



Determining teachers perceptions of self empowerment through professional development facilitated by asynchronous distance delivery instruction in classroom-based action research
by Carl Johnston Graves, II

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Education in Education
Montana State University
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Abstract:

The continual pursuit of professional development by science teachers must be a natural progression of those entering the teaching profession. This pursuit can take many forms, but one common approach is to earn a master's degree from a college or university. Often this requires taking time from one's teaching to devote at least a year in study on the campus of the college or university. In the summer of 1997, the Master's of Science in Science Education (MSSE) Program was begun at Montana State University, Bozeman. The program used a combined model of both face-to-face and distance delivery courses. Master's degree candidates spent six weeks one summer on campus and then continued to take courses through asynchronous, on-line, distance delivery for five semesters. In addition, the candidates were engaged in action research, studying their own practice as a means of examining and improving their teaching.

The purpose of this study was to determine the effects of the MSSE candidates' perceptions of self-empowerment as a result of their professional development experience, which was facilitated by asynchronous distance delivery instruction and classroom-based action research. Teacher empowerment was defined in terms of the following five constructs: self-reflection, control, collegial relationships, confidence, and instructional strategies. A total of 42 MSSE candidates were studied over a period of three years. Two semantic differential surveys, one on action research and one on telecommunications, were administered at the beginning, middle and end of the candidate's degree program to measure attitudes concerning action research and telecommunications. An exhaustive qualitative study which included narrative surveys, focus group interviews, individual interviews, and observations of candidates' final action research projects was conducted.

With regards to action research and professional development, the results of this study suggest that action research is a meaningful professional development endeavor and that action research contributes to teacher empowerment. Empowered teachers develop a commitment to continued professional growth. Distance education allows students to engage in learning that is more learner-centered. The MSSE candidates demonstrated a significant statistical difference in their perceptions of both action research and telecommunications from the beginning of their program to the end.

DETERMINING TEACHERS' PERCEPTIONS OF SELF EMPOWERMENT
THROUGH PROFESSIONAL DEVELOPMENT FACILITATED BY
ASYNCHRONOUS DISTANCE DELIVERY INSTRUCTION IN CLASSROOM-
BASED ACTION RESEARCH

by

Carl Johnston Graves II

A dissertation submitted in partial fulfillment
Of the requirements for the degree

of

Doctor of Education

in Education

MONTANA STATE UNIVERSITY
Bozeman, Montana

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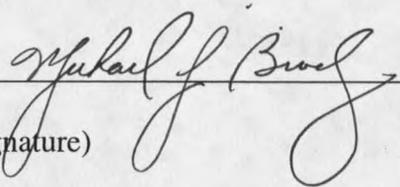
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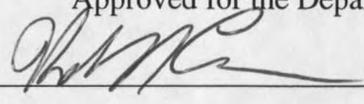
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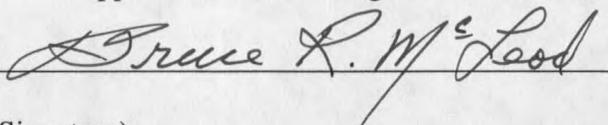
This dissertation has been read by each member of the dissertation committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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This work is dedicated to my mom, Geri (1921-2001) and my brother, Roger (1941-1999). You both provided me the inspiration to “stay the course.” And mom, thanks for continuing to teach me through the writings you left.

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ABSTRACT

The continual pursuit of professional development by science teachers must be a natural progression of those entering the teaching profession. This pursuit can take many forms, but one common approach is to earn a master's degree from a college or university. Often this requires taking time from one's teaching to devote at least a year in study on the campus of the college or university. In the summer of 1997, the Master's of Science in Science Education (MSSE) Program was begun at Montana State University, Bozeman. The program used a combined model of both face-to-face and distance delivery courses. Master's degree candidates spent six weeks one summer on campus and then continued to take courses through asynchronous, on-line, distance delivery for five semesters. In addition, the candidates were engaged in action research, studying their own practice as a means of examining and improving their teaching.

The purpose of this study was to determine the effects of the MSSE candidates' perceptions of self-empowerment as a result of their professional development experience, which was facilitated by asynchronous distance delivery instruction and classroom-based action research. Teacher empowerment was defined in terms of the following five constructs: self-reflection, control, collegial relationships, confidence, and instructional strategies. A total of 42 MSSE candidates were studied over a period of three years. Two semantic differential surveys, one on action research and one on telecommunications, were administered at the beginning, middle and end of the candidate's degree program to measure attitudes concerning action research and telecommunications. An exhaustive qualitative study which included narrative surveys, focus group interviews, individual interviews, and observations of candidates' final action research projects was conducted.

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CHAPTER 1

INTRODUCTION

Overview

The continual pursuit of professional development by science teachers must be a natural progression of those entering the teaching profession. The National Science Education Standards states that "professional development for teachers should be analogous to professional development for other professionals. Becoming an effective science teacher is a continuous process that stretches from preservice experiences in undergraduate years to the end of a professional career" (National Science Education Standards, 1996, p. 55).

Professional development takes many forms including teacher inservice provided by local school districts, professional organizations, state offices of education, and institutions of higher learning. Although no one form of professional development meets the needs of all educators, many teachers choose to combine professional development with an advanced degree. Reasons for choosing an advanced degree may include salary advancement, personal satisfaction, career advancement, career change and job requirement (Belcher, 1996, p. 8). For the purposes of this research project, the type of professional development being studied is a master's degree program in science education offered through the Montana State University system.

In 1996, the Master of Science in Science Education (MSSE) program was instituted on the campus of MSU-Bozeman with the cooperation of the Montana State University system. An intercollegiate, interdisciplinary degree program sponsored by three of Montana State University's (MSU) colleges--Agriculture; Education, Health and Human Development; and Letters and Science--the program utilizes a combination of on-campus and distance learning methods. The MSSE Program is coordinated by MSU's office of Intercollege Programs for Science Education with technical and logistical support provided by the Burns Telecommunications Center. The program is a unique, cooperative effort involving faculty from the departments of education, microbiology, earth science, biology, physics, plant and soil science and other fields (Boyce, 1998).

In contrast to earning a degree by physically being on the university campus where the courses are offered, a different technique adopted by the MSSE Program utilizes the offering of courses via asynchronous distance delivery method. Asynchronous distance delivery is defined as "learning which takes place between teacher and learner independent of time and place" (McMullen, Goldbaum, Wolffe, & Sattler, 1998, p.3). One form of asynchronous distance delivery is the use of a telecommunications system which utilizes electronic mail and on-line discussion groups. Students can "attend class" using a computer and a connection to the internet at whatever time of day or night they desire. The flexibility of this type of class delivery may be quite appealing to many students (Belcher, 1996).

A major goal of the MSSE Program is to increase literacy in science. Further, the program seeks to assist teachers to better understand the content and relationships in

different areas of science and to gain an appreciation of how best to learn and teach science (Reed, personal communication, November 12, 1997). The specific methodology selected to develop and enhance the professional development of teachers was teachers as classroom researchers (Boyce, 1998). These goals are consistent with the National Science Education Standards (1996) for professional development which state that "professional development activities must provide...opportunities for individual and collegial examination and reflection on classroom and institutional practice (p. 68) and must "connect and integrate all pertinent aspects of science and science education" (p. 62). The purpose of classroom research as stated by Cross (1990) is

to contribute to the professionalization of teaching, to provide the knowledge, understanding, and insights that will sensitize teachers to the struggles of students to learn. Classroom research consists of any systematic inquiry designed and conducted for the purpose of increasing insight and understanding of the relationships between teaching and learning (p. 136).

For the purposes of the MSSE Program, the type of classroom research being modeled through coursework and student implementation is referred to as action research. Action research is identified as research conducted by practitioners on their own practice with the purpose of gaining a better understanding of their own personal development and to make improvements in their practice (McNiff, Lomax, & Whitehead, 1996).

One of the transformations being observed in the paradigm of classroom research is that teachers are learning to become researchers through the use of action research. As a result of becoming action researchers, teachers are more reflective in their practice and sense a greater degree of empowerment within their professional settings (Nihlen, 1992).

Teacher empowerment has been identified by Miller (1993) as consisting of five major constructs. These constructs are self-reflection, control, collegial relationships, confidence, and instructional strategies. In addition, as a result of action research, teachers are adding to their knowledge of their practice. Kincheloe (1991) argues that "once teacher researchers begin to focus on knowledge production...their pedagogy is forever transformed" (p. 187). It is this transformation phenomenon embedded within the context of teacher empowerment that establishes, in part, the problem of this study.

The MSSE participants, once admitted to the program, are immersed in a professional development program of study intended to equip teachers to better understand the content and relationships in different areas of science and demonstrate an appreciation of how best to learn and teach science. Through the avenue of asynchronous distance delivery and the action research model, it is hoped that these graduate students will become better teachers, thus empowered teachers (Reed, N., personal communication, November 12, 1997). However, no determination of the degree to which students felt empowered as a result of participation in an asynchronous distance delivery, classroom research-based graduate program had been established.

Purpose of the Study

The purpose of this study was to determine perceptions of teacher empowerment through professional development in a graduate study program focusing on action research using asynchronous distance delivery methods. The context for this study arises from the Master's of Science in Science Education (MSSE) Program which began on the

campus of MSU-Bozeman during the summer of 1997. The MSSE Program is based on several principles: 1) all course work is interdisciplinary, combining science and education; 2) all students will conduct classroom-based action research; and 3) courses emphasize the interchange of knowledge between students with similar interests.

Participants spend six weeks on the campus of MSU taking courses during June and July of the summer they begin the program. The next six semesters of coursework are conducted on-line using MSU-Link, an Internet accessible, FirstClass Client® bulletin board service, an asynchronous distance delivery system utilizing group and personal email (Boyce, 1998).

A major educational emphasis of the MSSE program is the completion of a classroom research project. Students are required to take two action research courses through asynchronous instruction. Cross and Steadman (1996) state that:

Classroom Research may be simply defined as ongoing and cumulative intellectual inquiry by classroom teachers into the nature of teaching and learning in their own classrooms. At its best, Classroom Research should benefit both teachers and students by actively engaging them in the collaborative study of learning as it takes place day by day in the particular context of their own classrooms. Teachers are learning to become more effective teachers, and students are learning how to become more effective learners" (p. 2).

Classroom research, or action research, engages teachers in professional development as researchers to examine some aspect of their own teaching situation in hopes of better understanding and improving their practice. It is hoped that through action research, the MSSE Program will achieve one of its major goals, which is to "provide a model to increase appreciation of how best to learn and teach science" (N. Reed, personal communication to Northwest Association of Schools and Colleges,

February 1977). If "appreciation of how best to learn and teach science is achieved", the question of whether that translates into empowerment becomes critical.

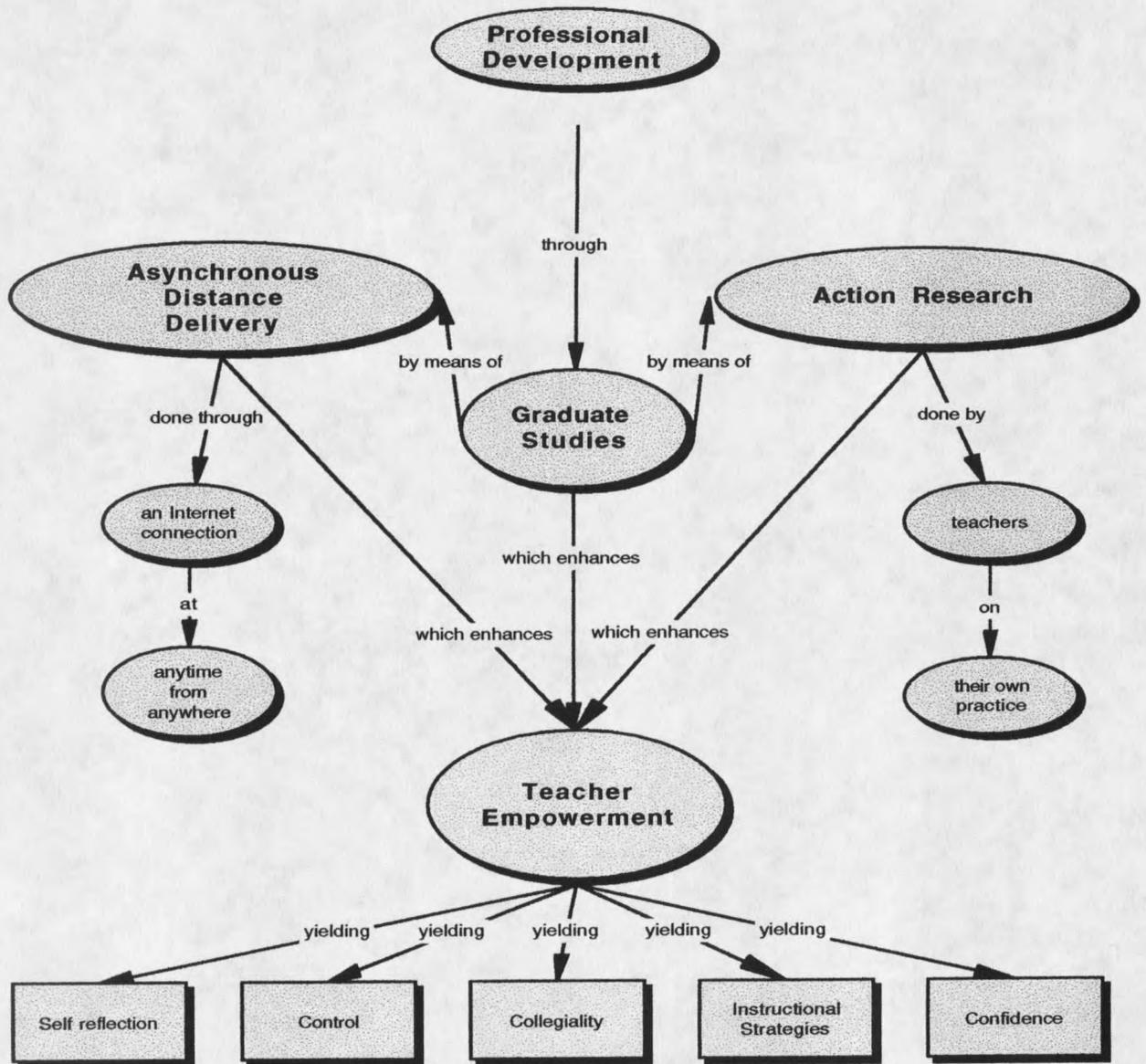
Research Question

The research question that guided this study was "What are teachers' perceptions of empowerment in their teaching as a result of professional development in an asynchronous distance delivery action research-based master's degree program?"

The following concept map (Figure 1) is offered as a means to assist the reader in visualizing the scope of this research question. Novak and Gowin (1984) advocate the use of concept maps, stating that "concept maps are intended to represent meaningful relationships between concepts in the form of propositions. Propositions are two or more concept labels linked by words in a semantic unit (p. 15).

The concept map begins with the research question dealing specifically with professional development. The proposition (link) to graduate studies is then made. The specific components of professional development examined in this study are action research and asynchronous distance delivery. Propositions defining the elements of the graduate study are then established by moving right to action research and left to asynchronous distance delivery. Finally, following the chart downward links the concepts of professional development through graduate studies by the use of action research and asynchronous distance delivery to teacher empowerment which is defined by five constructs (Miller, 1993).

Figure 1. Concept map of research question: Relationships of the major research components of professional development, graduate studies, asynchronous distance delivery, action research and teacher empowerment.



Definition of Terms

Research in the area of empowerment through professional development delivered by asynchronous distance delivery emphasizing action research does not require a command of technical vocabulary; however, several terms do require clarification in context of the MSSE Program and this study.

1. Action research: see Classroom research.
2. Asynchronous distance delivery: "learning which takes place between teacher and learner independent of time and place" (McMullen, Goldbaum, Wolffe, & Sattler, 1998. p.3).
3. Classroom research: "ongoing and cumulative intellectual inquiry by classroom teachers into the nature of teaching and learning in their own classrooms" (Cross & Steadman, 1996, p.2).
4. Confidence: "a feeling or consciousness of one's powers or of reliance on one's circumstances" (WWWebster Dictionary, 1999).
5. Control: "to exercise restraining or directing influence over" (WWWebster Dictionary, 1999).
6. Collegial Relationships: "a state of affairs existing between those having relations or dealings with an associate in a profession" (WWWebster Dictionary, 1999).
7. Empowerment: "to give official authority or legal power to; enable, to promote the self-actualization or influence of" (WWWebster Dictionary, 1999). Miller

- (1993) identifies five constructs of empowerment: "self-reflection, control, collegial relationships, confidence, and instructional strategies" (p. 70).
8. Instructional Strategies: "the action, practice, or profession of teaching and the art of devising or employing plans or stratagems toward a goal" (Webster Dictionary, 1999).
 9. MSSE.1 and MSSE.2: The first (.1) and second (.2) cohorts of the Master's of Science in Science Education Program (MSSE).
 10. Self-reflection: the consideration of some subject matter, idea, or purpose belonging to oneself (Webster Dictionary, 1999).
 11. Telecommunications: in regard to the MSSE Program, the personal and/or group exchanges between instructors and students using computing conferencing and electronic mail (or *e-mail*), usually via MSU-Link, which is accessed using First Class Client® software. MSU-Link is housed on the campus of MSU-Bozeman in the Burns Technology Center.
 12. Practitioner-researcher: used by Jarvis (1999) to describe practitioners (teachers) who do research.

Context of the Study

The researcher had a ready-made bias to this study in that he was an adjunct instructor in the MSSE program having taught or functioned as a Teaching Assistant in the following courses: EDCI 537 "Contemporary Issues in Science Education", EDCI 505 "Foundations of Action Research", and EDCI 509 "Implementing Action Research".

In addition, the researcher's graduate course of study included the following MSSE courses taught in an asynchronous telecommunication method: BIOL 514 "Life in Streams and Ponds of the Northern Great Plains", EDCI 503 "Evaluation and Measurement in Education", EDCI 536 "Construction of Curriculum", EDCI 551 "Improvement of Instruction Using Computers", MATH 517 "Advanced Mathematical Modeling for Teachers", PHYS 401 "Advanced Physics by Inquiry", and PHYS 511 "Astronomy for Teachers", and ES 580 "Principles of Earth Science". The researcher felt that his involvement in the MSSE Program as both an instructor and student brought an increased understanding of the issues surrounding this study and should not be viewed as a distracter to the study, but should serve to enhance the study. According to Lincoln and Guba (1985), prolonged engagement and persistent observation are two elements of research that add trustworthiness to the research project and provide depth to a researcher's work. In that regard, the researcher's direct involvement with the MSSE Program should be viewed as a strength of this research project.

Summary

Technological advances will continue to push the envelope of professional development opportunities as to when and where courses can be offered by instructors and taken by students. No longer is there a need to be "on location" in order to earn a graduate-level degree. As more courses and degree programs are offered via asynchronous distance delivery methods, new opportunities for learning will be opened.

Teachers, in their pursuit of understanding and applying the tools of their profession, gain experience, insight, and expertise in their field, thus possessing potential tools of empowerment. One strategy for achieving knowledge of one's teaching is through the use of classroom research. Kincheloe (1991) argues that "once teacher researchers begin to focus on knowledge production...their pedagogy is forever transformed" (p. 187). The degree to which professional development facilitated by asynchronous distance learning and focusing on classroom-based action research results in the empowerment of teachers was the purpose of this study.

CHAPTER TWO

LITERATURE REVIEW

Professional Development

Professional development is a process by which teachers engage in "active learning that builds their knowledge, understanding and ability (National Science Education Standards, 1996, p. 56). Loucks-Horsley, writing for the Eisenhower National Clearinghouse for Mathematics and Science Education publication Ideas That Work: Science Professional Development (1999) has identified five principles of effective professional development. The principles are:

1. Professional development experiences must have students and their learning at the core--and that means all students.
2. Excellent science teachers have a very special and unique kind of knowledge that must be developed through their professional learning experiences.
3. Principles that guide the improvement of student learning should also guide the professional learning for all teachers and other educators.
4. The context of professional learning must come from both inside and outside the learner and from both research and practice.
5. Professional development must both align with and support system-based changes that promote student learning (p.4).

One aspect of professional development for teachers is earning a master's degree in education or a specific discipline of education, such as science. There are numerous reasons why teachers pursue advanced degrees in education. Belcher (1996) found that among 297 technology and education graduate school respondents to a graduate school survey at Boise State University, the most important reason for attending graduate school was "that they would find it personally satisfying" (p. 8). Other reasons for attending graduate school included, in order of respondent selection, career advancement, ability to earn more, desire for a career change and job requirement (Belcher, 1996). When 333 continuing education respondents from a similar survey in Ohio reported, they stated that the "availability of a particular program ranked first, and convenient location ranked second highest" (Hanniford & Ventresca, 1993, p. 8). In addition, Hanniford and Ventresca (1993) discovered that "intellectual growth, earning a degree and learning a specific subject were cited as being very important by over 40 percent of the respondents" (p. 8). They also reported that many of the students are "goal oriented" (p.11). Furthermore, 69 respondents to a self-assessment of the doctoral program in higher education at the University of Georgia reported that "their primary purpose in pursuing the doctoral degree" was "preparation for professional practice" (Fincher, 1983, p. 5).

In spite of the benefits teachers gain from professional development, the process is also one that may create conflict. According to the NSTA Standards for Science Teacher Preparation (1998), "professional practice may result in internal conflict." The

Standards continue by stating that "True professionals have learned the art of disagreeing without being disagreeable and realize that professional growth requires taking risks."

Regardless of the reasons or obstacles for continuing one's education within the field of teaching, professional development is a recognized standard for science educators. The National Science Education Standards (1996) state implicitly that "professional development for a teacher of science is a continuous, lifelong process" (p. 57).

Summary of Professional Development

Professional development is a process of growth and change. Howser (1989) reports that "the value and attitude teachers had toward collegial relationships, curriculum changes, district mandates, and their own personal growth were associated, to a large degree, with whether or not they sought to grow and change" (p. 32). The American Association for the Advancement of Science (AAAS) in their Blueprints On-line (1997) state the following concerning professional development:

Perhaps the most important reason for continuing professional development for science, mathematics, and technology teachers is that it allows them to recognize the special expertise related to their work. Specialized knowledge becomes a source of authority for setting policies and making curricular decisions. A second reason is that pre-service education is simply not long enough or intense enough for teachers to master all the skill areas they need. Third, as knowledge in the fields of both science and teaching continues to expand, and as our society and its demands continue to change, teachers themselves must grow and develop. Finally, when teachers engage in long-term professional development, they build relationships with a wider community of peers, which improves teaching quality (p.6).

Action Research

Action research, one specific type of classroom research, has nearly a 50-year history (Foshay, 1998). Action research is defined by Berlin (1996) as "systematic and recursive inquiry and reflection in a collaborative learning community directed toward the understanding and improvement of practice" (Rhoton & Bowers, p. 73). From a historical perspective, action research has been an emerging field in research since World War II. Psychologist Kurt Lewin in 1946, educator Stephen Corey in 1955 and Lawrence Stenhouse, director of the Schools Council Humanities Project in 1983, have all contributed significantly to the development of action research as a research technique for teachers (Hollingsworth, S., 1992, p.2). According to Hollingsworth:

Three factors have made action research in the process model a viable alternative in the late 1970s and 1980s: (a) the difficulties of disseminating quantitative, experimental methodologies to local and social educational settings, (b) an increasing acceptance of the concept of curriculum as integrated with deliberation (Schwab, 1973), and (c) a professional and political reaction to the post-Sputnik accountability stance for improving and changing curriculum (p. 2-3).

The perceived role of practitioners in research has changed over the years. The more traditional model of research was one in which university-based researchers conducted their studies on teachers (Veal & Tippins, 1996, p. 81). As a result of that research paradigm, Kincheloe (1991) states that "the teacher is viewed as an aborigine to be studied objectively." He continued by saying:

Indeed, the status of teachers is quite low; can the 'natives' truly be expected to conduct their own research? Even though the practitioner may be in the school every day, engaged in an intensely personal relationship with students, he or she is simply incapable of conducting research in the situation. Research and theory building are the domains of the academic expert--teachers should stick to the execution of their tasks (p. 12-13).

Fortunately that view of teachers as subjects is changing. Because one of the goals in the field of educational research is the improvement of teaching and learning, a meeting of the minds of theorists, classroom teachers and curriculum writers has begun to occur. It has been recognized that theory generation does not always translate into improved learning. The recognized "experts" in the classroom are the teachers themselves, the practitioners. Only as practitioners are allowed to design, conduct and analyze research, and consequently implement changes based on their own research, will the improvement of teaching and learning occur (Houser, 1990).

Berlin (1996) reminds us that "within the current science education reform environment, action research is becoming endorsed as a means to broaden the research base, expand knowledge, and strengthen the impact of research" (p. 73). She continues by stating that "action research promises not only to improve practice, but also to contribute to the professional development of teachers and the professionalization of teaching" (p. 74).

Angelo (1991) has identified three major benefits of participating in classroom research. They are collegiality, positive student response, and intellectual excitement and renewal. In addition, he stated that "teachers found a new outlet for their intellectual energies in Classroom Research. They spoke of being 'revitalized' and 'challenged'..." (p. 14). Angelo also reports that university faculty participating in classroom research report "those faculty who initially found the approach helpful were using it and would likely continue to use it" (p. 122). He reported that one instructor's self-assessment stated that,

"My teaching seems more in depth. I have questioned and changed my own teaching goals. I am more aware of the needs of my students" (p. 122).

The use of action research in specific disciplines of science teaching has increased. Feldman (1999) addresses action research by physics teachers when he states that "It can be argued that all physics teachers, at all levels, including college, should be action researchers, to improve their teaching and to come to a better understanding of their educational situation" (p. 4). He further states that "Action research can, however, be conceptualized in a way that begins with the assumption that all good teachers pay close attention to their teaching, try out new ideas, and evaluate what they have done" (p.4).

Aside from the actual research benefits of action research, White and Klapper (1993) report:

As a result of their action research involvement in their implementation of their own innovations in their own classrooms, teachers' attitudes toward and perceptions of research, development, and evaluation do become more positive. Moreover, they display an increased self-confidence for inquiry and self-reflection on activities in their own classrooms. These teachers develop stronger feelings of personal professionalism in that they come to appreciate the importance of their own capabilities and professional responsibilities for identifying and making the curricular and instructional changes (reforms) needed to move our educational system toward the stature of world-class quality. Thus, teachers can become more deeply immersed in a challenging and increasingly complex profession (p.4).

Action research and effective professional development are strongly connected.

Bybee and Loucks-Horsley (2001) report that:

Effective professional development helps teachers learn and gives them tools for further, often less-formalized learning. One strategy that does both is action research, in which teachers determine what questions they are most interested in

asking about their students' learning and their own teaching and pursue those questions by learning ways of collecting and analyzing data and sharing their results (p.8).

There is a "downside" or a cost to teachers as researchers. Angelo (1991) identifies the "bottom line" costs of action research as time, coverage, and closure. Time, Angelo states, is "the most frequently mentioned 'cost' associated with using Classroom Research" (p. 12). Coverage he defines as "the perceived threat to coverage of course material" (p. 12). Many teachers are concerned that by doing classroom research, they will not be able to fully cover the requirements of the course. The third cost is closure, which Angelo describes as "those largely uncharted territories" of the ambiguity of classroom research data. In other words, what researchers do with the knowledge they have gained as a result of their research" (p. 13).

Yet another "cost" of teacher research is the perceived threat by those outside of teaching, administrators and others, that teachers as researchers will somehow overstep their role as teachers. As Hollingsworth (1992) reports:

Some might worry that the political implications of teacher empowerment and societal reform might lead us to a new and unknown world with unfamiliar epistemological and social norms. Others might be concerned that the growing popularity of the teachers as researchers movement will ensure that it becomes yet another form of power and hierarchy inside schools; becomes mandated, measured, and meaningless to actual improvement of practice; or simply becomes a new process for reproducing existing school structures and societal outcomes... What is clear is that the movement is part of the larger evolution of society into the post-information age--and teachers as researchers are no longer marginally involved (p. 7).

As Hollingsworth stated, society is moving and "teachers as researchers are no longer marginally involved" (p. 7).

The emerging role of teachers as researchers cannot be denied. According to Jarvis (1999), "Practitioner-researchers and their research are a sign of the times. Practitioner-researchers are an intrinsic part of the learning society, responding to the changes with practical knowledge that enables them to cope with the changes" (p. 167).

Summary of Action Research

Action research is a form of research conducted by practitioners on their own practice with the intent of finding ways to improve their practice. One of the goals of action research is a heightened sense of what occurs within one's practice. Through the process of self-reflection, teachers who participate in action research have reported an increase in collegiality, an increase in student learning and an excitement about teaching as a result of the action research process. The costs of action research include the time involved to conduct the research and the perceived or actual loss of instructional time due to conducting the research.

Asynchronous Distance Education

Asynchronous distance learning is "learning which takes place between teacher and learner independent of time and place" (McMullen, D., et al., 1998, p.3). In and of itself, distance learning is not a new approach to teaching. Correspondence courses through the mail, television and radio broadcasts of coursework, as well as the use of two-way interactive video and other technologies are all examples of distance education (The Institute for Higher Education Policy, 1999, p. 9). One specific form of asynchronous learning is the use of a telecommunications system which utilizes

electronic mail and on-line discussion groups. Users of this type of asynchronous distance delivery rely on a computer with some form of internet connection to access a system that serves as the clearinghouse for the course. In the case of the MSSE program, students use a computer and internet connection to contact the Burns Telecommunications Center at Montana State University-Bozeman using a bulletin-board system called MSU-Link. The flexibility of this type of class delivery may be quite appealing to many students (Belcher, 1996, p. 7).

There are numerous reasons why students may choose to participate in asynchronous distance delivery courses. Lacy (1999) identified five leading reasons as "flexibility (a better fit in schedule), work conflicts with on-site schedule, distance from campus, more time with family, and a desire for degree completion" (p. 87). A second report by The Institute for Higher Education Policy (1999) concurs by stating that "The students reported that they chose distance education because of the flexible schedule..." and "Students preferred not to commute and 'enjoyed the luxury' of not having to commit to a specific class meeting time" (p. 15).

According to Bull, Kimball and Stansberry (1998), "learners are more motivated to use computer mediated learning than they are to come to a traditional class" (p. 213). The authors continue to explain that the motivation is derived from the fact that there is "a reduction in external control, and there is usually no direct supervision in asynchronous environments. Hence the learner must take more responsibility, and with responsibility comes motivation" (p. 213). In regard to collegial relationships, Bull, et.al.(1998) note that:

Being part of a community invites belonging. This means that the learners must identify with the community and its goals. Being part of a computer mediated learning team invites belonging as does collaborative/cooperative learning which is focused on learner centered projects (p. 215).

Further, The Institute for Higher Education Policy (1999) reports that "distance learning students also had stronger analytical skills and written communication skills, and were more 'self-directed' than their on-campus counterparts" (p. 15).

Summary of Asynchronous Distance Delivery

Asynchronous distance delivery is a form of instruction that takes place at any time from any place. Asynchronous distance delivery methods have several advantages including the ability to take coursework from remote locations, ability to structure coursework according to one's own personal and professional schedule and to engage in learning that is more learner centered. Further, students in distance education courses may be more motivated, have stronger analytical and written communication skills.

Empowerment

The 1999 Webster's Dictionary defines empowerment as "to give official authority or legal power to; enable; to promote the self-actualization or influence of." As reported by Lichtenstein, McLaughlin, and Knudsen (1991), the term "teacher empowerment" became a common buzz-word in the 1980s. To many, especially policy analysts, it was realized that successful outcomes of educational reform centered in large part on the effectiveness of teachers to implement the reforms. Those who argued for

teacher empowerment often cited a "back-breaking educational bureaucracy" as the menace of the success of educational reform. "Reformers and practitioners alike embraced the concept of teacher empowerment as being fundamental to an enhanced sense of professionalism and, ultimately, to better teaching" (p. 1).

Definitions of teacher empowerment have since emerged from this debate. Lightfoot (1986) defines empowerment in terms of "the opportunities an individual has for autonomy, responsibility, choice, and authority" (p. 9). Lichtenstein et al. (1991) report that empowered "teachers possess an overall confidence in their own judgment, a strong belief in their ability to make intelligent and appropriate decisions in the classroom, and professional self-esteem" (p. 19). Miller (1993) identifies five constructs of empowerment. These constructs are self-reflection, control, collegial relationships, confidence, and instructional strategies.

Linking the Definitions of Empowerment

Reflective practice is the implementation of questioning in which a prepared set of questions is asked in order to provide the respondent opportunities to explore his or her knowledge, attitude, decision-making, experiences, values or beliefs. When the activity is performed on oneself, it is referred to as self-reflection. The process of reflection "relies much more on creating opportunities for respondents to think aloud and construct meaning for themselves" (Lee & Barnett, 1994, p.17). Russell (1994) defines reflection as "related to analyses of the nature of professional knowledge and the ways it is acquired, held and renewed, and it is driven by perspectives on the relationship between

thought and action" (p. 248). The National Science Teacher (NSTA) Standards for Science Teacher Preparation (1998) state that "Commitment to exemplary practice means staying abreast of the latest research in practice, examining one's own teaching, experimenting with new approaches, and sharing insights--in other words, becoming a reflective practitioner.

Control is defined as the ability "to exercise restraining or directing influence over" (Webster Dictionary, 1999). Kincheloe refers to this as "the principle of self direction" for teachers when he states that "Workers/teachers are ultimately their own bosses" (p.4).

Collegial relationships are "a state of affairs existing between those having relations or dealings with an associate in a profession" (Webster Dictionary, 1999). The National Science Education Standards (1996) recognize the need for collegial relationships by stating that "schools must explicitly support reform efforts in an atmosphere of openness and trust that encourages collegiality (p. 222). The Standards (1996) continue, stating that "Collegiality, openness, and trust must be valued; teachers must be acknowledged and treated as professionals whose work requires understanding and ability" (p. 223).

Confidence is "a feeling or consciousness of one's powers or of reliance on one's circumstances" (Webster Dictionary, 1999).

Instructional strategies are "the action, practice, or profession of teaching and the art of devising or employing plans or stratagems toward a goal" (Webster Dictionary, 1999).

