**Guided Project MLG382: Student Performance Prediction**

**Abstract:**

BrightPath Academy is a high school that has a commitment to academic excellence. BrightPath Academy faces various challenges with their progressive approach, this project serves as a solution to predict students’ academic performance by utilising machine learning.

[](https://github.com/badtzmaruu/MLG382)

2025-04-22

**Team Members:**

Markus Reblin 578083

Ulrigh Oosthuizen 577952

Vutivi Maswanganyi 577800

Jonathan Joubert 578085

Scan for [GitHub Repository](https://github.com/badtzmaruu/MLG382)

# Table of Contents

[Table of Contents 2](#_Toc195320740)

[1. Problem Statement 3](#_Toc195320741)

[2. Hypothesis generation 3](#_Toc195320742)

[Demographic: 3](#_Toc195320743)

[H1 – Students with higher parental education have better academic performance. 3](#_Toc195320744)

[H2 – Gender may influence academic performance. 3](#_Toc195320745)

[H3 – Ethnicity may influence academic performance. 3](#_Toc195320746)

[Study habits and parental involvement: 3](#_Toc195320747)

[H4 – Students with higher weekly study times have better academic performance. 3](#_Toc195320748)

[H5 – Students with fewer absences have better academic performance. 3](#_Toc195320749)

[H6 – Students who receive parental support have better academic performance. 3](#_Toc195320750)

[H7 – Students that receive tutoring have better academic performance. 3](#_Toc195320751)

[Extracurricular activities: 4](#_Toc195320752)

[H8 – Students who participate in sports and/or music have better academic performance. 4](#_Toc195320753)

[H9 – Students who volunteer have better academic performance. 4](#_Toc195320754)

[Reference List: 5](#_Toc195320755)

# 1. Problem Statement

This system aims to provide real-time data driven insights and information that will empower lecturers to delivery personalised interventions to improve individual academic performance.

Problem Statement:

Will we be able to develop a program that organises students into their respective ‘GradeClass’ based on data that includes students’ demographics details, study habits, parental involvement, etc.

# 2. Hypothesis generation

## Demographic:

### H1 – Students with higher parental education have better academic performance.

Parents with higher education levels are better equipped to support the students’ learning habits. They may influence the students’ grades by engaging with students by explaining homework, assignments, etc. (Dubow, Boxer and Huesmann, 2009)

### H2 – Gender may influence academic performance.

Traditional gender expectations encourage females to be more diligent and compliant with school norms and expectations. Males tend to be more affected by peer pressure that de-emphasises academic achievement in adolescence. Given that females are encouraged to be more organised and diligent regarding schoolwork, this positively impacts female academic performance. (Duckworth and Seligman, 2006)

### H3 – Ethnicity may influence academic performance.

In many South and East Asian cultural backgrounds strong emphasis is placed on educational achievement through forms of upholding family reputation and family honour. (Goyette and Xie, 1999) These educational attainments lead to higher levels of academic motivation which lead to increased academic performance (Sue and Okazaki, 1990)

## Study habits and parental involvement:

### H4 – Students with higher weekly study times have better academic performance.

Better academic performance is often a direct result of higher weekly study times. Students that study more often engage with the study material and display more effort than students who study less. This is a direct correlation with GPA. (Pei, 2024)

### H5 – Students with fewer absences have better academic performance.

Students who attend lectures and lessons more often continually learn and tend not to fall behind in study material opposed to students who are frequently absent. These factors improve academic performance. (Pei, 2024)

### H6 – Students who receive parental support have better academic performance.

Students with higher levels of parental involvement receive academic assistance such as explanations of study material, reminders to study, motivation and inspiration, etc. This foundation of support increase chances of academic success. (The Annie E. Casey Foundation, 2022)

### H7 – Students that receive tutoring have better academic performance.

Students who receive tutoring receive specific academic assistance. Tutors assist students with their weak areas in their study material. This individual assistance addresses students’ knowledge gaps by reinforcing course concepts which improves overall academic performance. (Nickow, Oreopoulos and Quan, 2020)

## Extracurricular activities:

### H8 – Students who participate in sports and/or music have better academic performance.

Student involvement in creative and physical extracurriculars enhance discipline and time management. Studies link these activities to improved academic performance. (Furda and Shuleski, 2019)

### H9 – Students who volunteer have better academic performance.

Students that volunteer have tend to have a sense of purpose and increased responsibility which are important factors that positively impact academic performance. (Astin et al., 2000)

# Reference List:

Astin, A., Vogelgesang, L., Ikeda, E. and Yee, J. (2000). *How Service Learning Affects Students*. [online] Available at: https://www.heri.ucla.edu/PDFs/HSLAS/HSLAS.PDF.

Dubow, E.F., Boxer, P. and Huesmann, L.R. (2009). Long-term Effects of Parents’ Education on Children’s Educational and Occupational Success: Mediation by Family Interactions, Child Aggression, and Teenage Aspirations. *Merrill-Palmer Quarterly*, 55(3), pp.224–249. doi:https://doi.org/10.1353/mpq.0.0030.

Duckworth, A.L. and Seligman, M.E.P. (2006). *APA PsycNet*. [online] psycnet.apa.org. Available at: https://psycnet.apa.org/doiLanding?doi=10.1037%2F0022-0663.98.1.198.

Furda, M. and Shuleski, M. (2019). The Impact of Extracurriculurs on Academic Performance and School Perception. *The Excellence in Education Journal*, [online] 8(1). Available at: https://files.eric.ed.gov/fulltext/EJ1208711.pdf.

Goyette, K. and Xie, Y. (1999). Educational Expectations of Asian American Youths: Determinants and Ethnic Differences. *Sociology of Education*, [online] 72(1), p.22. doi:https://doi.org/10.2307/2673184.

Nickow, A., Oreopoulos, P. and Quan, V. (2020). The Impressive Effects of Tutoring on Prek-12 Learning: A Systematic Review and Meta-Analysis of the Experimental Evidence. *SSRN Electronic Journal*. doi:https://doi.org/10.2139/ssrn.3644077.

Pei, C. (2024). Research on the influencing factors of student performance . *Theoretical and Natural Science*, 51(1), pp.26–33. doi:https://doi.org/10.54254/2753-8818/51/2024ch0131.

Sue, S. and Okazaki, S. (1990). Asian-American educational achievements: A phenomenon in search of an explanation. *American Psychologist*, 45(8), pp.913–920. doi:https://doi.org/10.1037/0003-066x.45.8.913.

The Annie E. Casey Foundation (2022). *Parental Involvement in Your Child’s Education*. [online] The Annie E. Casey Foundation. Available at: https://www.aecf.org/blog/parental-involvement-is-key-to-student-success-research-shows.