Educators and students alike have long searched for more effective ways of teaching and learning of class material. This has led to research defining multiple intelligences and various different learning styles that students can be characterized into. Much other work has been done and many conclusions have been drawn about improving student performance in class and their comprehension of material; notably, a lot of research has been done in which music was correlated to a student’s performance academically.

For instance, in a publication from the University of North Carolina at Greensboro, many studies that examined student performance on various types of standardized tests and class assignments and how they correlated with a student’s background in music education all showed similar results; students with a background in music education performed better on their assignments (Hodges, O’Connel). In other words, the studies generally concluded that if a student regular received musical instruction or practiced playing an instrument they would generally perform better on any of the given types of tests than students who did not have a background in music.

Another example of how music relates to student performance is a study done by Michael Ryave that focuses on tempo. Students read a passage under the condition of no music, slow music, and fast music. Afterwards, the students answered a comprehensive
exam regarding the passage. The results found that students who had no music present, comprehended the material more fully than those who were subject to slow music, and those who were subject to fast music, comprehended the material the least. (Ryave) Studies such as these point to the idea that music has some effect on comprehension.

In research published by Dr. Roy Paget, founder of the British Academy of Advanced Training, the effects of music on the mind and body were summarized into eight separate areas, two of which were: “a reduction in stress levels… [and] the stimulation of creativity, sensitivity, and thinking” (Paget 6). This was determined to generally be true with classical music because the rhythms and beats are more naturally in tune with the rhythms of our bodies (heart beats, etc) (Paget 6-8). Furthermore, studies at the Center for Neurobiology of Learning and Memory, UC Irvine, demonstrated that students who listened to Mozart for 10 minutes before taking a standardized test showed dramatic improvement in spatial and abstract reasoning than those students that did not (Paget 9).

This “Mozart’s Effect,” as it has been described, has been replicated in other studies and demonstrates that simply the act of listening to Mozart or similar style music can improve performance on various types of spatial and reasoning skills (Hetland). What we hope to do in this study is answer the question, how will playing contemporary acoustic music in EES 101 workshop affect student performance? Many studies focus specifically on the effect of classical music, but due to our sample population – college aged students – we chose contemporary music that may appeal more to our subjects. We hypothesize that the music will both calm and focus students during workshop, allowing
them to think more clearly during the session, which will lead to improved performance and engagement during the lab session.

**Methodology:**

The study was done on 72 students from the combined EES 101 workshops. The workshops ran from 2:00PM to 4:40PM on Monday, Tuesday, Wednesday, and Thursday, with each day having the same lab material. Labs sessions 7, 8, and 9 were used in the study.

During the Monday section, which has seventeen students total, music was played. A variety of music was used with genres that included acoustic rock, soft rock, pop, and alternative. The main artists included Jack Johnson, Coldplay, Billy Joel, Owl City, and Jason Mraz, with the addition of other similar artists. The music was played without speakers, but at a level that was audible to everyone under the conversation. Qualitative observations were taken during those three labs that would show how students reacted to the music. Acting as the controls, the Tuesday, Wednesday, and Thursday lab sections did not have music playing.

During lab session 10, after the three weeks of playing music, we gave a survey to the Monday workshop students. The questionnaire went as follows:

**Questionnaire**

Did you notice music playing over the last few labs?
   Yes   No   Sometimes

Did you find the music to be distracting?
   Yes   No   Sometimes

Did the genre of music appeal to you?
   Yes   No   Sometimes
Did the music make it easier for you to learn and work?

Yes  No  Sometimes

Would you like to elaborate on any of the above questions?

Do you have any additional comments regarding the music?

The qualitative data consisted of obtaining the average grade for each lab during the Monday section, as well as the average grade for each lab from the Tuesday, Wednesday, and Thursday lab sections combined.

**Results**

*Quantitative data*

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Lab 7</th>
<th>Lab 8</th>
<th>Lab 9</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>96%</td>
<td>93%</td>
<td>94%</td>
<td>94.3%</td>
</tr>
<tr>
<td>Tuesday</td>
<td>96%</td>
<td>92%</td>
<td>93%</td>
<td>93.7%</td>
</tr>
<tr>
<td>Wednesday</td>
<td>98%</td>
<td>93%</td>
<td>95%</td>
<td>95.3%</td>
</tr>
<tr>
<td>Thursday</td>
<td>96%</td>
<td>94%</td>
<td>90%</td>
<td>93.3%</td>
</tr>
</tbody>
</table>

Average grade with music = 94.3%
Average grade without music = 94.1%
**Hypothesis:** average grade with music > average grade without music

**Results:** The results indicate that we should reject our hypothesis, because there is a very small probability that there will be a difference in the average grades with and without music. The average grade with music was 94.3%, and the average grade without music was 94.1%.

**Qualitative data**

Did you notice music playing over the last few labs?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Sometimes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>14</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Did you find the music to be distracting?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Sometimes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2</td>
<td>9</td>
<td>4</td>
</tr>
</tbody>
</table>

Did the genre of music appeal to you?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Sometimes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>6</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

Did the music make it easier for you to learn and work?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Sometimes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
Comments:

Good
- Usually the music was quiet enough to provide a nice atmosphere.
- Music helps me focus. I tend to listen to music when studying and doing homework.
- I definitely enjoy the music.
- I love having the music! It makes concentrating easier for me because it relaxes me and makes lab feel more fun.
- I’m a fan of the music, but am not sure if it increases productivity; it is delightful regardless.
- I thought the music made lab more enjoyable.
- I am a fan.

Bad
- I like the music, but personally I found it distracting just because I’m not good at working with music. Maybe music without words?
- I love classical music and jazz.
- Occasionally it was too loud and it seemed chaotic.
- I like gangster rap. 2Pac helps me concentrate. Death metal is good, too.
- Play classical music!

Discussion:

Our results have shown that music does not improve student performance in workshop. Although the quantitative data shows a slight improvement in performance, the difference is not statistically significant. Analyzing our qualitative data, we find that students were aware of the music playing during workshop, and that 9 out of 15 students said the music was not distracting. There was an even split between those who liked and disliked the genre of music. When asked if music makes it easier for them to learn and work, 5 students answered yes, 5 students answered no, and 5 students answered sometimes. These results point to the conclusion that music has no overarching effect on the atmosphere of the workshop. This is supported by the varying comments regarding the music, in that any positive effects for some students are canceled out by the negative
experience of other students. Essentially, there is no net negative or positive effect of playing music during workshop.

Our data suggests that the effect of music on students is very individual. For example in our comments, one student underlined the fact that music makes it “easier” for him/her to concentrate and another students said music helps him/her “focus,” while another student responded saying that he/she “found it distracting.” This may be due to learning styles; it would be interesting to conduct a study comparing the relationship between student responses to music versus their learning style. Also, there was variety in how people felt about the genre, which could have also affected their mood, and therefore, their performance in workshop. One student’s response very effectively demonstrated our hypothesis: “It makes concentrating easier for me because it relaxes me and makes lab feel more fun.” The next step would be to correlate multiple intelligences to student performance.

The volume of music may have a profound effect on student performance, as reflected in the study done by Paget. We found that the music had to be at a level low enough to hold normal conversation, or otherwise, it proves to be very distracting to students. For instance, one student after working on a problem for a while, walked over to the computer to turn down the music. This may affect some students more than others.

There is a large amount of variance in the results due to a very small sample size, and other confounding variables. For instance, the results may have been affected by studies done in other lab session, and by the style and knowledge of the workshop leaders, as each workshop was taught by someone different.
Although the data from this study suggests no correlation between music and student performance is EES 101 workshop, it is worth considering the results of the aforementioned studies on the Mozart Effect. Perhaps music being played before lab will have a similar effect on EES 101 students as it did on those subjects in the studies. As our qualitative data shows, there were some students who have appeared to enjoy the presence of music in lab, which may have been reflected in their individual scores which are not considered in this study. Perhaps playing music during the 10 minutes before lab starts will have a net positive effect on the performance of those who enjoy the music while hopefully resulting in no net negative effect on the performance of those who do not enjoy the music; playing the music only before the lab will hopefully not have the same distracting effect as it would have if it were played throughout the entire lab. Further research is suggested to test this hypothesis.
Works Cited


