

EDITOR'S NOTE

Does Your Article Need A Methods Or Methodology Sub-Section?

Timothy F. Slater, University of Wyoming, USA

ABSTRACT

In the process of writing a discipline-based science education research article for the Journal of Astronomy & Earth Sciences Education, authors are faced with the question of titling each of the article's subsections. Some editors and authors advocate a METHODS section whereas others advocate for a METHODOLOGY(IES) section. What do we currently prefer in JAESE? The answer is an unsatisfying, "it depends." The vast majority of papers in the JAESE Journal of Astronomy & Earth Sciences Education use a traditional METHODS section because most—but certainly not all—papers to date describe studies in which the method of inquiry is based on a balance of pragmatism, cost, usefulness, and actionable information. This is in contrast to a METHODOLOGY section, which takes time to argue for why a particular approach will be most fruitful for the question at hand. A robust mix of both are vitally important across the broader discipline-based science education researcher community.

Keywords: Editorial; Astronomy Education; Earth Sciences Education

*I*n the process of writing a discipline-based science education research article for the *Journal of Astronomy & Earth Sciences Education*, authors are faced with the question of titling each of the article's subsections. Most articles start off with an introduction—although we rarely use the heading INTRODUCTION these days—that situates the research questions in the broader landscape of why readers should pay attention. In the end, most articles end up with a CONCLUSIONS section that summarizes answers to the big questions being pursued, implications of the results to the day-to-day life of a teaching scholar and proposes next steps for future lines of inquiry. These two end-points are generally agreed upon by most authors, editors, and reviewers without too much debate.

What is often the subject of much debate is what goes in the middle. Some editors and authors advocate a METHODS section whereas others advocate for a METHODOLOGY(IES) section. What do we currently prefer in JAESE? The answer is an unsatisfying, "it depends."

A METHODS section is undeniably the most commonly used sub-heading in most JAESE papers. This is because a METHODS section is simply a straightforward description of the tools used to sample a population. In this way, readers—and reviewers—can judge for themselves if the tools used are appropriate to the research question being addressed and if the sample observed makes sense. For example, a study using the TOAST *Test Of Astronomy Standards* (Slater, 2014) to understand what elementary school teachers know about comparative planetology would be suspect because the TOAST has very few questions focused on concepts of comparative planetology. The goal of such a section is to be sure that other researchers can follow the study recipe precisely in order to replicate the study or revise the study in order to supersede its shortcomings.

In stark contrast, a METHODOLOGY section argues for the study approach's rationale. In this way, such a sub-section describes a general strategy to conduct a study and implies a particular approach to making sense of the data acquired. Many of the recent astronomy education research dissertations provide a methodology section rather than a methods section because they use the methodologies of phenomenology, ethnography, or grounded theory (*viz.*, Bailey & Lombardi, 2015). This list provides examples of specific traditions of doing interpretive research, which do not always "make a recipe" that one might blindly follow in reproducing a study. Such a section spends time talking about why the selected approach is best for the study at hand and acknowledges that how the study is framed can dramatically impact the results one gets so much so that a different frame for the same research question might end

up have vastly different results.

The vast majority of papers in the JAESE *Journal of Astronomy & Earth Sciences Education* use a traditional METHODS section because most—but certainly not all—papers to date describe studies in which the method of inquiry is based on a balance of pragmatism, cost, usefulness, and actionable information. At some point, authors for JAESE might spend more time and energy trying to uncover the nuanced, underlying mental and social mechanisms that subtly impact how learners engage in learning science, which require more interpretive type strategies and well-argued rationales for why the approaches used are most appropriate, but that is far less common in most of JAESE thus far.

In short, research studies that need to describe the method of how one collects the data will most often use a METHODS section heading, whereas research studies that describe a broad strategy and the underlying frames that constrain and shape that work will most likely use a METHODOLOGY section. A robust mix of both are vitally important across the broader discipline-based science education researcher community. One is definitely not “better” than the other.

Timothy F. Slater, Ph.D.
Editor-in-Chief

REFERENCES

- Bailey, J. M., & Lombardi, D. (2015). Blazing the trail for astronomy education research. *Journal of Astronomy & Earth Sciences Education*, 2(2), 77-88.
- Slater, S. J. (2014). The development and validation of the Test Of Astronomy Standards (TOAST). *Journal of Astronomy & Earth Sciences Education*, 1(1), 1-22.