Letter from the editor:

Dear Dr. Roth:

We have received two reviews of your manuscript (Number 199163), "Toward an Epistemology of Teaching as Practice." Both reviewers raise what I regard as fundamental concerns with the manuscript, though they make different recommendations about publication. Reviewer 1 recommended against publishing the manuscript, while Reviewer 2 recommended that the manuscript be accepted for publication with revisions. Based on the reviews and my own close reading of the manuscript, I have decided not to accept the manuscript for publication in the Journal of Research in Science Teaching.

I see the manuscript as making three main points. I find myself in fundamental agreement with each of these points, but in each case it appears to me, and to one or both of the reviewers, that what this manuscript has to offer is new rhetoric without fundamentally new insights into very complex and important issues. I will offer a brief discussion of each of the main points below.

What I take to be your first main point concerns the difficulties of teaching science in urban schools. In my terms, schools like Opportunity are beset by a host of social, cultural, and economic problems that prevent most teachers from teaching successfully and most students from learning science with understanding. Our current reform recommendations, which are based mostly on successful practice in resource-rich settings, utterly fail to address these problems of urban schools. Like you, I find it very troubling that we are embarked on a reform program that sweeps these problems under the carpet rather than addressing them in meaningful ways. My difficulty here is that what you have to say about these issues does not seem particularly new or significant. The problems are abundantly documented in both the research and the popular literature. Personally, I felt that the description of the students' reactions to Ken's attempt at "street science" and their consequent visit to his methods class was the most promising part of the manuscript. It seems to me that Ken is working on a useful and provocative hypothesis that I would love to see developed with supporting data. However, I do not feel you have made a case that your ideas about praxeology or about coteaching contribute much to solutions.

I take your second main point to be about the importance of praxeology as a theoretical perspective and the theoretical power of the concepts of mitsein and habitus. Here again, I find myself in fundamental agreement with the point that successful teaching requires the development of locally situated craft knowledge, and that this knowledge must be developed in part through participation in and analysis of practice. However, like Reviewer 1, I am not convinced that the rhetoric of praxeology, habitus, and mitsein offers much in the way of analytical power that is not available through theoretical frameworks that are more familiar to the readers of JRST, such as Dewey's ideas about experience in education, Lave and Wenger's ideas about legitimate peripheral participation, or Vygotsky's and Baktin's ideas about appropriation of tools and discourse. Principles of parsimony militate against offering new theories or concepts unless they add significantly to the analytical power of those already widely understood within the science education community.
I take your third main point to be about the power of coteaching as a strategy for teacher education. Again, I am in fundamental agreement with your contention that coteaching is more effective than more traditional models of teacher education. Like both reviewers, though, I feel that you have not addressed the fundamental practical difficulties with implementing coteaching on a significant scale. I have spent the last seven years in a leadership position in a teacher education program that seeks to use coteaching as a basic aspect of the experience of all interns (about 500 per year). Our experience has been that successful coteaching requires substantial dedication and flexibility on the part of both interns and mentors, as well as resource-rich support systems that are often absent in urban schools. As Reviewer 2 suggests, Mr. Spiegel's approaches to coteaching are reasonable though unproductive responses to his circumstances; your manuscript does not suggest how teacher education programs can help mentor teachers to transcend the limitations of their backgrounds and circumstances. The suggestion that university faculty and staff should engage in coteaching with teacher candidates is simply not feasible economically.

I am also concerned about the connections that you seek to make among your main points. The problems of urban schools are very deep and complex. You make a convincing case that the current reform effort is inadequate to address those problems, but praxeology and coteaching also merely scratch the surface of those problems. I also have some concerns (though less serious) about the connections you suggest between praxeology as a theoretical framework and coteaching as a strategy for teacher education. At times you come dangerously close to the kind of logical fallacy that I associate with "constructivist teaching." The fact that students must construct their own knowledge does not logically imply that they never benefit from being told things. Similarly, the fact that prospective teachers must develop their own habitus does not logically imply that coteaching is the only method through which a productive habitus can be constructed.

In summary, I agree with the main points that I think you make in this manuscript, and I feel that they need to be better understood within the science education community. However, I do not feel that either the development of the individual points or the connections you make among them will be enlightening to most readers of JRST. I hope that you will continue to investigate these issues, and I hope that your investigations will lead to future contributions that are better supported by evidence and more attuned to the readers of JRST. However, I do not feel that this manuscript is appropriate for publication in JRST.

I hope that you find our reviewers' comments and this letter helpful as you continue your work. We would prefer not to reconsider this manuscript in the future, so you under no obligation to JRST and should feel free to submit the manuscript elsewhere. For your information, we have also enclosed a set of guidelines that inform our decisions about manuscripts to publish in JRST.

Sincerely,

Comments from Reviewer number 1:

1. The relative lack of impact that educational research has had on classroom practice and
educational policy is often attributed to the lack of relevance of our research to the lives of classroom teachers and/or how we "package" our findings and recommendations. Overall, this manuscript/research report has little more to add than a reiteration of the importance of context in learning to teach, supervision of teaching, the assessment of teaching, and research on teaching. For quite some time both teachers and researchers have understood that there exists no single set of skills and approaches that apply generically across teaching situations. Unfortunately, these authors have reiterated this point, but have chosen to "package" it rather awkwardly in a theoretical framework that will have little meaning to teacher educators and teachers, let alone those researchers who value practicality. The introduction of new terminology/jargon is not inherently negative if it adds new insight and meaning to phenomena of concern. However, the introduction of constructs such as *habitus* and *Mitsein* do little more than obscure some rather intuitive notions that have been recognized more directly by both teachers and researchers. This manuscript, unfortunately, is an exemplar of what is wrong with the direction educational research has taken with regard to the improvement of teaching.

2. On page #3, the authors mention that we should "endeavor to understand why some teachers believe that methods courses and teacher education programs lack relevance." It appears that the authors have focused primarily on the content of methods courses, programs, and supervision approaches (here and in the remainder of the paper) and have failed to recognize, or give proper attention to, the importance of the qualifications and expertise of the teacher educator. In particular, do the authors not recognize that a significant contributor to the problem of irrelevant courses and failure to recognize context can be traced back to teacher educators who have not taught in public schools for a significant amount of time, if at all? Although "coteaching" may have its value, no experienced professional teacher would ever forget the importance of context when providing suggestions to a beginning teacher or evaluating the performance of a peer.

3. On page #5, the authors refer to the development of resourcefulness in response to a lack of resources as a constraint to teaching. It is not at all clear why becoming resourceful is a constraint to teaching. It would appear that development of resourcefulness is a way to overcome a constraint.

4. The authors do a good job of stressing the dynamic and fluid nature of teaching. Any in-depth understanding of teaching needs to take such matters into account.

5. The description of the teaching vignette on page #7 is a bit disturbing. Spiegel interrupted Cam's teaching and may have usurped his position as a credible teacher in front of the students. One of the most important obstacles preservice teachers need to overcome as soon as possible is having the students continue to view the mentor/supervising teacher as the authority figure. In short, the students must view the student teacher as the teacher. A mentor or supervising teacher that intercedes in an obtrusive way serves to inhibit this process in many cases. The authors, however, seem to think that Spiegel's interruption of Cam's lesson is fine.

6. On page #8, the authors take the position that the supervising teacher must "teach alongside" the prospective teacher or context will missed. Does the supervisor really need to do this? Hasn't the experienced mentor teacher experienced teaching the same students in the
situation encountered by the student teacher? Does the supervision have to be teaching these students at the same time? In short, the authors are really speaking about the importance of context, but they have not made a compelling argument that a supervisor is unaware of context unless he/she is teaching the same students at the same time as the student teacher.

7. The authors use the "co-teaching" model for the improvement of teaching as also being consistent with what occurs in other professions (e.g., pilots, graduate students in science, banking employees). However, this model may not be true for all professions, as implied by the authors. Is this how lawyers develop their skills? What about engineers? What about doctors? It is not always the case that professionals lean their craft by "working elbow to elbow" with peers.

8. The authors have consistently taken the position in the manuscript, by referring to the present investigation as well as others, that co-teaching is an effective approach to develop instructional expertise. However, little evidence is presented to support this claim. All the authors have done is provide situations/conversations and described how these instances could possibly help both the experienced and prospective teacher. There is never any evidence provided that the teacher in question has actually benefited from co-teaching, as illustrated in changed instructional behaviors.

9. The introduction of *habitus* and the rest of the theoretical framework presented in the section on praxis and praxeology is of little value. This is unnecessary jargon and theory that simply obscures a rather intuitive and well-recognized point. We all know that classes, students, and teaching situations are all different. These are the very phenomena that make teaching so enjoyable or so dreaded. That is, some teachers welcome the challenge and find it invigorating, while others can't cope with the uncertainty. The point is that we have known for a long time that what works in one situation with one group of students may not work with another group of students. Just ask any teacher to compare how his/her lesson progressed in third hour versus fifth hour. Do we really need *habitus* to provide any insight? Does the introduction of the framework provided by the authors add any knowledge about the act of teaching?

10. On page #12, the authors state that, "even though it is highly desirable for teachers to plan thoroughly for enacting a curriculum in classes like those in which Cam is teaching it must be remembered that the most appropriate course of events will unfold in the enactment and cannot be pre-specified." Do the authors see little or no value in planning? Do the authors recognize the value of being able to edit a plan during instruction instead of having to create a totally new plan on the spot?

11. On page #12, the authors speak about the problem a supervisor would have sitting on the side of the room and specifying "a correct course of action" for the practicing teacher to adopt. The authors opt for co-participation, but what about the supervisor who simply offers a variety of things to consider and possible options? Isn't this more in line with currently advocated supervision practices? Again, if the supervisor is experienced and reasonable, the problem of context emphasized by the authors does not necessitate co-teaching.
12. Although the conversational approach between the authors is atypical of current research manuscripts, and at times interesting, it generally comes off as "preachy" and overly analytical. At other times the approach is rather pretentious and it tends to transform rather intuitive notions into what are apparently perceived as profound insights. The reader must struggle to avoid mental images of one teacher lying on a couch while the other plays clinical psychologist.

13. At times, the reader wonders whether the descriptions of classroom practice and follow-up discussions are real or hypothetical. If these are actual teaching situations there needs to be some documentation of the claims being made about student understanding and behaviors. For example, on page #20, Ken speaks of the "significant transformations" made by his students. What data is this claim based upon? There is no description of how self-analysis was completed by the teachers in question. How did they systematically analyze the data about themselves to arrive at the conclusions reached? Overall, it is not at all clear how the narratives were constructed.

14. It is not clear if the individuals reading the teaching narratives ever visited the classrooms in question. If not, how can these individuals comment accurately about classroom dynamics? Have the authors committed the same error that they have criticized in others through their analytical approach? How can the authors comment about each other's teaching unless they were coteaching?

15. On page #22, and elsewhere, the authors swing to far in the direction of "the best way to learn about teaching is to teach." Certainly, experience is indispensable, but when teachers learn simply through experience many bad habits are learned. The research literature on what occurs when teachers simply learn "on the job" is quite clear.

16. On page #23, the authors discuss the problems in Ken's chemistry class. The discussion is fraught with jargon and tends to be overly reductionistic. The result is similar to itemizing every aspect of driving a car. The process, although complex, is made to seem far more complex and unmanageable. The description of what went wrong in Ken's class is not useful for the improvement of instruction. It has made the rather common problem of students being disinterested in a teacher's particular approach to subject matter into an overly complex set of interactions among psychological constructs. Not sure much of this would resonate within the best teachers.

17. The final sentence in the first paragraph on page #23 is disturbing. This sentence addresses the role of education in changing the position of underrepresented individuals in mainstream America. Is either position acceptable? Isn't the latter just a little presumptuous?

18. In the last sentence of Ken's statement on page #24, he bemoans the lack of narratives of how to enact curricula with learners like the ones he confronted. It is not at all clear how these narratives, which illustrate "how to enact curricula" would be any better than the advice of methods instructors, previously criticized in the manuscript.

19. On page #25, Michael makes a comment that typifies the problem with this manuscript. He states to Ken, "the very institutional structures undermine what you consider "good practice
"The statement is made as if it is a profound revelation or new insight about teachers' workplaces. It is not. The manuscript, unfortunately, is fraught with such comments.

20. The reader is compelled to consider NARST's mission to improve science teaching through research and the communication of research when reading this manuscript. It is doubtful that the way in which teaching is described would resonate with any recognized expert teacher. Would these individuals describe what they do in the terms presented in the manuscript? What does it mean that the description of teaching presented by the authors would be unrecognizable to the most well-respected in the science teaching profession?

21. Again, it appears that the authors' main points are the importance of reflection on practice and the context of instructional instances. These have been well-recognized for quite some time. The authors' advocacy for coteaching as a mechanism to solve the identified problems related to teacher development needs much stronger supportive evidence.

22. It remains unclear (following page #30) why coteaching is necessary if context of teaching is to be considered. Doesn't the mentor teacher at the school site have the necessary experience with the same students and situation confronting the student teacher? Does the mentor teacher really need to be coteaching with the student teacher to offer context-specific advice?

23. There is also a significant and disturbing issue raised by the panacea of coteaching. Just because a supervisor finds it difficult to work with a particular group of students, it does not mean the students are a difficult group. Perhaps the supervisor is not a good teacher. If the supervisor's difficulty is used to temper feedback to the student teacher we may find ourselves in the position of assessing prospective and experienced teachers on a curve that uses the supervisor as the reference point. Is this consistent with competency-base teacher education?

24. The "solution" to the chemistry episode on page #31 may be a bit misguided. It seems that the students' initial problem was with the composition of the bubbles and not the relative proportions of hydrogen and oxygen.

25. The discussion about instruction on page #33 gives a good appearance, but is there any evidence that the students actually learned what was intended? Again, the manuscript thoroughly discusses the possible benefits of coteaching discussions, but provides virtually no empirical data in support.

26. The example of Michael and Nadely's coteaching experience is of little use since Nadely "did not have a science background." Naturally, any help she could receive in the area of subject matter would be welcomed. How she could provide any assistance to Michael regarding the teaching of science is a mystery. Ken's seems overly impressed by Michael's emphasis on asking students for explanations of their responses. This is not as rare in teaching as the authors may think. True, many teachers need to request explanations from students more often, but does this constitute any additional insight to what one can already find throughout the literature?

27. The authors should carefully consider their discussion about Nadely and her teaching
with respect to the research on PCK and teachers with little subject matter knowledge. What does that research say about Nadely's ability to teach science just because she has seemingly learned some new questioning strategies?

28. Michael's description of how he helped Loretta's students understand the importance of collecting sufficient data is problematic. First, it is not at all difficult for students in grade 7 to realize that more data is better than less data. This is an idea that most elementary students can grasp rather quickly. More importantly, the students spoke of how bugs "liked" intermediate temperatures and "didn't like" the cold. Such comments were left disturbingly unchallenged by Michael. What was learned in this lesson?

29. The end of the first paragraph of *Conversation* on page #40 is another example of how a rather intuitive and well-recognized aspect of teaching is stated awkwardly and couched in unnecessary terminology. The main idea is simply that reflecting on practice can lead to deliberate teaching actions in the future or teaching actions can be performed automatically almost as a reflex or habit. Interestingly, Michael exalts the power of *habitus* in the following paragraph by stating that it can result in situated actions without the teacher having to take the time to reflect. The "powerful" concept is something every teacher and researcher already knows; some teaching actions are the result of reflection and others are the result of reflex or habit. Indeed, haven't we already known for a long time that the problem with the teacher who "runs on automatic pilot" is that he/she is not responding to the particular students and situation at hand and this often results in instruction that fails. The concept of *habitus* does not appear to have provided any new insights.

30. Ken comments, on page #41, about potential changes in Loretta's teaching as a result of her coteaching experience with Michael. However, the reader is provided with no evidence of any changes in Loretta's subsequent questioning style and/or teaching approach. The value of coteaching must be based on presentation of empirical data and not on what appears to be possible at an intuitive level.

31. Michael's comment about the value (or lack of value) of structure at the top of page #42 is interesting. It is not at all clear why a supposedly expert and experienced teacher would think "structure is bad."

32. Toward the bottom of page #42 Michael speaks about the collaborative relationship he has experienced with teachers in coteaching situations. One wonders how collaborative his situation was with Loretta, given that she referred to him as Dr. Roth in front of the students. Were Loretta and Michael really on equal footing in terms of whose advice about teaching and subject matter were considered?

33. At the end of the paragraph preceding the *Implications* (page #43) section, the authors claim that their recommendations are based on practice rather than the "traditional route that led from theory to practice." Indeed, the contrary is the case. The recommendations and the framework for the investigations are heavily derived from theory, at times a theory that was a forced-fit to teaching. Little new insight is provided about teaching, the manuscript simply describes the familiar in unfamiliar terms.
34. In the Implications section, the authors extol the values of learning by doing. However, it is not clear that anyone has recently claimed otherwise. The authors claim to have based their implications on the results of the current study, but one is left wondering whether what was reported was a study at all. Virtually no data is supported for the claims that have been made.

35. The authors spend much time discussing the virtues of an "insider's" view for the education of prospective teachers. Interestingly though, what has been presented as an "insider's" view in the manuscript will not at all ring true to practicing or beginning teachers.

In the section on Assessment the authors discuss how Cam or Ken would have been viewed as unsuccessful if evaluated with a "traditional teacher performance checklist." The authors claim that these instruments do not consider the context of Ken's teaching and, therefore, misrepresent how well he may have taught. With all due respect, Ken's described performance was anything but successful regardless of the assessment approach. Using Ken's performance as a reference point to gauge the success of other teachers

**Comments from Reviewer number 2 :**

1. While the article addresses an important topic in a novel and insightful manner, it is open to question whether the praxis proposed is a mere calibration of existing practice or - as the authors seem to suggest - a major rethinking of the epistemology of teaching.
2. The authors situate 'coteaching' within a theoretical framework which they adequately describe in the opening section. I think the organization of the paper will be enhanced if an extensive definition of 'coteaching' is also included in the opening section. This definition can include answers to the following questions:
   a. What are the essential features of 'coteaching'?
   b. Which particular features of 'coteaching' are highlighted or exemplified in the various vignettes?
   c. How is 'coteaching' different from existing practice?

Having answers to these questions at the outset would help the reader navigate his/her way more easily through the long article. To my mind 'coteaching' is not adequately problematized. The authors need to address the following questions:

   a. Are there potential disadvantages to 'coteaching'?
   b. Can a state of involved 'mitsein' potentially induce a tunnel vision which may need to be tempered by a view from the outside? c Is 'coteaching' better suited for the attainment of certain types of knowledge about teaching than others?

The authors leaves the impression that knowledge of teaching is only about classroom techniques around management and content issues. Coteaching is certainly a potent vehicle for fostering this kind of knowledge. But there are other aspects of the epistemology of teaching. To be persuaded that all students can learn and are entitled to learn is a 'belief' aspect of teaching knowledge that comes from prior reflection and may not readily emerge once one is in 'the trenches' in a coteaching mode.
3. The 'Bad Day' vignette does not seem to make the case for 'coteaching'. Mr. Spiegel's counterproductive interference in Mr. Riley's class was his (Spiegel's) way of coteaching consistent with his habitus. No amount of coteaching by Mr. Spiegel will result in the needed changes to his practice. What Spiegel needs to do is to reflect on the cultural and political aspects of teaching and this may be done better in a declarative context aimed at examining and fostering particular worldviews.

4. The episode on 'street science' (p.26) also fails to make a compelling case for coteaching. Once again Spiegel's attempt at coteaching (informed by an unexamined worldview) is no help at all. The reason why the lesson was not succeeding was because students were not asked for their input as to what would constitute relevant and engaging science for them. The solution to the problem here lay in better communication with students and the contribution from 'coteaching' was minimal in this specific instance and there are no indications that 'coteaching' is particularly suited for providing the required solution even under the best of circumstances.

5. The vignette (Two Veterans Coteach) p.37 is a persuasive argument for coteaching as conceptualized by the authors. The issue here is content and it illustrates that coteaching is particularly effective in this context.

7. My overall recommendation is that the article be accepted for publication after the authors make the changes suggested in the review or persuade the editor that these changes are not needed. The vignette descriptions can also be shortened without losing much.

6. Some Minor editorial points:

p.5: par. 4: I recommend removing the category 'all African American' from the list of problematic categories ('low achievement', and 'from conditions of poverty') The sentence as it stands implies that being African American is a problematic category per se together with the others. I have no doubt that it is not the intention of the authors to communicate that categorization. Suggested change: '..Mr. Spiegel who is struggling to find ways to teach African American students who are also poor and have histories of poor academic attainment'.

p.12. line 7: I suggest changing 'events' to 'action'. p.12. penultimate line: (change eith to 'either'.

p.26 line 2: student dimension to 'student view'.

p.26 line 12: boarder to 'border'.

p.27 line 5: ' change 'deal them' to 'deal with them'.

p.33: last sentence before 'Conversation' unclear.