



## Student Data Report for 2022-2023 Academic Year

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### SUMMARY

All school data for this template attendance and GPA report has been generated and contains no real data. Attendance and GPA data for the fictional ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY students for the academic year 2022-2023 was extracted from the Phoenix<sup>®</sup> school database and analyzed. Student daily attendance was 94% with an unexcused daily absence rate of 1% and truancy rate of 18%. Class tardy rate was 2%. A significant increase in unexcused class absences over the academic year was found, increasing from 0.9% in Q1 to 4.5% in Q4. The least attended block was D with an unexcused absence rate of 2.49% whilst block A had the highest tardy rate of 2.51%. The median GPA for the first semester was 3.3 with female students significantly outperforming male students. Median cumulative GPA for current students is 3.2. Student GPAs were found to be skewed toward the higher end of the GPA scale indicating a positive teaching effect. A moderate strength positive correlation ( $R = .45, p < .0001$ ) was found between student attendance rates and GPA. Fulfillment of J-Term course preferences was 78% with 94% of students receiving at least one course of their choice. Disciplinary infractions increased in the second semester, largely due to the increase in unexcused absences (74% of all infractions). A strong negative correlation ( $R = -.61, p < .0001$ ) between number of infractions and GPA was found.

### 1. Introduction

The COVID-19 pandemic has had a profound impact on high school student attendance and GPAs in the United States. With the widespread adoption of remote learning and intermittent school closures, students faced unprecedented challenges in maintaining regular attendance and academic performance. Studies have shown that the shift to online instruction resulted in decreased attendance rates and engagement among students (Carminucci et al. 2021). Moreover, the absence of in-person support, limited access to resources, and increased stressors have contributed to fluctuations in GPAs and academic achievement. Making detailed observations of current student attendance and performance is vital in assessing long-term impacts of the pandemic on education.

This report analyses student data from ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY to provide a comprehensive overview of how students are performing and how the school is operating. Included in this report are the following

- Daily and class attendance with breakdowns by grade, section and absence type.

- GPA breakdowns by grade, historical medians for ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY over the last decade, and correlation with attendance rates.
- J-Term course preference fulfillment.
- Discipline breakdown by infraction type and correlation with GPA.
- Potential areas for process improvement.

### 2. Attendance

Student attendance is marked in the Phoenix<sup>®</sup> database using only absences, tardiness or other infractions. If a student has no attendance entries for a day or section then they are assumed to be present. The different absence types are listed in Table 1 and Figure 3 shows the proportion of the total attendance infractions for all students across the whole academic year.

#### a. Daily Attendance

**Daily Attendance for the academic year was 94%.  
Unexcused Daily Absence Rate was 1% (99% attendance).  
Truancy Rate was 18%.**

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Type	Group	Points	Excused	Count	Rate
Absent-Excused	Absent	1	Y	25008	5.37%
Absent-Unexcused	Absent	1	N	8352	1.79%
Called Out	Other	0	Y	1156	0.25%
Extended Vacation	Absent	1	N	1503	0.32%
Internship	Other	0	Y	676	0.15%
Out of Room	Other	0	Y	8234	1.77%
School Sponsored	Other	0	Y	3653	0.78%
Suspended Absence	Other	0	Y	425	0.09%
Tardy-Excused	Tardy	0.25	Y	1645	0.35%
Tardy-Unexcused	Tardy	0.25	N	2156	0.46%

TABLE 1: Absence Types. Each type is assigned a Group of Absent, Tardy or Other and is either Excused or Unexcused. Accumulated points lead to intervention action. Count shows the total number of each type for all sections and students for the academic year.

Students absent for a full day are marked with excused or unexcused absences. Table 2 shows the daily attendance rates for each grade. Let  $n_o$  be the number of days the

Grade	Daily Attendance Rate	Unexcused Daily Absence Rate
All	94.1%	1.0%
9	93.2%	0.8%
10	94.5%	0.5%
11	92.7%	1.1%
12	93.6%	1.4%

TABLE 2: Daily attendance rates by grade.

school was open,  $n_e$  be the number of days the student was enrolled in the academic year and  $n_a$  the number of days the student was absent then the *Daily Attendance Rate* is defined as

$$a_d = 1 - \frac{n_a}{n_e}. \quad (1)$$

The Daily Attendance Rate includes any absence excused or unexcused. Let  $n_u$  be the number of unexcused day absences, then the *Unexcused Daily Absence Rate* is defined as

$$a_{du} = \frac{n_u}{n_e}. \quad (2)$$

The *Truancy Rate* is defined as

$$a_t = \frac{s_t}{s_e}, \quad (3)$$

where  $s_t$  is the number of students with less than 90% daily attendance ( $a_d < 90\%$ ) and  $s_e$  is the total number of students enrolled.

### b. Class Attendance

**Class Attendance for the academic year was 93%.  
Unexcused Class Absence Rate was 2%.  
Tardy Rate was 2%.**

Attendance for each class or section is marked using the absence types listed in Table 1. A student with no attendance entries for a class or section is assumed to be present. If  $n_c$  is the number of sections a student was absent and  $n_{ce}$  is the number of sections they are enrolled in then the *Class Attendance Rate* is

$$a_c = 1 - \frac{n_c}{n_{ce}}, \quad (4)$$

where  $n_c$  is the sum of all absences types in Table 1 with Group = Absent. Let  $n_{cu}$  be the number of section a student was absent without excuse (Group = Absent, Excused = N), then the *Unexcused Class Absence Rate* is

$$a_{cu} = \frac{n_{cu}}{n_{ce}}. \quad (5)$$

Let  $n_t$  be the number of sections a student was tardy (Group = Tardy), the *Tardy Rate* is

$$t_c = \frac{n_t}{n_{ce}}. \quad (6)$$

Let  $n_{tu}$  be the number of sections a student was unexcused tardy (Group = Tardy, Excused = N), then the *Unexcused Tardy Rate* is

$$t_{cu} = \frac{n_{tu}}{n_{ce}}. \quad (7)$$

Figure 1 shows the class attendance for the whole school over the academic year. Class attendance is at its highest at the start of each term and drops lower at the end of each term, with a particularly significant drop around the winter holiday season. Class attendance and

punctuality is lower for seniors than it is for freshman as seen in Table 3.

Figure 2 shows an upward trend in unexcused absences over the academic years with a rate of around 0.9% in the first quarter increase to over 4.5% in the fourth quarter.

Grade	Attendance Rate	Unexcused Absence Rate	Tardy Rate
ALL	92.9%	2.0%	1.9%
9	92.4%	1.3%	0.7%
10	90.6%	2.7%	0.8%
11	90.2%	2.6%	1.5%
12	88.7%	3.0%	1.3%

TABLE 3: Class Attendance Rates by Grade.

### c. Infractions

**89% of all sections were attended with no infractions occurring.**

**97% of all sections were attended with no unexcused infractions.**

**23% of all infractions were unexcused.**

Table 1 shows the rates for each infraction type over the academic year.

### d. Section Attendance

**D block was the least attended with an unexcused absence rate of 2.49%.**

**A block had the highest tardy rate of 2.51%.**

Table 4 and Figure 4 shows the absence rates and tardy rates for each block. The afternoon class blocks had lower attendance than the morning blocks, with D block being the lowest attended. Advisory block (ADV) also has low attendance. This is reflected in the unexcused absences rates with the J-Term lunch block (L3) also having high unexcused absences.

Figure 5 show the first class block of the day (A) has a significantly higher tardy rate than all other blocks likely due to students being late arriving at the start of the day. Blocks C and D have the next highest tardy rates.

## 3. GPA

**Median GPA for the academic year was 3.2.**

National GPAs were impacted by COVID-19 but have been steadily increasing over the last few years with a mean GPA of 3.11 in 2019 (NAEP 2019). Table 5 shows the GPAs for ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY students over the academic year with a median of 3.2, greater than the national average. Female students (median GPA 3.12) significantly outperformed

Block	Attendance Rate	Unexcused Absence Rate	Tardy Rate	Unexcused Tardy Rate
A	90.03%	1.74%	2.51%	1.65%
B	90.75%	1.40%	0.91%	0.52%
L	93.61%	2.36%	0.24%	0.16%
C	89.60%	2.01%	0.71%	0.27%
D	87.40%	2.49%	0.73%	0.53%

TABLE 4: Absence and Tardy Rates by Block

male students (median GPA 2.92). The median cumulative GPA for current students is 3.2.

Two different averages are presented in Table 5 and are defined as follows. Let  $x_i$  for  $i = 1, \dots, N$  represent the GPAs of  $N$  students sorted in ascending order ( $x_1 \leq x_2 \leq \dots \leq x_N$ ). Then the *Mean* is defined as

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i \quad (8)$$

and the *Median* is

$$\tilde{x} = \begin{cases} x_{\frac{N+1}{2}} & \text{if } N \text{ odd} \\ \frac{1}{2}(x_{\frac{N}{2}} + x_{\frac{N}{2}+1}) & \text{if } N \text{ even} \end{cases} \quad (9)$$

The mean is a suitable measure of a populations average when the data is symmetrically distributed and there are few outliers, the median is more suitable for skewed data with outliers (Statology 2021). For non-random data sets, data is likely to be skewed with outliers, therefore the median is a more representative average for the population, whilst the mean indicates skewness.

Student grades are often described as fitting a “bell-curve” or normal distribution. However a normal distribution is based on the idea that some students will fail and only a few will achieve high levels of success which is counteractive to the endeavor of education (Arthurs et al. 2019). Indeed, GPA data from ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY was tested for fitness to a normal distribution (see Section A3) and was found to be skewed to the high-end of the GPA scale (Figure 7), indicating that teaching at ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY is producing the desired effect.

### a. Historical GPA

Historical median final GPAs for ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY are shown in Figure 8. The averages show a slight upward trend since 2013 with near future median final GPAs expected to be between 2.64 and 3.36 with 99.7% probability.



FIG. 1: School Class Attendance for 2022-2023 Academic Year. Attendance calculated using Equation 4, that is absence types with Group = Absent from Table 1.

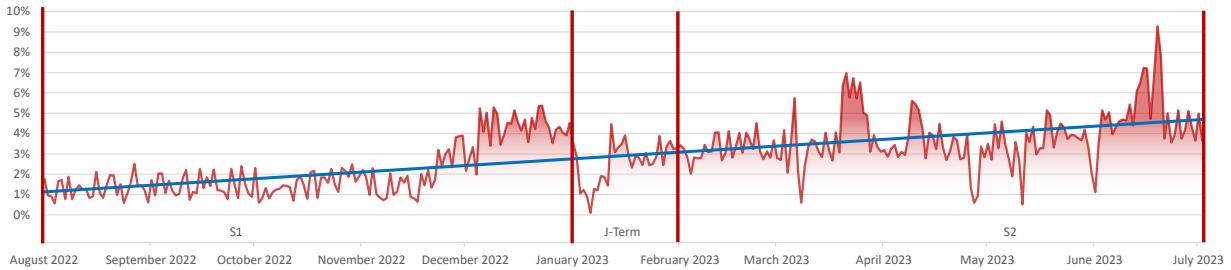


FIG. 2: School Unexcused Class Absence Rates for 2022-2023 Academic Year. Absence rate calculated using Equation 5. Blue trendline indicates unexcused absences have been increasing over the academic year.

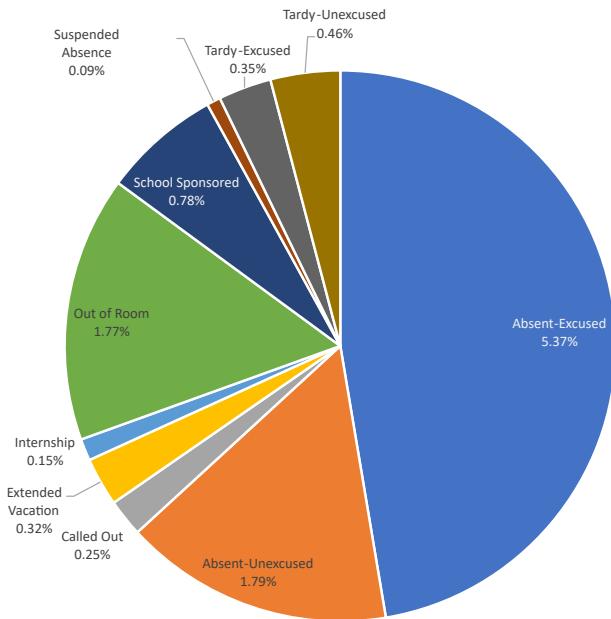


FIG. 3: Total attendance infractions for all students across the academic year.

*b. Attendance and GPA Correlation*

Figure 9 shows the correlation between student attendance (excluding excused absences) and their GPAs

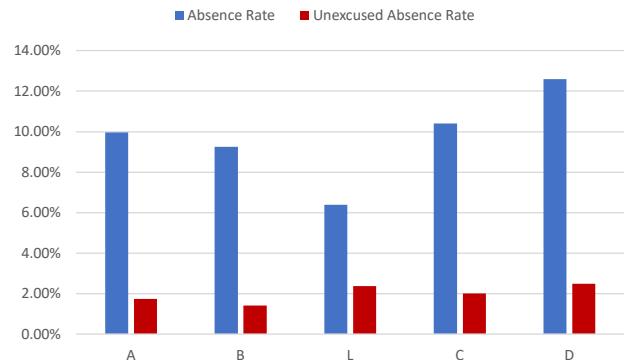


FIG. 4: Absence Rates by Block

for the academic year. The Spearman’s Rank correlation coefficient ( $R = .45, p < .0001$ ) indicates a moderate strength positive correlation, that is students with higher attendance rates tend to have higher GPA. The coefficient of determination ( $R^2 = .20$ ) suggests that 20% of the variation in GPA may be attributed to unexcused student absences<sup>1</sup>. Correlations between overall attendance rates (including excused absences) was also significant ( $R = .45, p < .0001$ ).

<sup>1</sup>Note that whilst this is a plausible causation, this statistical test does not explain the relationship

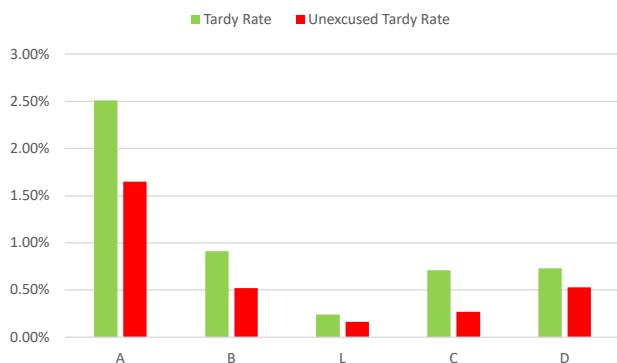


FIG. 5: Tardy Rates by Block

		9	10	11	12	Total
Cumulative	Mean	2.84	2.82	2.78	2.92	2.92
	Median	3.02	3.11	3.41	3.09	3.2
Q1	Mean	2.93	2.98	3.12	3.22	3.14
	Median	3.04	3.27	3.43	3.60	3.39
Q2	Mean	2.88	2.94	3.10	3.29	3.13
	Median	2.95	3.02	3.25	3.44	3.29
S1	Mean	2.85	2.98	3.14	3.33	3.07
	Median	2.99	2.98	3.35	3.49	3.31
Q3	Mean	2.99	3.13	2.92	2.99	2.98
	Median	3.21	3.16	3.08	3.32	3.16

TABLE 5: Mean and median GPAs for ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY academic year.

#### 4. J-Term

**Total J-Term block preferences fulfillment was 78% and 94% of students received at least one course preference.**

Students were invited to complete a survey prior to J-Term to express their 1st, 2nd and 3rd preferences for A,B,C and D block courses. 341 students responded to the survey and 63 did not. This survey was used to assign students to classes with non-responsive students assigned to courses with remaining spaces. Many courses received overwhelming support and not all students could be assigned these classes. Figure 11 shows the student preferences for the 10 most popular courses.

Table 6 shows that 12th grade received the highest number of preferences with 9th grade receiving the lowest number. 54.3% of all first choices were fulfilled with 78.2% of 3rd or better choices fulfilled.

The overall pass rate for J-Term course was 94.3%. Students in courses of their preference had an overall pass rate of 94.7% and students in unpreferred courses had an overall pass rate of 87.8%.

Each J-Term course was categorized to determine which types of courses students preferred. Figure 12

Preference	12	11	10	9	All
1st	76.1%	64.2%	50.6%	18.3%	54.3%
2nd or better	81.2%	78.3%	69.6%	37.4%	65.6%
3rd or better	85.9%	81.3%	76.5%	56.3%	78.2%
None	14.1%	18.3%	22.1%	43.9%	21.8%

TABLE 6: J-Term course preference fulfillment by grade.

demonstrates that students preferred courses involving games, physical activities and creativity over the more traditional academically inclined courses.

#### 5. Discipline

Figure 13 shows detentions over the academic year at ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY. Detention frequency increased toward the end of the academic year. Table 7 shows that 73.7% of all disciplinary infractions were due to unexcused absence, with potion use (4.8%) and broom use (3.7%) being the next most frequent infractions. Figure 14 shows a strong negative correlation between number of infractions and GPA ( $R = -.61, p < .0001$ ), that is students with more infractions tend to have lower GPAs.

#### 6. Conclusion

Daily attendance rate at ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY was found to be 96% which is inline with pre-pandemic national rates of 92% (Carminucci et al. 2021). Additionally, median GPAs at ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY from the first semester of 2023 are exceeding pre-pandemic averages at the school, indicating that ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY is on-track to return to normal operation.

##### a. Process Improvement

The following areas were identified as possible areas for improvement.

- *Magical Creatures Student Tracking.* The Magical Creatures department currently tracks student enrollment and grading with a spreadsheet that is manually updated and separate from the main school database. This introduces inefficiencies in accuracy of current student data and creates duplicate workloads between maintaining the school database and the Magical Creatures system. The most elegant solution to this would be to upgrade the school database to a system that can meet the Magical Creatures department's needs.

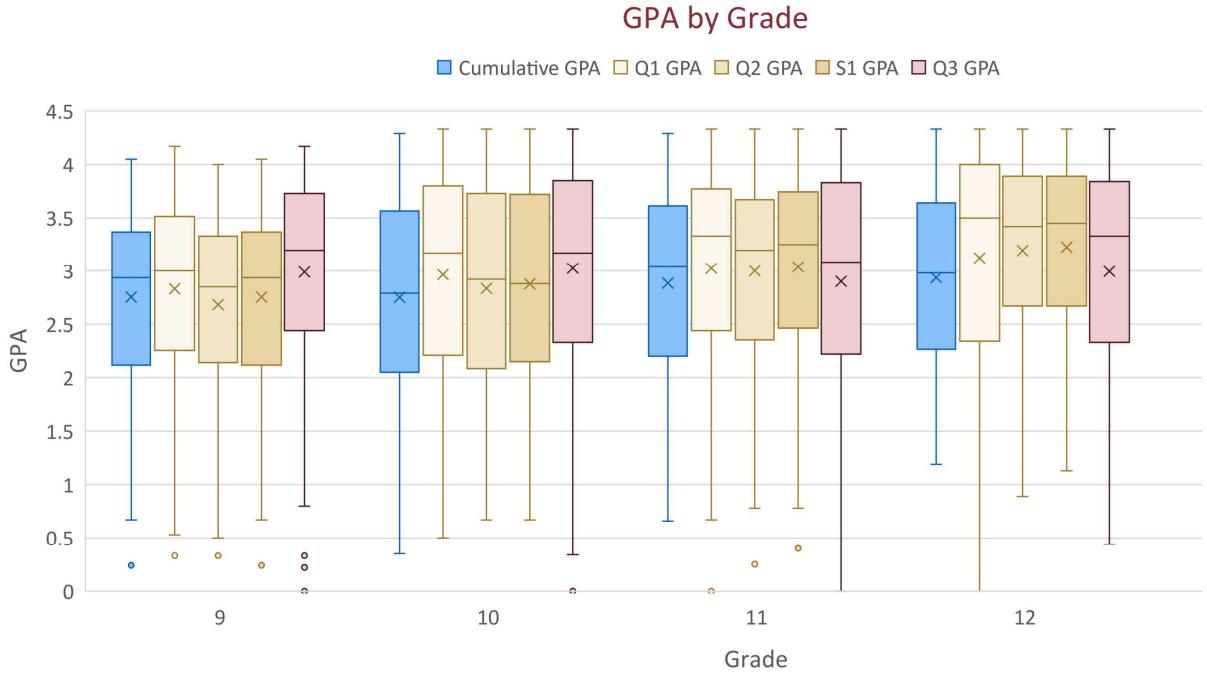


FIG. 6: Distribution of School GPAs for academic year by grade. See Figure A1 for an explanation of the box plot format.

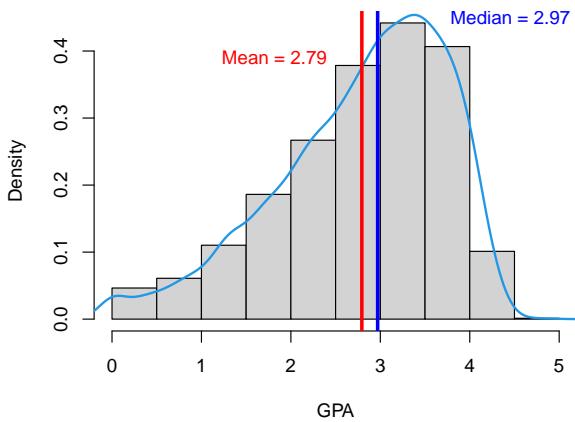


FIG. 7: GPA density distribution at ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY for 2013-2023. Density distribution shows GPAs are skewed towards the high-end of the GPA scale.

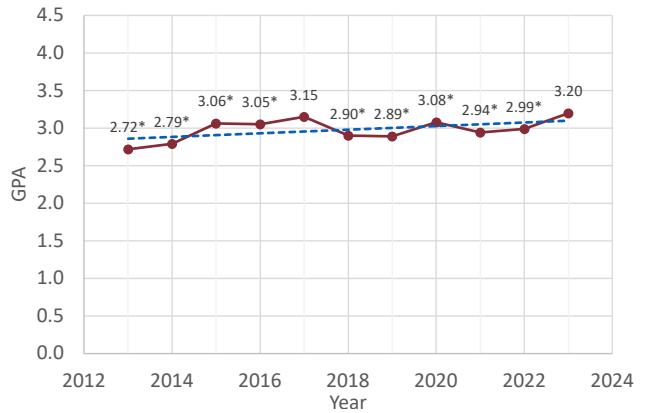


FIG. 8: Median Final GPAs at ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY for 2013-2023. Blue dashed line indicates an upward trend. \*Significantly different ( $p < .05$ ) from 2023 first semester.

- *Student Credit Evaluations.* These are currently done manually by staff, which is time consuming and is something that could be automated. Other school

management software should have this functionality, although exporting student credits data from the current system into a spreadsheet to automate credit evaluations is possible.

- *Scheduling.* The current Phoenix<sup>®</sup> database is not capable of handling scheduling for the new

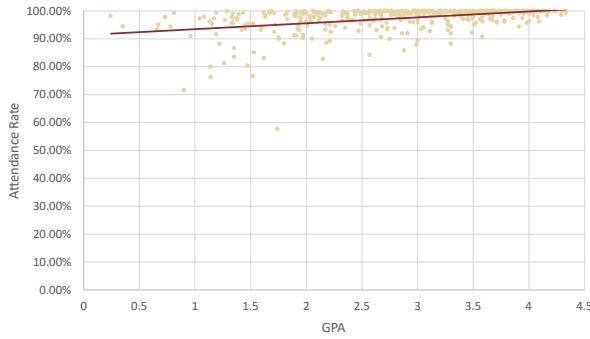


FIG. 9: Moderate correlation between attendance (excluding excused absences) and GPA for 2023 academic year,  $R^2 = .20$ .

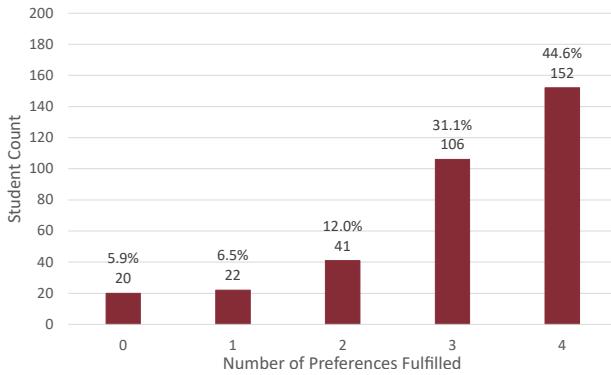


FIG. 10: J-Term student preference fulfillment. 94.1% of students received at least one of their preferences.

alternating daily format, resulting in significant workload for the registrar. Additionally, J-Term scheduling could be improved by streamlining the student preference survey by requiring each student to pick 4th or 5th preferences and restricting identical choices.

- *Feedback Surveys.* Constructing more quantitative questions in surveys will make analyzing the feedback faster as well as making the survey easier for students to complete, increasing the amount of useful feedback. eg. How interesting did you find this course on a scale from 1 to 10?
- *Database System Upgrade.* The current Phoenix® database is functional, however lacks many useful features that would streamline workflow at ILVERMORN Y SCHOOL OF WITCHCRAFT AND WIZARDRY , such as attendance and grade statistics, credit tracking, more flexible scheduling, and at-risk student analysis. Recommend upgrading to Phoenix® 2.0.

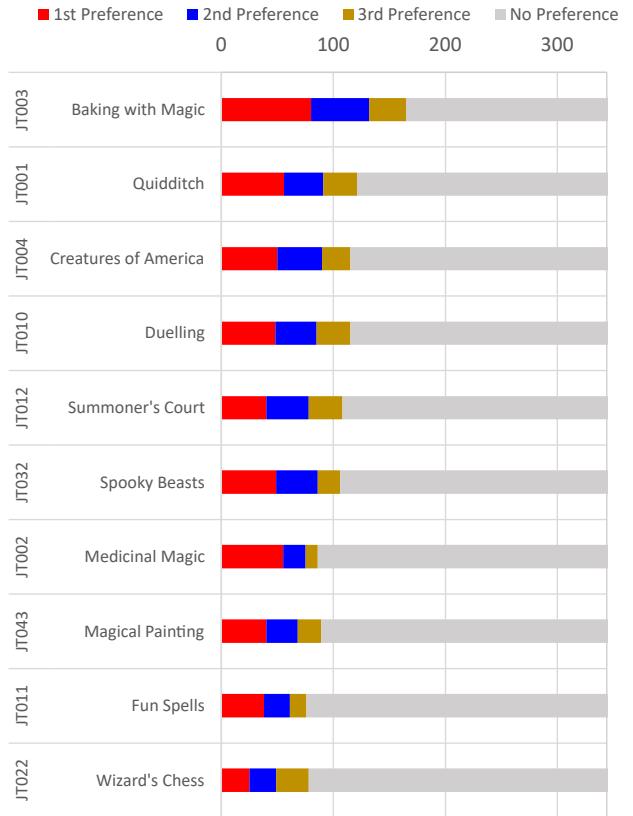


FIG. 11: Student preferences for top 10 most popular J-Term courses.

### Average Interest

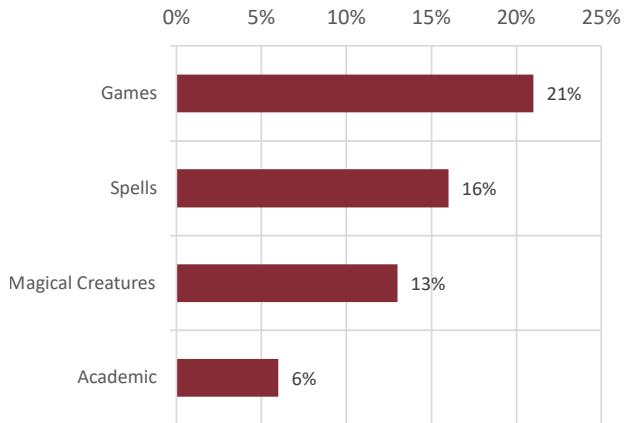


FIG. 12: Average student interest for courses in each category as percentage of student body that responded to preference survey.

Infraction Type	Count	Proportion
ALL	1061	-
All Unsafe Behaviors	9	0.8%
Broom Use	39	3.7%
Bullying or Harrassment	16	1.5%
Deface, Damage, Steal	2	0.2%
Disruptive in Class	11	1.0%
Dress Code Violation	31	2.9%
Fighting	3	0.3%
Flagrant Disrespect	22	2.1%
Inappropriate Behavior	14	1.3%
Leaving w/o Permission	19	1.8%
Magical Creatures	10	0.9%
Misuse of magic	25	2.4%
Non-Compliance	9	0.8%
Owl Mail	6	0.6%
Potion Use	51	4.8%
Profanity	11	1.0%
Unexcused Absence	782	73.7%
Unforgivable Spell	1	0.1%
Unsafe, Immoral Behavior	4	0.4%

TABLE 7: Disciplinary infractions over 2023 academic year. Total count for the year and percentage of total infractions is displayed.

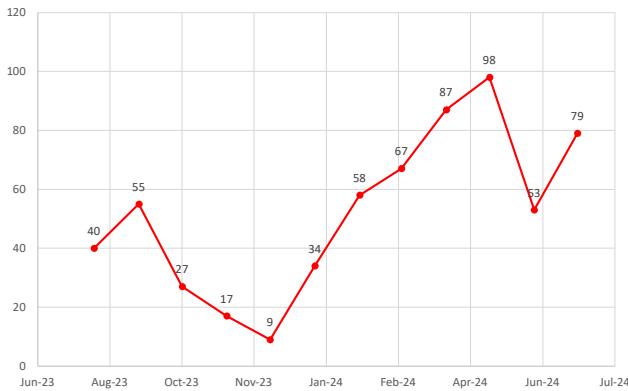


FIG. 13: Number of detentions given each month for 2023 academic year.

*b. Further Work*

The following are some suggestions for further data analysis work.

- *Magical Creatures Student Tracking.* Identify patterns in students that take introductory care of Magical Creatures courses and continue to take full time Magical Creatures course.

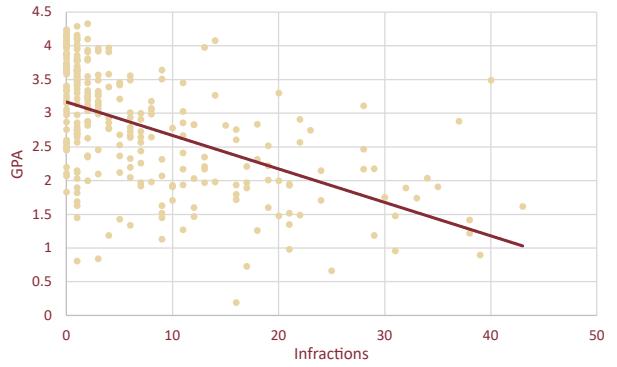


FIG. 14: Strong negative correlation between number of infractions and GPA for 2023 academic year ( $R^2 = .37$ ).

- *Student Performance Prediction.* A machine learning model could be implemented and trained using previous student attendance, grade and discipline data to identify early warnings of at-risk behavioral patterns among current students.
- *Intervention Efficacy.* Test the statistical significance of changes in student attendance and grades before and after interventions.

*Acknowledgments.* This analysis was produced using fabricated data extracted from the fictional ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY 's Phoenix<sup>®</sup> database. All data in this report has been fabricated for demonstration purposes, no real data is displayed in this report.

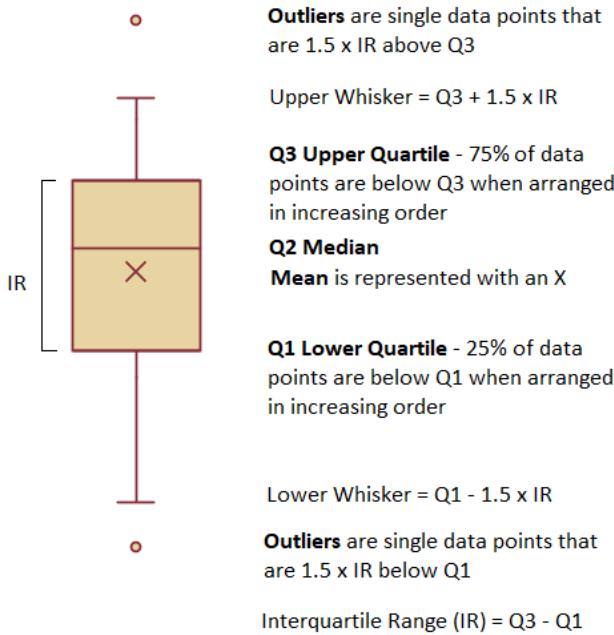


FIG. A1: Box plot Diagram.

APPENDIX

This appendix contains more technical details on the work described in this report as well as data tables.

**A1. Box Plot Charts**

Box plots are used to provide a visual representation of how data is distributed and identify outliers. Figure A1 details the features of these plots.

**A2. Statistical Tests and p-values**

Throughout this report, statistical tests are used to check whether datasets are statistically different from each other. Two-tailed t-Tests are used to test the significance of correlation coefficients and Mann-Whitney U (Wilcoxon Rank Sum) Tests are used to test the significance in GPA samples due to their skewed distribution. These tests result in a “p-value”. A p-value that is less than 0.05 (95% confidence level) is generally considered to be statistically significant in the scientific community, although it can depend on the industry.

**A3. Normality of GPA data**

It is necessary to check if data is normally distributed as many statistical tests, such as parametric tests, require this as an assumption. If data is not normally distributed, then non-parametric statistical tests are required for accurate results. Figure A2 shows box plots of the last decade of

final GPAs at ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY . Outliers can be seen to be present and means are below the medians indicating significant skew. Figure A3 shows the quantile-quantile plots for historical GPAs. These plots show that the GPAs do not follow normal distributions, this is confirmed by the Shapiro-Wilk Normality test values in Table A1. This is to be expected as normal distributions are found in random data, whereas education is a intentional endeavor that will produce skewed data.

Year	W Stat	p-value
2013	0.957	1.60E-04
2014	0.97	5.71E-06
2015	0.934	3.48E-13
2016	0.948	1.52E-13
2017	0.946	1.07E-13
2018	0.951	1.97E-12
2019	0.967	4.16E-09
2020	0.947	9.22E-12
2021	0.947	5.85E-11
2022	0.933	4.24E-13
2023	0.949	7.88E-11

TABLE A1: Shapiro-Wilk Normality test for final GPAs from 2013-2023. All p-values are < .05 indicating that the hypothesis that the data are normally distributed should be rejected.

**References**

Arthurs, N., B. Stenhaus, S. Karayev, and C. Piech, 2019: Grades are not normal: Improving exam score models using the logit-normal distribution. *International Educational Data Mining Society*. URL <https://files.eric.ed.gov/fulltext/ED599204.pdf>.

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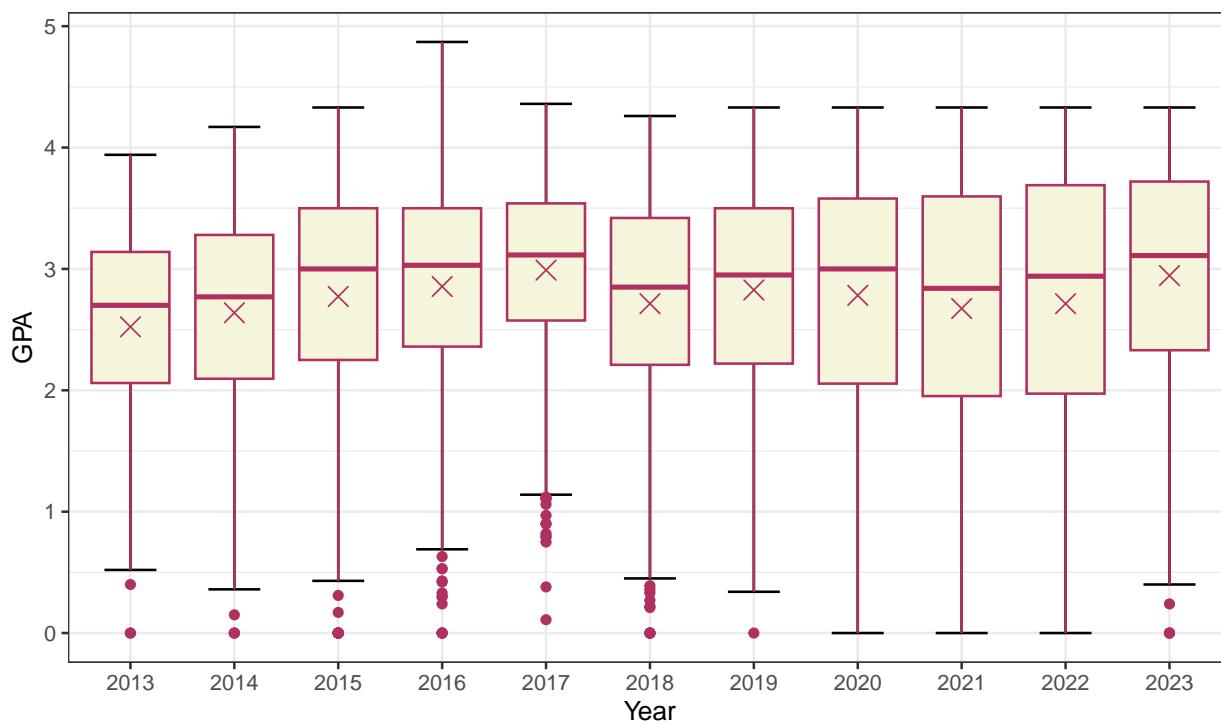


FIG. A2: GPA distributions for ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY for 2013-2023. Large numbers of outliers are visible for many years which influences the mean values. Data from 2023 is using only first semester grades.

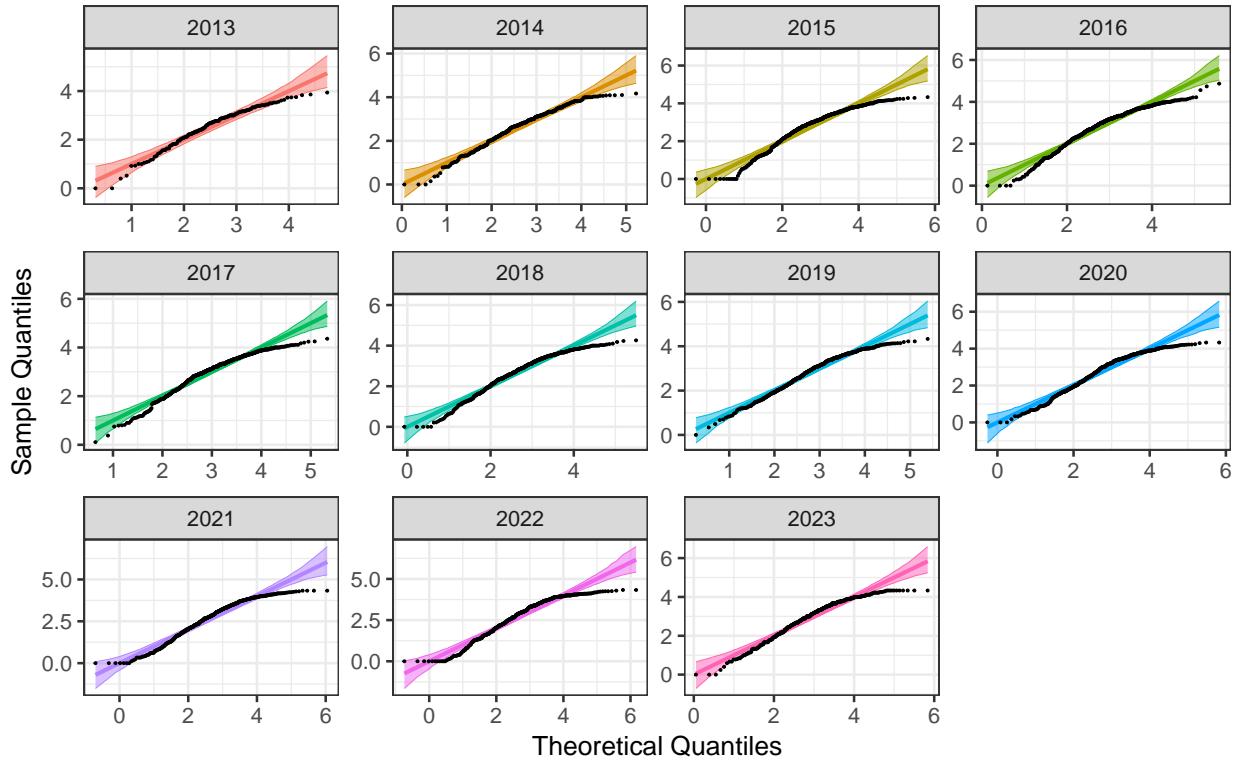


FIG. A3: 2013-2023 ILVERMORNY SCHOOL OF WITCHCRAFT AND WIZARDRY GPA Quantile-Quantile plots. Observed GPAs plotted against theoretical normally distributed GPAs. Diagonal shows reference line with 95% confidence bands that data points should follow if normally distributed. GPAs deviate significantly outside the 95% confidence bands indicating they do not follow normal distributions.