

Taking Action in Science Classrooms Through Collaborative Action Research

A Guide for Educators

Karen Goodnough



SensePublishers

TAKING ACTION IN SCIENCE CLASSROOMS THROUGH COLLABORATIVE
ACTION RESEARCH

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By

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DEDICATION

I dedicate this book to the teachers I have worked with during my career and thank them for affording me the privilege of playing a role in their professional learning.

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INTRODUCTION

I have been a teacher and a teacher educator for 25 years, with 14 of those years as a classroom teacher. From the very early stages of my career as a K-12 teacher, I constantly sought out opportunities to engage in professional development. However, I had never been exposed to collaborative action research. My introduction to collaborative action research occurred during graduate studies and, since that time, I have become a facilitator of collaborative action research, as well as a researcher who examines the potential of collaborative action research to support and enhance teacher learning. Moreover, I have also become an action researcher myself. In the context of my university-based teaching, I have studied my beliefs and practices as they relate to teaching and learning in teacher preparation and graduate education. As a result of these experiences, I have seen first-hand the power of collaborative action research to effect change – in teacher beliefs about teaching and learning, in professional knowledge and practice, in learning environments, and in school and school district policies.

The purpose of this book is to help others develop an understanding of the nature of collaborative action research, when it is helpful or appropriate for teachers or practitioners to engage in collaborative action research, and how to engage in the collaborative action research process. In writing about collaborative action research, I adopt the metaphor of *learning spaces*. Typically, traditional notions of space focus on a particular time or place. While we all occupy physical spaces and sometimes virtual spaces, these are not the only spaces that exist. Spaces are created and exist as a result of individuals' experiences and interactions with others and the environment. Spaces may be formal or informal, and certainly have an impact on learning.

In this book, I examine how collaborative action research can be used to create different types of spaces: problem-posing spaces, problem-solving spaces, meaning-making spaces, and spaces for communicating and disseminating the outcomes of collaborative action research. Action researchers pose problems and examine issues that are relevant to their own practice; they create meaning as they adopt new pedagogies and reflect on how their actions are impacting students and themselves; and they simultaneously create new knowledge while sharing it both locally and publicly. The spaces created through collaborative action research are constantly shifting as teachers uncover, examine, and scrutinize their own beliefs, the beliefs of others, and the research of others. Collaborative action research provides a venue for establishing learning spaces that promote collaboration, reflection, and classroom- and school-based change. In addition, collaborative action research provides a means for teachers to integrate practical wisdom, theory, and experience (Korthagen, 2001). Luenberg and Korthagen (2009) describe practical wisdom as “the sensitivity for and awareness of the essentials of a

INTRODUCTION

particular practice that shapes our perception of the situation, and helps us find possible courses of action. Practical wisdom is not something that is stored in our heads, but is intrinsically connected to specific phenomena occurring in the here-and-now and it only functions well in relation to these phenomena” (p. 227). Perception and awareness are important elements of developing practical wisdom and result in new ways of seeing the world. In contrast, theory is considered to be known and written down, and “involves logical structuring, such as the formulation of definitions and logically derived propositions” (Lunenberg & Korthagen, p. 227). Unlike practical wisdom, theory is not context-bound and is usually generated by university researchers and used by practitioners. Experience, the third component of this triad, is gained by being in the real world, and involves both the environment in which one operates (e.g. classrooms) and one’s inner reality as one connects with the environment. This inner reality includes beliefs, perceptions, know-how and one’s sense of professional identity. In this three-pronged view of teacher learning, practical wisdom, theory, and experience need to interact for learning to occur and for teachers to enhance their practical wisdom.

I offer this book as a set of guidelines to science teachers, teachers of science, teacher educators, or any other educator who would like to develop a greater understanding of the nature of collaborative action research and how to engage in the collaborative action research process. The book is divided into two parts. Part One focuses on helping the reader develop an understanding of collaborative action research, while Part Two presents four cases studies of teachers who have engaged in the action research process.

PART ONE

This part of the book is about the nature of collaborative action research and how to “do” action research. I draw upon my own experiences and insights as a facilitator of action research and as an action researcher, as well as the experiences of numerous teachers who have engaged in the action research process. As a starting point, you may wish to read a case study from Part Two of the book before starting Part One. This will give you an immediate introduction to what action research looks like in a classroom. However, your approach to reading the book will depend on your own personal learning style. Embedded in each chapter in Part One are connections to the case studies, thus providing you with specific examples of how teachers navigated the action research process. As well, at the end of each chapter is a set of reflective questions to guide your thinking as you conceptualize and plan for an action research project.

Chapter 1 provides an introduction to the nature of collaborative action research (the relationship of action research to other types of research, definitions, theoretical underpinnings, the history of action research, and the action research cycle) and its potential to create different types of learning spaces. Chapter 2 explains how to identify an area of focus and develop research questions, as well as how to examine personal beliefs and values about teaching and learning. Chapter 3 outlines how to create a plan of action to guide implementation of an action research project. Ethical actions and issues of rigour in conducting research are also addressed. Chapter 4 introduces data collection methods and sources, and provides insight into how to organize, describe, analyze, and interpret data. Chapter 5 discusses considerations and decisions that need to be made prior to sharing action research outcomes, as well as formats that may be adopted for dissemination. Happy reading!

CREATING LEARNING SPACES

The Nature of Action Research

Learning spaces may be bounded in some instances, such as the walls of a classroom, but they can also assume many other forms (e.g. creating time for individual reflection or establishing a community of learning for a specific purpose). Learning spaces are created as a result of individuals' experiences and interactions with others and the environment. This chapter provides an introduction to action research and its potential to create different types of learning spaces. It situates action research within the broader context of educational research; examines the nature of action research (definitions and theoretical underpinnings); provides a brief history of the development of action research; and describes the action research cycle.

ACTION RESEARCH IN THE CONTEXT OF EDUCATIONAL RESEARCH

As a long-term facilitator of action research, one of my roles is that of teacher. As teachers experience their first encounters with action research, they need to develop a sound understanding of the nature of action research and how to engage in the action research process prior to planning a classroom or school-based project. During early planning sessions with collaborative groups of action researchers, I often ask group members to brainstorm descriptors that reflect their understanding of educational research. Responses typically include words and phrases such as “publishing,” “scientific,” “generating knowledge,” “gathering evidence,” “collecting data,” and “understanding things around us.” Many of these descriptors reflect the essence of educational research. McMillan (2004) defines educational research as “systematic, disciplined inquiry applied to educational problems and settings” (p. 4). Blaxter, Hughes, and Tight (2001) state that all research should be “planned, cautious, systematic, and reliable ways of finding out or deepening understanding” (p. 5). Educational research moves beyond ways of knowing that are based solely on personal experience or sources of knowledge that are idiosyncratic; it involves finding answers to questions or exploring issues through a systematic process of collecting, analysing, and interpreting data or evidence and then drawing conclusions. It can inform decision-making about the educational policies and practices we adopt.

While many research traditions exist and each is informed by particular beliefs about the nature of the world and how we explore and understand it, two broad research traditions have been delineated. Ary, Jacobs and Razavieh (2002) describe quantitative research, one of these traditions, as “objective measurement and statistical analysis of numeric data to understand and explain phenomena,” whereas

qualitative research, the other broad tradition, “focuses on understanding social phenomena from the perspective of the human participants in the study” (p. 22). Quantitative research involves controlled settings, reflecting a philosophical perspective that the social world can be understood in the same way as the physical world. In other words, principles and laws can be discovered and then applied to predict or understand human behavior. In contrast, philosophic perspectives underpinning qualitative research approaches are informed by the notion that social reality is constructed and experienced by individuals in different ways, based on their interactions with others and events and the corresponding meanings that they attach to those events. Quantitative approaches to research in education were prevalent until the 1970s. Today, quantitative and qualitative approaches are well-represented in the research literature, and mixed methods (drawing from both traditions) are often adopted depending on the goals and purposes of a study.

Educational research may also be categorized based on its purposes and how research findings are used. For example, basic research is conducted mainly for the purpose of generating theory that attempts to understand, explain, or establish generalizations. Applied research, unlike basic research, seeks to apply theories and ideas to practical settings in an attempt to solve problems and issues, and to inform decision-making about real world events and phenomena. While most educational research is applied, some researchers do engage in basic research. Action research is considered a form of applied research that may be adopted to examine specific issues or address problems that are classroom-, school-, or society-based.

THE NATURE OF ACTION RESEARCH

A review of the literature on action research finds numerous definitions. The following represent how several authors conceptualize action research. It is:

a process by which practitioners attempt to study their problems scientifically in order to guide, correct, and evaluate their decisions and actions (Corey, 1962, p. 6).

any systematic inquiry conducted by teacher researchers, principals, school counselors, or other stakeholders in the teaching/learning environment to gather information about how their particular schools operate, how they teach, and how well their students learn. This information is gathered with the goals of gaining insight, developing reflective practice, effecting positive changes in the school environment (and on educational practices in general), and improving student outcomes and the lives of those involved (Mills, 2003, p. 5).

a form of self-reflective inquiry undertaken by participants (teachers, students, or principals, for example) in social (including educational)

situations in order to improve the rationality and justice of (a) their own social or educational practices, (b) their understanding of these practices, and c) the situations (and institutions) in which these practices are carried out (Carr & Kemmis, 1986, p. 162).

a substantive act with a research procedure; it is action disciplined by inquiry, a personal attempt at understanding while engaged in a process of improvement and reform (Hopkins, 2002, p. 42).

used in almost any setting where a problem involving people, tasks and procedures cries out for a solution, or where some change of feature results in a more desirable outcome (Cohen, Manion & Morrison, 2007, p. 297).

These definitions share a number of commonalities. Action research is systematic, intentional research that is carried out by practitioners themselves and is not imposed by others. It is insider research in the sense that those directly involved in the situation take action to improve their own practice and their understanding of that practice, while resolving problems. It involves an “ethical commitment to improving society (to make it more just), improving ourselves (that we may become more conscious of our responsibility as members of a democratic society), and ultimately improving our lives together (building community)” (Holly, Arhar, & Kasten, 2005, p. 31).

As you read more and more about action research, you will find varying labels for action research (e.g. classroom-based action research, participatory action research, school-wide action research, individual-researcher action research). These reflect different purposes and theoretical foundations of action research. Because of the plethora of conceptions of action research, Rearick and Feldman (1998) developed a framework as a guide to understanding the multi-faceted nature of action research. In reviewing the many models and categories of action research, they proposed that action research be viewed as a space with three dimensions: theoretical orientation, purpose, and reflection. Building on the work of other authors (Carr & Kemmis, 1986; Grundy, 1987; Habermas, 1971), they describe three orientations: technical, practical, and emancipatory. The technical orientation involves control. External researchers or individuals with special expertise determine the research questions; and the focus is product-oriented and on determining effective practices. Because the research is directed by others, practitioners may not take ownership or “buy in” to the research. The practical orientation, on the other hand, is focused on understanding particular contexts, such as school and classroom events, through group reflection and consensual meaning-making. Critical orientations are concerned with issues of power, and finding ways and means through research to empower individuals and groups to effect societal change.

In terms of the purpose of action research, Rearick and Feldman, drawing upon the work of Noffke (1997), articulated three broad foci: a) personal growth

(developing new insights into one's own professional knowledge and practice), b) professional understanding (teacher development and generation of new knowledge in the area of teaching and learning), and c) political empowerment (becoming aware of economic, social, gender, and racial inequities and directing social action to overcome these inequities).

The third dimension involves various forms of reflection (autobiographical, collaborative, and communal). Autographical reflection focuses on the researcher's personal introspection about beliefs, perspectives, and actions. As the reflection becomes more public, it becomes collaborative where groups of individuals pose questions that move beyond the self. In this form of reflection, there is a move towards understanding the actions of others and how the self is constructed in relation to the social context. Communal reflection then situates the self in relation to the broader society and issues such as social justice. Public meaning is achieved through public debate and dialogue.

In chapters 6 to 9, four cases studies of teachers engaging in action research are presented. I invite you to read and examine one or all cases from the perspective of the Rearick and Feldman framework. What orientation to action research is reflected? What are the primary goals of the research and what types of reflection are utilized by the teacher action researchers?

ACTION RESEARCH: A BRIEF HISTORY

Kurt Lewin is generally given credit for coining the term action research (Lewin, 1946). Lewin believed action research provided a means to solve practical social problems, to improve social conditions, and to "discover 'general laws of group life'" (Peters & Robinson, 1984, p. 115). Throughout the 1950s, action research in education continued to be championed through the work of Stephen Corey. According to Corey (1953), practitioners were pivotal to the improvement of curriculum through investigating their own problems and concerns. Near the end of the decade, action research moved into the background as the focus on rationalist approaches to curriculum development became entrenched. There was limited tolerance for a form of research (action research) that recognized the key role of educators in the development of curriculum and the creation of educational theory. Later, in the 1970s, action research gained momentum again through the work of Lawrence Stenhouse. For the betterment of schools, he believed "curriculum research and development ought to belong to the teacher ... [and] is based on the study of classrooms. It thus rests on the work of teachers" (Stenhouse, 1975, pp. 142-143). His work was supported and developed through the efforts of John Elliott and Clem Adelman in the Ford Teaching Project (Elliott, 1976-1977).

In the past three decades, educational action research has grown in popularity and is being adopted and promoted by many educators, including K-12 teachers, school and school district administrators, and university researchers, as a means to effect change. Many action research resources are available, including:

- *The Ontario Action Researcher* at <http://www.nipissingu.ca/oar/>
This is an electronic peer-reviewed journal that targets the work of elementary, secondary, and university teachers.
- *The Collaborative Action Research Network (CARN)* at <http://www.did.stu.mmu.ac.uk/carnnew/>
This network supports action research through the publication of action research projects from many disciplines (education, health, etc.) and by providing a forum for engaging in critical dialogue about many aspects of action research.
- *Educational Action Research* at <http://www.tandf.co.uk/journals/titles/09650792.asp>
This refereed international journal publishes reports of a variety of action research and related studies in education and across many professions.

A quick search of the Internet or your local library databases will reveal many other resources and materials related to action research.

THE ACTION RESEARCH CYCLE

Now that you have had an opportunity to situate action research within the context of educational research, and to consider the characteristics of action research, we will explore the action research cycle. We will ask, how do practitioners carry out action research, thus creating spaces for learning? The action research process is typically represented as a cycle or spiral involving a number of stages, although the number of stages may vary. For example, Lewin's approach to action research, as described by McKernan (1991), starts with

a general idea or difficult problem requiring resolution. This is followed by further fact-finding ... resulting in an overall plan of how to solve the problem. This planned action is implemented, and monitored in an attempt to evaluate the effectiveness of the first action step, to plan the next step and to modify the 'overall plan' ... The researcher then spirals into developing a second and possibly further action steps (p. 18).

Others have described the action research cycle in a similar manner. Stringer (2004) presented the action research process as involving a) research design (defining, exploring, and framing the issue; conducting a review of the literature; checking the validity and ethics of the work), b) data gathering (using a variety of techniques and sources), c) data analysis (identifying key features of the experiences), d) communication (dissemination of the outcomes), and e) action (using the outcomes of a project to work towards a resolution to the issue).

In chapters 2 to 5, the steps in the action research cycle will be discussed in more detail (see Figure 1). The initial step involves identifying an issue or problem, thus linking an action with an idea. For example, teachers may wish to explore the reasons for students' lack of engagement in learning science. After identifying the

problem, the researcher then explores the nature of the problem, generating ideas about how the problem or issue can be addressed. This step is referred to as *reconnaissance* (Elliott, 1991), describing and explaining the facts of the situation or context. Once the action research group has clarified the idea or problem, a “plan of action” is established – how will data be collected and how will the implementation of the plan be monitored. Next, the group analyzes the results of the implementation, and states conclusions. Data analysis should not only occur at the end of data collection, but also throughout the entire implementation process. If the plan has not resulted in positive change (e.g. students have not become more engaged in science class), then the plan may be revised and further implementation may occur. All stages of the action research cycle require the group to engage in monitoring, reflecting, and evaluating.

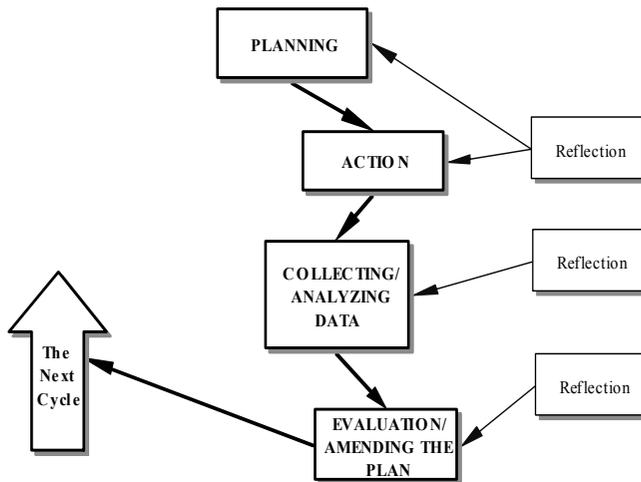


Figure 1. The action research cycle.

Chapter 6 describes the experiences of a colleague of mine, Katrina, as she completed an action research project. The following summarizes how she engaged in the action research process:

– Issue or Problem

Katrina wanted to shift her approach to teaching science from teacher-directed to being student-directed.

– Research Focus

Katrina adopted a webquest to create an inquiry-oriented learning environment for her grade one students.

– Research Questions

How does a webquest engage students in learning?

How does using a webquest influence the role of both the teacher and the student in the science classroom?

– Plan of Action

This involved collaboration with two other teacher researchers. Katrina engaged in web-based research and completed a literature review; adapted an existing webquest for use in her classroom; integrated the webquest into a unit on *Living Things*; developed and/or selected appropriate assessment tools and learning activities; considered ethical issues; sent a letter to parents about the action research project; developed a timeline for implementation; and selected data collection sources and methods.

– Implementation

Katrina implemented five lessons to engage students in inquiry through a webquest.

– Data Collection

Data collection methods and sources included classroom observational notes, a parent survey (baseline data collected prior to implementation), student-generated work, a student survey, and teacher reflective journal entries.

– Data Analysis

This was ongoing during implementation, but was more intensive at the end of implementation. Katrina looked for evidence of changes in student learning. She tabulated frequencies of responses from parent and student surveys, examined student work and compared observational notes and survey responses to look for common themes related to student behaviors, and analyzed her reflective journal entries to examine changes in her own classroom behaviors and beliefs about teaching.

– Revised Plan of Action

Katrina continues to use the webquest and is refining her teaching through inquiry. In addition, she recognizes the need to provide students with more consistent feedback and to elicit more response from them about how they are learning through webquests.

Engaging in the action research process provides a means for teachers to view themselves differently and to adopt an inquiry stance to their teaching (Cochran-Smith & Lytle, 2001). Approaches to action research that are teacher-centred,

CHAPTER 1

teacher-driven, and afford teachers opportunities to situate themselves as knowledge-creators and inquirers (Carson & Sumara, 1997) have the potential to positively impact teaching and learning and can greatly influence the teaching profession.

QUESTIONS FOR REFLECTION

- How is action research different from your current practice of reflection?
- Why would collaboration be an important element of action research?
- Identify an issue or concern you would like to explore in your own classroom.
How would you use action research to explore this problem?

PROBLEM-POSING SPACES

Identifying an Area of Focus

Before crafting a plan for engaging in action research, you need to identify an area of focus – a concern, issue, or problem. The area of focus will define the project and shape how it will be implemented. In this chapter, you will develop an understanding of how to: a) identify an area of focus, b) examine how it relates to your beliefs and values about teaching and learning, and c) craft specific research questions based on an identified area of focus. This initial stage in the action research process fosters the development of spaces for problem-posing where you can identify and pursue questions that are relevant and meaningful to you in the context of your classroom and school.

IDENTIFYING AN AREA OF FOCUS

One of the most critical aspects of the action research process is identifying an area of focus. Sometimes teachers start an action research project with a particular focus already identified. For example, a school-based group of three junior high teachers that I worked with two years ago formed an action research project with an established area of focus. For several years, these teachers had been using slide shows, which incorporated text, graphics, applets, animations, and interactive activities, and they wanted to demonstrate the positive impact this pedagogical approach was having on their students' learning. In other instances, it may be far more challenging to identify an area of focus.

Most of the teachers I have supported in action research projects have typically started the process without an area of focus. The teachers described in the case studies in chapters 6 to 9, for example, were all new to action research; thus they identified a research focus after they understood the nature of action research and how to engage in the process. So, while teachers have many interests, and certainly have numerous questions and concerns about their teaching and student learning, selecting a specific focus requires careful thought and consideration. When selecting a focus or topic, you should consider the following questions:

– Have you chosen a topic that focuses on teaching and learning?

CHAPTER 2

- Does the topic focus on your own work?
- Are you passionate about your topic of choice?
- Does the identified topic focus on something you wish to change or improve?
- Have you chosen a topic that is manageable, considering your time, energy, and resources?

In Chapter 8, which describes the action research experiences of Arlene, Ernie, and Lisa, identifying an area of focus was one of the biggest challenges for this school-based group. They wanted to broaden their teaching repertoires and adopt a new approach that would challenge them, as well as engage students in a new way of learning. Moving from this very broad notion, and with the help of some other members of the larger action research group, we brainstormed a list of classroom approaches. A graphic organizer, concept maps, appealed to the three teachers as a possible option that would “breathe some life” into their approach to teaching science. They became passionate about the topic as they learned more about the nature of concept mapping and its possible pedagogical potential. The teachers felt it would be feasible to explore this topic and incorporate it into their science curriculum over a period of several months.

As a facilitator of action research, one of my cautions has always been that groups need to start small and create plans of action that are manageable. It has been my experience that many teachers often become very zealous about their new projects and, consequently, have a tendency to plan a project that is far too large in scope. While it may be challenging to identify an area of focus, there are a number of reflective exercises that can be used to facilitate the process. For example, Holly, Arhar, and Kasten (2005) describe five lenses that may be used to assist in selecting an area of focus:

- Examining the needs of an individual student (Why is Sara so quiet in science class?)
- Focusing on a small group of students in a classroom (Why are these students performing so poorly in science? How can I help these students develop a better understanding of the relationship among voltage, current, and resistance?)
- Studying an area in the curriculum that affects an entire class or a number of classes (How can we engage students in more student-directed inquiry in our biology classes?)
- Addressing larger issues (Why are so few students enrolling in physics courses in high school?)
- Examining social issues (How can we address the issue of bullying in our school?).

The authors suggest that action researchers use these different perspectives simultaneously, viewing events and phenomena from both a broad and a more focused perspective when indentifying an area of focus.

In my own work with action researchers, many of whom have focused on classroom teaching and learning, I have found the work of Fichtman-Dana and Yendol-Silva (2003) to be very helpful. After analyzing over 100 teacher inquiry projects, these authors identified eight distinct passions or areas of foci that were represented in teachers' research. These are described in Table 1.

Table 1. Areas of focus in action research and ways to identify them.

Passion or Area of Focus	Examples	Activity to explore this passion
Helping an Individual Child	<p>How can I help a student understand a particular topic in science?</p> <p>How can I encourage this child to participate more in classroom activities?</p>	<p>Generate a list of the students in your class. Note next to the name of each child how each child is unique and/or note whether each child is experiencing a challenge in your classroom.</p>
Improving or Enriching the Curriculum	<p>How can I make the unit on <i>Living Things</i> more inquiry-based?</p> <p>How can I design a science unit that integrates language arts and social studies?</p>	<p>Meet with a program specialist to discuss changes that will be introduced in the curriculum in the near future. Craft a research project that connects to one of the suggested changes.</p> <p>Generate a list of topics or units that you would like to change. Why were you dissatisfied with them in previous implementations?</p>
Developing Content Knowledge	<p>I am uncomfortable with teaching the upcoming unit on electricity. How can I increase my understanding of the key concepts and principles in this unit?</p>	<p>Generate a list of topics of which you feel you would like to enhance your understanding. Prioritize the list, noting the topics and areas in which you feel you need to augment</p>

		or enhance your subject matter knowledge.
Improving or Experimenting with Routines or New Teaching Strategies or Techniques	<p>While I incorporate questioning into my lessons, I would like to ensure I ask higher level thinking questions. How can I do this?</p> <p>This approach (problem-based learning) seems to have the potential to enhance student problem-solving skills, while promoting collaborative learning. How can I use this approach to promote both of these goals?</p>	<p>Draft a list of teaching strategies you would like to try and state a reason for your desire to try each. Now, write a question that connects the strategy and your reason.</p>
Examining the Relationship between Beliefs and Classroom Practice	<p>It is important to me that students not only understand scientific concepts and principles, but that they also develop an appreciation for how scientific knowledge is generated. Unfortunately, I devote very little time to this in the curriculum. How can I change my classroom planning and practice such that I have a more focused emphasis on promoting and understanding of the nature of science?</p>	<p>Keep an ongoing reflective journal of classroom events. Identify ways you might respond differently to these events. What beliefs underpin how you reacted and what beliefs underpin how you might act differently in a particular situation?</p>
Examining the Intersection between Personal and Professional Identities	<p>I am very passionate about music and perform on the weekends on a regular basis. How can I use this passion to make</p>	<p>Develop a timeline of your growth as a person and as a teacher.</p> <p>Connect a personal</p>

	my science classes more engaging for students?	passion to your classroom practice.
Advocating Social Justice (exploring questions of race, class, gender, or disability)	How can I incorporate examples and analogies into my science classroom that are more gender inclusive? Analyze existing resources to determine the perspectives reflected as they relate to diversity.	Keep a journal that focuses on a particular subset of your students (e.g. race, gender, etc.). Based on your observations, how do these students experience schooling? If inequities exist, how can you make learning opportunities more accessible to these students?
Understanding the Teaching and Learning Context	My school district has adopted standardized testing in science courses. How can I prepare students for these examinations while promoting student-centred teaching practices?	Brainstorm a list of contextual issues (e.g. large class size) that may impact your classroom practice or school functioning. How can each be addressed or changed?

In identifying an area of focus, it is always important to talk about your interests and possible topics with colleagues. If you are part of a school-based group that is exploring a common topic, then you have an immediate forum for sharing ideas and reflection. Furthermore, this discussion and collaboration can be extended to other school-based colleagues or those from other schools, as well as critical friends such as university researchers or other experienced facilitators of action research. Costa and Kallick (1993) describe a critical friend as “a trusted person who asks provocative questions, provides data to be examined through another lens, and offers critique of a person’s work as a friend” (p. 50). Critical friends can play a valuable role at many stages in the action research process, from assisting with identification of a focus area, providing feedback on the design of the action research plan, to offering advice on data collection and analysis.

INTERROGATING THE AREA OF FOCUS (RECONNAISSANCE)

Once an area of focus has been identified, it is important to find out more about the topic, and to develop an understanding of the area of focus in connection to your

own beliefs, values, and teaching practices. This step in the action research process is referred to as *reconnaissance* and involves reflecting on what you already know about the area (self-understanding and the context), as well as reviewing what others know about the area (literature and research). Issues and questions that should be considered include:

– Self-Understanding

As a starting point, you need to examine your own beliefs and values about teaching and learning in relation to the area of focus. Why have you chosen this topic? How does it fit with your current classroom practices? How does it fit with the context of your classroom and school? For example, in Chapter 9, the teacher action research group, consisting of five primary and elementary teachers, pursued a shared inquiry focused on adopting problem-based learning (PBL). Initially, the teachers wished to examine how PBL affects student achievement in their classrooms. After reflection about the science program and the lack of student excitement and/or lack of interest in science classes, they shifted their focus to examine how the adoption of PBL could foster student engagement and interest in learning science.

– The Context

With any area of focus, you need to be aware of your starting point. You need to determine if you can act on the issue and if you can realistically effect change and make improvements. Mills (2003) suggests that action researchers describe the situation by addressing the “who, what, when, where, and how” as it relates to the area of focus. During reconnaissance, the teachers described in Chapter 9 posed these questions: Which students are not engaged in learning science? Are some groups engaged while others are not? What is our evidence that a lack of engagement in science is an issue? How often do we have science class? Where is science class held? Do we utilize different learning settings in science (classroom-based, informal learning environments, virtual environments)? How do we structure science inquiry in our classrooms? Is it mainly teacher-directed? How do we encourage students to take responsibility for their own learning?

– What Others Know about the Area of Focus

Ascertaining what others know about the area is a crucial part of reconnaissance. Consulting with teachers, university researchers, community-based professionals, or other educators who have completed work on your proposed topic can be extremely informative. A wealth of information can be garnered through reviewing the literature (internet sites, practitioner and professional journals, and professional books). If you know very little about the area of focus, you may need to tackle general readings first and then move on to more specific literature. During this stage, you are not only learning about your

topic, but you are also interrogating the literature! You are examining ideas and research from a critical perspective, and connecting theories and empirical research to your own experiences and emerging understandings.

DEVELOPING RESEARCH QUESTIONS

Once you have engaged in reconnaissance, you are ready to draft a research question or set of research questions to which you wish to find answers. You should start by drafting an open-ended question(s) that reflects the purpose of your study. The following are examples of research questions generated by the teachers described in chapters 6 to 9 of this book.

– Katrina (Grade one teacher)

Broad Questions: How does a webquest engage students in learning? How does using a webquest influence the role of both the teacher and the student in the science classroom?

– Arlene, Ernie, Lisa (Primary/elementary teachers)

Broad Question: How do we use the concept mapping tool to improve teaching and learning in the elementary science classroom?

Specific questions: What is concept mapping? How do we teach concept mapping to children? How do we assess concept maps? How do teachers view concept maps? What are students' perceptions of concept mapping? Do they like it? What are some advantages/disadvantages of concept mapping?

– Lana (Junior high science teacher) and Sonja (Junior high art teacher)

Broad question: How will the integration of art and science affect student learning in a simple machines science unit?

Specific questions: What are the most feasible approaches for incorporating art into the science curriculum? How will participation in a student-centred unit, with a focus on integrating art and science, affect student engagement in learning science? How will participation in a student-centred unit, with a focus on integrating art and science, impact student understanding of concepts and principles in a unit on simple machines?

– Deidre, Lois, Judi, Nancy, and Samantha (Primary/elementary teachers)

Broad Questions: How does the adoption of PBL engage all students in my classroom? What are the roles of teachers and students in PBL environments?

Questions may be open-ended and include both broad and specific questions. When phrasing the questions, identify the expected outcomes of your research.

CHAPTER 2

Moreover, drafting a set of clear questions will help you to determine if you have a feasible path for moving forward with your plan of action.

QUESTIONS FOR REFLECTION

- Use one of the lenses or several in Table 1 to explore a possible idea (focus area) for an action research project.
- Develop a broad research question, based on the outcomes of the previous exercise.
- Write responses to the questions posed in the self-understanding stage of “Interrogating the Area of Focus” in relation to the focus you identified.
- Write responses to the questions posed in the context stage of “Interrogating the Area of Focus” in relation to the focus you identified.