Quantitative Research is More Effective than Qualitative Research in the Studying of
Science Teaching

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Quantitative research is defined as research that is experimental, thus meant to observe and isolate a variable about which the researcher can draw conclusions. The goal of experimental research is to figure out what the effect of a particular approach or variable might be (Johnson, 2005). Last semester I had the opportunity to hear Dr. Carl Wieman, a Nobel Prize winner in physics, speak at Loyola University. He began his speech with a simple and compelling argument regarding the goal of science teaching and how we can get there. He said that the goal of science teaching is to teach students how to think about and use science like a scientist. According to Dr. Wieman, achieving this goal is only possible if the teaching of science is based on science. We must make sure that science education research is conducted similarly to other scientific research – quantitatively; thus making it just as valid.

Qualitative research is not by nature statistically significant, since it does not collect numerical data. In fact, there are many data analysis tools to help code and interpret qualitative results through a quantitative lens in order to lend more credibility and usefulness to the data (Shaffer and Serlin, 2004). In general, qualitative research needs the support of a quantitative interpretation in order to bring forth patterns and lend validity to the results. Often, even with coding and transferring of data sets, qualitative research is too narrowly applied to have any true significance outside of its small sample set. Qualitative research most often leads to a deeper understanding of the research topic or subjects (such as students) and can not be generalized to other student populations. To be applicable outside of its narrow scope, qualitative research will always need quantitative data analysis infused into it and thus is the inferior research model.

Quantitative research tests hypotheses. In fact most qualitative studies are unable and do not test hypotheses and are often purely exploratory (Lund, 2005). I found that
research that utilizes quantitative data collection not only addresses a hypothesis, but also can be exploratory and descriptive (Lund, 2005). In qualitative studies such as action research, one can not compare two methods or have a control and experimental group, or even have an independent and dependent variable (Johnson, 2005). These are all characteristics of quantitative research. Thus, quantitative studies are superior to qualitative since they can offer true scientific testing as well as fulfill the role of qualitative research.

Quantitative research can have large sample sizes where patterns can be observed. This allows quantitative studies to safely discount minor errors and rule out bias. Quantitative studies allow us to use our content expertise by using our prior research as an organized knowledge base, just as real scientists do prior to conducting their own research. By testing our hypotheses on large sample sizes, we can have a greater impact with our results. Quantitative studies lend themselves easily to generalizations, thus enabling science teachers to quickly learn about new best practices and teach their own students how to think like scientists. On the other hand, qualitative research can easily be biased because of the small sample size and close relationships between participants and researchers (Shaffer and Serlin, 2004).

Quantitative research should not only be the model for science education research, but also the method used in the science classroom for laboratories and experiments. If we expect our students to think like scientists do, then we must view our teaching practice through the eyes of scientists. We must have questions (hypothesis) and methods of quantifying the answers that can lead us to valid and groundbreaking inferences. Quantitative research can stand independently from qualitative research while delivering statistically significant conclusions – it will allow us to pose questions, and thus is the superior methodology for research.
References


