Using Data to Measure Pedagogical Change Effectiveness

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Editor's Note: The author of this paper was a Visiting Scholar from China being sponsored by SUNY–Canton and TIBI during the duration of the project that led to this paper. As a professor at SUNY–Canton, I worked closely with the author, helping him design this project and write this paper—including allowing the appropriate repetition of phrasings from my previous reports of similar projects (e.g., Ledoux, 1995) which, as it turns out, I also used in a subsequent report (i.e., Ledoux, 2002) of another similar project. As a result, this paper reads, as it should, much like that Ledoux, 2002, paper (which appears on the pages before this paper). However, this paper originally appeared in the Fall 1999 issue while the Ledoux, 2002, paper originally appeared in the Spring 2000 issue. They appear together here in this issue of reprinted papers because they use similar methods to evaluate similar educational goals at two different times and in two different situations.—Ed.

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Abstract: Verifiable student success can demonstrate the value of pedagogical change. This report provides such data for a particular pedagogical technique.

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Faculty often make changes in the pedagogical techniques they use to teach their courses. However, without data, they cannot state with confidence whether or not the changes were beneficial, nor whether or not the changes should be retained. Measures and methods are available, though, for collecting and evaluating data relevant to answering these questions.

During the 1998 calendar year, this author twice taught a course called "Introduction to Chinese History and Culture," once in the spring term and once in the fall term. In the fall term, one pedagogical change was introduced while everything else was kept the same. Data were collected to measure whether or not this change had any beneficial effect on student outcomes. Retention of the change depended on the presence of beneficial effects.

Method

The pedagogical change for the fall term involved requiring the students to write out a prepared answer for each of the study questions that were assigned as homework (the same questions as in the previous spring term). The completion of these answers was checked for all students and verified by recitation from students called on at random. Earlier, in the spring term, writing out the answers had been recommended, but had not been required, although the same recitation had been attempted.

The measure used to evaluate that change is called the percent of possible gain achieved (Ledoux, 1995). Fraley called it the attained percent of possible or desired gain, and described it fully along with several others (Fraley, 1980).

The percent of possible gain achieved is the ratio between a student's actual gain and the gain that was possible for that student in that term. Based on calculations with pre–test and post–test scores, the actual gain is computed by subtracting the pre–test score from the post–test score, while the possible gain is computed by subtracting the pre–test score from the maximum possible score. Then, the percent of possible gain achieved is computed by dividing the actual gain by the possible gain and then multiplying by 100. The test used to obtain the pre–test and post–test scores was the same, being the "comprehensive final exam" composed for the course (in this case, an essay test).

To compare across terms, the percentage of students in each term reaching different levels (above or below 60%) of their possible gain was calculated. The cut–off was set at 60%, rather than the more common 50% (Ledoux, 1995), because this author wanted to judge effectiveness at a higher standard.

Results

Table 1 contains the data for the two classes in the spring and fall semesters respectively. As shown in that table, of spring term students, 25% achieved 60% or more of their possible gain, while 75% achieved below 60% of their possible gain. In comparison, of fall term students, 67% achieved 60% or more of their possible gain, while 33% achieved below 60% of their possible gain. Across terms, the percentage of students doing better increased.

Achieved ≥ 60% of Possible Gain	25%	67%
Achieved < 60% of Possible Gain	75%	33%
	Spring '98	Fall '98

Table 1: Percent of Students in Each Term Achieving ≥ 60% of Their Possible Gain, or Achieving < 60% of Their Possible Gain

Discussion

These results show that the small change of *requiring* students to write out answers to the study questions benefited the fall term students. Based on this, that change should be retained. While the small change evaluated here had a beneficial effect, there is always room for further pedagogical improvement. Additional changes can be introduced and evaluated in the same way. If evaluation shows a further change to be effective, it should be retained. This kind of cycle encourages instructors to try new techniques, including combinations of techniques, while keeping those that prove to work.

Further, this behaviorological evaluation method is useful across courses, curricula, and campuses. This author will use this approach to evaluate other courses, whether taught in the USA or China (this author's home country*) and, upon returning to China, will share this approach with other colleagues there as well.

Conclusion

Any innovation is not just for innovation's sake or for the novelty effect. Each pedagogical change must be field–tested, supported by scientific data, and serve educational goals. Indeed, sound pedagogical innovations and educational changes can only be reliably established through scientifically verifiable quantitative methods like the one used in this study.☘

References

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