

**Gateway to Healthcare Careers for Vulnerable Students:**

**A New Approach to the Teaching of Anatomy and Physiology<sup>1</sup>**

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*The Problem*

At Southern Vermont College (SVC) and at our nation's other colleges and universities, Anatomy and Physiology (A&P) is the gateway course into healthcare careers. Given the country's growing workforce development needs in this field, it is critical that our first-year students accumulate the requisite body of knowledge in the course to pass it and proceed in their healthcare programs: nursing, radiologic technology, dental hygiene, allied health, and so forth. Disturbingly, at SVC and elsewhere, many first-year students interested in healthcare careers do not succeed in this course (A&PI), which they take in their first semester. They withdraw from the course or the institution, or their final grade may be below the identified threshold for progressing in their programs (77 is the threshold at SVC). In short, A&PI has become a gatekeeper course, preventing students from entering careers where they are sorely needed.

There is no simple or single reason why this situation occurs. Some students realize that healthcare careers are not what they have an aptitude for or want. Yet, there are many students who want to pursue healthcare careers, even though they struggle academically in A&PI. Worse, some of those students are leaving college altogether, despite efforts to redirect them to other programs.

While academic failure is a complicated issue, the literature suggests that the students most likely to succeed in A&PI have strong mathematics and science backgrounds and come

from high schools with rigorous programs of study.<sup>2</sup> Many of the students at schools like SVC are first-generation students and/or Pell-eligible students, and they have relatively low SAT/ACT scores. These students do not enter colleges from programs of study that have prepared them for A&PI, particularly in their first semester of college.

This reality offers some options—most of which are unpalatable. We could accept only high-achieving students in our healthcare programs, but we would be failing to fulfill our institutional mission to serve vulnerable students—many of whom will become tomorrow’s healthcare workers. We could water down the course so as to decrease the degree of difficulty, but we would be creating a cadre of students unlikely to succeed professionally—particularly in fields with national licensing examinations. We could offer other foundational courses, deferring entry into A&PI, resulting in expanding the length of time it takes to progress through a healthcare program—a costly consequence for vulnerable students.

### *The Proposed Solution in a Nutshell*

Faced with these challenges, at SVC, we decided to launch a pilot A&PI course (Pilot) designed for vulnerable first-year students. We identified first-year students we deemed academically at risk, and they were offered an opportunity to enroll in a re-envisioned A&PI course (based on a model deployed in legal education and in certain first-year writing courses).<sup>3</sup> While we must await the end of the summer 2011 semester to determine the full impact and results of this initiative, we have seen positive trend indicators on all the major items being measured and, importantly, some positive, unintended benefits.

### *The Pilot*

In late spring and early summer of 2010, we evaluated data about the pass rates in A&PI in fall 2009 (a grade of 77 or better). We determined that enrolled first-year students in fall 2009 with a combined mathematics and verbal SAT score of 900 or below were at considerable risk of withdrawing from A&PI, or failing to receive the threshold grade of 77 or better. Of the 54 first-year students with available scores (transfer students do not proffer scores for admission to SVC), 27 students who either failed to receive the threshold grade of 77 or withdrew from A&PI had a combined SAT score of 900 or less. To be fair, there were students in 2009-2010 who failed A&PI with a combined SAT score above 900, and there were students who passed with a combined SAT score below 900. However, for 2010, the predicted risk of not earning a 77 was uncomfortably high (in excess of 84%) for students with a combined SAT score at or below 900.

Professors and administrators involved in selecting the Pilot students identified thirteen first-year students who subsequently enrolled in the new course. All had a combined mathematics and verbal SAT score of 900 or less. Given the predicted rate of failing, a sizable course withdrawal rate, and, ultimately, student departures from the College, we attempted to see if the success rate could be improved. Importantly, all outreach literature to these first-year students indicated that our Pilot was designed to enhance the possibility of passing this course.

### *Key Features of the Pilot*

1. The usual semester long A&PI course was stretched over two semesters, and students who received a grade of 77 or better at the end of the spring semester were allowed to enroll in A&PII during the summer, without additional tuition or housing costs. The

- mid-year grade for the A&PI course was calculated; however, unless a student earned less than a 60, she or he was permitted to progress to the second semester of the Pilot.
2. Pilot students completing A&PII successfully in the summer will proceed to Nursing I or into the Radiologic Technology program with their peers who were not in the Pilot course, and they will be on the same track for program completion and graduation.
  3. In the fall 2010 semester, physicians undertook the task of teaching in the Pilot in collaboration with an SVC science professor.<sup>4</sup> In addition to teaching the traditional material, the physicians engaged these first-year students in understanding why the material mattered for their future careers.
  4. Class lectures and laboratory exercises were integrated, especially to assist students in recognizing how laboratory work informed the course material.
  5. A classroom response system (i.e., clicker technology) was deployed early in the fall semester and then frequently in the spring semester, to determine whether or not the first-year students understood the material.
  6. Retaking quizzes was permitted, but a re-take grade could not exceed a score of 80. Retakes were only offered in the fall semester.
  7. Peer tutoring was offered.
  8. A hypothetical patient, Harriet, was created early in the fall semester, and she presented the illnesses the first-year students were studying. Harriet was utilized again in the spring semester.
  9. Small group work, collaborative learning, and one-on-one tutoring opportunities were part of the course design.

10. Residential Hall opportunities were offered for shared activities among the Pilot students.

11. There were ongoing meetings among all involved in the Pilot to assess student progress.

### *The Results of the Pilot*

To contextualize the results of the Pilot, data from 2009–2010 provide key comparisons.

For the fall 2009 A&PI course, 75 first-year students were enrolled. Of these, 65% of the enrolled students either failed to earn a 77 (41%) or withdrew from the course (24%). Nineteen percent (19%) of the enrolled students subsequently transferred to another college or withdrew from college altogether. Eleven percent (11%) of the first-year students remained at SVC, but changed their major.

Stated in the inverse, 35% of the enrolled first-year students passed A&PI in fall 2009.

Of those who passed the fall 2009 course and for whom scores are available (54), the combined math and verbal SAT score was 992. The average combined SAT score for all enrolled students in the course was 882. The average high school GPA was 2.87 for all enrolled first-year students for whom data are available (57). The average high school GPA for those who passed was 3.00. Among the TRiO<sup>5</sup> students, the withdrawal rates were higher than those for non-TRiO students (38.9% compared to 7.5%); TRiO students passed the course at a lower rate than non-TRiO students (33.3% compared to 42.5%). First-generation students passed the course at a lower rate than non-first generation students (33.3% compared to 48%).

In examining the results for fall 2010, we begin with the comparable A&PI course. Thirty-six (36) first-year students were enrolled. Of these, a total of 22% of the enrolled first-

year students either failed to earn a grade of 77 (14%) or withdrew (8%). None of the enrolled first-year students transferred to another institution or left the College, and only 8% changed their majors.

Stated in the inverse, 78% of the first-year students enrolled in A&PI in fall 2010 passed the course with a 77 or better.

One hundred percent of the enrolled first-year students were retained compared to 81% of the students in fall 2009. Of the first-year students enrolled for whom we have SAT scores (24), the combined math and verbal SAT score for those who passed was 915. (*Note that this is 77 points lower than the average for students who passed in 2009.*) The overall SAT combined score for enrolled students was 925. The average high school GPA for enrolled students, for whom we have data (28), was 2.97. The average high school GPA for those who passed was 3.08. Non-trio students had a higher withdrawal rate than TRiO students (10.7% compared to 0%). TRiO students passed the course at a higher rate than non-TRiO students (87.5% compared to 84%). First-generation students passed the course at a higher rate than non-first generation students (85% compared to 68.8%).

Remarkably, the pass rate in the course from fall 2009 to fall 2010 increased from 35% to 78% (a percentage increase of more than 50%), while the average SAT score of the passing students fell by more than 70 points.

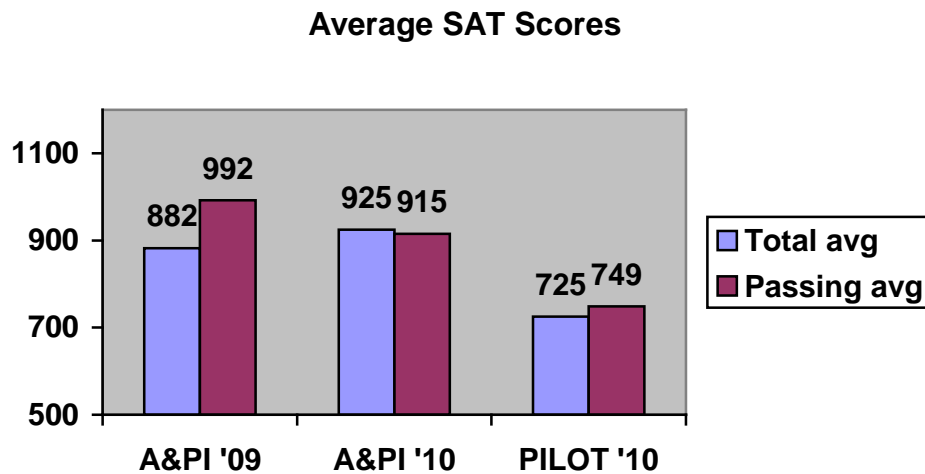
In looking at the results for the Pilot, 13 first-year students were enrolled. All 13 progressed to second semester with a grade of at least 60. Of the 13 enrolled first-year students, 46% earned a fall grade below 77, meaning 54% received a grade of 77 or better for the first semester. None of the Pilot students withdrew from the course and 15% transferred to another

institution or withdrew from college. Ninety-six percent (96%) of the fall 2010 A&P I students (Pilot & traditional) were retained, compared to 81% of the students in fall 2009.

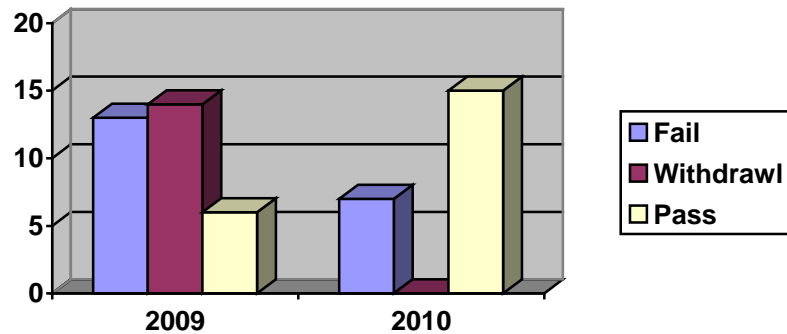
Of the first-year students enrolled in the Pilot for whom we have SAT scores (12), the combined math and verbal score for those who “passed” the course, or who earned a 77 or better, was 749; the average score for all enrolled students was 725. The average high school GPA for the Pilot students was 2.84 and 3.05 for those who “passed.” Only one student in the 2009 A&PI course has a score below 749 and “passed” the course. The combined SAT score for the Pilot students who “passed” is 166 points lower than those who passed the traditional course, or 18% lower.

Among the TRiO students, the “pass” rate in the Pilot was 50% and the “pass” rate for non-TRiO students was 66.7%. Neither TRiO nor non-TRiO students withdrew. First-generation students “passed” the course at a rate of 66.7%, while non-first-generation students passed at a rate of 20%.

These results are summarized in the following two bar charts.



### Students with SAT score $\leq$ 900



At the end of the spring semester, there was a pass rate of 50% for the Pilot students.<sup>6</sup>

No students withdrew, one (8%) changed major, and one student (8%) did not register for the fall 2011 semester.

Students who do not succeed in A&PI typically perform poorly in their other courses. The average GPA of the first-year students in the fall 2009 semester who did not succeed in the traditional A&PI course was 1.95. The first-year students in fall 2010 who did not pass the traditional A&PI course had an average GPA of 1.48. By stretching out A&P I, first-year students were able to learn the course content by studying it differently, more actively, and in a much more engaged manner. Additionally, having a less intensive gateway course, that is, having A&PI spread out over two semesters, provided the first-year students with the opportunity to give more attention to their other courses, resulting in higher performance. The fall 2009 semester GPA for first-year students with an SAT score of 900 or below was 2.18. The fall 2010 semester GPA for the Pilot first-year students was 2.65 and 2.33 at the end of the spring 2011 semester. Those who passed the course (77 or higher) had an average spring semester GPA of 3.17.



### *Conclusions, Explanations, and Next Steps*

Based on these data, several conclusions can be reached, even at this stage:

1. Fewer 2010-2011 first-year students withdrew from A&PI (whether run as a traditional course or Pilot) or changed their majors compared to 2009-2010 first-year students.
2. The pass rates in fall 2010 for the traditional A&PI course and the Pilot exceeded pass rates for fall 2009, despite lower average combined SAT scores for both 2010 groups.
3. The pass rate in the traditional A&PI course improved significantly in 2010.
4. All first-year students in the Pilot course in fall 2010 succeeded in earning at least a grade of 60 or better, none withdrew from the course, and 54% “passed” the first semester of this two-semester course with a 77 or better. In 2009, 81% of similar first-year students failed at the end of first semester and only one student had a combined SAT score below 749, whereas that was the average SAT score of all the students in the Pilot who passed.
5. All of the 13 enrolled Pilot first-year students were eligible to progress to the second semester of the course.
6. Fifty percent of the Pilot first-year students received a 77 or higher by the end of the spring semester.
7. The combined SAT scores of the Pilot first-year students was 18% lower than those in the 2009 A&PI course, yet 50% of them passed—a percentage that exceeds that of other similarly situated students in 2009.

8. Retention at SVC for the Pilot first-year students was 85% and 100% for the first-year students in the A&PI course. This exceeds the retention rate of 81% from fall 2009.
9. Withdrawal from A&PI improved in the Pilot and A&PI in 2010 (combined 8% compared to 24% in fall 2009).
10. The average GPA was higher for Pilot first-year students compared to similar students in fall 2009.
11. These data suggest A&PI can be a gateway course that assists colleges like ours in retaining vulnerable, first-year, healthcare students.

While the results of the Pilot are positive, the improved pass rates in the traditional A&PI course are noteworthy as well. We can speculate that several factors account for both these results. First, both the traditional A&PI and the Pilot had manageable class sizes, allowing for more collaborative, engaged teaching. Second, there was greater consistency in the academic levels of the students enrolled in the traditional A&PI course, thereby encouraging success. Third, the enhanced teaching strategies (clicker technology, simulated patient, peer-to-peer conversations and student-to-professor/physician conversations) emphasized risk-taking and experimentation, encouraging learning while doing over time.

The true success will be measured by how many of the Pilot students pass A&PII in summer 2011. Nonetheless, we are pleased with the progress of the Pilot students. We are encouraged by the “stretch” model, enthusiastic about the collaborative learning we have observed, delighted by the physicians involvement in the teaching and learning of the class, impressed with the possibilities presented by the classroom response system (the clicker technology), and committed to Harriet, our simulated patient. One major finding so far is that

SAT scores alone are poor predictors of student success in A&PI when enacted in a stretch modality with the aforementioned additions.

Currently, we cannot determine which of the changes led to the improvement in results; however, we believe that all of the enhanced teaching strategies benefited our first-year healthcare students. We are encouraged by this effort and the successes experienced by both the Pilot students and the non-Pilot students.

## Notes

<sup>1</sup> The authors are grateful to Southern Vermont College President, Karen Gross; her genuine commitment to ensuring that vulnerable students progress to and through college has inspired the entire campus community; to Executive Assistant, Colleen Little, for assistance with data and charts; and to the Southern Vermont College Success Center, especially Sylvia Jimison and Kitty Farnham, as well as our registrar, Jim Frederick, for the data they provided regarding our TRiO and First-generation students. We are also thankful for the expertise provided by the physicians that took part in the Pilot project: Drs. Nancy Scattergood, James FitzGerald, Michael Gelfand, and Robert Pezzulich.

<sup>2</sup> See, for example, “Current trends in student retention: A literature review,” by K. B. Porter, 2008, *Teaching and Learning in Nursing*, 3(1), 3-5.

<sup>3</sup> See “Curriculum design and bar passage: New York Law School’s experience,” by D. H. Ziegler, J. Ingham, and D. Chang, 2010, *Journal of Legal Education*, 59(1), 1-20. See also “Exposing some basic realities: A conversation about BW strategy from portfolios and stretch courses to studios and mainstreaming,” by G. Creel, K. DeVore, and J. Fennell, 2008, *Panel Presentation at the Conference on College Composition and Communication*.

<sup>4</sup> Dr. Nancy Scattergood and Dr. James FitzGerald team-taught the Pilot course during the first semester. The physicians received assistance, when needed, from Professor Tammy Kenny who was the professor for the traditional A&P I course. While both physicians believed that the teaching experience was enriching to them and to our students, based upon their experience and ongoing conversations and physician availability, we elected to have a professor (Professor Tammy Kenny) in the classroom second semester and to have the physicians assist us with lectures and discussions about topics in their special areas of interest.

<sup>5</sup> TRiO students at SVC are students who qualify for services (i.e., tutoring) under a federal grant to the College. They meet at least one of three criteria: (1) they are from families in which neither parent has a four-year degree; (2) they are from low-income families, as determined by the U.S. government; and (3) they have documented disabilities.

<sup>6</sup> In the fall 2010 semester, there were thirteen first-year Pilot students, two of whom transferred at the end of the semester. One student, with extenuating circumstances, was added to the Pilot course at the beginning of the spring semester. The fifty percent pass rate refers to the seven students who received a 77 or higher from the fourteen students who took part in the Pilot course.

## References

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