**Educational Impact Report on Student Performance in Math and Portuguese Subjects**

This report synthesizes the findings from various hypothesis tests conducted to assess the impact of several attributes on the final grades of students in Math (`G3\_x`) and Portuguese (`G3\_y`) subjects. The analysis utilized a range of statistical tests, including **ANOVA, Tukey's HSD post-hoc test, t-test, Welch's t-test, Levene's test for equality of variances, and Pearson and Spearman correlation tests**, to explore the effects of **study time, parental education, absences, school support, and internet access.**

**1. Study Time**

**Hypothesis:** Students who dedicate more hours to study per week will achieve higher final grades, reflecting the efficacy of sustained academic effort.

**Success Definition:** Significant differences in final grades among study time groups, particularly higher grades with increased study time.

**Rationale:** Increased study time is presumed to enhance comprehension and mastery of course content.

**Results:** For Math, ANOVA revealed no significant difference across study time groups (F-statistic=1.599, p-value=0.189). In contrast, Portuguese showed significant differences (F-statistic=13.697, p-value=0.000), with Tukey’s HSD indicating higher grades for those studying more than 5 hours weekly.

**Inference:** While study time significantly affects Portuguese grades, suggesting effective learning with increased study hours, it does not have the same impact on Math grades within this dataset. This disparity may indicate subject-specific learning differences, or the influence of external factors not captured by study time alone.

**2. Parental Education**

**Hypothesis:** Higher levels of parental education positively influence student final grades, indicating the role of an enriched home learning environment.

**Success Definition:** Statistically significant higher grades among students with parents of higher education levels.

**Rationale:** Parents with higher education levels may provide better academic support and resources.

**Results:** Both subjects demonstrated significant differences in final grades based on parental education levels, with ANOVA yielding p-values of 0.000 for Math and Portuguese. Tukey’s HSD indicated particularly higher grades for students with parents possessing the highest education level.

**Inference:** The consistent impact of parental education on both subjects underscores its importance in student academic achievement, suggesting benefits from parental involvement and possibly, a more resource-rich learning environment at home.

**3. Absences**

**Hypothesis:** Increased school absences negatively affect student final grades, reflecting the importance of regular class attendance.

**Success Definition:** Negative correlation between absences and final grades.

**Rationale:** Regular attendance ensures continuous learning and reduces knowledge gaps.

**Results:** Correlation analyses showed no significant relationship between absences and Math grades (Pearson p-value=0.572; Spearman p-value=0.764), but a weak negative correlation with Portuguese grades (Pearson p-value=0.005; Spearman p-value=0.001), indicating that increased absences might slightly impact language subject grades.

**Inference:** The lack of a significant relationship for Math and a weak relationship for Portuguese implies that while attendance is beneficial, its impact on academic performance may be less direct and influenced by other compensatory factors.

**4. School Support**

**Hypothesis:** School support services enhance student academic performance, especially in challenging subjects.

**Success Definition:** Higher grades for students receiving school support compared to those who do not.

**Rationale:** Targeted support addresses individual learning needs, fostering better understanding and performance.

**Results:** For Math, the Mann-Whitney U test showed a significant difference favoring students without school support (p-value=0.006). For Portuguese, Welch’s t-test indicated that students with school support performed significantly worse than those without (p-value < 0.0001).

**Inference:** The findings for both subjects highlight a need for reevaluation and possibly, redesign of support programs to ensure they effectively aid student learning. Also, the main goal of school support is to uplift the students who are performing poor.

**5. Internet Access**

**Hypothesis:** Internet access at home facilitates better academic performance through access to educational resources.

**Success Definition:** Significant differences in final grades between students with and without home internet access.

**Rationale:** The internet is a vital educational tool, offering vast information and learning opportunities.

**Results:** One-tail t-tests revealed a significant positive effect of internet access on Portuguese grades (p-value=0.041) but not on Math grades to a statistically significant level (p-value=0.043), suggesting a marginal effect.

**Inference:** The beneficial impact of internet access across both subjects’ advocates for initiatives aimed at increasing digital inclusivity, providing students with essential learning resources.

**Conclusion**

The analyses reveal diverse impacts of the examined attributes on student performance in Math and Portuguese, highlighting the multifaceted nature of academic achievement. While some factors like parental education and internet access consistently benefit students across subjects, others such as study time and school support show varied effects. These insights call for targeted interventions that consider the specific needs and circumstances of students, alongside broader efforts to enhance educational equity and access to resources. The findings underscore the importance of a supportive home environment, regular engagement in learning activities, and the critical role of accessible educational technologies in modern education.