Secondary Earth/Environmental Science Teachers' Aversion to Videotaped Self-Study

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ABSTRACT

This descriptive paper recounts the use of action research in the context of an NSF-funded, three-year professional development program for earth/environmental science teachers entitled Earth-View (ESI-9911850). We describe the implementation of action research during the program and the ways in which the participants responded. Participants typically focused their research efforts on student learning and attitudes. No participants, however, elected to examine their own behaviors, although a few studied teaching choices and their effects on learning or attitudes. Various reasons were provided for their research choices including a strong aversion to the use of video recording, which is disturbing as it serves as one of the most powerful tools educational researchers have available to examine teacher behaviors. We conclude by offering suggestions for program leaders regarding ways to encourage earth/environmental science professional development participants to study their own practice using video recordings.

INTRODUCTION

This study recounts the use of action research as used in Earth-View, a three-year, National Science Foundation funded, fieldwork-based program that involved earth/environmental science teachers from across North Carolina. In particular, the study focuses on our role as program leaders in facilitating teachers' research efforts. We believe action research as a component of professional development has great promise for the improvement of teaching practice. This potential improvement, however, is contingent in part on teacher researchers' willingness to examine their own teaching. As such, we provide examples of elements of Earth-View that proved effective in the facilitation of teacher research and offer suggestions for program leaders of earth science professional development who find encouraging teachers to inquire into their own teaching problematic.

ACTION RESERACH AND SELF-STUDY

Action research is increasingly advocated as a tool that can be used to involve teachers in curriculum development and as a self-reflective tool in which teachers reflect in a systematic manner (i.e. self-study) on their own teaching (Goodnough, 2001; Hollingsworth, 1997; Holly et al., 2005). Action research is context specific and practitioners such as teachers have relied on this type of research to inform their practice (van Zee, 2006). Corey (1953) defined action research as a process by which practitioners would study their own practice to solve practice problems. In the context of this program and study, we define action research as a process of authentic inquiry (i.e. answering viable research questions that add to the body of knowledge through scientific methods) undertaken by teachers to answer questions about and develop means to improve their practice. The idea that teachers must take action once they analyze their data is one component of action research that makes it unique. What separates self-study from action research is that self-study "defines the locus of the inquiry", while action research describes the methodology (Slutsky, et al., 2005, para 6).

In addition to a multitude of definitions, there exist at least as many suitable contexts in which action research can be appropriately applied including individual teacher research in areas of personal interest and professional development programs with plans for more systemic change (Glesne, 1999; Mills, 2003; Pekarek et al., 1996). Action researchers predominantly employ qualitative methods, with mixed methods appearing occasionally (Bogdan and Biklen, 1998). Some of the more frequently used and powerful forms of data collection used in action research include the use of surveys, interviews, peer observations, reflective notebooks, interviewing, and videotaping. As such, any aversion to one of these major forms of data collection and analysis without an appropriate substitute considerably compromises the researcher's ability to address particular research questions. For example, individual teacher researchers who choose not to make use of videotaping may experience difficulty in studying their own teaching behaviors (e.g. frequency and type of teacher initiated questions) without relying on a colleague or their students to provide them with data. In either instance, the data collected are done so from an entirely different perspective than that collected and analyzed through the use of videotape. Minimizing aversions to specific forms of data collection and analysis and conversely acquiring a multitude of research tools and strategies is essential to the development of effective teacher researchers (van Zee, 1998). Teacher views and attitudes towards action research and self-study in specific contexts (e.g. earth/environmental professional development) are in need of further documentation. Although studies (for example Adler, 2003; Gilbert and Smith, 2003) exist that suggest teachers from a variety of contexts experience a range in levels of discomfort in response to conducting this type of inquiry, "there are fewer studies in this area" (Slutsky, et al., 2005, para 5). In response, this study explores the question, what reasons

exist for teachers' aversions to videotaped self-analysis in the context of conducting action research as part of a sustained earth/environmental science professional development opportunity.

METHODS

Background on the Earth-View Context - Focusing on content, pedagogy, and leadership, the program (Earth-View) approached these three strands from the perspective of teacher research. Summer courses provided instruction and experiences related to content, with implications for pedagogy and leadership. During the school years (every year), teachers designed and implemented research projects and reported on them at the spring meeting with their peers. The first year teachers engaged in scientific research regarding earth/environmental topics related to North Carolina's coastal system and more specifically its barrier islands. Program leaders modeled appropriate data collection techniques and analysis methods and supported the practice and inquiry associated with participants' implementation of their scientific research plans. This paper focuses on the research assignment from the second year, which focused on studying pedagogical considerations through action research. In the summer of the second year and the follow-up sessions in the fall, teachers worked on developing a plan for their action research. Instructors provided information about the purpose of action research and several examples. They also provided instruction regarding various ways to collect and analyze data including videotaped interviews, concept mapping, and questionnaire development. A research proposal format was provided for the teachers, along with a sample proposal. Although teachers were given the freedom to make their own decisions, project leaders provided a variety of examples from which they might choose if they needed assistance. Described below are the choices teachers made and, significantly, the options they chose not to consider.

Participants - Twenty-four participants completed the Action Research Questionnaire and the background information sheet provided during the Fall Follow-Up Session. All were secondary earth/environmental science teachers and of those three taught in middle school. All of the teachers were Caucasian and half were male. Two-thirds of the participants held Masters degrees. The average number of total years they had taught was 14.2 with a standard deviation of 8.4, a median of 15, a minimum of 1 and a maximum of 28. The average number of total years they had taught science was 13 with a standard deviation of 8.5, a median of 12.5, a minimum of 1 and a maximum of 26.

Instrument - During the Fall Follow-Up Meeting, instruction was provided regarding what action research is and how to go about conducting it. Included in that instruction was discussion regarding the use of videotaping as a means of data collection and analysis and what types of research questions could be addressed concerning one's own teaching. Additionally, the worksheet participants completed in the process of designing their study included as a guiding example a research plan in which a teacher examines his/her own teaching using videotaping as a tool. The first item asked participants to define their research question/problem and the second item asked them to articulate a research plan. We provided the following example as a guide:

1. Research Question/Problem:
   Example:
   What is the ratio of teacher talk to student talk in a weeklong unit?

2. Research Plan:
   Example:
   a. Videotape myself teaching for five days (during whole class activities).
   b. View the videotape with a stopwatch, recording the time segments in which I talk and students talk during whole group learning activities.
   c. Plan a new unit with strategies to increase the amount of meaningful student talk relative to teacher talk during whole group activities.
   d. Repeat the process (steps a and b).
   e. Compare the results and draw conclusions.
   f. Determine the implications for teaching and learning in your classroom.

A number of examples were provided, however the program leaders did not share their own recordings or provide video examples during the meeting. After the program leaders reviewed all the participants' research plans, we noted that nobody chose to videotape him or herself and analyze their own teaching. We were interested to find out what reasons existed for this trend. Consequently we developed a questionnaire with six, open-ended items and a brief explanation for the questionnaire. The explanation was: "We had a wide variety of action research projects proposed for this year (to be continued next year). Although one of the suggestions we offered (among many) was to videotape yourself and analyze your teaching, nobody chose this option". The questions began immediately following the explanation and consisted of the following: (1) "Why do you think EV [Earth View] teachers chose other options?" (2) "Why did you choose another option?" (3) "What do you perceive to be difficulties (negatives) associated with analyzing your teaching through videotapes? (if any)" (4) "Do you think there are any advantages to using videotapes in this way? If so, explain." (5) "If you did videotape yourself, do you think you have the skills to analyze your teaching productively (in order to improve) or would you need help learning how to do this?" and (6) "Do you think there are areas in which you can improve the effectiveness of your teaching? If yes, what would be the best way to do this?" Responses from these items were transcribed and coded. Categorical aggregation was applied and trends were identified from which assertions were made.

RESULTS

What Teachers Chose To Do - At a follow-up meeting in the fall of year two, teachers worked in their previously assigned research groups to begin the development of action research proposals. In some cases they chose to conduct similar studies in different school settings; in other cases they designed a plan specifically

relevant to their own teaching situation. More specifically, ten teachers focused on student learning, examining the effect of various interventions. Examples of studies include effects on student learning of: (a) use of "foldables" with students in alternative school setting; (b) inquiry setting vs. textbook-based setting; (c) use of CBLs in field trip setting; (d) tutoring sessions; (e) field trip vs. classroom book work; (f) use of customized learning activities tailored to students' needs; and (g) use of alternative assessments. Fifteen teachers examined students' understandings of the nature of science by using a survey instrument provided by the project instructors. These fifteen teachers collaborated on the project, determining results for their own students and for the entire group of students from all schools. Four teachers focused on student attitudes in relation to factors such as: (a) increased numbers of schoolyard field trips; (b) use of the Internet; and (c) various earth science topics. Three teachers collaborated on a project to examine relationships between student achievement and socioeconomic and ethnic backgrounds of students in three different schools. One teacher focused on correlations between home communication and performance of exceptional children.

While some of these studies included brief descriptions of what the teachers did in the process of collecting data regarding student learning, student content knowledge, or student attitudes, none focused on their own teaching in a way that required them to measure and analyze their own in-class teaching behaviors. For example, even in the studies where teachers examined whether or not a particular instructional strategy was effective at increasing student achievement, the focus was on student outcomes, not on what the teacher did. While it could be argued that these studies represent a degree of self-study because they include such descriptions, they represent a lower level of self-study than inquiries that require teachers to observe their own behaviors rather than observing student variables. For instance, systematically studying how I implement fieldwork (i.e. what did I do and when did I do it) is very different than examining whether a correlation exists between increased fieldwork and student achievement. Both studies could provide valuable information, but vary considerably in their degree of self-study.

By having permission to design a project of their choosing, teachers addressed areas of particular interest or concern to them. For those who were uncertain about their ability to design and conduct a study, the Nature of Science Survey (Dawkins and Dickerson, 2003) became a default. Most participants possessed little experience in developing and executing an action research plan. As such, some teachers engaged in a formative process with program leaders and peers regarding the development of their proposals. In order to maintain an up-to-date and accessible list of research proposals, we created a page on our web site where teachers could submit and re-submit their proposals. As part of the Earth-View web site, teachers could see what studies other participants were involved in and contact them regarding any questions or suggestions they had. It also served as an efficient way for program leaders to document participants' activities for reports to funding agencies.

What Teachers Chose Not To Do - From the perspective of the instructors, the projects teachers chose to conduct were perhaps not as significant as the projects they did not consider-more specifically, the option to observe their own teaching. Although there were a number of teachers who looked at certain teaching choices and their effects on learning or attitudes, no teacher proposed to examine his or her own teaching through the use of videotaped lessons. Furthermore, higher degrees of self-study in general were avoided. During the discussion of possibilities for action research, the instructors gave many examples, including the videotape option, peer-observation, and student feedback. We stressed the use of private videotape analysis due to our concern that peer-observation and student feedback would create a climate of evaluation, rather than one of inquiry. We did tell participants however that if they felt comfortable doing so, they could also have a peer (e.g. another Earth-View participant, a colleague at their school or another school, etc) assist them with the analysis. This option was not stressed as much as private analysis of the videotape. In fact, project leaders encouraged teachers to consider analyzing their teaching through videotapes, emphasizing again that no person would see the tapes except the teacher unless they chose to include another person to help them with the analysis (perhaps a peer). In previous sessions, teachers had read research reports and conducted discussions on such topics as teacher talk vs. student talk, questioning techniques, and wait time. They were challenged to reflect on those aspects of teaching in the context of their own practice. Despite the extensive discussions and the experience several teachers previously had with videotaping themselves for National Board Certification, the teachers unanimously avoided this option.

In the context of gathering data about the value of the experience, the instructors prepared a survey to determine the teachers' reasons for avoiding the use of classroom videos. A summary of results follows. There were multiple responses from each teacher (n=24), so percentages do not total to one hundred. Participants provided a variety of reasons for choosing options other than videotaping, including: (a) takes too much time (22%); (b) self-conscious about appearance and speech (44%); (c) difficult to face the reality of being an imperfect teacher (26%); (d) technical complications with the equipment and/or getting permission forms signed (37%); (e) more relevant problems to investigate (22%); and (f) distractions in classroom (26%). Example transcribed responses include: (a) I have enough problems getting ready for class and students without having to add another task to my responsibilities; (b) I am camera shy and not photogenic. Like any other woman, I hate to see how fat I really am. I don't like the way my voice sounds on tape. I stutter in front of a camera; (c) Reality is a tough thing to swallow, no taping, please! I guess it would expose flaws that I don't want to see but need to see; (d) It's a hassle to find the equipment and figure out how to use it; (e) The research I chose to do did not involve taping. I was more interested in another project; and (f) This might be an intrusion that would impact the behavior of the students.

A disturbing aspect of the responses was a recurring reference to being judged. Although there was much discussion about the purpose of their action research projects, the specter of videotaping obviously triggered emotional responses related to evaluation of their teaching as seen in the statements below:

> I fear that those analyzing you will find nothing good with your teaching style based on the one

episode you teach-not take into account your teaching over time.

Teachers are Under so Many Evaluations and Criticized on Style, Not Content - Despite the teachers' hesitation to use videotaping, they stated that there were benefits to this method of analyzing their own teaching. In fact, every teacher surveyed except for one conceded that there were advantages, including seeing themselves as their students see them, analyzing new strategies and students' responses to them (lesser degree of self-study), and looking for specific behaviors (such as questioning techniques). The one teacher who was an exception thought the practice would be helpful to others trying to critique his teaching, but not helpful to him in his own professional development as a practitioner. Although there was nearly unanimous agreement about the usefulness of the method, there were a few disclaimers:

> If a new teacher undertakes this, they may be more successful in modifying their behavior/ presentations since they are still learning how to teach.
>
> I think it would depend on how much a person would really want to improve their methods.
>
> I could learn more about my strengths and weaknesses, but changing is the problem.

These statements may also suggest a link between videotaping as a tool and a fear of changing. While the validity of peer-observations and student feedback can be questioned, there may be a perception that it is much more difficult to discount videotaped observations. Since those data may be viewed as more difficult to discount, being confronted with such evidence would require action on the teacher's part. The prospect of significantly changing how one teaches as opposed to just adding some new activities to one's current repertoire is understandably intimidating.

CONCLUSIONS AND IMPLICATIONS

The use of videotape analysis is considered by the education community as a productive means of improving the practice of teachers, and is widely used with pre-service teachers and teachers in graduate programs. In the U.S. it is a requirement for those teachers seeking certification from the National Board for Professional Teaching Standards. The researchers in this project were surprised by the unanimous avoidance of this procedure as an option for action research by the Earth-View teachers. Obviously, in the context of university courses and National Board Certification, videotape analysis may be a requirement; in the Earth-View project, it was an option. Given the option, teachers chose other research alternatives.

If earth/environmental science professional developers are to encourage the use of videotape analysis, they must reduce the factors that discourage teachers from using this method. This study suggests several actions that might be helpful: (a) Provide equipment and help with setting it up; (b) Emphasize that videotapes will be viewed only by the teachers and others of their choosing and that the teachers will decide on specific aspects of teaching to be examined-not every aspect; (c) Provide suggestions for looking at positive teaching behaviors, not just negatives; (d) Suggest ways of making the process less intrusive in the classroom; (e) Be willing to videotape yourself and allow teachers to critique; and (f) Discuss the difference between using videotapes to improve teaching and observations used by administrators for the purposes of evaluation. Creating more effective earth/environmental science teachers through professional development opportunities is a goal that many of us share. Higher degrees of self-study facilitate that process and videotape analysis can serve as an effective means of assisting teachers in that effort, but only if we take purposeful steps in making the tool a palpable option.

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REFERENCES

Adler, S., 2003, Dilemmas of action research, Action in Teacher Education, v. 25, p. 76-82.

Bogdan, R. C. and Biklen, S.N., 1998, Qualitative Research for Education: An Introduction to Theory and Methods, Boston, Allyn and Bacon.

Corey, S., 1953, Action Research to Improve School Practice, New York, Teachers College Press.

Dawkins, K.R. and Dickerson, D.L., 2003, Students' conceptions regarding scientific theories, Paper presented in March at the National Association for Research in Science Teaching in Philadelphia, PA.

Gilbert, S. L., and Smith, L., 2003, The bumpy road to action research, Kappa Delta Pi Record, v. 39, p. 80-83.

Glesne, C., 1999, Becoming Qualitative Researchers: An Introduction, New York, Longman.

Goodnough, K., 2001, Teacher development through action research: A case study of an elementary teacher, Action in Teacher Education, v. 23, p. 37-46.

Hollingsworth, S., 1997, International Action Research: A Casebook for Educational Reform, Washington, DC, Falmer Press.

Holly, M. L., Arhar, J. M., and Kasten, W. C., 2005, Action Research for Teachers: Traveling the Yellow Brick Road, Upper Saddle River, NJ, Pearson/ Merrill/Prentice Hall.

Mills, G. E., 2003, Action Research: A Guide for the Teacher Researcher, Upper Saddle River, NJ, Merrill/Prentice Hall.

National Research Council, 1996, National Science Education Standards, Washington, DC, National Academy Press.

Pekarek, R., Krockover, G.H. and Shepardson, D.P., 1996, The research-practice gap in science education, Journal of Research in Science Teaching, v. 33, p. 111-114.

Slutsky, R., Christenson, M, Bendau, S., Covert, J., Risko, G., Dyer, J., and Johnston, M., 2005, Teacher tales of action research: Trials and triumphs, International Electronic Journal For Leadership in Learning, v. 9.

van Zee, E.H., 1998, Fostering elementary teachers' research on their science teaching practices, Journal of Teacher Education, v. 49, p. 245-254.

van Zee, E.H., 2006, Teacher research: Studying student thinking and learning, Science Educator, v. 25, p. 29-36.