTION

The brain is a part of the body that functions as a control center for the other organs of the body, and the brain is related to one's intelligence and one's ability to concentrate, especially for students during learning activities (Ikbal et al., 2017). The success of learning process is influenced by the individual's ability to focus on the object that is being studied (Csikszentmihalyi, 2013). Regarding this point, concentration is an important aspect for someone in achieving learning success. This is connected to humans' efforts to pay attention on an object so that they can understand and comprehend the object that is being focused (Rosenfield & Mouzon, 2013).

Students often have trouble in concentrating especially in studying subjects that have a high difficulty level (Chang & Zhou, 2022). If a person's concentration level decreases, it can cause obstacles in daily activities, one of which is in learning activities. It can hamper students' achievement (Li et al., 2021). Therefore, a stimulus is needed in order to increase concentration especially in the teaching and learning process by providing audio stimuli to students (Guan, 2021).

Based on these conditions, the researcher conducted a study to see a comparison of student learning concentration by providing audio stimulus (Shih et al., 2012). The types of stimulus given are instrumental songs, murotal/Qur'an recitation, and the participants' favorite songs (Thoma et al., 2013). The methods that can be used quantitatively to see learning concentration are reaction time and memory recall methods. This is conducted to get a variety of data variability in order to obtain valid data (Velnath, Prabhu, & Krishnakumar, 2021). The purpose of this research is to analyze the influence and relationship between concentration levels when listening to several different types of audio stimuli (Cochrane et al., 2018). This research is conducted on 30 Industrial Engineering students, Hasanuddin University, consisting of 15 men and 15 women with age ranging from 18 to 24 years.

## 2. METHODS

The research was conducted in the Ergonomics laboratory of the Department of Industrial Engineering, Faculty of Engineering, Hasanuddin University. The subjects involved in this study were 30 people, consisting of 15 men and 15 women. Determination of this subject is done with several criteria, namely, the subject is a student who has entered the age range of 18-24 years. The subjects did not have a history of hearing loss because the stimulus given in this study was an audio stimulus and were not experiencing psychological disorders. This study is a comparative study for giving the same stimulus but with a different measurement method using EEG in other studies (Kurnia et al., 2023).

In this study, the test was carried out with a reaction time test, which is done by pressing the button quickly when the lights are on, stepping on the pedal when the visual meter moves, turning off the sound when it sounds by pressing the appropriate button. After the reaction time test, a memory recall test was carried out, in the form of a number sequence of 10 numbers that were remembered for one minute and then wrote them on paper for 10 seconds for one number sequence. The reaction time and memory recall tests were carried out with audio stimuli in the form of instrumental, murottal Al-Qur'an, and favorite songs for 10 minutes which were played

for one type of stimulus. Then the data was analyzed using the T test and Anova test to test the difference in sample means of different variables and draw conclusions by finding different data groups.

### 3. RESULTS AND DISCUSSION

#### a. Results

In the Figure 1 and Figure 2. it shows the results of the reaction time data using the T test before and after on male and female participants.

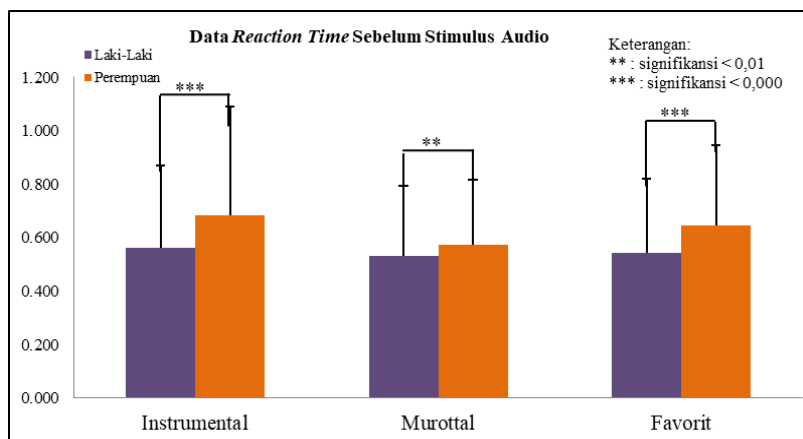


Figure 1. Reaction Time Diagram Before Audio Stimulus

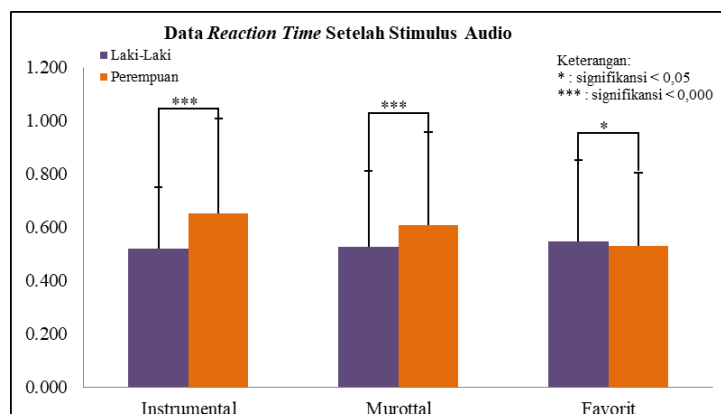


Figure 2. Reaction Time Diagram After Audio Stimulus

The first data processing carried out was the T test to see the difference in the mean value between the data groups. Before conducting the T test, the following is a hypothesis test that was carried out in this study:

**H0:** There was no significant mean difference between reaction time before and after being given the audio stimulus to male and female participants.

**H1:** There was a significant mean difference between reaction time before and after being given the audio stimulus to male and female participants.

If the significance value is  $> 0.05$  then H0 is accepted and H1 is rejected, while the significance value is  $< 0.05$  then H1 is accepted and H0 is rejected (Hendri & Setiawan, 2017). Figure 1 and Figure 2 are the results of reaction time analysis data using the T test on male and female participants.

Then ANOVA test was conducted to draw conclusions by looking for different data groups. Figure 3 and Figure 4 are processing of reaction time data using the Anova test on male and female participants:

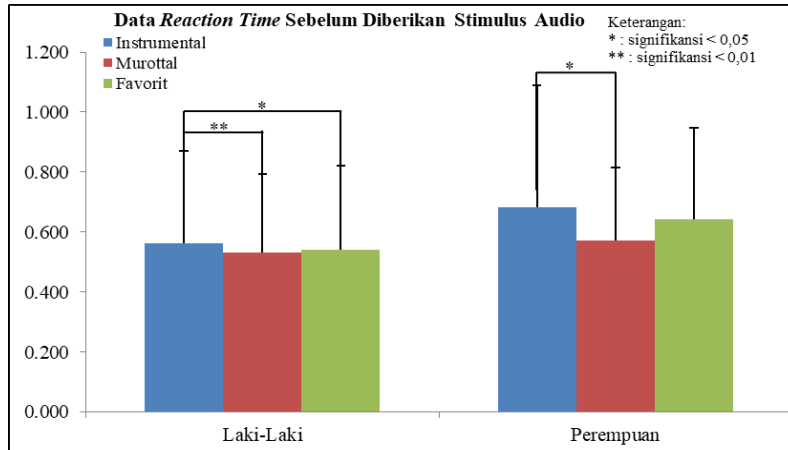


Figure 3. Diagram of the Anova Reaction Time Test Before Being Given an Audio Stimulus

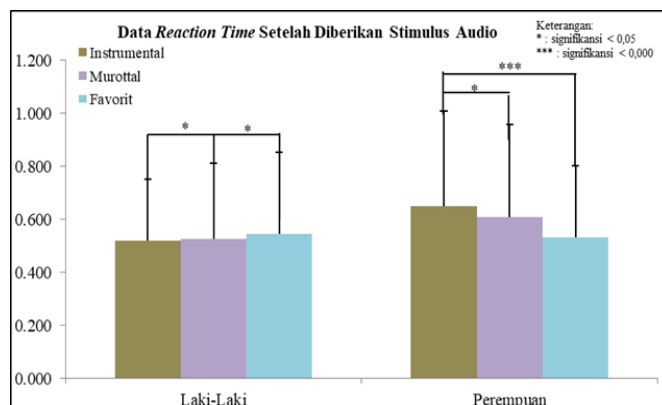


Figure 4. Diagram of the Anova Reaction Time Test After Being Given an Audio Stimulus

Figures 3 and Figure 4 show the average results of recall memory measurements that are able to be memorized from each of the male and female participants in the three types of audio stimulus both before and after being given the audio stimuli. Figure 5 and Figure 6 are the processing of reaction time data using the Anova test on male and female participants:

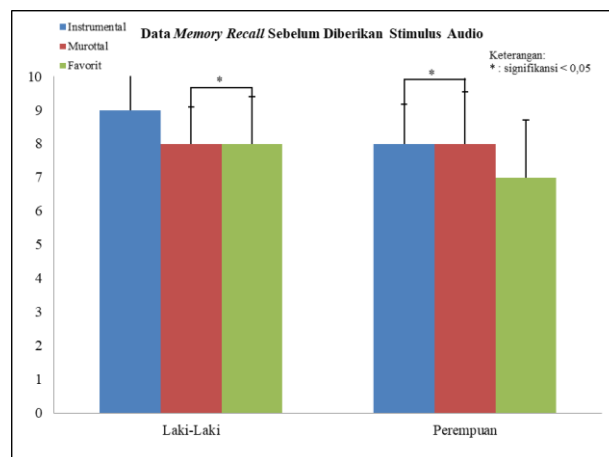


Figure 5. Diagram of Anova Memory Recall Test Before Given Audio Stimulus

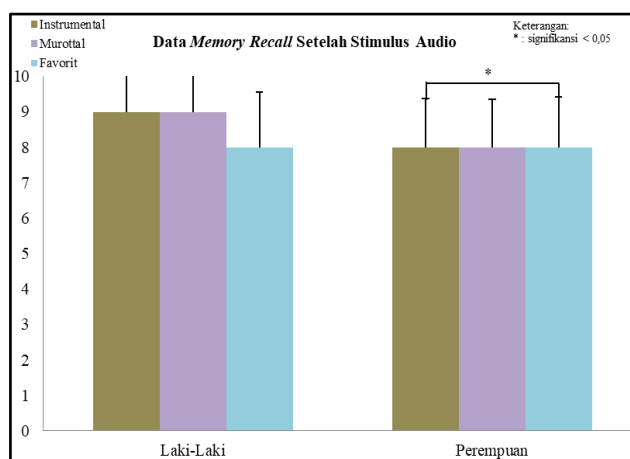


Figure 6. Diagram of Anova Memory Recall Test After Given Audio Stimulus

## b. Discussion

### Reaction Time

Research conducted at reaction time uses 2 different conditions, which are before and after the administration of each of the three audio stimuli (instrumental songs, murottal Al-Qur'an, and favorite songs). This measurement is used to measure the duration it takes for the tested subjects to respond to a given stimulus.

From the reaction time test based on the conditions of the data collection shown in Figure 1 for before stimulus and Figure 2 for after stimulus, the results shown before being given the three audio stimuli obtained a significance value of  $<0.05$ , which means that there was a significant difference between the data groups, namely between men and women. This is due to the participants being able to press the button as quickly as possible when given a stimulus. The results of the T test after being given the three audio stimuli showed a significance value of  $<0.05$ , which means that there was a significant difference between the data groups, namely between men and women. This is caused by differences in the level of concentration of each individual.

The Anova test is carried out to draw conclusions by finding different data groups. Figure 3 shown the conditions before being given the audio stimulus to the men, the giving of the instrumental-murottal and favorite-instrumental stimuli had a significance value of  $<0.05$ , which means there was a significant difference. So, giving murottal stimulus has a higher level of effectiveness when compared to instrumental stimulus, and giving favorite song stimulus is more effective than instrumental stimulus. Whereas for female cohorts, instrumental-murottal results were obtained where the significance value was  $<0.05$ , which means there was a significant difference. As a conclusion, providing a murottal stimulus is more effective than an instrumental stimulus. Figure 4 shown the current condition after being given an audio stimulus to male participants, the provision of the murottal-instrumental stimulus and the murottal-favorite stimulus had a significance value of  $<0.05$ , which means there was a significant difference. So, providing an instrumental stimulus is more effective than the murottal stimulus and providing the murottal stimulus is more effective than the favorite song stimulus. Whereas for female test takers, the provision of instrumental-murottal stimulus and favorite-instrumental song stimulus had a significance value of  $<0.05$ , which means there was a significant difference. So, giving murottal stimulus is more effective than instrumental stimulus and giving favorite song stimulus is more effective than instrumental stimulus.

### Memory Recall

Figure 5 shown the Anova test of the conditions before being given the three audio stimuli to men, giving the murottal-favorite song stimulus has a significance value of  $<0.05$ , which means there is a significant difference between the data groups, namely between the murottal stimulus and favorite songs. So, giving murottal stimulus and favorite song stimulus are equally effective. Whereas for female test takers, the provision of the murottal-instrumental stimulus had a significance value of  $<0.05$ , which meant that there was a significant difference between the data groups, namely between the instrumental and murottal stimuli. So, providing instrumental and murottal stimuli are equally effective.

Figure 6 shown the conditions after being given the audio stimulus, there was no significant difference between the data groups in giving the three audio stimuli to male respondents where the significance value was  $> 0.05$ , while giving the instrumental-favorite song stimulus to female researchers had a significance value  $<0.05$ , meaning that giving favorite songs and instrumental stimulation are equally effective.

## 4. CONCLUSION

Based on the results of the research analysis that has been conducted on students regarding the effect of audio stimulus on concentration levels, it can be concluded that based on the results of the T test, giving the three audio stimuli to men did not provide a significant average difference in reaction speed. Meanwhile, for female respondents, only the favorite song stimulus had a significant average difference. There is no significant difference in memory recall ability to audio stimulus. For the male respondents, the instrumental stimulus was the most effective stimulus, while for the female, the favorite song stimulus was the most effective. The advice given for further research is that concentration levels should be measured using a different stimulus and method.

## ACKNOWLEDGEMENT

This study is a part of the research supported by the 2022 PDPU grant funding from LPPM Hasanuddin University. We would like to thank all respondents who are involved in this research.

## REFERENCES

- Chang, Z., & Zhou, M. (2022). The influence of different music styles on Chinese students' lateral thinking skills. *Thinking Skills and Creativity*, 43, 100990.
- Cochrane, K. A., Loke, L., de Bérigny, C., & Campbell, A. (2018). Sounds in the moment: designing an interactive EEG nature soundscape for novice mindfulness meditators. *Proceedings of the 30th Australian Conference on Computer-Human Interaction*, 298–302.
- Csikszentmihalyi, M. (2013). *Flow: The psychology of happiness*. Random House.
- Guan, M. (2021). The role of classical music in the creative thinking of university students. *Thinking Skills and Creativity*, 41, 100925.
- Ikbāl, B., Sutria, E., & Hidayah, N. (2017). Pengaruh Senam Otak Terhadap Konsentrasi Belajar Mahasiswa Keperawatan UIN Alauddin Makassar. *Journal of Islamic Nursing*, 2(2), 52–59.
- Kurnia, M., Bakri, I., Ikasari, N., Wardani, P. I., & Tanditasik, P. I. (2023). Literature Review: Electroencephalogram (EEG) the Characteristics of Students' Learning Concentration Due the Audio Stimulus. *9th International Conference on Technical and Vocational Education and Training (ICTVET 2022)*, 131–139. Atlantis Press.
- Li, F., Wang, Z., Tzi Dong Ng, J., & Hu, X. (2021). Studying with Learners' Own Music: Preliminary Findings on Concentration and Task Load. *LAK21: 11th International Learning Analytics and Knowledge Conference*, 613–619.
- Rosenfield, S., & Mouzon, D. (2013). Gender and mental health. In *Handbook of the sociology of mental health* (pp. 277–296). Springer.
- Shih, Y.-N., Huang, R.-H., & Chiang, H.-Y. (2012). Background music: Effects on attention performance. *Work*, 42(4), 573–578.

- Thoma, M. V, La Marca, R., Brönnimann, R., Finkel, L., Ehlert, U., & Nater, U. M. (2013). The effect of music on the human stress response. *PloS One*, 8(8), e70156.
- Velmath, R., Prabhu, V., & Krishnakumar, S. (2021). Analysis of EEG Signal for the Estimation of Concentration Level of Humans. *IOP Conference Series: Materials Science and Engineering*, 1084(1), 12003. IOP Publishing.