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Doing and reporting educational research

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I HAVE BEEN REVIEWING articles for *Advances in Physiological Education* since the appearance of the first issue in 1989. Over the years, I have seen an increasing number of studies describing the results of classroom research. The authors describe some new approach to teaching physiology [problem-based learning, cooperative learning, the use of computer simulations, etc. (a complete list would be quite long)] and attempt to compare the outcomes of the “new” approach with the outcomes achieved by the “old” approach (whatever it might be). While it is only fair to acknowledge that educational research, of any kind, is extremely difficult to do (1), it is also true that our skills as physiology researchers are certainly germane to the design and reporting of our educational experiments.

Let me therefore make explicit the things that reviewers look for in articles describing an educational experiment and that the reader, too, must have to make sense of the work being reported.

What Do the Reviewers and Readers of an Article on Educational Research Need to Know?

Your hypothesis. Basically, this amounts to a statement of the form “if I do X, then I should observe Y.” X is, of course, the “new” educational approach you want to test, and Y is the outcome(s) you predict you will observe. Often the hardest, and therefore the most critical, decision is what you think the relevant outcomes will be. These are not new ideas; all of your experiments in the laboratory are basically conducted using this research paradigm.

Characteristics of the student population that was studied. Were the students you studied physiology or biology majors, majors in some other science, or nonscience majors? Were they enrolled in a preprofessional program of some kind? Were they undergraduate students, graduate students, or professional students (medicine, dentistry, etc.)? This is important to readers because it allows them to think about the results in terms of the populations they themselves teach. What works for one student population may not be appropriate for, or may not work with, another group of students.

Characteristics of the course in which the experiment took place. What was the course about? That is, what content was the student expected to master? What was expected of the students? What were the goals or objectives of the course? What was the course schedule? How many contact hours were there and what did students do during those hours? How were students assessed?

The nature of the “treatment” and the control being studied. What was the “new” educational approach that you tested? What did you, the instructor, do and what did the students do? Labels like “problem-based learning” or “technology-assisted learning” never adequately communicate the nature of the treatment. Did this treatment apply to all of the course or only some part of it? If you are using any kind of control (another section of the course taught the “old” way or last year’s offering of the course), you must provide exactly the same information about it as you provide for the “treatment.”

Outcomes that occurred as a result of the “treatment.” The majority of studies describing the outcomes of a new approach to teaching report student reactions to their experience. This is, of course, important information, as are reports of faculty reactions. However, student reactions (they liked the experience, they thought they learned more than from conventional approaches, etc.) are *not learning outcomes*. It is often difficult to determine what measure or measures of learning are appropriate to attempt to obtain (amount learned, retention, or greater ability to solve problems). It may also be difficult to measure the learning outcomes of interest. Nevertheless, it is crucial that such measures be obtained and reported. If the results of a new educational approach are being compared with the outcome of conventional instruction, it is essential that learning outcomes for the control group be obtained in the same way and reported.

Frequently, authors report the instructor’s subjective sense of the outcomes that resulted from the new approach. This too is valuable. This subjective sense can often be supported by evidence (student writings, for example) that documents the perceived changes. This may well be more accurate, and useful, than the students’ subjective reporting, but it too is not a measured learning outcome.

Adherence to this protocol for doing classroom research does not guarantee that you will obtain worthwhile results, and adherence provides no guarantee that your article will be accepted for publication. However, in the absence of this information, it is difficult for the reviewer to adequately assess the merits of your work and your article, and it is impossible for a reader to decide whether the innovation you have tested is something they might want to adopt.

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REFERENCE

1. **Berliner DC.** Educational research: the hardest science of them all. *Edu Researcher* 31: 18–20, 2002.

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