BIOL Accelerated Pre-Nursing Courses

Initial Year (Fall 2017-Spring 2018) With Additional Long Term (2012-03 to Present), Aggregate, Data:

The Drawn-Out Evolution and Assessment of An Accelerated Approach to The Pre-Nursing BIOL Courses

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Definitions/Abbreviations/Acronyms Used in This Report

AAP: Assessment of Anatomy and Physiology; a home-grown assessment tool to examine what students are learning and to demonstrate that learning; the precursor to this tool was the HuAP.

A&P: Human Anatomy and Physiology

AU: is an "Audit" per NSHE Code; for the purposes of this report, audits are not counted.

Average Course Grade: as set forth by NSHE Code (Title 4, Chapter 16, Section 38, Para 5), is a course letter grade of "C".

Core students: for the purposes of this report, five students who completed all 4 accelerated BIOL courses.

Cross-Sectional Studies: a fresh sample of subjects is examined/studied each time an experiment is carried out.

Education: cf Glossary, p. 3.

Empowering: cf Glossary, p. 3.

Enabling: cf Glossary, p. 3.

Grading Scale or Grading Policy: is set forth by NSHE Code (Title 4, Chapter 16, Section 38, Para 5); cf also Glossary, p. 4.

HAPS: Human Anatomy and Physiology Society National Examination.

HuAP: Human Anatomy and Physiology assessment tool developed at WNC; its precursor was the HAPS.

Learning: cf Glossary, p. 4.

Longitudinal Studies: the same population of subjects is experimentally examined/studied/followed over time.

MAP: Microbiology Assessment and Progression tool

New Students: for the purposes of this report, 19 (BIOL 223) or 18 (BIOL 224) students who completed BIOL 190 with other faculty.

NSD: Not Statistically Different.

R: is a course repeat, providing the repeated course received a higher grade than the initial course. For the purposes of this report, "R's" were not included in the determination of final course grades' distribution.

SLO: Student Learning Outcomes; every course at WNC is supposed to have SLO's.

Student's 2-Tailed T-Test: Student's T Test compares two averages and tells you if they are different from each other. The t test also tells you how significant the differences are, i.e., it lets you know if those differences could have happened by chance. For differences to be considered statistically significant, the cut-off was at $p < 0.05$ or less.

Studying: application of the mind to the acquisition of knowledge, as by reading, investigation, performing copious amounts of homework, or reflection; may or may not be accomplished in a group setting.

Teaching: cf Glossary, p. 6; teaching comes in many forms, e.g., some use the spoken word, some use the written word; some use both, some use various forms of technology.

W: is a "withdraw" or "withdrawal" per NSHE Code; for the purposes of this assessment, a "W" counts as an "F".

WNC-Defined Successful Course/Program Grade: a grade of "C-" is WNC's standard for student success.

WNC-NURS Defined Successful Course/Program Grade: a minimum of a letter grade of a "C" (GPA of 2.0) is required a) for application (and admissions) to WNC's Nursing Program, b) to graduate with an AAS-

NURS from WNC and c) to sit for R-NCLEX to earn a license to practice professional nursing. A "C-" in WNC's Nursing Program (or in a required pre- or co-requisite course) is the equivalent of an "F".

Brief Assessment Summary

Introduction: Assessment tools measured student learning/retention in BIOL 190/L, 223, 224 and 251, from 2012-03 through 2018-01 (2017-03-2018-01 is the charter accelerated year of pre-NURS BIOL offerings).

Methods: BIOL 190 was assessed by pre-/post-testing across the 4 courses (2017-03-2018-01).

Results: BIOL 190 results demonstrated increases in performance that doubled the average scores, $p <<< 0.001$. BIOL 251 results showed no statistically significant increase in performance. BIOL 223 results showed an increase of 20%, $p < 0.02$. BIOL 224 results showed an increase of 27% in performance, $p <<< 0.001$. On average, across all four courses, students demonstrated a 35% increase in performance, $p <<< 0.001$.

Results: BIOL 190 was assessed in BIOL 223 and 224 broken out by group, i.e., a core group and a "new" group of students. Consistently, the core group scored statistically higher regarding BIOL 190 than the new group of students: pre-223 pre-test, new group scored 38% less than the core group, $p < 0.015$; post-223 post- test, new group scored 35% less than the core group, $p < 0.002$; pre-224 pre-test, new group scored 15% less than the core group, $p < 0.01$; post-224 post-test, new group scored 19% less than the core group, $p < 0.01$.

Methods: BIOL 223 and 224 were assessed via AAP in a pre-/post-test format. All three sections of the AAP were administered pre-BIOL 223; post-AAP 1 was administered post-BIOL 223; all three sections were administered post-BIOL 224.

Results: AAP 1 pre-223 and post-223 demonstrated 97% increase in performance, $p <<< 0.001$. AAP 1 re-assessed upon BIOL 224 completion illustrated a 79% increase in performance, $p <<< 0.001$. AAP 2 pre-223 v post-224 demonstrated 47% increase in performance, $p <<< 0.001$. AAP 3 pre-223 v post-224 illustrated 72% increase in performance, $p <<< 0.001$.

Methods: BIOL 223/224 assessment scores were also broken out by group.

Results: With the exception of AAP 2, average scores were not statistically different. AAP 2 differed only in the pre-testing, $p < 0.05$.

Methods: Final course grades were reviewed, as well.

Results: The charter class of BIOL 223 in the one year accelerated sequence of courses, 2018-01, scored significantly higher than the average across the 11 semesters examined, $p < 0.05$. All other average course grades were NSD from the overall average. Likewise, the charter class of BIOL 224, 2018-01, scored significantly higher than the average across the 11 semesters examined, $p < 0.05$. All other average course grades were NSD from the overall average.

Methods: Enrollments and withdrawals were examined in the charter classes of BIOL 223 and 224.

Results: Enrollments were the highest ever observed in the accelerated classes. In addition, withdrawals were the lowest ever observed in the accelerated classes.

Methods: An Excel-generated, quasi-probability distribution of final course grades was developed.

Results: BIOL 223 (using GPA format; Mean, Median and Mode), grades were 2.573, 3.7 and 3.0; BIOL 224, grades were 2.595, 3.0 and 3.0.

Methods: BIOL 251 was assessed via MAP in a pre-/post-test format.

Results: Compared to pre-testing performance, on average, BIOL 251 students showed 76% improvement on final assessment, $p <<< 0.001$.

Observations/Conclusions/Recommendations:

BIOL 190: Between BIOL 251 and BIOL 223 (Christmas Break), students demonstrated a 38% reduction in knowledge transfer; between BIOL 223 and BIOL 224 (Spring Break), there was no similar loss of knowledge.

BIOL 223/224: New students scored higher, albeit not statistically different, than the core group of students.

BIOL 190/L, 223, 224 and 251: Students are learning and are demonstrating their learning satisfactorily. The accelerated courses, when scheduled properly, serve WNC's (or any NSHE) pre-Nursing students very well, as evidenced by the successful passing rates of the R-NCLEX by students admitted into the WNC's (or any NSHE) Nursing Program resulting in their completion of the Nursing Program.

General: Some mild (moderate?) adjustment to course scheduling is needed to aid students in knowledge retention for improved student success in their follow-up courses.

General: Course organization/structure requires some tinkering to aid students in knowledge retention for improved student success by re-joining BIOL 190 with BIOL 190L (and the 191 sequences, as well) to make a 4-credit course as it was pre-BIOL 190, 191 and 192 "conversion in the 1990's by UNR, in line with CHEM 121 and PHYS 151.

General: While students re-gain some ground regarding BIOL 190, on average, no students reached the heights of their success that were demonstrated prior to the month long (±) break between semesters. Compared to Spring Break for the same data and groups, knowledge retention/transfer held constant.

General: While students completed the AAP 1, post-BIOL 224, "ahead of" their AAP 1, pre-BIOL 223, the data indicates an additional rationale for potentially pursuing the development and implementation of BIOL 225 at WNC.

Introduction

Assessment, be it at a course, program or institutional level, is/has become a necessary evil in higher education, today [4]. The design of assessment tool design runs the gamut from absolute bare bones minimum to nationally-accepted exams. While there are national exams for a variety of professions, e.g., medicine, nursing, law, auto mechanic, and welding, and for a variety of courses, e.g., American Chemistry Society exams, Human Anatomy and Physiology Society national exam, there's really no "one size fits all" tool, nor a lot of guidance "out there" regarding assessment tools, excepting non-hard science fields.

Nursing has consistently been an exception and a leader in the assessing of their students inasmuch as they have legislative/administrative (NRS/NAC 632 in Nevada) and accreditation requirements that can make or break their programs … and their students.

"Hard, biophysical types of sciences" have attempted to get a handle on student learning and engagement. Carl Wieman [1] has been examining short-term student learning assessment for a number of years. While Wieman's had some success, there's been no long-term follow-up on demonstrating exactly what the students have retained over a longer period of time than one semester, unlike what the R-NCLEX (or USMLE or MCAT), for example, determines.

The traditional 16-week semester-long course makes for long term assessment difficulties; hence, assessments, at least in this author's opinion, have lacked considerably. Accelerating two (2) courses helped in data acquisition that is of more substantial (long term) merit. Accelerating four (4) courses (i.e., completing 2 years' worth of courses in one year), however, has been quite powerful, albeit sometimes painful in terms of meeting administrative ideals for a (?) "one size fits all" assessment for data acquisition, reporting and implementation.

At present, each course at WNC is supposed to have a set of agreed-upon "student learning outcomes" and NSHE-agreed upon content. This author's courses are no different. Upon considerable, "broken record", reflection, if assessment of these SLO's is being completed in an active manner by all participants, i.e., this also includes students buying into the idea of assessment, assessment has the potential be a powerful tool to explore issues with student learning and interest [5]. This is not unlike the revolution that is taking place at the University of Southern California (USC) [2, 3], where "popularity contests", aka student evaluations, are being replaced with tools that include the gathering of student involvement data and engagement data in their learning activities. In addition, USC is beginning to go more and more to peer evaluations, similar to the PEG process at WNC.

At present, each course at WNC is supposed to have a set of agreed upon "student learning outcomes" and NSHE-constituted content. This author's courses are no different. If assessment of these SLO's is being completed in an active manner by all participants, students will also participate in the idea of it. Assessment has the potential to be a powerful tool to explore issues with student learning and interest [5]. This is not unlike the revolution that is taking place at the University of Southern California (USC) [2, 3] where "popularity contests", AKA student evaluations, are being replaced with tools that include the gathering of student involvement data and engagement data in their learning activities. In addition, USC is beginning to shift over to peer evaluations which are similar to the PEG process at WNC.

Assessment must also be a process with outcomes that have evidence-based value and that can be reported upon and implemented in a complete manner (would we, as academic faculty, accept incomplete work from our students?). Assessment-based projects that span over a complete semester or year tend to get lost over summer when academic faculty are off recovering from the previous year's activities and re-charging for the onslaught of the upcoming new academic year.

In this report, the assessment emphasis lies on/with the four (4) pre-Nursing BIOL courses taught by Dr, Carman in an accelerated manner at WNC for the first time in 2017-03-2018-01: BIOL 190/L, 223, 224 and 251.

Methods

Statistical analysis for significance was determined by Student's Two-Tailed T Test for Variance.

BIOL 190 Assessment

An assessment tool was designed by this author for pre-testing and post-testing students in BIOL 190/L. The pre-test assessment was given the first day of class in the computer lab at WNC, utilizing the Canvas

platform. The post-test assessment was given the last day of class, again, in the computer lab at WNC, utilizing the Canvas platform.

The BIOL 190 assessment was not only given prior to and upon completion of BIOL 190/L, it was also given in a pre-/post-test manner in BIOL 251, BIOL 223 and BIOL 224 to determine the degree of information retention inasmuch as 190/L content is necessary to successfully comprehend and complete these additional three courses for which BIOL 190/L is a required pre-requisite.

BIOL 190 assessment results were also examined by groups in the charter year of the accelerated approach for the pre-Nursing BIOL courses. Core students' vs new students' performances were examined, supplementary to comprehensive, aggregated data from 2012-03 through 2018-01. The latter dates cover the academic equivalent of 11 years' worth of data obtained in 11 semesters.

BIOL 223 and 224 Assessment

Biol 223 and 224 assessments were first designed by this author in Fall Semester 2015. The assessments cover three areas of content: the first section (now called AAP 1) covers BIOL 223, the second section (now called AAP 2) covers BIOL 224 and the third section (now called AAP 3) is an explicit assessment of student learning regarding electrocardiographic (EKG) and arterial blood gas (ABG) analysis.

All three sections are administered in the computer lab at WNC, using the Canvas platform on the first day of BIOL 223. AAP 1 was administered in the same manner upon completion of BIOL 223.

Upon completion of BIOL 224, all three sections were again administered in the computer lab at WNC, using the Canvas platform. Students who did not complete BIOL 223 in this sequence did not participate in the pre-testing prior to BIOL 224.

Data analysis was as previously mentioned in the BIOL 190/L section, above.

BIOL 251 Assessment

The BIOL 251 assessment tool was newly designed by this author for Fall 2017. The identical format as previously indicated for BIOL 190/L, 223 and 224 was implemented. Data analysis for this report only examines the assessment tool results/student performance.

Results

All results are presented graphically in the Appendices at the end of this report in support of the following statements. All data has been accumulated from either Canvas or myWNC.

BIOL 190 Results

BIOL 190 results (Appendices 1 and 2) demonstrated increases in performance that doubled the average scores, $p <<< 0.001$. BIOL 251 results showed no statistically significant increase in performance. BIOL 223 results showed an increase of 20%, $p < 0.02$. BIOL 224 results showed an increase of 27% in performance, $p <<< 0.001$. On average, across all four courses, students demonstrated a 35% increase in performance, $p <<< 0.001$.

BIOL 190 was assessed in BIOL 223 and 224 broken out by group (Appendices 1 and 2), i.e., a core group and a "new" group of students. Consistently, the core group scored statistically higher regarding BIOL 190 than the new group of students: pre-223 pre-test, new group scored 38% less than the core group, $p < 0.015$; post-223 post- test, new group scored 35% less than the core group, $p < 0.002$; pre-224 pre-test, new group scored 15% less than the core group, $p < 0.01$; post-224 post-test, new group scored 19% less than the core group, $p < 0.01$.

BIOL 223 and BIOL 224 Results

AAP 1 pre-223 and post-223 demonstrated (Appendix 3) 97% increase in performance, $p <<< 0.001$. AAP 1 re-assessed upon BIOL 224 completion illustrated a 79% increase in performance, $p <<< 0.001$. AAP 2 pre-223 v post-224 demonstrated 47% increase in performance, $p <<< 0.001$. AAP 3 pre-223 v post-224 illustrated 72% increase in performance, $p <<< 0.001$.

With the exception of AAP 2 (Appendix 3), average scores were not statistically different. AAP 2 differed only in the pre-testing, $p < 0.05$.

The charter class of BIOL 223 in the one year accelerated sequence of courses (Appendix 4), 2018-01, scored significantly higher than the average across the 11 semesters examined, $p < 0.05$. All other average course grades were NSD from the overall average. Likewise, the charter class of BIOL 224, 2018-01 (Appendix 5), scored significantly higher than the average across the 11 semesters examined, $p < 0.05$. All other average course grades were NSD from the overall average.

Enrollments in BIOL 223 and 224 were the highest ever observed in the accelerated classes. In addition, withdrawals were the lowest ever observed in the accelerated classes (Appendices 4 and 5).

BIOL 223 (using GPA format; Mean, Median and Mode), final course grades were 2.573, 3.7 and 3.0; BIOL 224, final course grades were 2.595, 3.0 and 3.0 (Appendix 6).

BIOL 251 Results

Compared to pre-testing performance, on average, BIOL 251 students showed 76% improvement on final assessment, $p <<< 0.001$ (Appendix 7).

Discussion/Observations/Conclusions

BIOL 190/L

This author has taught students about BIOL 190/L in three different course formats: as a 3-week summer course (Summer 2014), as a 16-week semester course (Fall 2015) and, most recently, as an accelerated, 8-week course (Fall 2017). Upon completion of each offering, the course was partially re-written. Based on a variety of observations, whether objective or subjective, content was removed, altered or added. As with all other courses prepared by this author, the reading level of the lectures averages 9th grade (high school freshman) level. Additionally, certainly, the amount of homework required for course completion has increased monumentally.

Recently, this author was made aware of a variety of issues regarding student pre-requisite preparation.

Item 1: "*… grades in these classes are part of the basis for admittance to the nursing program, students are extra sensitive to perceptions of inequity …*"

It's incumbent upon folks taking complaints from students to consider the issues, and thought processes occurring, at USC as previously cited. This author heard similar complaints about the lack of detail in pre-req coursework from "new" students in his own courses. As a result, the two groups of students were broken out and explored. Clearly, there were problems in performances on the assessment tools as illustrated in **Figure 2** between the core students and new students. Indeed, between **Figure 1 and Figure 2**, it's clear that the new students entering BIOL 223 performed on the BIOL 190 pre-test as if they'd never taken the course (BIOL 190). While the new students made improvement in their acquisition of BIOL 190 content, they never got caught up; likewise, the core students illustrated some slippage of knowledge later on in the assessment sequence.

Readers need to review Dr. Carman's website carefully, inasmuch as review material for BIOL 190 is linked conspicuously to his BIOL 223, 224 and 251 course content pop-down menus. It's up to the student to go over that material, regardless of who their BIOL 190 faculty member was.

Lastly, grades and inequity are oxymorons. Grades, contrary to most students' beliefs, don't just materialize out of thin air. In order to earn a grade in a course, a student must learn the material and demonstrate that learning, regardless of the inequity. Failing that comprehension demonstrates clear academic immaturity.

Item 2: "*… if all faculty teaching A&P in the future work toward reasonable agreement on the general scope of material each class covers…*"

There are NSHE-agreed upon topics for educating students regarding these courses. Is this statement "code" for "dumbing material down" or for passing everyone regardless of their evidential performance to the contrary as recorded in Canvas?

This author has had the benefit of the opportunity to observe many faculty over his almost 30 years at WNC (and 34 years in the NSHE (USN and UCCSN)) and their students in follow-up courses. There have been (and continue to be) faculty at WNC who have a variety of approaches to teaching students that, while not in step with this author, are clearly well within their academic freedom rights. Furthermore,

students have either notes or online textbooks or hard copy textbooks or all of the above available; students also have the internet and a library available to/for them to utilize. Presumably, each faculty member holds office hours to assist students, as well, with learning the course information. At what point at WNC are college students held accountable for information acquisition as opposed to being spoon-fed in a middle school style? This hasn't changed since 1990, indeed, it's progressively worsened!

In addition, it's of no small observation to note that, bluntly, grades in the pre-requisite courses don't matter a whit, be it for follow-up courses, see **Figure 4**, nor for success in WNC's Nursing program. These observations are made both anecdotally and empirically, e.g., this author has seen students take five different faculty for their A&P between TMCC and WNC and finally get into WNC's Nursing program, complete it satisfactorily AND pass R-NCLEX!

Newer faculty, hired very near the very last minute, have the biggest challenge and need the greatest advocacy, assistance and support at WNC as they are very vulnerable to extra-academic-faculty pressure while getting through their first years of teaching at WNC. ANYone who has taught for any appreciable amount of time is acutely aware that the first 1-3 years of teaching are the most difficult. A faculty member no longer with us was a very good in-class lecturer (the author evaluated the member as a Division Chair) yet had issues throughout that member's tenure. Like it or not, students have to be held accountable, as well – they must buy into the idea of assessment (for the gazillionth time!) and they have to develop the fire in their belly! Lackluster interest … [5] … there's a phrase.

Having raised a child through a master's degree and having spent 36 years in a classroom and a lab, this author is very familiar with the complaints that emanate from children and students … cf articles regarding USC [2, 3]. Simply having and/or stating a complaint gives no credence, merit or validity to repeating it (nor is it a blanket monopoly on complaints): that destroys institutional collegiality and propagates adversity, i.e., Klemmerer and Associates, 1999 or 2000, mandatory WNC "be happy in your work" seminar: the 3-R's …

As regards the 38% reduction ($p < 0.02$) of BIOL 190/L content transfer over Christmas Break and 4.8% reduction (NSD) of BIOL 190/L content transfer over Spring Break, if these results are reproducible over the upcoming academic year, and if faculty are to use assessment information to provide evidence-based education, this will throw a monkey wrench into the gears of scheduling at WNC.

BIOL 223 and 224

The emphasis of this report focuses on BIOL 223 and 224: they've been offered in the accelerated format for a longer period of time and there's more data. They are also the more "competitive courses" where students look for the "easy way out" faculty (and then complain about it) and faculty scramble to acquire adequate lab supplies to properly prepare students for their (and the State of Nevada's population's) futures.

Assessment Tool History

For a number of years, Dr. Tattersall and this author used the Human Anatomy and Physiology Society's nationally recognized exam (HAPS) to assess students in BIOL 223 and 224. In Fall of 2015, an incident occurred, and the HAPS was dropped. At that time Dr. Carman developed a homegrown assessment tool that was used in December of 2015. The goal was to develop an assessment tool that would yield comparable average scores as the HAPS; without compromising the HAPS or the course. In January 2016, Drs. Carman and Tattersall got together and hammered out a compromise assessment tool, which was given the acronym, HuAP (pronounced WHAP!) by Dr. Tattersall. The HuAP was administered by both Drs. Carman and Tattersall and results were within reason: both groups of students were statistically identical and students were hitting the national averages as designed.

During Fall 2017, the HuAP was shared via Canvas with all WNC A&P faculty to use. By the end of Fall 2018, however, it was clear that there were issues, e.g., only one faculty was pre-testing (and post-testing); not all questions were being used by other faculty; the degree to which it was being used towards a student's grade was inconsistent, to name a few. At that time, 201 ASP was undergoing the remodel (for which this author is very grateful on behalf of the students!) and this author was not teaching 223/224 as the first two courses in the four-course sequence were underway.

As more and more discrepancies began to surface, this author decided to personally withdraw, and remove other individuals' works, from the HuAP administration since the courses were accelerated and didn't fit the 16-week model for experimental design. He then developed the Assessment of Anatomy and Physiology (AAP). A great deal of the HuAP originated with this author, rendering it reasonably

comparable for statistical purposes. The portion of the AAP used to determine a substantial portion of the student's final course grade is readily available in Canvas to the Division Director, the VPASA and the President.

Figure 3 illustrates the outcomes of the AAP, all three parts, in the charter class of 2017-03-2018-01. As expected, the scores are well within the original assessment goal of hitting the national averages comparable to the HAPS exam. While students completed the AAP 1, post-BIOL 224, "ahead of" their AAP 1, pre-BIOL 223 performance, the data indicates an additional rationale for potentially pursuing the development and implementation of BIOL 225 at WNC.

As a follow up to **Figure 2**, **Figure 4** was generated to explore any effect and/or impact of the assessed BIOL 190 pre-requisite issue on the degree of successful completion of BIOL 223/224. As can be seen, the new students, on average, out-scored the core students, albeit statistically insignificantly. This was not only surprising, but pleasantly surprising, as it bears out previous statements regarding the effect of grades from pre-req's on follow-up course-work: the results depend clearly on the efforts put forth by the students!

What remains is how to explain the phenomenon. This author's suspicions are that 1) the new lab format/layout that encouraged some pretty incredible collaboration was a part of this unexpected windfall, 2) the students were "captured" (like the NURS students, these students had no alternatives if they wanted to apply to the NURS program by mid-June 2018) by and with proper scheduling and/or 3) the students simply put in more effort in response to the perceived faculty member's reputation (is a legend in his own mind). Regardless, the new students were quite successful; were there not so many different approaches (numbers of assessments performed) to the assessments of BIOL 190/L, 223 and 224, it seems reasonable to consider that "stacking" the assessment scores of BIOL 190/L on top of the AAP assessment scores, in a graphical manner, would generate an image that would illustrate zero degrees of difference between the two groups of students (i.e., core vs new). That IS new for the first time in almost 30 years! The lab space worked; the scheduling worked; the faculty worked! the STUDENTS worked! SUCCESS!

Figure 5 and top **Figure 9,** as well as **Figure 7** and bottom **Figure 9**, illustrate something that may come as a surprise to many folks: on average, across the equivalence of 11 years of data from accelerated courses, BIOL 223 (using GPA format in order of Mean, Median and Mode; taught by the author) final course grades were 2.573, 3.7 and 3.0; BIOL 224 (also taught by the author) final course grades were 2.595, 3.0 and 3.0. In each case, the average final course grade was in excess of a "C+" (almost a "B-"), in spite of the NSHE Code that states that a 2.0 GPA value equals an average grade of a "C" (Section 38). 81+% of students in both courses earned a grade of "C" or higher, contrary to popular opinion, belief and rumors.

Figure 6 and **Figure 8** demonstrate the impact on student success that careful advising, scheduling and planning has on increasing enrollments and retention (from BIOL 223, only two students did not continue on: one didn't need the 224 course and one failed; one additional student enrolled in 224 to help with that enrollment (TMCC student in their Surg Tech program, again, captured – student had to have it to graduate and sit for national boards)). As indicated previously, these students appear to have been "captured", which, for academic purposes and for those who do not have the privilege of traveling elsewhere, works remarkably well, i.e., when students want something badly enough, and their choices are limited, they'll develop that "fire in their belly" and take off, run with it and do very well, in spite of their possible, previous K-12 performance/experience.

BIOL 251

The new MAP performed well to demonstrate the performance of the students enrolled in BIOL 251: 76% improvement ($p < 0.001$). There are issues, however, these issues are minor and can be addressed "on the fly".

Final Conclusion

Each SLO statement in the course outline (or the Course Snapshot linked to Dr. Carman's website) is prefaced by the statement "defined as a 75% course score or better", indicating student success. Additionally, Dr. Carman's grading scale indicates that the lowest "C" is a 75% for a course grade in his courses. Based on the data presented here and stored in myWNC, on average, students were ahead of the 75% "target", e.g., BIOL 223 and 224 were at 81+% ahead of the 75% target. **These students met (and exceeded!) that goal/target**. It's clear that while these students were "captured", they also academically self-selected for their own success, i.e., the students took the ownership necessary to be successful in

these college courses. That these students were so successful is exciting in light of the recent Reno Gazette-Journal article, "*Nevada Schools Rank Low; Lyon County Outperforms State Averages*".

Recommendations

The vast majority of recommendations involve scheduling and appropriate utilization of resources, i.e., academic faculty. With careful academic faculty distribution, with, potentially, two new labs at WNC, enrollments may very well improve. That said, there is a population-based (declination) issue in this country that will drop enrollments (Mickey Wade, MS, RN, Dr. Judy Cordia's immediate predecessor, predicted this happening, as regards nursing and health care, in general, 20+ years ago), eventually. It's happened before, it'll happen, again.

With careful scheduling (i.e., not over-scheduling), faculty can have a hugely major impact on students in this service area; students have to do their parts, as well, and therein lies the rub.

** As stated previously, as regards the 38% reduction of BIOL 190/L content transfer over Christmas break and 4.8% reduction of BIOL 190/L content transfer over Spring Break, if these results are reproducible over the upcoming academic year (2018-2019), and if faculty are to use assessment information to provide evidence-based education, this will throw a monkey wrench into the gears of scheduling. To that end, and given the inherent challenges to adjusting (changing) the academic teaching schedule that is established at WNC well over a year in advance (some of you may remember the master course schedule from 1999 or 2000 and its intrinsic issues), if the content transfer issue remains as illustrated in/by this current report, **the following changes to Dr. Carman's (only) BIOL/Pre-NURS teaching/offering schedule** proposes to adjust that issue:

BIOL 190 – Aug 12, 2019 – Oct 3, 2019 – T/R 1600-1845 – Majority falls in Fall Semester

BIOL 190L – Aug 12, 2019 – Oct 3, 2019 – T/R 1900-2145 – Majority falls in Fall Semester

BIOL 251 – Oct 7, 2019 – 26 Nov, 2019 – T/R 1600-1845 – All in Fall Semester

BIOL 251L – Oct 7, 2019 – 26 Nov, 2019 – T/R 1900-2145 – All in Fall Semester

BIOL 223 – 2 Dec 2019 – 7 Feb 2020 – T/R 1600-1845 – Majority falls in Spring Semester

BIOL 223L – 2 Dec 2019 – 7 Feb 2020 – T/R 1900-2145 – Majority falls in Spring Semester

> NOTE: Students get X-mas break/New Year's 20th Dec 2019 through 5th Jan 2020 – it's a compromise to see if a schedule change with a shorter break (16 days vs 4 weeks ±) helps with content retention/transfer.

BIOL 224 – Feb 10, 2020 – 3 Apr 2020 – T/R 1600-1845 – All in Spring Semester

BIOL 224L – Feb 10, 2020 – 3 Apr 2020 – T/R 1900-2145 – All in Spring Semester

> These are 8-week long courses.
>
> What follows is a **6-week** course:

BIOL 251 – Apr 6, 2020 – 15 May 2020 – T/R 1400-1745 – All in Spring Semester

BIOL 251L – Apr 6, 2020 – 15 May 2020 – T/R 1800-2145 – All in Spring Semester

This last course (BIOL 251, 6 weeks) fits accreditation requirements for time and content, for room/space utilization, FTE (if that really matters, any more) and serves the accelerated students who did not take 251 in Oct/Nov but want to complete their Nursing pre-/co-requisite courses prior to application and/or entry into the Nursing program at WNC. 201 ASP is required for all of these courses, lecture and lab.

This only effects the pre-NURS BIOL courses' scheduling. CHEM will be addressed in its own report.

** Course organization/structure requires some tinkering, as well, to aid students in improved course completion/success by re-joining BIOL 190 with BIOL 190L (and the 191/L sequences, as well) to make a 4-credit course[s] as it was, inline, so to speak, with CHEM 121 and PHYS 151. This has been supported, electronically, by Drs. Bhattarai, Evett, Tattersall and Carman, as well as Professor (now Fallon Center Director) O'Toole (10 April 2018) – likewise, dropping the 190/L and 191/L and bringing BIOL 196 and 197 from the south onto WNC's course structure has been e-supported. The primary reason for no further action on this activity since Spring 2018 seems to have been to wait for the arrival of a new President.

Note is also made that not everyone is cut out for taking accelerated courses; however, this author has been told that WNC's Nursing program is like taking four of his accelerated courses at the same time, hence, those students completing the accelerated course sequence are in more than good shape to be successful in WNC's Nursing Program.

Change. A word that strikes terror into even the staunchest of hearts. Change can not just come from above: it must also come from below. George C. Marshall was well aware of that from his field action in World War I and developed the practice of supporting his "boots on the ground" commanders from his desk in Washington, DC during World War II. Assessment data at the classroom level (boots on the ground) can change education in an evidence-based manner that will benefit students. The issue becomes hurtful when Administrative faculty and Academic faculty are on non-converging paths to drive change: there has to be a common goal between the two groups.

** Something else to consider as regards the completion of assessment projects in such a manner that they aren't "lost" during summer breaks or remain incomplete indefinitely: perhaps one idea is to have the B faculty return a week later in the Fall and stay a week longer in the Spring, i.e., spend a week post-graduation working up assessment projects that are complete and mean something.

Final Commentary

The very best assessments occur when I hear signed statements/comments from former students or from faculty members/colleagues.

12 April 2018, from a second-year resident in dermatology at the University of Missouri-Columbia:

> "*I have been meaning to email you for over a year to tell you this story (pretty sure I never told you, sorry if I did and forgot!)... this was August of 2016, only a week into my first block of wards and I had a page about a patient with respiratory distress. I went in to evaluate her and it was an odd picture, lung sounds were normal and X-ray was normal. When I first walked into the room it was like she was bound down and unable to undergo the physical motion of breathing. Anyway I just had a feeling that she was a picture of hypocalcemic tetany (I visualized pictures from YOUR lectures). Sure enough her calcium was critically low (she was overly corrected for hyperca2+ following dx of MM). I did the Trousseau and Chvostek's sign which I remember you talking about :)*
>
> *Anyway, just wanted you to know the far reaching positive effects of your teaching!*"

8 May 2018, from one of WNC's graduating Nursing students:

> "*You may or may not remember me but I was a student of yours in the accelerated anatomy class spring of 2016. I was writing to say thank you to you. I am graduating from the nursing program here at WNC in two weeks. When I was in your class the first day we had to dissect cadavers I cried, a lot. I was horrified at cutting human flesh. But during those six weeks I actually overcame my fear and the cadavers were a learning experience I really looked forward to each week. If it wasn't for your class and that experience I would not have just accepted an offer for my dream job as a surgical nurse in the operating room at Carson Tahoe. Thank you for what you do for the students here at WNC.*"

3 December 2017, shared with me by a WNC faculty colleague; written by a student doing a literature review:

> "*1. Citation in MLA format: Steve, Carman. "Principles of Nutrition." Introduction. Nutrition in Pregnancy, lactation, infancy and childhood: A Broad Overview. Microbiology 251. October 16 2017, Western Nevada College. 2. Type of source: Speeches, Lectures, or Other Oral Presentations (including Conference Presentations) 3. Evaluation-- author or source credibility: The source is immensely credible and has multiple research articles integrated into the lecture. This source allows me to evaluate from an unbiased view of the real necessary requirements for a healthy diet. The lecture is not back by any trendy but contains the cold hard facts. It provides large amount of statistics and data that ranges from the average caffeine of a beverages to the nutritional requirements of children that range from infancy to adolescence. It also provides insight into diets that have to be followed by people who have predetermined conditions. It also looks into diet therapy and senior nutrition showing that a vegan or a meat diet is necessary for anyone to be healthy as long as you meet your daily requirements of vitamins and minerals. 4. Summary: An in-*

depth overview of nutrition for not only males and females but as well as pregnant women and infants. 5: How it is useful for my research paper: It provides a massive amount of insight into the nutrition of a human being and helps people see past the misconceptions."

Anyone, and everyone, teaching has positive moments like this. They outweigh the negative, regardless of the source. Bellyaching and whining go with the territory, and they're much more common. Those who teach are not unlike those who raise children. **If there was any one thing that came out of this specific study, it's that things, from an academic/teaching/learning perspective, are improving in BIOL, at least as far as the pre-Nursing BIOL courses are concerned.** But … beware of pushing your most loyal employees to the point where they no longer care. Genuine, equitable, internal PR has suffered since Jim Randolph left this institution …

Appendices

Appendix 1: Cross-Sectional BIOL 190 Assessment

Accelerated Pre-Nursing Approach

Across the Academic Year

Fall ‘17 – Spring ‘18

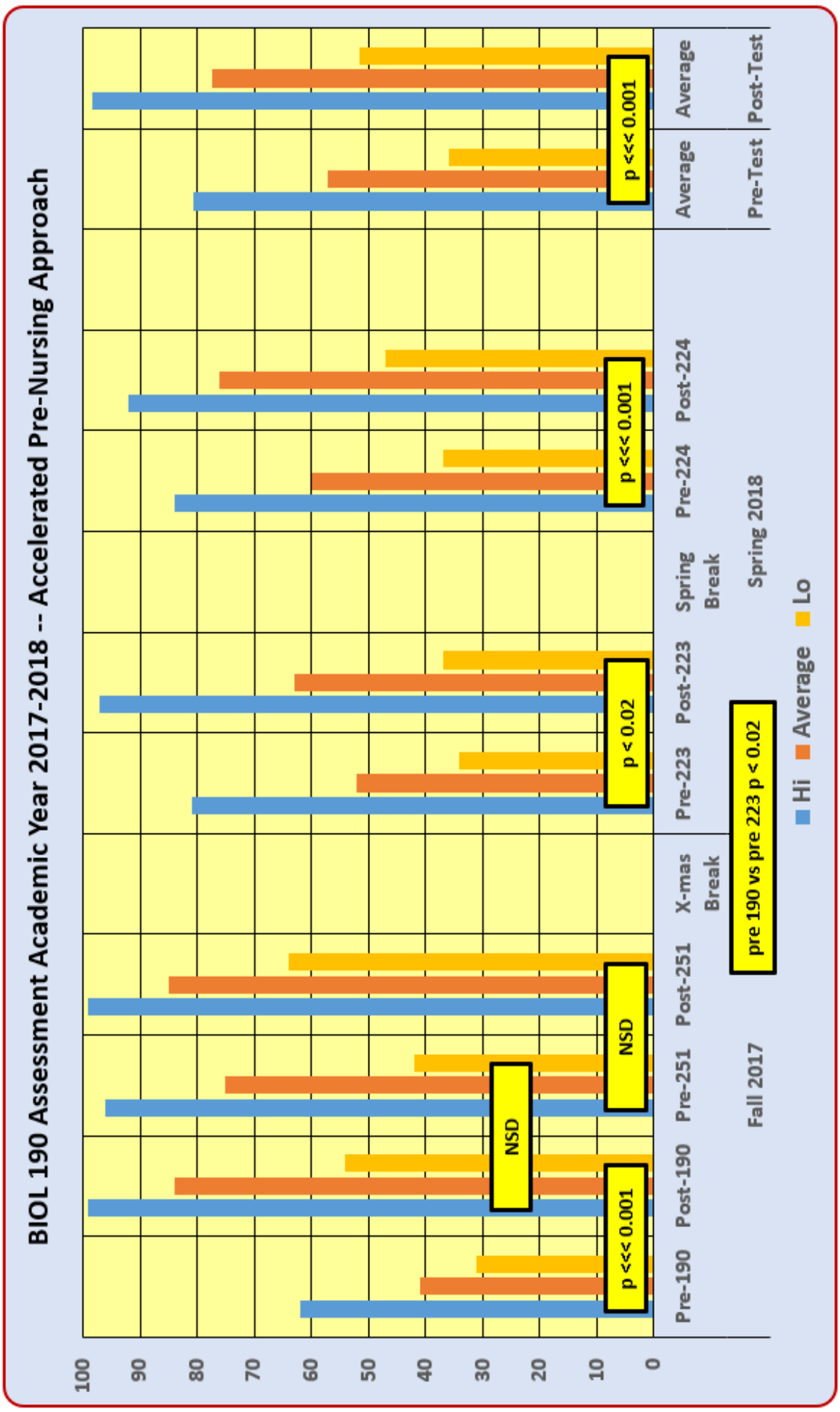

Figure 1. BIOL 190 Aggregated/Cross-Sectional Assessments across the Accelerated Pre-Nursing Science Courses, F ’17-Sp ’18. Charter Year.

Appendix 2: Cross-Sectional and Longitudinal BIOL 190 Assessment

Accelerated Pre-Nursing Approach

Across the Academic Year

Fall ‘17 – Spring ‘18

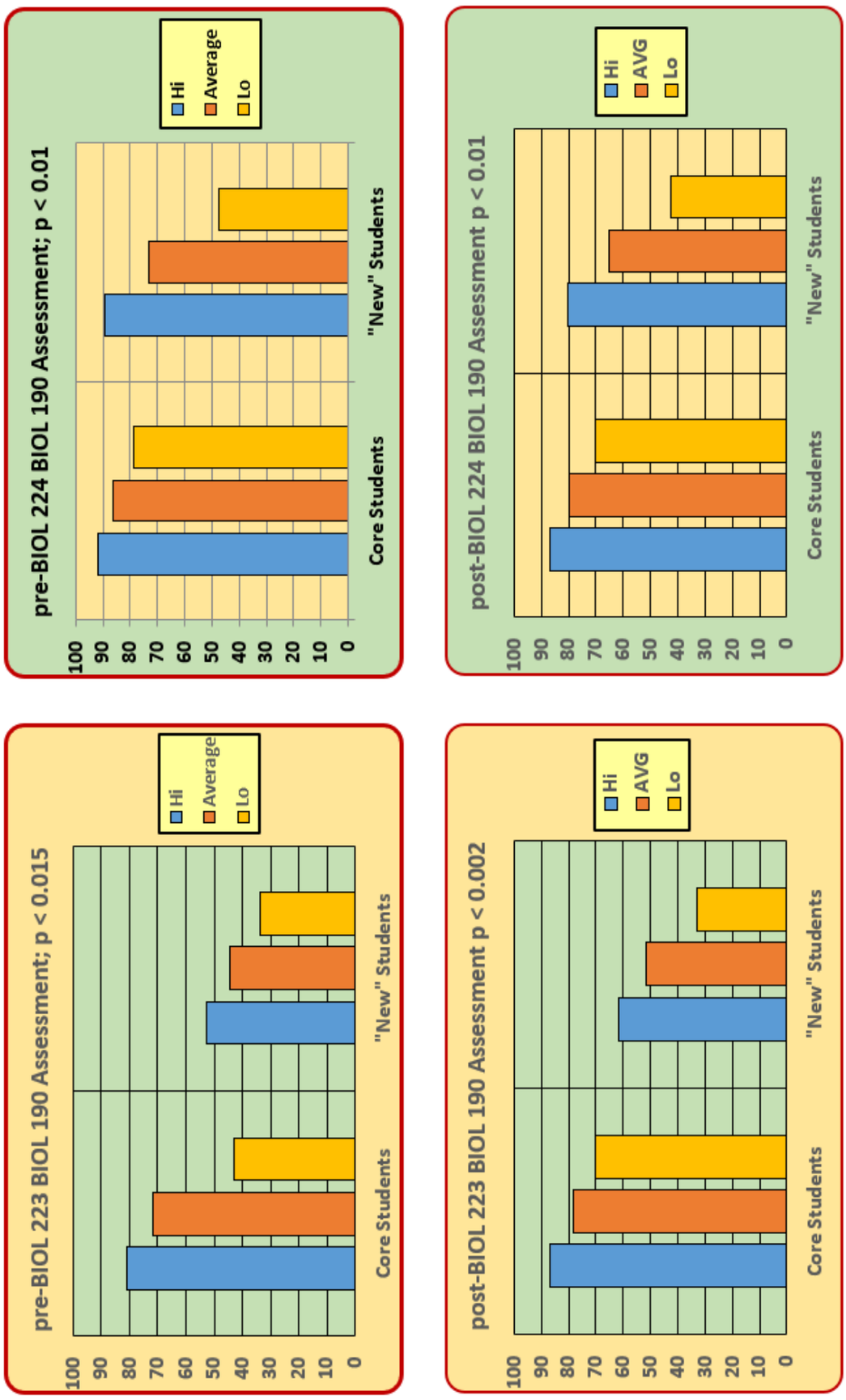

Figure 2. BIOL 190 Assessment by break-out group. Terms defined in text/glossary.

Appendix 3: Cross-Sectional and Longitudinal Assessment of Anatomy and Physiology (AAP):

Pre- and Post-Testing

Accelerated Pre-Nursing Approach

Across the Academic Year

Spring ‘18

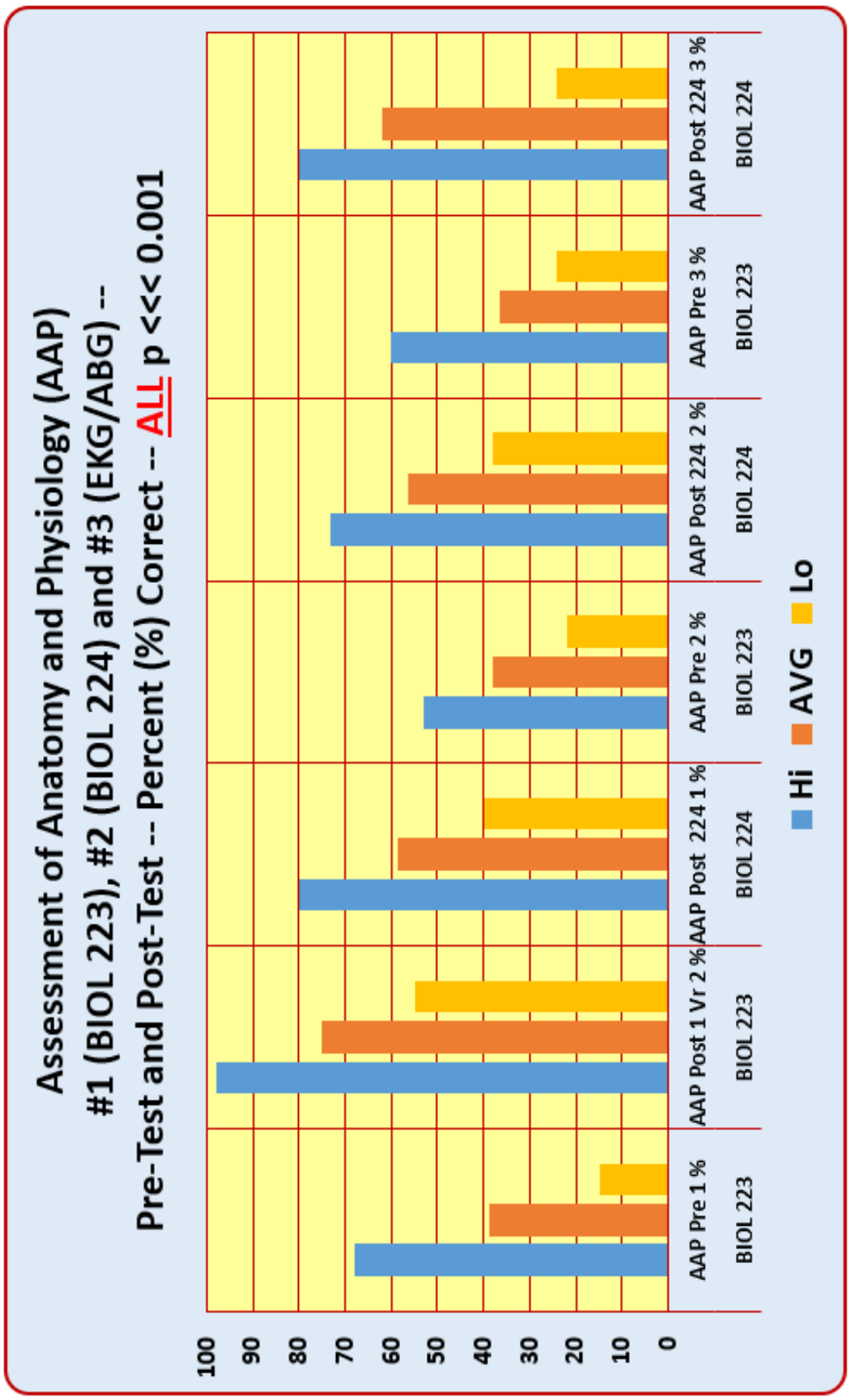

Figure 3. AAP results, cross-sectionally.

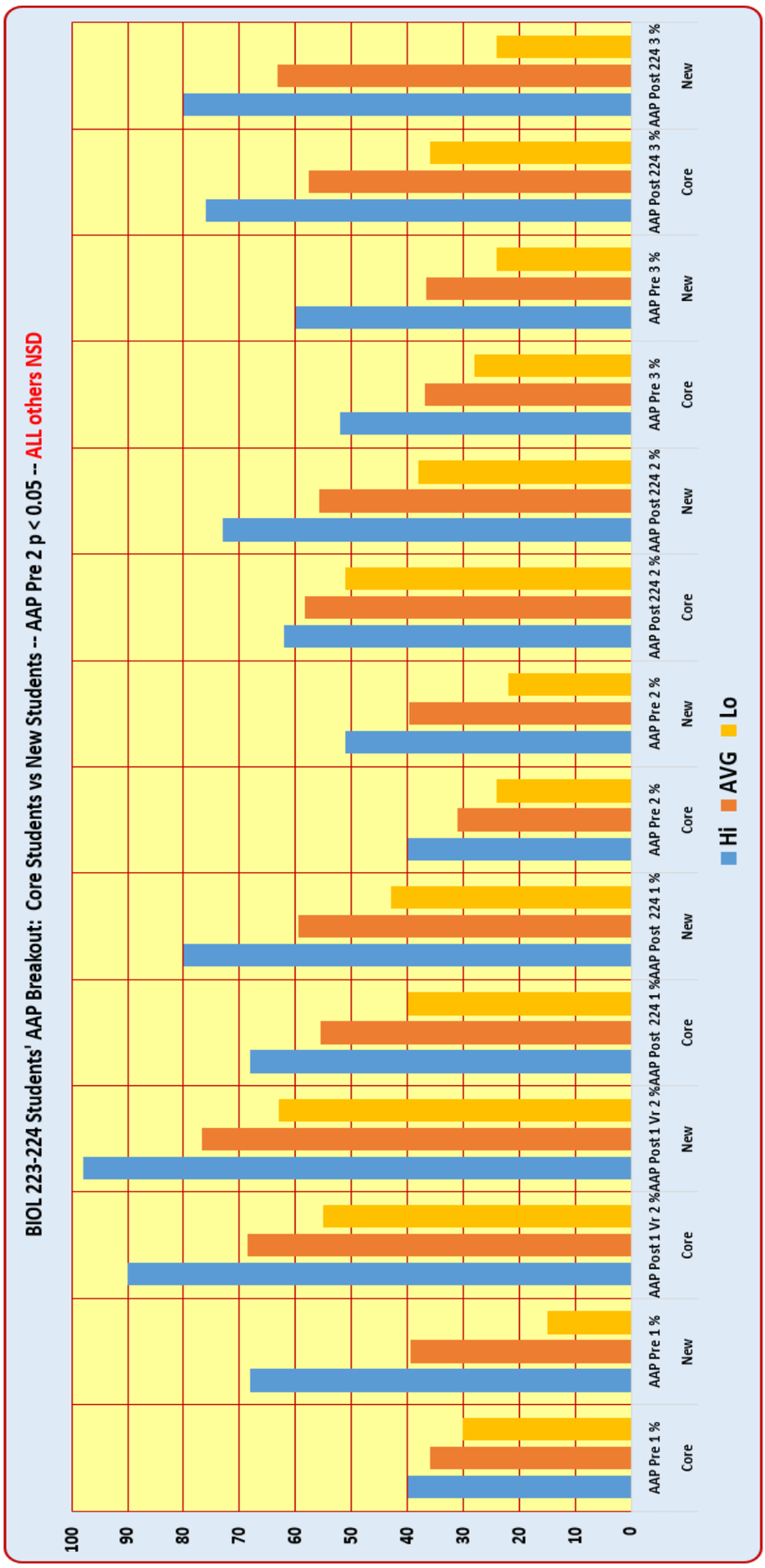

Figure 4: AAP results broken out by group.

Appendix 4: Cross-Sectional Final Course Grade, Enrollment and Number of "R's": BIOL 223

Accelerated Pre-Nursing Approach

Across the Academic Year

Fall '12 – Spring '18

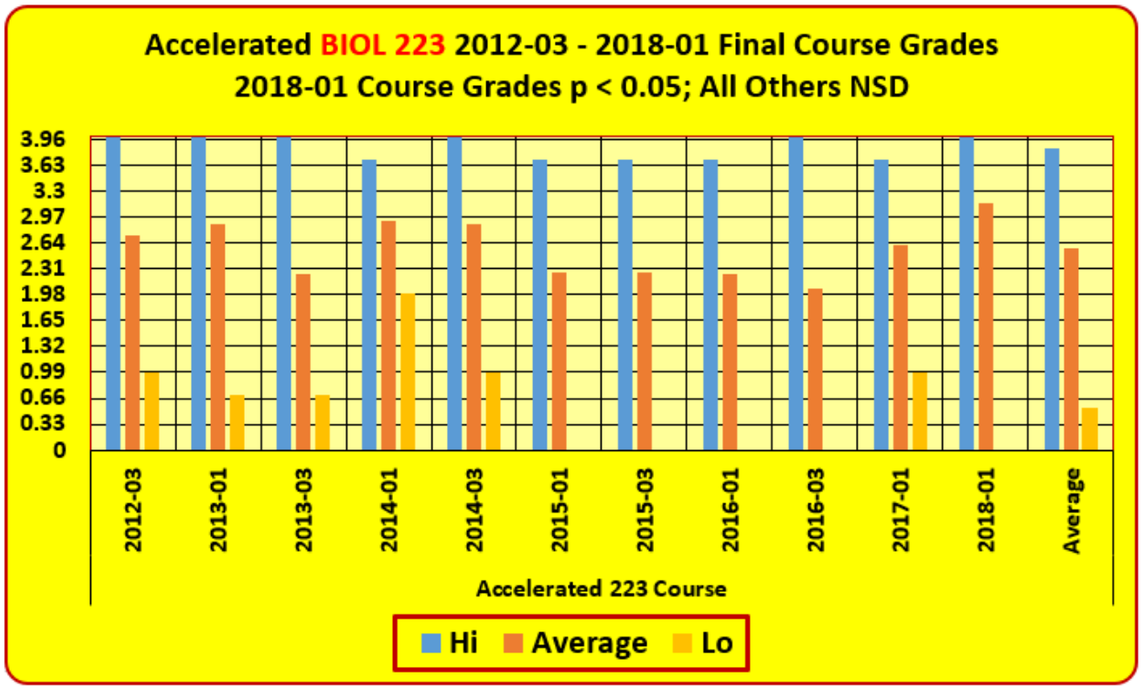

Figure 5. Final Course Grades, BIOL 223, Fall 2012 through Spring 2018.

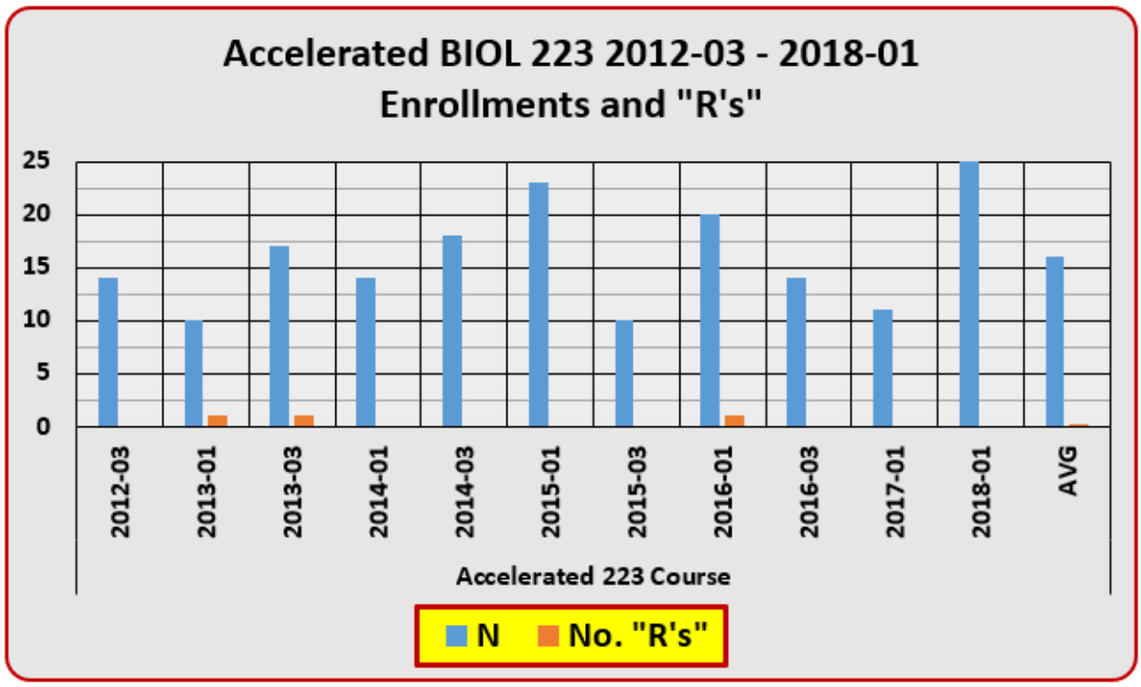

Figure 6. Enrollments and “R’s” in accelerated BIOL 223, Fall 2012 through Spring 2018.

Appendix 5: Cross-Sectional Final Course Grade, Enrollment and Number of "R's": BIOL 224

Accelerated Pre-Nursing Approach

Across the Academic Year

Fall '12 – Spring '18

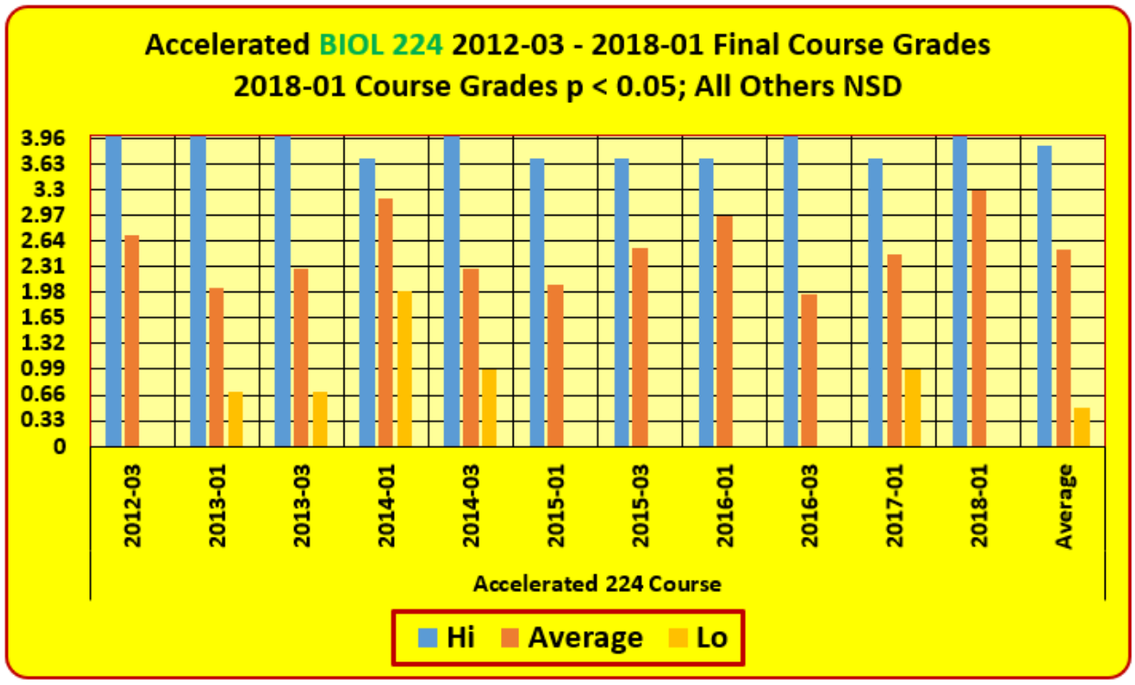

Figure 7. Final Course Grades, BIOL 224, Fall 2012 through Spring 2018.

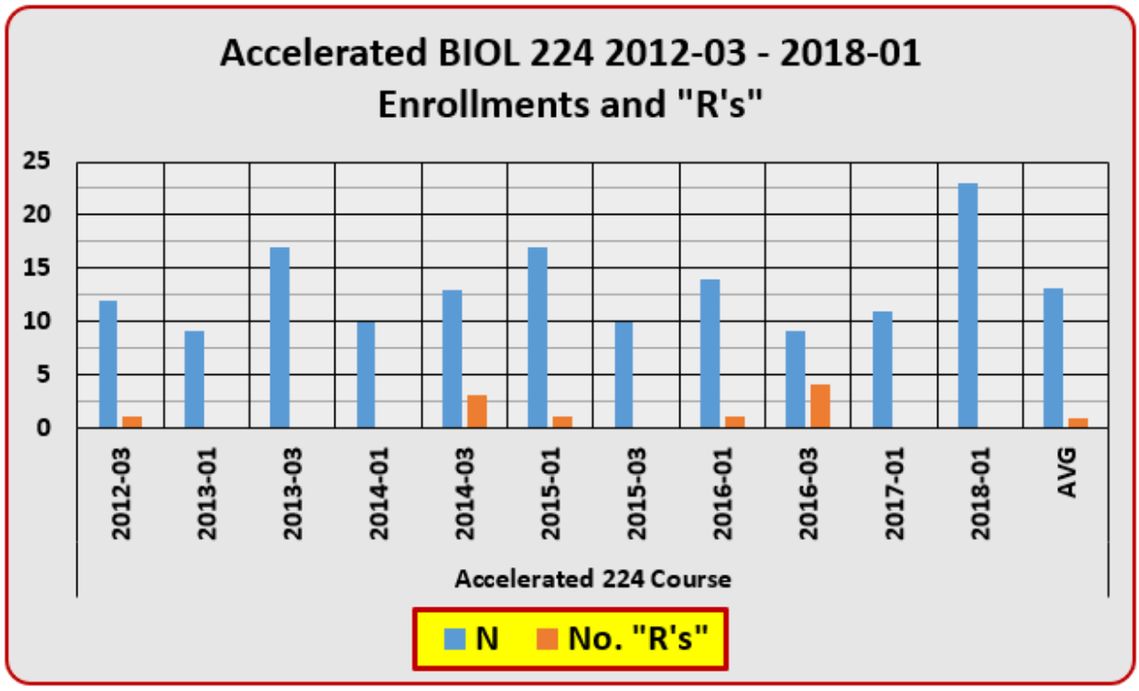

Figure 8. Enrollments and “R’s” in accelerated BIOL 224, Fall 2012 through Spring 2018.

Appendix 6: Cross-Sectional Final Course Grade Distribution: BIOL 223 and BIOL 224

Accelerated Pre-Nursing Approach

Across the Academic Year from The Beginning

Fall ‘12 – Spring ‘18

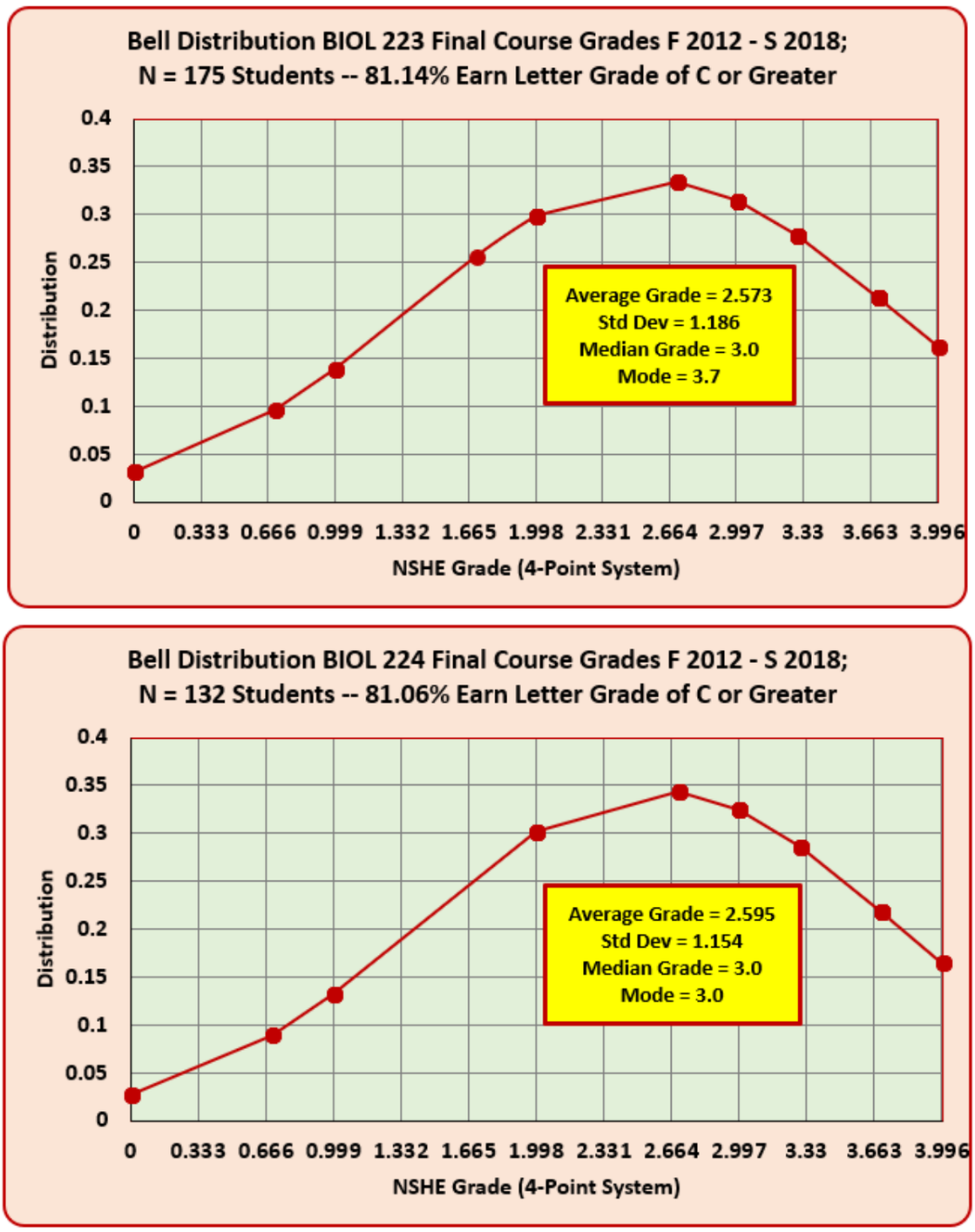

Figure 9. Distribution of final course grades, BIOL 223 (top) and BIOL 224 (bottom), 2012-03 – 2018-01.

Appendix 7: BIOL 251 Course Assessment

Accelerated Pre-Nursing Approach

Fall ‘17 – Spring ‘18

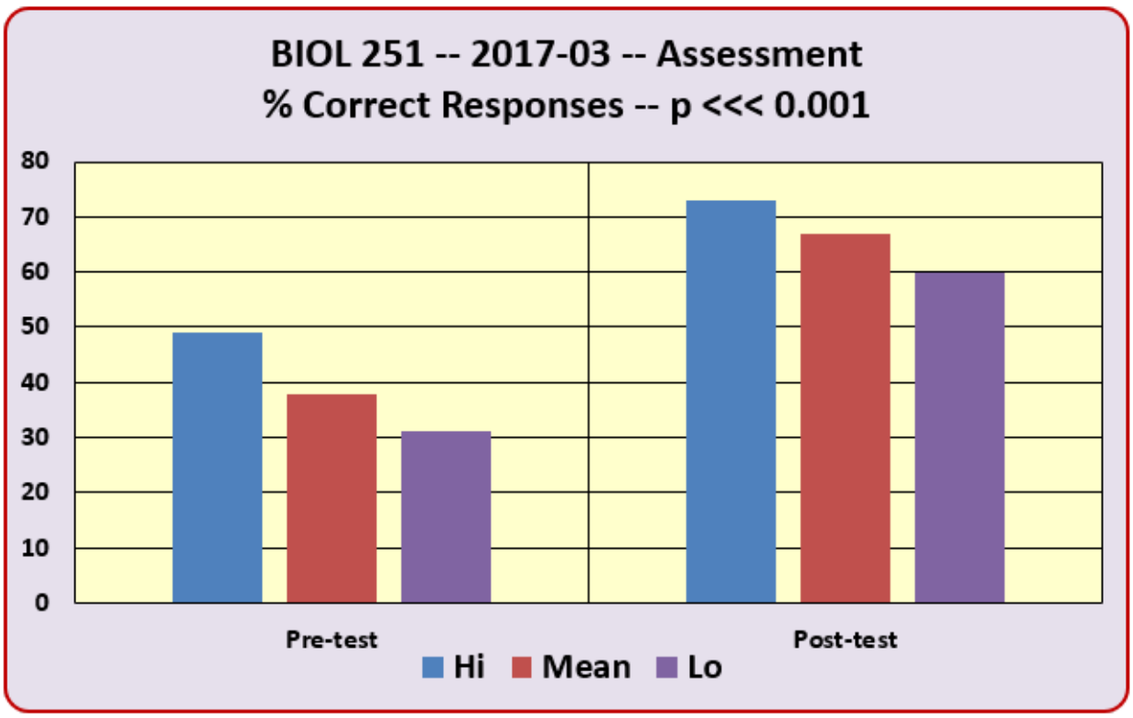

Figure 10. BIOL 251 Assessment, Fall 2017.