



7-1-2000

Revoicing Reflections

Ward Pycock
digitalpublishing@library.wisc.edu

Follow this and additional works at: <http://newprairiepress.org/networks>



Part of the [Teacher Education and Professional Development Commons](#)

Recommended Citation

Pycock, Ward (2000) "Revoicing Reflections," *Networks: An Online Journal for Teacher Research*: Vol. 3: Iss. 2. <https://dx.doi.org/10.4148/2470-6353.1223>

This Full Article is brought to you for free and open access by New Prairie Press. It has been accepted for inclusion in *Networks: An Online Journal for Teacher Research* by an authorized administrator of New Prairie Press. For more information, please contact cads@k-state.edu.

Revoicing Reflections

by Ward Pycock

Ward Pycock is Principal of Blue River Elementary School, School District No. 73, Kamloops/Thompson, BC, Canada. Correspondence concerning this article should be addressed to Ward Pycock, Box 192 Blue River, B.C. Canada V0E 1J0

Serendipitously, I stumbled onto revoicing in an article written by O'Connor and Michaels (1996). I often use a speech sequence called the initiate-respond-evaluate (IRE) pattern without being aware of doing it. Many teachers will recognize it -- you pose a question, nominate a student to respond and when they give you the answer you say "What an excellent answer." I've come to realize, through reflection, the restrictions of this speech sequence. In spite of the fact I might even have had a hot topic in class enthusiastically generated by students, I knew that classroom discourse failed to flourish at times. I saw potential in this talking technique called revoicing that might lead the class along the trail of meaningful and thoughtful discussion. It offered a possible alternative to the IRE pattern in classroom discourse.

First, I had to understand the implications of the IRE talking pattern before I could understand the implications of revoicing. The IRE pattern "is not a structure in which teachers can be sensitive to student-directed work and inquiry" (Pappas, Kiefer, & Levstik, 1999, p. 43). The limitations of this particular pattern of discourse are mentioned in O'Connor and Michaels (1996), who wrote that it is "the hallmark of teacher-led classroom discourse" (p. 95). Cynthia Onore (1990) alluded to its limitations when she commented that, "all of the teacher's questions and her automatic evaluations of each student's response communicated that there was one right answer to every question" (p. 58). No matter who used the IRE pattern, the outcome remained the same: "the sequence is such that all participants know that [their] answer is an attempt to hit a target -- the answer the teacher is waiting for" (O'Connor & Michaels, p. 95).

O'Connor and Michaels (1996) examined what set some teachers aside as exemplary. They identified two key constructs: a "participatory framework" and a speech technique called "revoicing." Their first term, the participatory framework, referred to an utterance which "is distinct from that of speech activity" (p. 70) and it set up "the creation of roles and relationships in talk directed from one speaker to another and in talk by one speaker about another" (p. 68). In other words, it refers to a discourse pattern in which turns and power relationships are shared more equitably than in traditional teacher-led classroom talk.

The authors described the second key construct, revoicing, throughout the chapter. It turned out to be a multi-dimensional idea. According to O'Connor and Michaels (1996), revoicing meant "a particular kind of reuttering (oral or written) of a student's contribution -- by another participant in the discussion" (p. 71). The researchers stated three specific purposes for using the revoicing technique. First, it could be in the form of a "reformulation," which might be a "clarification of content," or "new terminology for familiar ideas," or it might be simply a "rebroadcast" because no one heard the originating student's utterance (p. 75). Second, the reutterance could be used for "laminating" the "teacher's phrasing, register, and information onto the student's contribution" (p.

80). Last, the utterance could create an opening, or a "concomitant slot" allowing students an entry point into the discourse (p. 93). I felt this to be an important aspect of revoicing. This allowed for more student participation in any ongoing discourse. I felt this to be an important enough reason for me to alter and improve my own classroom discourse practice and that spurred me on to try revoicing.

Data Collection

I chose a small group, rather than using the entire class for the discussion I planned, in order to keep this project manageable. The sample for this project became six students. This was a "naturalistic study" rather than a quasi-experiment (Smith & Glass, 1987, p. 253), so I had no control group to compare my data and results against. I asked for volunteers and out of twenty-five students, fourteen volunteered. I separated the fourteen names into a pile of boys names and girls' names and had someone draw three names from each gender group. I put the leftover names together and drew out one last name to be my camera operator. Of the seven, one dropped out because he wasn't allowed to participate in the project. In the end, I had a group of five students with whom I interacted, while the sixth member video taped the session. Three grade six students and three grade sevens formed the group. Four girls participated along with two boys. Three participants were eleven year-olds, two were twelve, and one was thirteen.

At the time, I happened to be running an integrated social studies/language arts/fine arts unit on ancient Egypt and the history of the Hebrew-Jewish people, integrated with Easter and Passover traditions, combined with the movie *The Ten Commandments*, based on British Columbia's grade seven social studies curriculum. I started the unit by posing the question, why was Easter weekend so special that we get a four day weekend from it? Why do we recognize it in Canada? The initial answers were vague and sketchy. The students had no real understanding of why Easter is celebrated, or why the actual date of Easter changes every year, let alone where the holiday traditions came from. One boy summed it up when he said, "My sister was born on Easter. But since then, Easter jumps around and her birthday has never been on Easter Day again." I asked the students, at that time, to fill out a "KWL chart" (Bellanca, & Fogarty, 1990, p. 107; Pappas, et al., 1999, p. 274), which means, "what we know," "what we want to find out," and "what we learned and still need to learn." I used the chart to see if they could generate any questions of their own and provided some time for them to work at that task. Next, I asked if anyone "cared to share" their ideas and ask their questions. About half the class aired their concerns.

I tried to remain consistent with the guidelines for naturalistic studies, as outlined in Smith and Glass (1987). They stated: "naturalistic researchers do not intervene in the existing flow of events, but study them as they are, as they exist in nature, in a sense" (p. 253). I took the stance of participant observer (p. 254). To help bolster the reliability of the project, I videotaped a twenty-minute lesson because, as Smith and Glass pointed out there was a "value of having a permanent record of behavior on tape for reliability checks" (p. 264). They added that a permanent record captures "the stream of ordinary behaviour that would have existed if the researcher had not been in the room" (p. 264). I still would have been there, but in my role as teacher, not as teacher-researcher. I am keen to become involved in teacher action research because "the theory behind this approach is that when teachers elect to develop the habits of

mind and the disciplines of inquiry that result from repeated experiences with the action research process, they not only become more effective practitioners, but also more fulfilled educators" (Sagor, 1997, p. 172).

Analysis

Having a videotape of the session helped my analysis too. I had time to watch the session as well as listen to it. The video camera didn't record every single utterance of the student's speech, as they spoke softly a couple of times. I transcribed the whole discussion section, and, for the inaudible syllables, I used an asterisk to mark the unintelligible part in the transcript. The video camera did capture all their actions. In reviewing the tape, I saw how the transcription erased "the context along with some crucial nonverbal data" (Miles, & Huberman, 1994, p. 56). I knew the small group was on task because I could see it. I knew they were off task when our principal walked into the session because I could see them all turn to look at him and the discussion came to a halt. For the most part, it was evident that they were engaged in the discourse from both the transcription and from the raw data captured in the video clip.

Overall, I found the videotaping session challenging. Teaching is often like a juggling act and I ended up simultaneously balancing a number of different competing demands on my attention. To start with, I found implementing revoicing, a new teaching technique, challenging because I was consciously attempting to change my teaching practice while "on the go." Next, I needed to attend to the content of the discourse as the small group of students grappled with it. The topic of the moon's phases, shifting across the months, proved to be a difficult concept for the students. As well, I still needed to keep a part of my mind on the rest of the class who were not involved directly in the videotaping session. Added to that, the principal entered the classroom at one point. He needed to speak with me, so I had to deal with the interruption. Plus, I knew I was videotaping the session. I didn't want to halt the video session. I wanted to keep the revoicing project rolling, as it had taken so much work to get it organized and coordinated. These distractions interfered with my ability to hear everything the students said.

At times, I needed to focus and concentrate on the discourse of the small group to the exclusion of all else. I found it extremely challenging, for example, trying to help the students decipher the symbols of the moon's phases. The moon's phases became a complex puzzle for the students, yet they also explained why Easter's date "bounced around" the calendar from year to year, which was a central and perplexing point raised by a student that went all the way back to the beginning of this Easter unit. I felt that it was important for the students to understand the reasons why Easter's date changed each year. I felt that they could better understand the relationship between the lunar cycle and the solar cycle if I used a visual device as part of the explanation. I wanted to pursue the topic in depth because I knew of research which stated that society needs "a public capable of deciphering and criticizing nonverbal messages" (Manifold, 1995, p. 3), and that using an integrated language/subject approach "allows students to become participants in inquiry rather than passive receivers of information" (p. 4). I considered the topic of the moon to be "a real-life problem" which I could use to "challenge the students to find a solution" (Delpit, 1990, p. 262). To accomplish that, however, required me to think on my feet in order to decide how to go about it. While I thought, my ability to hear everything the students voiced was derailed. I heard them on the videotape afterwards, but I realized I didn't hear them while teaching.

Once I began to analyze the tape record itself, I focused on a few specific aspects of the discourse, such as my use of revoicing, linkage (which means students talking consecutively without my teacher talk breaking into their flow), and my use of the IRE pattern. I believed I used the revoicing technique during this lesson and I wanted to find evidence of such in the transcription. I even consciously tried to use all three of the revoicing aspects that O'Connor and Michaels (1996) said were used by teachers in their study.

As part of that, I wanted to link student's thinking together because:

Teachers in the classroom know the curriculum and the children, linking both so the children are more likely to develop schemas for understanding the world, not just as it is in their immediate experience but as it was in the past, is now elsewhere, and could be in the future. The intent is to empower children by creating a learning environment in which content, process, and intellectual excitement are connected. (Pappas, et al., 1999, p. 82)

For me, evidence of linkage would be shown in the transcript when students talked consecutively together, without my utterances interrupting. I wanted to see if students became "interlocutors," from when I uttered something until the conversational turn returned to me. (I was using the dictionary definition of the word, meaning a role taken as middlemen in a conversation). I based this idea-linkage on Schiffrin (1994): "inferences. . . about relationships across utterances, and so on, must be grounded in actual doings and sayings" (p. 409).

First, I searched the transcript for evidence to support my supposition that I used the revoicing technique. I used the technique a couple of times to "rebroadcast" because I sensed that either the student uttered something too softly for all to hear, or that he/she might have spoken when someone else spoke and that the utterance might be lost in discourse as it flowed along. Here is a transcript example of students discussing the Easter topic of rabbits:

- 1) Don: Because it's a gentle animal.
- 2) Jenny: Yeah, yeah. . .
- 3) Teacher: Okay.
- 4) Jenny: . . . it's gentle and it's got white fur.
- 5) Carolyn: Timid.
- 6) Teacher: It's got white fur and it's timid. Anything else, Larry?
- 7) Jenny: And.
- 8) Larry : No.

Carolyn uttered the word "timid" but softly in line 5. I didn't think anyone heard her. I wanted Carolyn's utterance to be included in the discourse as it contributed directly to the topic of rabbits that the students were discussing, so I revoiced it in line 6 to make sure it was a part of the discourse.

I found some evidence of my use of revoicing for 'laminating' some of my information into the discourse. When the topic of Jesus' resurrection turned up in connection to Easter, the students worked through the idea that Easter Friday and the following Monday were both holidays:

- 1) Teacher: Now, what do you know about when Jesus was executed?
- 2) Carolyn: He. . .
- 3) Larry: He. . .
- 4) Carolyn, Larry & Jenny (all spoke at once): . . . he rose from the dead.
- 5) Teacher: Okay, he rose from the dead, three days later, right?

The students knew the general story of the resurrection, but I laminated in the information of how many days it took for the resurrection to transpire by remarking "three days later." I tried to link the story to the calendar, so the students could see another connection to Easter's dates and customs. Of the three types of revoicing I attempted, I found the least amount of evidence for laminating. I think what happened was that I was more concerned with the "concomitant slot" aspect of revoicing, and in eliminating my use of the IRE, so that I did not concentrate as much on laminating.

In the data, I found examples of revoicing used for establishing "concomitant slots" where I could engage students to enter into the discourse. Here is one example.

- 1) Teacher: Anyone else want to see whether anyone else got a question that we can try?
- 2) Jenny: Is Easter always on a Monday?
- 3) Teacher: Okay, is Easter always on a Monday? Does anyone have a possible answer for Jenny?
- 4) Larry: Yeah, yeah, because it changes from week to week. It always has to be Good Friday and Easter Monday and Easter Sunday. . .

My revoicing in line 3 created an entry point for Larry to jump in and he commented on Jenny's question, without me having to nominate him. I revoiced Jenny's question as an invitation for the other students to comment on the discourse initiated by Jenny. I wanted students to respond to her, not to me.

I found another example of a concomitant slot, after I brought out the calendar and we examined the phases of the moon and its relationship to Easter weekend. I steered the discourse back to one of the questions that Larry had posed aloud to the entire class back at the beginning of the unit a few weeks earlier.

- 1) Teacher: Okay, now, what's the explanation for why does Easter jump around? Have you learned anything since you last said that comment?
- 2) Larry: Yeah, because of the moon, so they change every time. It, like. . .
- 3) Jenny: It's not the same every year.
- 4) Larry: Uh, yeah, because like, how can the moon be on the 31st one year and then on the 2nd? It's, it's just. . .
- 5) Jenny: I have a question.
- 6) Larry: . . . really hard to explain.
- 7) Jenny: Okay, why is Easter here and not here?

Larry responded in line 2 to my question and Jenny addressed her comment to him in line 3. Larry tried to explain the phenomenon, but he found out that even if he understood it, articulating

back to the group proved to be "really hard to explain." Meanwhile, Larry's point about the date changing triggered Jenny's question. She pointed to the calendar asking about Easter Monday. She changed the path of the discussion with her question. We went on to talk about the connection between Good Friday, Easter Sunday, the resurrection of Jesus, and Easter Monday. My revoicing of Larry's question started the discussion in one direction, but Jenny's ideas soon took it in a different direction -- one that was generated by a student, and that the other students wanted to explore.

Here is another example of an entry slot opened up by revoicing:

- 1) Teacher: And I know one of the other questions, I can't remember who asked it, was why do rabbits lay eggs?
- 2) Jenny: They don't.
- 3) Don: *
- 4) Teacher: They don't, so how come the Easter bunny. . .
- 5) Jenny: They have live bunnies. Like, well, they don't necessarily lay eggs. They lay chocolate eggs which makes this bunny different.
- 6) Carolyn: Yeah.
- 7) Larry: Yeah, but don't all mammals and humans, umm, like the babies when they're still in the stomach, they are in an egg?
- 8) Jenny: They start out as an egg. . .
- 9) Larry: Yeah.
- 10) Jenny: . . .like, we all started out as an egg, but it was like that big.
- 11) Larry: Yeah and it was still in the stomach.

I revoiced Jenny's response in line 4 and the students pursued the topic of bunnies laying eggs, linking their ideas to the original question voiced in line 1. I used the discourse marker "so" as suggested by O'Connor and Michaels (1996) to shift control of turns back into the hands of the students. The students proceeded to discuss the idea with each other. They tried to make sense out the connection between rabbits, which don't lay eggs, and the idea that human babies start out as eggs.

I did find evidence of my use of the IRE pattern too. At one point, we talked about the symbolic use of eggs at Easter. I nominated Don, he responded and I evaluated his response:

- 1) Teacher: Okay, sorry, Don, didn't mean to cut you off.
- 2) Don: The eggs are like for rebirth, like lots of eggs.
- 3) Teacher: Right.

Fortunately, I didn't find too many incidences of the IRE pattern, as I really had tried not to fall into that pattern. I ended up using the word "okay" often, as I needed to think for a moment while deciding on how to implement the revoicing technique. Then, I began to wonder if "okay" was just another form of the evaluation part of the IRE. So then I tried to eliminate using "okay" by reiterating student utterances on a number of occasions. This helped me to bypass the IRE pattern and at the same time, it helped to keep the discourse between students flowing.

Discussion

I implemented revoicing to support the goal of using student-generated topics within a given theme. I still regulate the theme because I still am responsible for delivering the curriculum. As well, I use a theme because, "A thematic unit has a central theme or concept that provides overall coherence. At the same time, it provides opportunities for children to explore specific topics and domains in-depth" (Pappas et al., 1999, p. 46).

Revoicing provided a richer discourse for and amongst the students. The videotape of the discourse showed it had a flow to it that belonged to the students. I found at times, though, that I needed to draw the students back to the topics at hand to stay within the bounds of the current theme; yet, at other times, I let the discourse flow until I sensed it was no longer profitable. Also, I noticed in the transcription that some topics slipped away unaddressed. I didn't hear their questions or concerns because I was thinking about my next move for the discourse, or my attention was distracted momentarily due to the complex nature of the classroom setting where everything sometimes transpires all at once. I never meant to exclude some of those topics, but I have come to realize that in the confines of a classroom, there is only so much time in a day and a few ideas do slip away.

Through the process of transcribing and then reflecting on the transcribed instructional interactions, I saw a number of interactional patterns and discourse strategies that I employed during the session with the students. First, I did find examples in the transcript where I successfully employed revoicing. Second, the discourse did flow between the students and they carried on at times without interruption or intervention from me. In the end, that was what I really wanted. I wanted the students to engage in a discussion with each other, without me. They conversed directly with each other, on topics of interest to them, within my general overall theme. My use of revoicing created entry points for them to bring in their topics, to ask their questions, to challenge each others' comments, to ask for clarification, or to add new ideas to previous ones. I thought that a richer discourse resulted. Third, I discovered that, despite my intentions, I still used the IRE sequence. I tried to change the pattern to a revoicing sequence a number of times as the session moved along, in more than one way. I changed strategies by asking questions that were open-ended and that could not possibly be answered by a simple yes or no, to try to break the chain of IREs. Here is an example of what I tried: "Okay, now, what's the explanation for why does Easter jump around?" By asking that question, I transferred control of the discourse back into the hands of the students.

My analysis of the data unearthed a few unanticipated interactions as well. With regard to the discourse of the students, the data revealed that student thinking sparked new student thinking. For example, a brand new topic emerged, one that had not been voiced before in the videotaping session, nor in the weeks of discussion beforehand. One student spoke about foxes and the change of fur colours with the seasons. This led to a spontaneous discussion about other animals changing their colour. Another aspect of student discourse surfaced in the data, as well. The students broached controversial topics -- ones closer to their interests. They brought up ideas about making babies and parents pretending to be Easter bunnies. They talked about Jesus and his resurrection, which can be slippery ground in a secular school setting. Still, broaching such topics is desirable and supported by research. Teachers can "use the social studies to help

children develop the knowledge, skills and attitudes necessary to understand and cope with controversy" (Pappas, et al., 1999, p. 185). Revoicing allows students to venture forth the issues that they want to learn about, whether or not I might find some of those topics controversial. Something else I noticed was the peer/social relationships in the video. Some students found it easy to speak up and enter the discussion, whereas others needed my encouragement to participate.

I noticed some aspects of the discourse that pertained to the teaching side of the process. We hit only briefly upon some topics, some of which were complex and rich sources of knowledge. It would have been wonderful to pursue them in more depth. Along with that, I noticed how long it took for the students and me to come to a shared understanding. What must happen in a classroom discussion when all the students are present? Imagine the volume of information and ideas and topics that never get fully aired for all to ponder. Something else that caught my attention was how, on a couple of occasions, the students came close to using the IRE on me. In particular, Jenny asked me directly for an answer on a few occasions. It alerted me to the possibility that students might use the IRE pattern on their teachers. This is not unlikely if their teachers, over the years, have modeled the pattern for them.

From the data, I noticed one aspect of my own teaching style that came as a surprise to me. I can physically prompt a specific student to respond without nominating her/him by name, or uttering a sound. If I looked directly at one of them and paused, they knew I wanted that person to speak. I never knew I did that until I watched myself in action on the video. The tape provided me with an opportunity to analyze my own speaking turns. For example, I counted the number of turns taken in the transcript, which was 230. I had 80 turns, or 34% of the turns. (It felt as if I had used up more, like half of them or so.) The students had to share 66% of the turns. At least the students had more than 50% of the turns to voice their ideas and thoughts. I think if I had used more IREs, my percentage of turns would have been higher -- which means the students would have had less air time.

The tape allowed me an opportunity to see some other items in the data. The tape allowed me to notice what my other students were doing in the background, when my attention was diverted elsewhere. I was so busy working with my small group of students, especially during the part when we examined the moon's phases on the calendar, that I had no memory of what the rest of the class was doing. All I know is they didn't do anything that disrupted me while I helped the small group. From the tape, I saw that they were on task working on an alternate assignment. Also, I could examine gender issues based on this tape and transcript, or the disruptive effects on discourse from the various sources like announcements, principal visits, students moving about the environment and the like.

This sample creates a starting point for me. I could expand this research now, examining the context around this small group of students. I could expand the time line of this sampling over the rest of the year, or I could use a follow up session to see if my implementation of revoicing has improved. I know that I employ revoicing with much more ease since that first session with the students, and I know that I am much more aware of my use of the IRE pattern. I don't have any documented proof, however, to back that assertion up. But, before this becomes an overwhelming project, I am reminded of the advice of Miles and Huberman (1994) "there is

often a need to pause and ponder: What were the main concepts, themes, issues, and questions that I saw during this contact? Without such reflection, it is easy to get lost in a welter of detail" (p. 51).

Conclusion

I am just learning to use revoicing. I believe that revoicing works, and that given time and practice, I will be able to employ it more successfully. Revoicing has a time and a place, however. I could never totally eliminate the IRE sequence, nor am I sure that I need to. Revoicing lends itself to the introduction of student-generated topics and themes. It creates entry points for student to exchange ideas with each other, in the context of a classroom's discourse. I can see employing revoicing after the students have had time to pursue their questions. Revoicing allows for reflection, I think, as well as interaction and exchange. At this point, I feel confident to state my revoicing was successful.

Another reason for attempting something like this falls into the domain of professional reflection:

Many educators, as well as researchers, believe that the ability to reflect on teaching is the mark of a true professional. Through reflection, real growth and therefore excellence are possible. By trying to understand the consequences of actions and by contemplating alternative courses of action, teachers expand their repertoire of practice. (Danielson, 1996, p. 106)

I think this project showed me some glimpses of the possibilities of the revoicing technique, in spite of my inexperience with this speech device. Part of the success for me means that I was able to alter my teaching practice in the form of my discourse pattern. Although revoicing is just a modification of the IRE pattern, I think it has a profound effect on classroom discourse. When I used the IRE pattern, the evaluation component blocked the flow and student-ownership of the discourse. The students never had an opportunity to link directly up with each others' ideas. The evaluation part, uttered by me, always brought the discourse turn back to me, although I did not always want it. I wanted to transfer control of the discourse to the students, yet I did not know how. Nor did I understand why the discourse did not flourish, when I sensed that it should. The revoicing technique provided me with a method of creating entry points for students into the discourse. I removed what I perceived to be a main stumbling block towards a more flowing and dynamic student discourse by employing revoicing techniques.

References

1. Bellanca, J., & Fogarty, R. (1990). Blueprints for thinking in the cooperative classroom. Palatine, IL: Skylight Publishing.
2. Danielson, C. (1996). Enhancing professional practice: A framework for teaching. Alexandria, VA: Association for Supervision and Curriculum Development.
3. Delpit, L. (1990). Language diversity and learning. In S. Hynds & D. L. Rubins (Eds.), Perspectives on talk and learning (pp. 247-266). Urbana IL: National Council of Teachers of English.

4. Manifold, M. (1995). Art education in the social studies. ERIC Digest, EDO-SO-95-7, pp. 1-4.
5. Miles, M., & Huberman, A. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.
6. O'Connor, M., & Michaels, S. (1996). Shifting participant frameworks: Orchestrating thinking practices in group discussions. In D. Hicks (Ed.), *Discourse, learning, and schooling* (pp. 63-103). New York, NY: Cambridge University Press.
7. Onore, C. (1990). Negotiation, language, and inquiry: Building knowledge collaboratively in the classroom. In S. Hynds & D. L. Rubins (Eds.), *Perspectives on talk and learning* (pp. 57-72). Urbana IL: National Council of Teachers of English.
8. Pappas, C., Kiefer, B., & Levstik, L. (1999). *An integrated language perspective in the elementary school: An action approach* (3d ed.). New York: Longman.
9. Sagor, R. (1997). Collaborative action research for educational change. In A. Hargreaves (Ed.), *1997 ASCD yearbook: Rethinking educational change with heart and mind* (pp. 169-191). Alexandria, VA: Association for Supervision and Curriculum Development.
10. Schiffrin, D. (1994). *Approaches to discourse*. Cambridge: Blackwell.
11. Smith, M., & Glass, G. (1987). *Research and evaluation in education and the social sciences*. Needham Heights, MA: Allyn and Bacon.