A Prospectively Retrospective Analysis of Student Performances on The AAP 1, 2 and 3 Following Completion of Accelerated BIOL 224:

2018-01, 2019-01, 2020-01 (COVID-19-1) and 2021-01 (COVID-19-3)

Hypotheses

1) Across the 4 years' assessment period, student average scores will fit the data-derived grading scale for the BIOL pre-requisite courses for the Nursing Program at WNC [2], i.e., an average score will fall into the "C-range" (C- to C to C+), and will average a "C" letter grade.

2) The average student grades will not be **practically** impacted by the effects of the COVID-19 Pandemic.

Definition

Prospectively Retrospective ≡ An assessment designed in advance of the course[s] (prospectively) for post-course analysis and evaluation upon course completion (retrospective).

Introduction

The AAP, Parts 1, 2 and 3, has been previously described [1, p.8 and Appendix 3], as has the content of these assessment tools [Ibid, p.8]. The AAP, Parts 1, 2 and 3, has been administered upon completion of the accelerated biology course sequence leading to the fulfillment of the Nursing science pre-requisite courses' requirements each Spring, beginning in 2018: the completion of the charter class of the biology course acceleration sequence (Fall Semester: Biol 190 immediately followed by BIOL 251; Spring Semester: BIOL 223 immediately followed by BIOL 224; 8 weeks per course).

Methods

All Parts of the AAP were administered as timed assessments in Canvas using multiple question formats, i.e., multiple choice, multiple-multiple choice, matching, fill-in-the-blank, short answer formats. All Parts of the AAP were administered as pre-tests and post-test assessments (only the post test results will be examined in this report; the pre-/post-test analyses have been reported upon, previously [3, Appendix 3]. To minimize exam familiarity, multiple questions over identical topics were developed, e.g., one version asks questions about one type of lever and another version asks about another type of lever; the same approach was used regarding mechanical advantage. Questions were also "scrambled" so as to minimize "patterning".

Canvas automatically collected exam score data that includes Hi Score, Average Score, Standard Deviation, Lo Score and Average Time to complete the assessment/exam/quiz. That data was transcribed by hand for keying into Microsoft Excel to generate collective graphically visual representations of the assessments' outcomes.

Student's 2-Tailed T-Test for significance was employed in the analysis of the data.

Results and Conclusions

Statistical results, with one exception, are class average scores compared with/to the overall average of the scores. The one exception is the comparison of AAP 2 scores between 2018-01 and 2021-01 ($p < 0.002$).

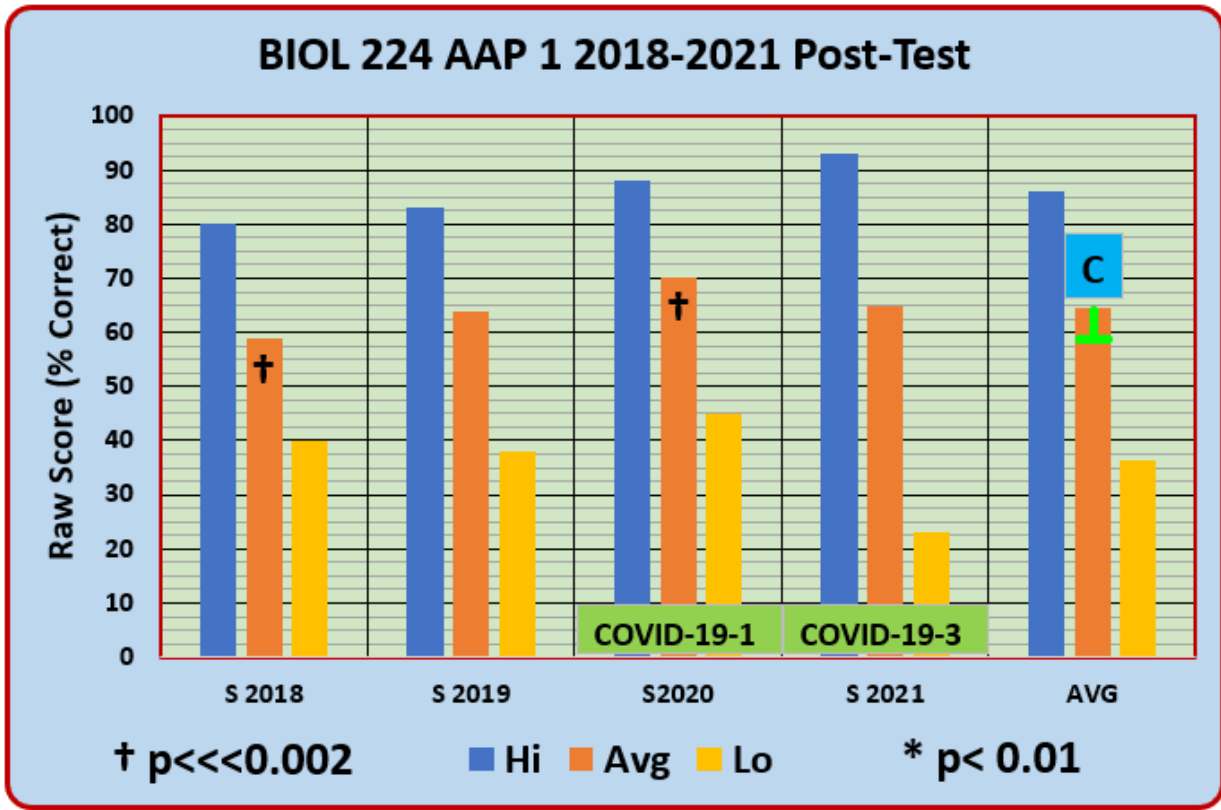The results for AAP 1 are illustrated in Figure 1, below (top page 2):

Figure 1: AAP 1 Results S 2018 – S 2021; Student's 2-Tailed T-test for stastical significance is indicated in image; no labelling = NSD. Lime green inverted "T" = uni-directional error bar.

The 4-year average is a "C" letter grade. Both COVID-19 groups performed **practically** as well as, if not a little better than, the non-COVID-19 groups.

The results for AAP 2 are illustrated in Figure 2, below:
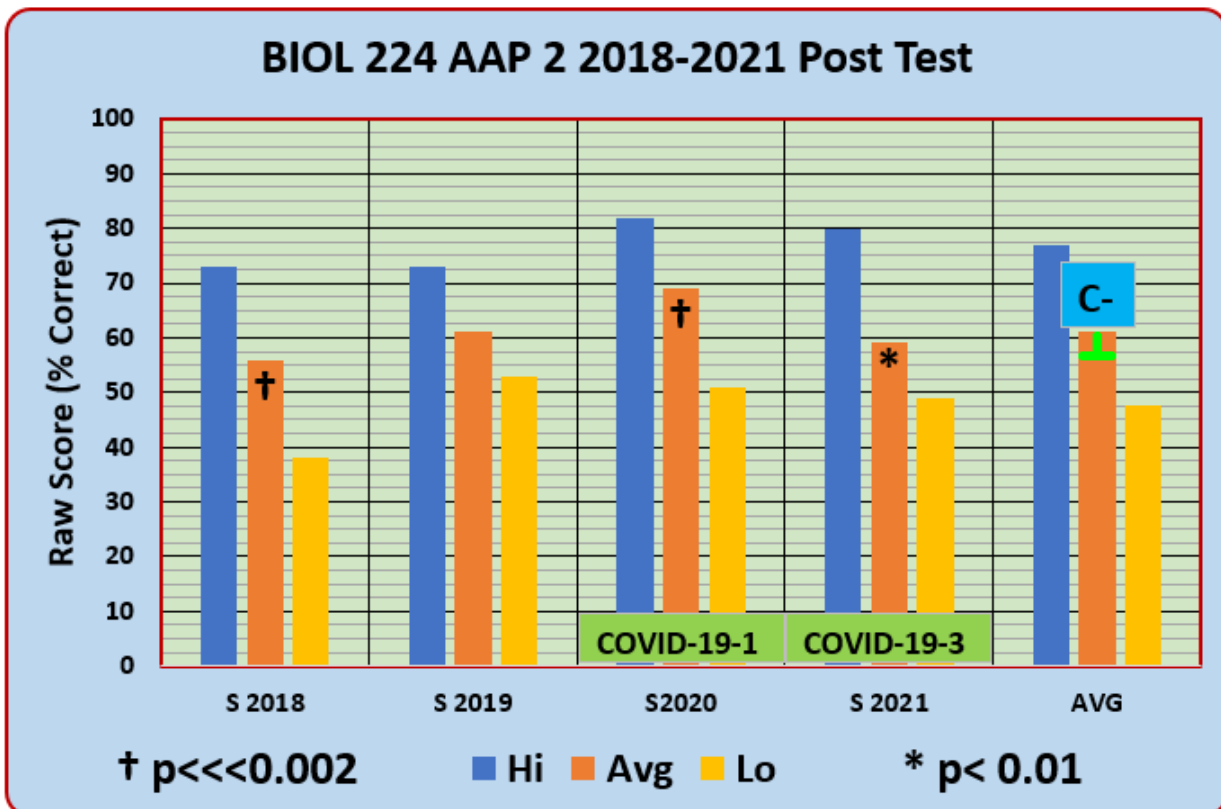

Figure 2: AAP 2 Results S 2018 – S 2021; Student's 2-Tailed T-test for stastical significance is indicated in image; no labelling = NSD. Lime green inverted "T" = uni-directional error bar.

The 4-year average is a "C-" letter grade. Although statistically different from the overall average, both COVID-19 groups of students performed **practically** as well as, if not a little better than, the non-COVID-

19 groups. In addition (and repetitively), the comparison of AAP 2 scores between 2018-01 and 2021-01 (p < 0.002) are statistically different.
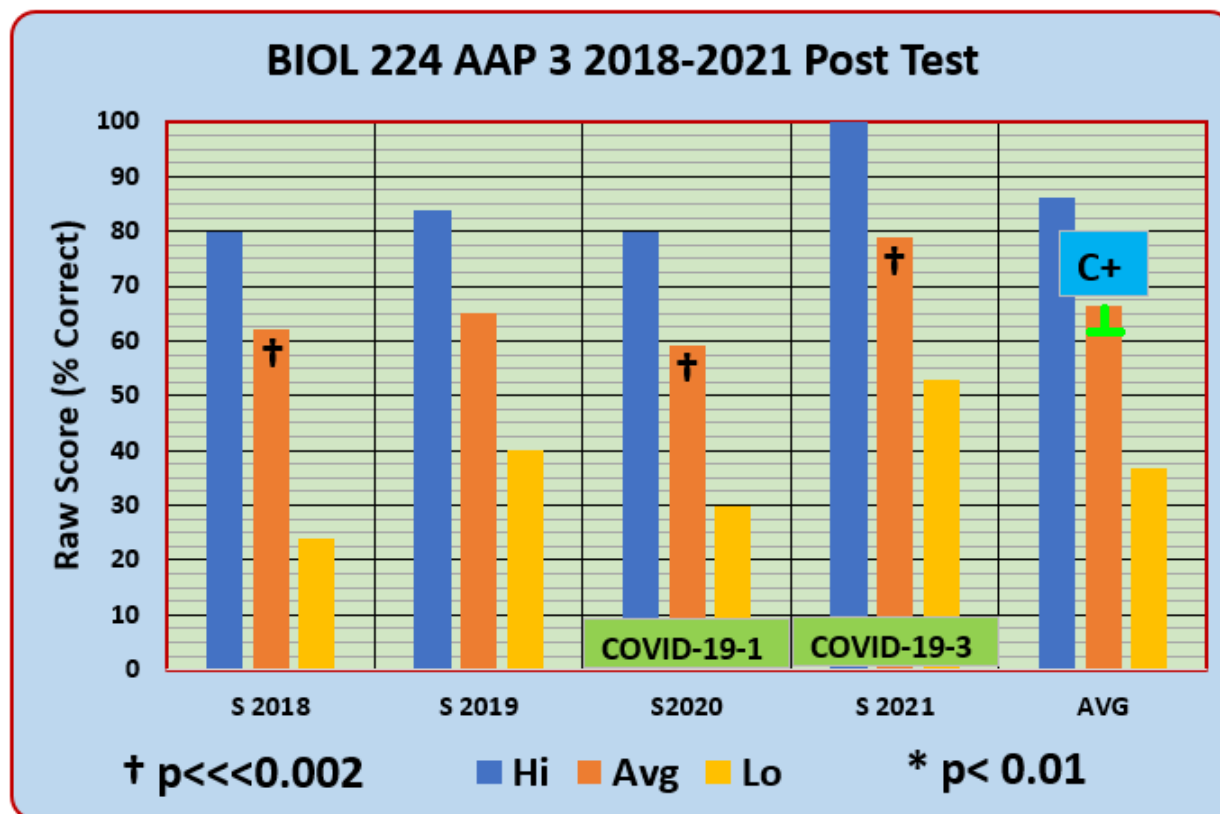
The results for AAP 3 are illustrated in Figure 3, below:

Figure 3: AAP 3 Results S 2018 - S 2021; Student's 2-Tailed T-test for stastical significance is indicated in image; no labelling = NSD. Lime green inverted "T" = uni-directional error bar.

The 4-year average is a "C+" letter grade. Although statistically different from the overall average, both COVID-19 groups of students performed **practically** as well as (there's not much practical difference between a 62% and a 59%), if not a little better than (on average), the non-COVID-19 groups.

Overall, the average of the three (3) AAP Parts is a "C" letter grade.

Final Conclusions

Hypothesis 1 is supported by the data. In addition, although the AAP wasn't designed in the same manner as the CHEM 121 assessments [4], the overall results/outcomes are virtually identical.

Hypothesis 2 is supported by the data: the AAP assessment appears to also be COVID-proof [Ibid]. Students, in terms of only the SLO's, are clearly advancing with/in their knowledge of the material to which they've been exposed.

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