Analysis Report

This report is structured as follows.

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Descriptive Statistics

In analyzing the descriptive statistics by class, it is observed that the classes labeled as "1FC" and "2FC" exhibit relatively higher mean StdScores of 0.826 and 0.800, respectively, compared to their "T" counterparts, which have mean scores around 0.52. The "3FC" class also shows a higher mean score of 0.782 compared to "3T" with a mean of 0.538. These contrasts indicate that the "FC" classes generally outperform the "T" classes. Additionally, the standard errors of the mean (SEM) are quite low across all classes, indicating precise estimates of the means.

Class	Mean	SEM	SD
1FC	0.826	0.005	0.077
1T	0.522	0.007	0.104
2FC	0.800	0.006	0.088
2T	0.515	0.008	0.107
3FC	0.782	0.010	0.122
3T	0.538	0.011	0.118

When examining the data by period, the mean StdScores are remarkably consistent across the years 2021-22, 2022-23, and 2023-24, all hovering around 0.683 with minimal variation in the SEM, suggesting that the period does not have a significant effect on the StdScores. The standard deviations are also similar across periods, indicating consistent variability in scores from year to year.

Period	Mean	SEM	SD
2021-22	0.683	0.009	0.171
2022-23	0.683	0.009	0.172
2023-24	0.681	0.009	0.176

In terms of test performance, "Test5" stands out with the highest mean StdScore of 0.831, significantly higher than other tests which range from 0.649 to 0.697. The SEM for "Test5" is also notably low, emphasizing the reliability of this high mean score. In contrast, the other tests have lower means and slightly higher standard errors and standard deviations, suggesting more variability in performance.

Test	Mean	SEM	SD
Test1	0.697	0.010	0.184
Test2	0.658	0.009	0.166
Test3	0.666	0.010	0.161
Test4	0.649	0.013	0.179
Test5	0.831	0.829	0.074

When breaking down the interaction between class and period, "1FC" consistently maintains high mean StdScores across all periods, with slight increases in 2023-24. In contrast, "1T" shows more fluctuation, with the highest mean in 2023-24. Classes "2FC" and "3FC" also demonstrate higher means compared to their "T" counterparts across all periods. Notably, the SEMs remain low, indicating precise and consistent mean estimates.

Class	Period	Mean	SEM	SD
1FC	2021-22	0.823	0.007	0.069
1FC	2022-23	0.825	0.010	0.085
1FC	2023-24	0.830	0.008	0.078
1T	2021-22	0.517	0.011	0.096
1T	2022-23	0.504	0.014	0.105
1T	2023-24	0.541	0.012	0.108
2FC	2021-22	0.787	0.011	0.093
2FC	2022-23	0.793	0.011	0.096
2FC	2023-24	0.820	0.008	0.072
2T	2021-22	0.501	0.014	0.112
2T	2022-23	0.522	0.013	0.105
2T	2023-24	0.524	0.013	0.105
3FC	2021-22	0.813	0.013	0.097
3FC	2022-23	0.787	0.016	0.114
3FC	2023-24	0.743	0.020	0.143
3T	2021-22	0.578	0.018	0.108
3T	2022-23	0.550	0.018	0.112
3T	2023-24	0.486	0.019	0.116

The interaction between class and test further highlights the performance disparities. The "1FC" class achieves the highest mean StdScores across all tests, particularly in "Test1" and "Test5," with means of 0.872 and 0.831, respectively. In comparison, "1T" shows lower mean scores across tests, with the highest mean in "Test1." Similar trends are observed for "2FC" and "3FC," where the "FC" classes consistently outperform the "T" classes in all tests, underscoring the overall stronger performance of the "FC" classes.

Class	Test	Mean	SEM	SD
1FC	Test1	0.872	0.009	0.066
1FC	Test2	0.810	0.011	0.082
1FC	Test3	0.797	0.011	0.077
1FC	Test4	0.815	0.009	0.060
1FC	Test5	0.831	0.010	0.074
1T	Test1	0.547	0.015	0.113
1T	Test2	0.530	0.014	0.101

1T	Test3	0.517	0.014	0.102
1T	Test4	0.492	0.013	0.091
2FC	Test 5	0.826	0.011	0.070
2FC	Test1	0.839	0.009	0.063
2FC	Test2	0.776	0.014	0.100
2FC	Test3	0.771	0.012	0.084
2FC	Test4	0.791	0.015	0.098
2T	Test1	0.546	0.016	0.116
2T	Test2	0.519	0.016	0.108
2T	Test3	0.504	0.015	0.106
2T	Test4	0.488	0.014	0.089
3FC	Test1	0.844	0.013	0.091
3FC	Test2	0.765	0.017	0.124
3FC	Test3	0.734	0.017	0.122
3T	Test1	0.533	0.016	0.120
3T	Test2	0.542	0.016	0.116

Examining the combined interaction of class, period, and test, the "1FC" class maintains high mean StdScores across all tests and periods, with particularly high scores in "Test1" and "Test5" across all periods. In contrast, "1T" shows more variability with generally lower scores, though there is a slight improvement in 2023-24. The "2FC" and "3FC" classes also show consistently higher means compared to their "T" counterparts, reinforcing the trend that "FC" classes outperform "T" classes. Notably, the SEMs remain low across all interactions, suggesting reliable estimates of the observed means.

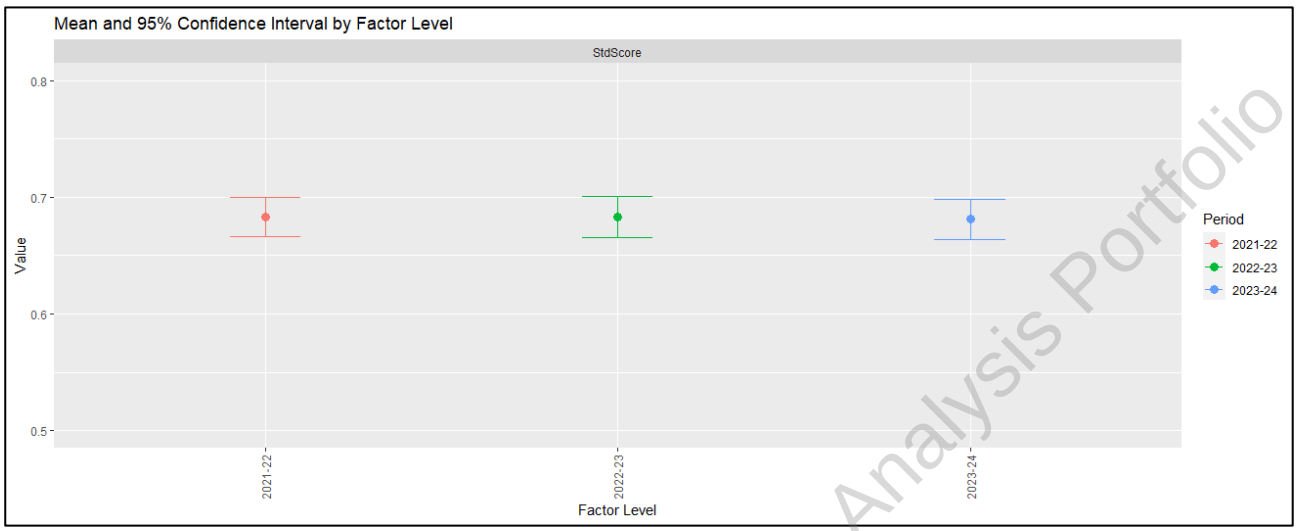
Class	**Period**	**Test**	**Mean**	**SEM**	**SD**
1FC	2021-22	Test1	0.856	0.013	0.059
1FC	2021-22	Test2	0.785	0.016	0.069
1FC	2021-22	Test3	0.823	0.014	0.061
1FC	2021-22	Test4	0.805	0.012	0.051
1FC	2021-22	Test5	0.848	0.019	0.079
1FC	2022-23	Test1	0.866	0.015	0.064
1FC	2022-23	Test2	0.821	0.025	0.100
1FC	2022-23	Test3	0.780	0.021	0.086
1FC	2022-23	Test4	0.813	0.019	0.071
1FC	2022-23	Test5	0.839	0.022	0.083
1FC	2023-24	Test1	0.893	0.016	0.071
1FC	2023-24	Test2	0.828	0.018	0.077
1FC	2023-24	Test3	0.786	0.019	0.082
1FC	2023-24	Test4	0.828	0.015	0.061
1FC	2023-24	Test5	0.809	0.014	0.060
1T	2021-22	Test1	0.531	0.028	0.120
1T	2021-22	Test2	0.518	0.022	0.096
1T	2021-22	Test3	0.523	0.023	0.100

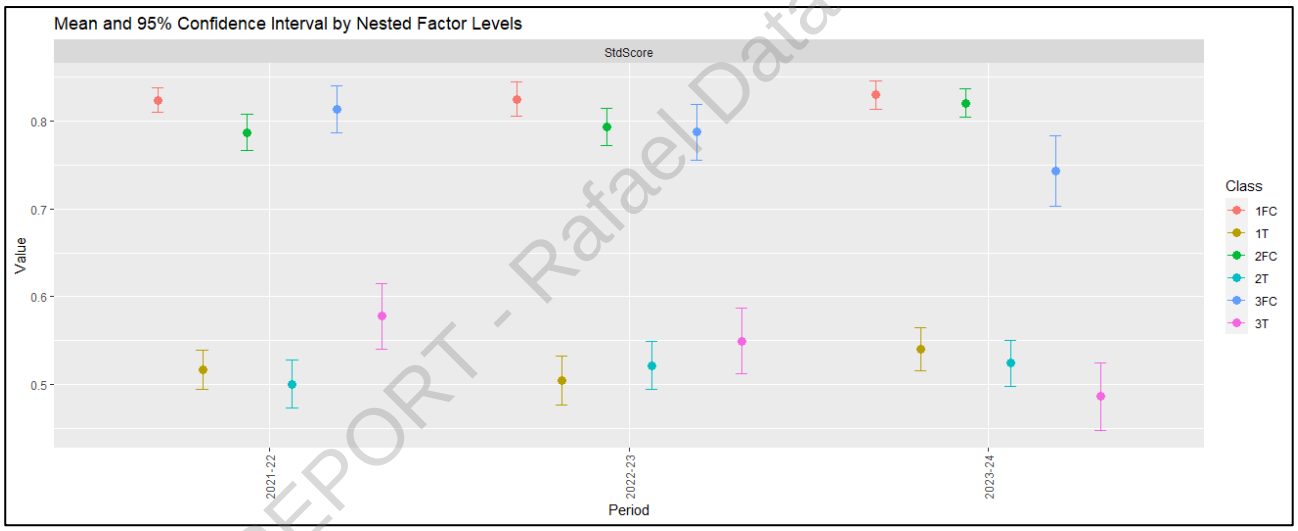
1T	2021-22	Test4	0.495	0.015	0.064
1T	2022-23	Test1	0.555	0.026	0.100
1T	2022-23	Test2	0.509	0.028	0.104
1T	2022-23	Test3	0.485	0.027	0.104
1T	2022-23	Test4	0.464	0.027	0.097
1T	2023-24	Test1	0.557	0.027	0.119
1T	2023-24	Test2	0.557	0.023	0.102
1T	2023-24	Test3	0.538	0.025	0.102
1T	2023-24	Test4	0.508	0.025	0.109
2FC	2021-22	Test1	0.807	0.014	0.057
2FC	2021-22	Test2	0.764	0.022	0.091
2FC	2021-22	Test3	0.762	0.025	0.096
2FC	2021-22	Test4	0.775	0.031	0.126
2FC	2021-22	Test 5	0.834	0.020	0.071
2FC	2022-23	Test1	0.867	0.013	0.054
2FC	2022-23	Test2	0.754	0.027	0.115
2FC	2022-23	Test3	0.763	0.020	0.083
2FC	2022-23	Test4	0.771	0.025	0.091
2FC	2022-23	Test 5	0.809	0.022	0.081
2FC	2023-24	Test1	0.843	0.017	0.067
2FC	2023-24	Test2	0.814	0.021	0.083
2FC	2023-24	Test3	0.790	0.019	0.074
2FC	2023-24	Test4	0.823	0.016	0.068
2FC	2023-24	Test 5	0.832	0.016	0.061
2T	2021-22	Test1	0.532	0.030	0.122
2T	2021-22	Test2	0.488	0.029	0.118
2T	2021-22	Test3	0.507	0.027	0.108
2T	2021-22	Test4	0.474	0.025	0.099
2T	2022-23	Test1	0.551	0.024	0.099
2T	2022-23	Test2	0.542	0.025	0.100
2T	2022-23	Test3	0.503	0.030	0.120
2T	2022-23	Test4	0.478	0.025	0.088
2T	2023-24	Test1	0.555	0.031	0.129
2T	2023-24	Test2	0.527	0.027	0.104
2T	2023-24	Test3	0.503	0.024	0.097
2T	2023-24	Test4	0.511	0.021	0.080
3FC	2021-22	Test1	0.852	0.018	0.077
3FC	2021-22	Test2	0.790	0.025	0.105
3FC	2021-22	Test3	0.797	0.024	0.100
3FC	2022-23	Test1	0.868	0.013	0.054
3FC	2022-23	Test2	0.775	0.031	0.127
3FC	2022-23	Test3	0.718	0.023	0.095
3FC	2023-24	Test1	0.813	0.030	0.125
3FC	2023-24	Test2	0.729	0.033	0.138
3FC	2023-24	Test3	0.687	0.035	0.143
3T	2021-22	Test1	0.590	0.027	0.111
3T	2021-22	Test2	0.566	0.025	0.108
3T	2022-23	Test1	0.543	0.024	0.104

3T	2022-23	Test2	0.556	0.028	0.122
3T	2023-24	Test1	0.473	0.028	0.121
3T	2023-24	Test2	0.501	0.026	0.112

Charts

The figures below illustrate the differences in exam scores.





Linear Mixed Model

A linear mixed model (LMM) is a statistical approach used to analyze data that involve both fixed effects, which are consistent and predictable across the dataset, and random effects, which capture random variability at different levels of the data hierarchy. This type of model is particularly useful when dealing with grouped or hierarchical data, such as repeated measures on the same subjects or clustered observations.

In the presented model, the dependent variable is the standardized exam scores (StdScore), and the fixed effects include the different periods (2021-2022, 2022-2023, and 2023-2024), with the period 2021-2022 serving as the reference category. The random effects account for the variability attributable to differences between students within classes (Student), between tests (Test), between classes (Class) and between Exam Types.

Term	**Estimate**	**std.error**	**statistic**	**df**	**p.value**
(Intercept)	0.665	0.143	4.662	1.018	0.131
Period2022-23	-0.002	0.007	-0.308	1120.948	0.758
Period2023-24	-0.001	0.007	-0.178	1100.846	0.859
Term	**Variance**				
Class_Student	0.001				
Test	0.001				
Class	0.000				
ExamType	0.040				
Residual	0.009				

The fixed effects results indicate that the coefficients for the periods 2022-2023 and 2023-2024 are -0.003 and -0.001, respectively, both with p-values greater than 0.05, suggesting no significant difference in standardized scores compared to the reference period 2021-2022.

The random effects variances provide insights into the variability at different levels. The variance for Student is 0.000, indicating negligible variability at this level. The variance for Test is 0.001, and for Class, it is 0.024, suggesting more variability across classes than across tests. The residual variance is 0.009, representing the remaining variability in scores not explained by the model.

Overall, the model indicates that while there is some variability across classes and tests, the period of examination does not significantly affect the standardized scores.