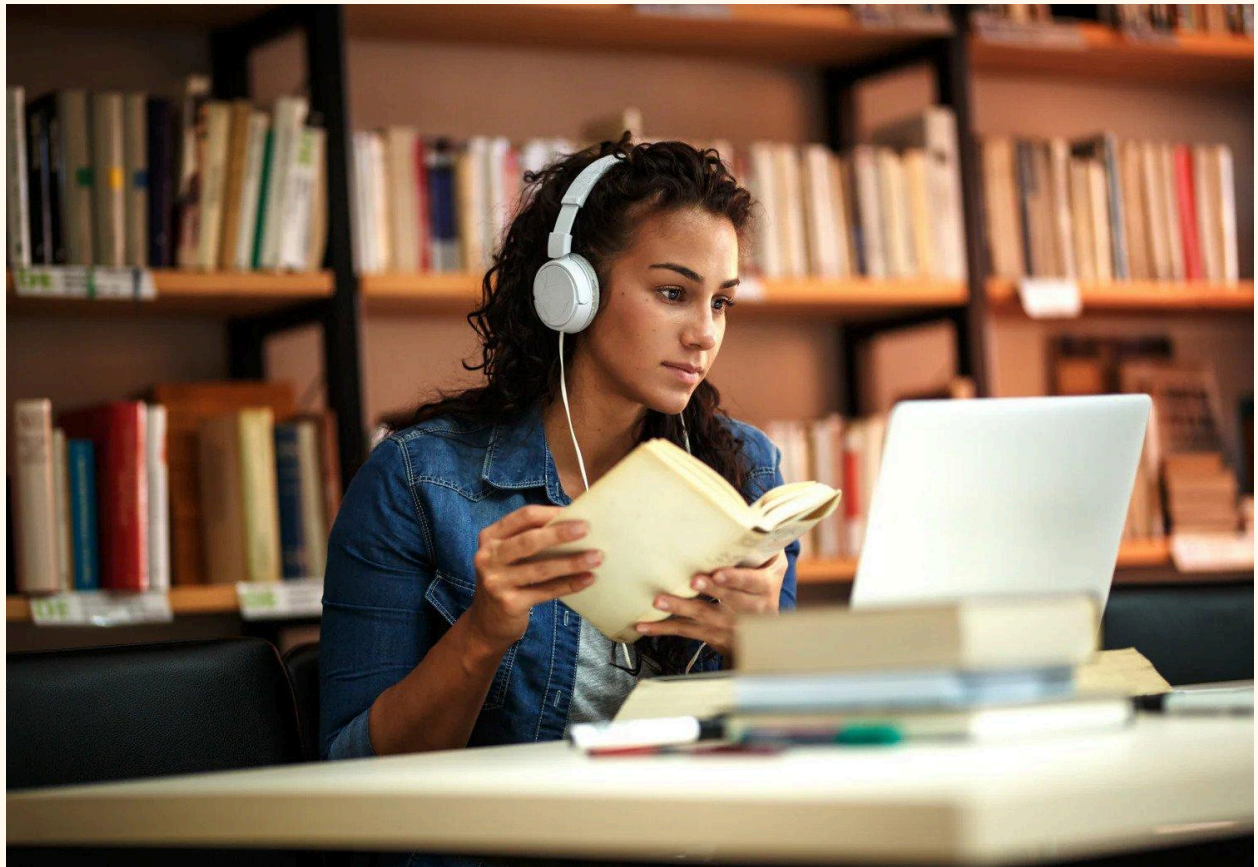# THE SOUND OF EFFECTIVE LEARNING

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ABSTRACT

The use of music to aid studying has been anecdotally shown to affect performance and efficiency, creating a massive market for music intended for studying. The purpose of this experiment is to assess the impact of different types of music on retention and concentration. Previous research has shown that classical and opera music are the most effective types of music to enhance performance. We will use a sample size of 15 Grade 6 students, and divide them up into 3 groups which will all have to learn a word association quizlet in 10 minutes. The music we decided to use was rap/hip hop, classical/opera, and lo-fi music. We picked these types of music due to the wide range of BPMs, Vocals, and Tonalities in order to observe which of these factors had the largest impact on retention and learning speeds. Both classical/opera and rap music performed exceptionally well, and this data, when combined with existing research indicates that high bpm songs with minimal to no lyrics, such as electro or phonk music would be most beneficial in shorter studying sessions.

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DESCRIPTION OF ACTIVITIES

In order to investigate the effect of different genres of music on learning, we had to conduct an experiment which included music, and a topic that the participants had to be tested on. For this, we required participants, which consisted of a younger populace, as we believed they would have clearer minds which could grasp knowledge at a quicker rate then their older counterparts. Hence, we invited 15 Grade six students.

A sound proof room in the library was booked beforehand, with sufficient seating arrangements for the participants to sit comfortably in. Each participant required their laptop, and a pair of headphones to listen to the assigned music. While playing the different genres of music in the background, either lofi, rap/hip-hop or classical/opera, the students learnt a Quizlet, using specifically only the flashcard mode for ten minutes. The Quizlet was designed in such a way that previous knowledge would not affect the results in any way. Named Fruits and Colors Word Correlation, the terms in the Quizlet had nothing significant to do with each other. For example, the fruit Pineapple, would correlate to the colour Turquoise, while the Tangerine would correspond to Aquamarine. This would effectively remove any biases, and hence, the participants would require utmost concentration to register the fruit and colour correctly in their brain. 20 terms were present in the Quizlet, and after taking care of the technicalities, the ten minutes of studying time started, after which the participants would switch to the test mode on Quizlet, which they would have to complete in 3 minutes.

The instructions given to the participants are as follows:

Experiment Outline

Part 1
Step 1: Plug in your headphones
Step 2: Click on the link that you are assigned to
Step 3: Listen to the music (keep it running in the background)
Step 4: Use the flashcard mode to study Quizlet 1: Fruits and Colors for 10 minutes
Step 5: Then, test yourself using the test mode when cued by supervisors (3 minutes maximum)
Step 6: Once you are done with the test, raise your hand and take a screenshot of your results. The supervisors will also record your scores.

Group 1: Lofi - https://www.youtube.com/watch?v=lTRiuFIWV54&t=32s
Group 2: Rap/Hip-Hop - https://www.youtube.com/watch?v=Ep1uUuPBsaU
Group 3: Classical/Opera - https://www.youtube.com/watch?v=DrITKSRCqGo

Quizlet 1: [Fruits and Colors](#)

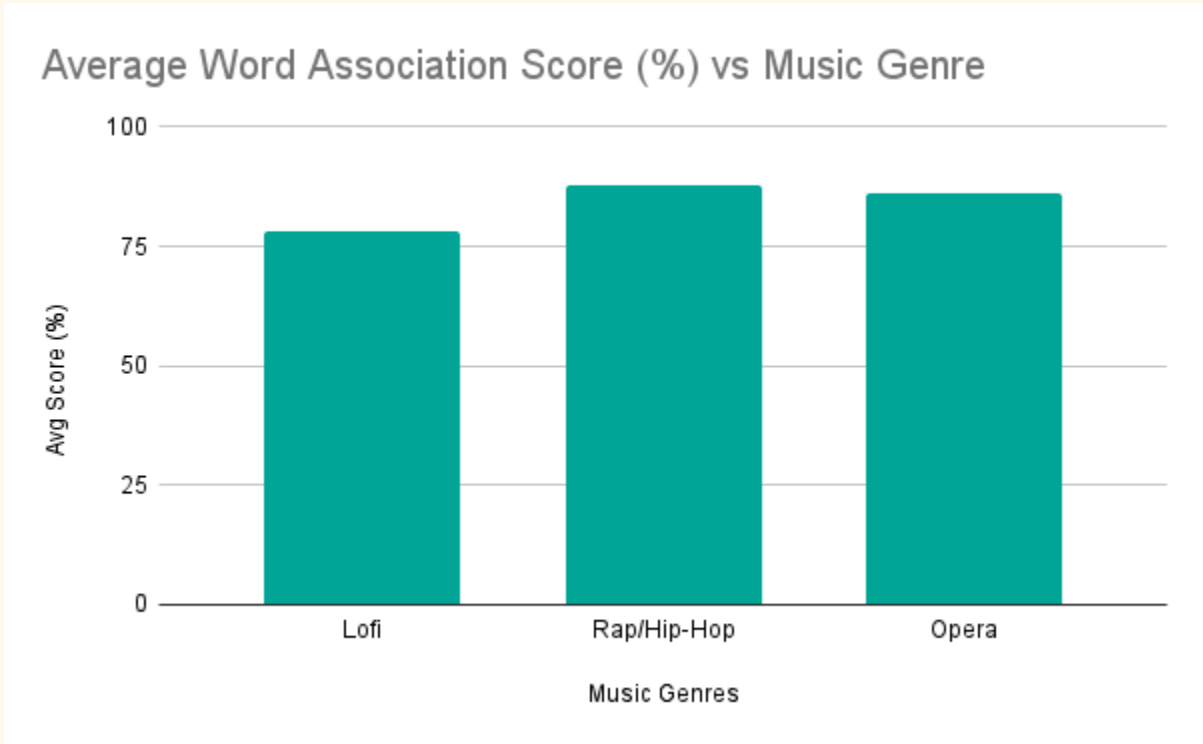After recording the test results in a table *(see raw data)* the students were dismissed.

RESULTS

Raw Data

Name	Music type	Test Score - Fruits and Colors (%)
Redacted	Lofi	100
Redacted	Lofi	95
Redacted	Lofi	90
Redacted	Lofi	45
Redacted	Lofi	60
Redacted	HipHop/Rap	100
Redacted	HipHop/Rap	100
Redacted	HipHop/Rap	100
Redacted	HipHop/Rap	80
Redacted	HipHop/Rap	60
Redacted	Classical/Opera	95
Redacted	Classical/Opera	65
Redacted	Classical/Opera	95
Redacted	Classical/Opera	90
Redacted	Classical/Opera	85

Processed Data

	Lofi	Hip-Hop/Rap	Classical/Opera
Average Score	78	88	86
Standard deviation	24.1	17.9	12.5
Range	65	40	30
Statistically significant			

Lofi

Confidence Level	Margin of Error	Error Bar
68.3%, $s_{\bar{x}}$	78 ±10.794 (±13.84%)	
90%, $1.645s_{\bar{x}}$	78 ±17.755 (±22.76%)	
95%, $1.960s_{\bar{x}}$	78 ±21.155 (±27.12%)	
99%, $2.576s_{\bar{x}}$	78 ±27.804 (±35.65%)	
99.9%, $3.291s_{\bar{x}}$	78 ±35.521 (±45.54%)	
99.99%, $3.891s_{\bar{x}}$	78 ±41.998 (±53.84%)	
99.999%, $4.417s_{\bar{x}}$	78 ±47.675 (±61.12%)	
99.9999%, $4.892s_{\bar{x}}$	78 ±52.802 (±67.69%)	

Hip-Hop/Rap

Confidence Level	Margin of Error	Error Bar
68.3%, $s_{\bar{x}}$	88 ±8 (±9.09%)	
90%, $1.645s_{\bar{x}}$	88 ±13.16 (±14.95%)	
95%, $1.960s_{\bar{x}}$	88 ±15.68 (±17.82%)	
99%, $2.576s_{\bar{x}}$	88 ±20.608 (±23.42%)	
99.9%, $3.291s_{\bar{x}}$	88 ±26.328 (±29.92%)	
99.99%, $3.891s_{\bar{x}}$	88 ±31.128 (±35.37%)	
99.999%, $4.417s_{\bar{x}}$	88 ±35.336 (±40.15%)	
99.9999%, $4.892s_{\bar{x}}$	88 ±39.136 (±44.47%)	

Classical/Opera

Confidence Level	Margin of Error	Error Bar
68.3%, $s_{\bar{x}}$	86 ±5.568 (±6.47%)	
90%, $1.645s_{\bar{x}}$	86 ±9.159 (±10.65%)	
95%, $1.960s_{\bar{x}}$	86 ±10.913 (±12.69%)	
99%, $2.576s_{\bar{x}}$	86 ±14.343 (±16.68%)	
99.9%, $3.291s_{\bar{x}}$	86 ±18.324 (±21.31%)	
99.99%, $3.891s_{\bar{x}}$	86 ±21.664 (±25.19%)	
99.999%, $4.417s_{\bar{x}}$	86 ±24.593 (±28.60%)	
99.9999%, $4.892s_{\bar{x}}$	86 ±27.238 (±31.67%)	

Average Word Association Score (%) vs Music Genre

CONCLUSIONS

Our experiment found that, with reasonable certainty, listening to rap/hip-hop or classical/opera music should result in quicker learning than lofi, which was previously quite a popular type of music to study with. However, we also found the highest range and standard deviation in the lofi group, suggesting that the music might have widely varying effects on the individual depending on a range of external factors such as personality, taste, and concentration level. We informed the subjects that this was a race in order to try and minimise the effects of differences in effort and concentration. The results also found that music with a higher BPM seems to be conducive to learning and increases concentration. We selected these types of music because of the range in beats per minute (bpm), instrumentation, and vocals in order to assess which ones had the most impact on productivity. Ideally we would have more trials with a larger range of subjects and music, however this was not feasible in the current circumstances due to time and resource constraints.

Some disclaimers about the results: The tests were conducted with a relatively small studying window in mind, akin to something like the pomodoro method. This is because over longer periods of time, the subjects become much more subject to distraction or loss of focus. We decided to conduct multiple trials on the same subjects in order to prevent attention residue or split concentration, and to avoid any issues of fatigue or loss of motivation.

Again, because of the nature of music it is difficult to assess exactly what caused the elevated absorption rates in the rap/opera groups. Since the genres are so different, one would assume it was separate factors that influenced their results. According to current literature, lyrics seem to distract participants from study, but during anecdotal research, we have found that slower BPMs tend to lead to less productivity over longer periods of time (Lin et al). Crescendos and faster BPM tend to lead to more adrenaline and attentiveness (Levitin). Rap has a characteristically high BPM, and fast lyrics, but classical/opera has a characteristically low BPM, and slow lyrics. These two inverse genres both produced superior results when compared to the much more popular alternative, lofi. Therefore, it can be concluded that a high-bpm song with little/no lyrics would be optimal for short windows of studying, such as electro or phonk music.

WORKS CITED

Works Cited

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