

**Topic: Relationship between class level and
some cardiovascular indicators of music
students.**

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Introduction

Music education not only enhances artistic skills but can also influence physiological and cognitive development in students. With the integration of Internet of Things (IoT) devices and Artificial Intelligence (AI) algorithms, it is now possible to collect and analyze real-time physiological and performance-related data in educational settings. This study explores the relationship between class level and physiological responses (heart rate and blood pressure) in music students. Using data collected via IoT devices, we analyzed 100 students across three class levels—Beginner, Intermediate, and Advanced—to examine whether more advanced training is linked to higher physiological activity.

Methodology

This dataset, which was augmented by Internet of Things (IoT) devices and Artificial Intelligence (AI) algorithms, was created to assess the efficacy of music education by gathering data on student performance, physiological data, engagement, and other metrics in a classroom context. The data mimics a learning environment in which students' physiological reactions, behavioral patterns, and numerous music performance indicators are tracked by IoT devices during music classes. With an emphasis on skill development, engagement, and performance outcomes, the dataset is organized to allow for study of the effects of music instruction. ([“Music Education Performance Data.”](#) by Ziya)

In this research, we will be looking at 3 specific variables: `Class_Level`, and the 2 cardiovascular indicators in the data, which are `Heart_Rate` and `Blood_Pressure`. For simplicity purposes, we will only be looking at the first dataset, which is the one that has `Blood_Pressure` as one of its variables, as the new version does not have `Blood_Pressure`. In this data, there are a total of 3 different class levels: beginner, intermediate, and advanced. There are 100 observations in this data.

Figure 1 graph shows the comparison of student counts in different class levels. There are some differences in the distribution of students in the 3 class levels, but overall, it is still relatively even. To analyze this data, the students will be grouped by their class levels, and within those different class levels, we will try to find if there is any pattern or trend when looking at the heart rate and blood pressure of the students.

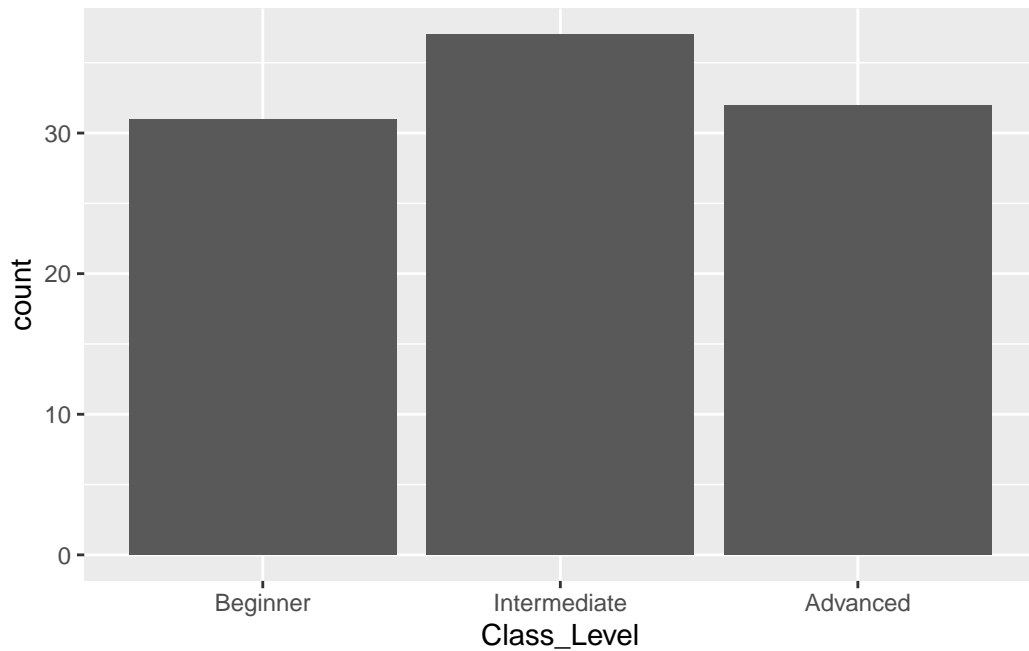
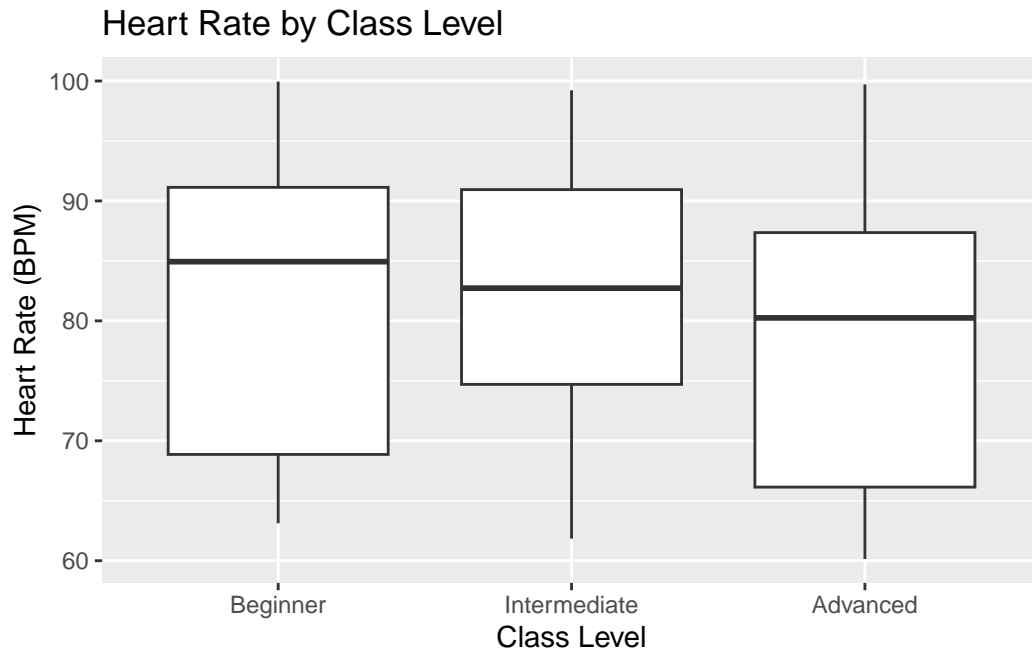


Figure 1: Student counts of different class levels

Result

This result section looks at the relationship between blood pressure, heart rate, and class level among 100 music students in three groups: advanced, intermediate, and beginner.

Averages of heart rate



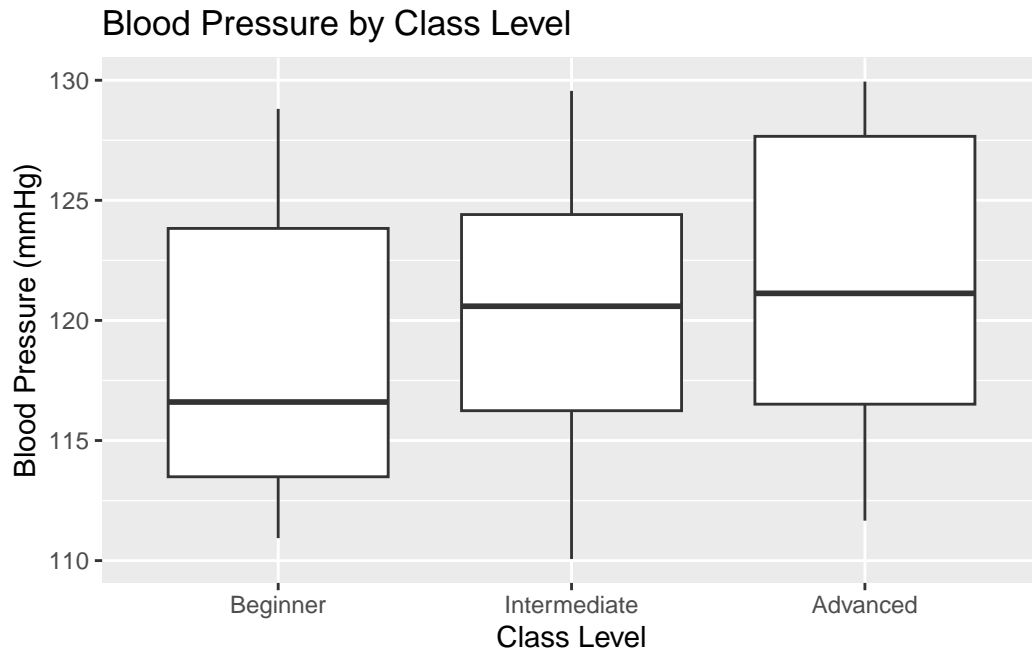
Beginners: around 85 BPM

Intermediate: around 83 BPM

Advanced: around 80 BPM

The Beginner group displays the highest median heart rate, followed by Intermediate, and Advanced students with the lowest. This shows that students in higher class levels have lower heart rates.

Averages of blood pressure



Advanced: around 121 mmHg

Intermediate: around 120 mmHg

Beginner: around 118 mmHg

The Advanced group displays the highest median blood pressure, while Intermediate students follow closely, and Beginners have the lowest. This means students in higher class levels tend to have higher blood pressure.

Conclusion

The analysis shows an inverse relationship between heart rate and class level, and a direct relationship between blood pressure and class level:

- **Heart Rate:** Beginners show the highest median heart rate (~85 BPM), while Advanced students have the lowest (~80 BPM).
- **Blood Pressure:** In contrast, blood pressure tends to increase with class level—Beginners at ~118 mmHg and Advanced students at ~121 mmHg.

The results show that beginner students have higher heart rates, while advanced students have higher blood pressure. This may indicate that beginners experience more performance anxiety, whereas advanced students face greater physical or cognitive demands during music instruction.

Recommendation

1. Collect additional data (e.g., stress levels) to better understand these physiological patterns.
2. Support beginners with stress-reducing strategies.
3. Use physiological feedback to adapt teaching strategies.
4. Ensure breaks and support for advanced students to manage workload.

Reference

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