

## Meeting contemporary statistical needs of instructional communication research: modeling teaching and learning as a conditional process

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suggest ideas on how the field's quality of research might become more robust; others focused on topics they felt warranted greater attention than they have received to date. As you read this forum, be mindful of the fact that a case can be made for many other topics and approaches as well. Just some of the excellent essays we lacked room to print made a case for greater attention to more interdisciplinary research, teaching critical thinking, grounding work in broader range of intellectual traditions, linking instructional research to student retention, enhanced focus on global learning outcomes, and more attention to K-12 education. And those are just some.

As in previous forums, we took the first step from monologue to dialogue by inviting several scholars to reflect on those initial essays. For a topic that reflects broadly on the field, we wanted scholars who have engaged instructional communication scholarship at the broadest and deepest level—as editor of *Communication Education*. Thus, we invited the previous editor, Paul Witt, and the incoming editor, Deanna Dannels, to offer their reflections on the collection of essays. In different ways, both of them challenge our scholars, and we encourage you to take their challenges seriously.

Which of these points is most compelling for your scholarship? What was left out that should have been part of this conversation? Where would you respectfully disagree with the writers? We hope this forum stimulates your thinking and impacts your research over the next five years. And as always, we encourage you to develop this dialogue further through conversations in the office, class, conference papers and presentations, and original research projects of your own.

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### STIMULUS ESSAYS



## Meeting contemporary statistical needs of instructional communication research: modeling teaching and learning as a conditional process

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For decades, instructional communication scholars have relied predominantly on cross-sectional survey methods to generate empirical associations between effective teaching and student learning. These studies typically correlate students' perceptions of their instructor's teaching behaviors with subjective self-report assessments of their own cognitive learning.

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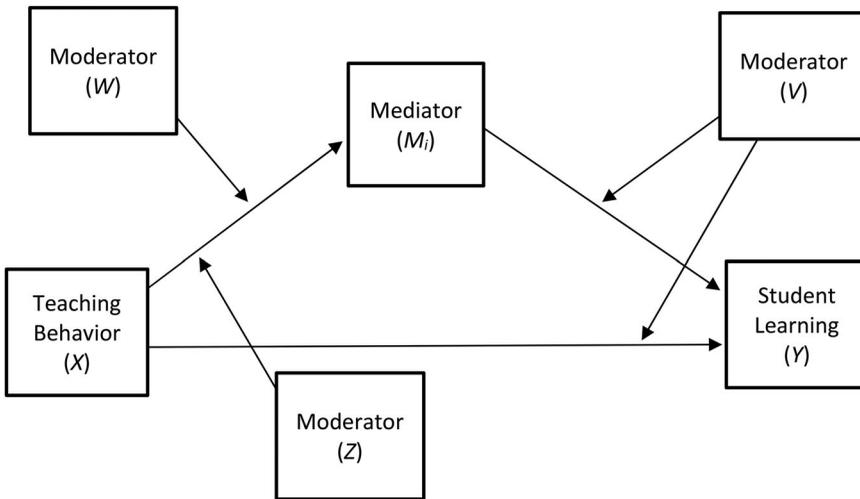
Unfortunately, these self-report perceptual studies are limited by design, providing little insight into how various teaching behaviors foster authentic student learning (Lane, 2017). Methodologically speaking, instructional scholars attuned to this criticism have favored experimental designs over surveys in order to manipulate teaching behaviors (live lecture, video, or written instruction) and measure causal increases in authentic learning outcomes (short-/long-term recall from tests, comprehension and transfer, notetaking, psychomotor performance). Statistically speaking, even quality teaching experiments that demonstrate causal gains in student learning often are analyzed with bivariate statistical analyses. This is surprising because learning is a process, and instructional scholars cannot model the complexity of the learning process by computing bivariate analyses alone. Fortunately, a well-designed teaching–learning experiment can be strengthened with advances in statistical modeling that allow researchers to analyze student learning as a process.

Learning is always the result of some process at work in the mind of the student learner; there is no direct absorption or transfer of knowledge taught by a teacher. Instead, there are mechanisms through which effective teaching helps students learn, and these indirect mechanisms are *mediators* between teaching and learning. Mediation answers the question of “how” or “the mechanism through which” effective teaching increases students’ learning (Hayes, 2013). Teaching may foster learning through its indirect effects on sustained attention, intrinsic motivation, emotions, and cognitive processes such as elaboration, among other mediators of learning.

Moreover, the propensity for students to learn is not infinite; there are boundary conditions for associations between teaching and learning. These boundary conditions are captured by *moderators* of learning. Moderation refers to how the association between teaching and learning depends on a third variable, in terms of sign or magnitude (Hayes, 2013). Not all students learn the same way or at the same proficiency, so effective teaching yields systematically different learning effects for different types of students. Students in the same course will have unique learning experiences that depend on their self-regulatory learning strategies, academic self-efficacy, intelligence, personality, and psychosocial contextual influences such as academic stress and support, among other moderators of learning.

Mediation and moderation can be combined (moderated mediation) in order to model conditional indirect effects that explain how learning results from teaching (see Figure 1). This is known as *conditional process analysis*, which “is used when one’s research goal is to determine the conditional nature of the mechanism or mechanisms by which a variable transmits its effect on another and testing hypotheses about such contingent effects” (Hayes, 2013, p. 10). Conditional process analysis has much potential for future instructional communication research because it can be used to model indirect causal processes that explain learning for some students and not other students, among many other possibilities. A recent example of conditional process analysis is by Bolkan, Goodboy, and Myers (2016), who revealed that high-clarity/low-immediacy lecturing increased students’ test scores indirectly by sustaining students’ attention (mediation), but only for students who were low in effort regulation (moderation).

Undoubtedly, learning is a process, and it should be researched as such. Therefore, one of the greatest reforms for instructional communication research over the next five years would be to encourage researchers to design teaching–learning experiments and adopt recent advances in linear modeling (see Darlington & Hayes, 2017; Hayes, 2013) to test hypotheses featuring mediation, moderation, and conditional process analysis to better



**Figure 1.** Conceptual diagram featuring conditional process analysis.

Note: This is model 30 in Hayes's (2013) PROCESS macro. More than one mediator can be included to operate in parallel.

understand the mechanisms through which learning occurs and the boundary conditions under which learning opportunities are optimized. By doing so, scholars will study authentic learning as the causal process that it is and identify with greater precision how and when teaching does (or does not) foster authentic student learning.

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## Mixing methods in instructional research

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*Communication Education's* commitment to publishing rigorous instructional communication research with a diversity of methods is clear in its publication of quantitative,

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