Content Guidelines for Manuscripts

EFFECTIVE FOR ALL MANUSCRIPTS SUBMITTED ON OR AFTER SEPT. 15, 2008

Beginning in 2009, the Journal of Geoscience Education will publish articles under three headings: Research, Curriculum & Instruction, and Commentary. Research and Curriculum & Instruction papers will undergo peer and editorial review, and Commentary papers will undergo editorial review only. As the premier publisher of geoscience education works, we are open to all manuscripts related to learning and teaching in geoscience-related domains. Learning and teaching are broadly construed to include all types of learning as well as all settings in which learning can occur. Pedagogy and research involving experts to novices of any age are welcome. We recognize that some papers may deviate from the review criteria outlined below, and that some work will blur research and pedagogical boundaries. **As scholars, we expect our authors to decide how best to present their own work.** If you have any questions or comments, please contact JGE at: jge@msu.edu.

Types of Papers Suitable for Submission to JGE

1. **Research Papers**

   1a. *Empirical Papers* describe data collection and analyses to answer a specific geocognition or geoscience education research question or test a hypothesis.

   1b. *Theoretical Papers* describe new geocognition or geoscience education theories, including philosophies, developed to fill a theoretical or philosophical gap.

2. **Curriculum & Instruction Papers**

   2a. *Curriculum Papers* describe new materials developed for geoscience-related instruction.

   2b. *Instructional Approaches Papers* describe new teaching methods developed for geoscience-related instruction.

3. **Commentary Papers:** Manuscripts providing thoughtful literature reviews, discussions of current topics or future directions, opinions, or comments to published work may be submitted to the Editors for review. Materials formerly published as Columns will now be published in the Commentary section. Please contact the Co-Editor for Operations before submitting Commentary pieces to determine whether or not your piece is appropriate for JGE.

We have carefully outlined content review criteria for both Research and Curriculum & Instruction papers to: 1) increase consistency of JGE papers with the standards of other STEM education, education, and cognition communities; 2) ensure consistency in research design and findings, as well as usability of presented curriculum and instructional approaches; 3) provide clearer guidelines for JGE reviewers; and 4) correlate content review criteria for the Research and Curriculum & Instruction papers to ensure that they are treated equally by the journal.

Consistency in research design and findings
Readers should be able to reach similar conclusions based upon the data presented in the manuscript or in online supplements, and all study findings should be supported by evidence. In addition, the experiment can be conducted with, or the new theory can be applied to, other populations or settings.

Usability of curriculum and instructional approaches
Readers should be able to implement curriculum and instructional approaches in similar settings and should have access to all necessary materials (or lists of materials) in the manuscript or in online supplements. In addition, modification of the materials for new populations or in other settings should be feasible.

Review Criteria

Where appropriate, special criteria for different types of papers are included.

1. **Question, Hypothesis, or Purpose:** The research question or hypothesis being tested or the purpose of the new theory, curriculum, or instructional approach is clearly explained.
2. **Context:** The study is placed in context with prior published work emanating from geosciences, STEM, education, cognition or other relevant communities. This includes description of existing theories, empirical studies of importance to the work, or existing curriculum or instructional approaches. Links have been established between this work and existing principles or theories of research, curriculum development or instructional design.
3. **Study Population and Setting:** The study or target population and the research or instructional setting are described completely. This includes appropriate attention to individual demographic variables such as age, gender, or ethnicity, as well as setting characteristics such as population size or type of setting (e.g., research university, museum).
4. **Methods:** Clear explanation and justification of all methods are included.

   a. Research-Empirical: The methods used to collect and analyze data are clearly explained and justified.

   b. Research-Theoretical: The methods used to develop a new theory, apply an existing theory from a different domain, or generate models are clearly explained and justified.

   c. Curriculum & Instruction: The materials needed to implement the curriculum or instructional approach, and the strategy for implementation, are clearly described and justified. Who, what, where, when, how?

   NOTE: The **Results** and **Validity, Reliability &Trustworthiness** sections may overlap for some manuscripts.

5. **Validity, Reliability & Trustworthiness:**
   In the context of research, validity refers to the "approximate truth of propositions, inferences, or conclusions" (Trochim, 2000). Reliability is the extent to which work can be reproduced consistently. Validity and reliability in some qualitative research can be addressed by the general concept of trustworthiness. Trustworthiness considers the extent to which research findings are worth notice and consideration. For example, Lincoln and Guba (1985) suggest that reflection about credibility, transferability, dependability, and confirmability can establish the trustworthiness of a study. For curriculum and instruction, we can also think about why we believe a specific curriculum or approach is effective, as well as conditions under which that effectiveness may or may not be reproduced.

   a. Research-Empirical: Validity, reliability and/or trustworthiness measures for empirical studies, whether qualitative, quantitative, or mixed, have been clearly discussed.

   b. Research-Theoretical: A rationale for the theoretical work is provided, as well as discussion of potential empirical tests. If behavioral models are presented, validity and

reliability of these models is clearly discussed.

c. Curriculum & Instruction: A description of how the authors' experiences support (or reject) the effectiveness of the described tool for the target population and setting is included. This should be accompanied by evidence of effectiveness (such as examples of student work). For example, see chapter 8 of Wiggins and McTighe (2005) for a discussion related to evidence of validity in instructional design.

6. **Results:**

   a. Research-Empirical: Findings and analytical tests (whether statistical or qualitative) are described and applied correctly.

   b. Research-Theoretical: The theory, as well as the conditions under which it can be applied, is explained.

   c. Curriculum & Instruction: Suggestions for implementation, along with description of limitations and potential pitfalls for implementers and students, are included.

7. **Implications:** The implications of this work for the study or target population and other potentially impacted populations are described. Suggestions for additional work that could prove or refute study conclusions are discussed.
8. **Figures, Tables, Supplements:** Appropriate and necessary figures, tables, and supplements for online distribution are included. This includes all materials that are needed to reproduce the described research, curriculum, or instructional approach. We expect to be able to support online materials including Word documents, PowerPoint files, video files, and databases of quantitative data or exemplar qualitative data.

Review Categories

JGE has added a fifth review category that allows for re-review of manuscripts that require significant revision. The complete set of review categories are:

A. Accept

B. Accept with Minor Revisions

C. Accept with Major Revisions

D. Accept with Major Revisions, Re-Review Required

E. Reject

Recommended Reading

A few resources that we have found useful are described below. Web links are provided for those resources that are available for free online.

Bransford, J.D., Brown, A.L., and Cocking, R.R., editors, 2000, How People Learn: Brain, Mind, Experience, and School: Exapanded Edition. Committee on Developments in the Science of Learning and Committee on Learning Research and Educational Practice, Commission on Behavioral and Social Sciences and Education, National Research Council. Washington, D.C.: National Academy Press. http://www.nap.edu/catalog.php?record_id=9853#toc

This book provides a review of work on learning and cognition, its application to education, and ways in which we can discover if and what students are learning. Relevant implications for instructional design are also discussed.

Lincoln, Y.S., and Guba, E.G., 1985, Naturalistic Inquiry. New York: Sage. One of the most cited texts on research theory, design, and practical applications.

McGriff, S.J., 2005 (last updated), Instructional Systems Design Knowledgebase: http://www.sjsu.edu/depts/it/mcgriff/

This site provides a guided tour through the theories and principles of instructional design, including links between research and development.

Pellegrino, J., Chudowsky, N., and Glaser, R. (eds.), 2001, Knowing What Students Know: The Science and Design of Educational Assessment. Washington DC: National Academy Press. http://www.nap.edu/openbook.php?isbn=0309072727

This book takes a cognitive perspective on understanding learning. Theories, guiding principles, and case studies provide an excellent introduction to the science of cognition and its application to learning research.

The Science Education Resource Center (SERC): http://serc.carleton.edu/serc/

SERC is a clearinghouse of diverse materials for science education pedagogy and research.

Sternberg, R.J., and Ben-Zeev, T., 2001, Complex cognition: the psychology of human thought. New York, NY: Oxford University Press.

This text provides an exceptional overview of cognitive science, its history, and its application in a variety of domains. Highly recommended!

Trochim, W. (2000). The Research Methods Knowledge Base, 2nd Edition. Cincinnati, OH: Atomic Dog Publishing. http://www.socialresearchmethods.net/kb/

This text provides excellent guidance through research theory, research design, methodology considerations, and analytical techniques.

Wiggins, G., and McTighe, J., 2005, Understanding by Design, Expanded 2nd Edition. Alexandria, VA: Association for Supervision and Curriculum Development (ASCD).

This text provides insight into development of educational materials and environments that can encourage learning, and presents detailed steps for backward design