Research Methods and Statistics in Physical Education

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Armel Dawson

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PREFACE

Physical education, also known as Phys Ed., PE, Gym, or Gym class, and known in many Commonwealth countries as physical training or PT, is an educational course related of maintaining the human body through physical exercises (i.e. calisthenics). It is taken during primary and secondary education and encourages psychomotor learning in a play or movement exploration setting to promote health. Statistics in physical education is the practice of teaching and learning of statistics, along with the associated scholarly research. Statistics is both a formal science and a practical theory of scientific inquiry, and both aspects are considered in statistics physical education. Physical Education in statistics has similar concerns as does education in other mathematical sciences, like logic, mathematics, and computer science. At the same time, statistics is concerned with evidence-based reasoning, particularly with the analysis of data. Therefore, physical education in statistics has strong similarities to education in empirical disciplines like psychology and chemistry, in which education is closely tied to "hands-on" experimentation..

– Armel Dawson

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Introduction

MEANING

Research comprises "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humans, culture and society, and the use of this stock of knowledge to devise new applications." It is used to establish or confirm facts, reaffirm the results of previous work, solve new or existing problems, support theorems, or develop new theories. A research project may also be an expansion on past work in the field.

To test the validity of instruments, procedures, or experiments, research may replicate elements of prior projects, or the project as a whole. The primary purposes of basic research (as opposed to applied research) are documentation, discovery, interpretation, or the research and development (R&D) of methods and systems for the advancement of human knowledge. Approaches to research depend on epistemologies, which vary considerably both within and between humanities and sciences. There are several forms of research: scientific, humanities, artistic, economic, social, business, marketing, practitioner research, life, technological, *etc.*

DEFINITION

Research has been defined in a number of different ways.

- A broad definition of research is given by Godwin Colibao - "In the broadest sense of the word, the definition of research includes any gathering of data, information and facts for the advancement of knowledge."

- Another definition of research is given by Creswell who states that - "Research is a process of steps used to collect and analyze information to increase our understanding of a topic or issue". It consists of three steps: Pose a question, collect data to answer the question, and present an answer to the question.
- The Merriam-Webster Online Dictionary defines research in more detail as "a studious inquiry or examination; especially investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws".

NATURE

The research process is, for many of us, just the way we do things. We research the best buys in cars and appliances, we research book reviews before shopping for books, we research the best schools for our children and ourselves, and we probably perform some kind of research in our jobs. Our search for information may lead us to interview friends or other knowledgeable people; read articles in magazines, journals, or newspapers; listen to the radio; search an encyclopedia on CD-ROM; and even explore the Internet and World Wide Web for information. We use our local public libraries and our school libraries.

Research can be a way of life; it is the basis for many of the important decisions in our lives. Without it, we are deluged with information, subjected to the claims of advertisers, or influenced by hearsay in making sense of the world around us. This informal, experiential research helps us decipher the flood of information we encounter daily. Formal academic research differs from experiential research and may be more investigative in nature. For example, it may require us to learn about an area in which we have little knowledge or inclination to learn. It may be library-oriented or field-oriented, depending on the nature of the research.

Academic research, like the everyday research we do, is associated with curiosity and intellectual discovery. The writing associated with academic research is demanding and challenging, with a methodology and discipline all its own. Although many of the concepts and processes of research are generic, academic research is discipline-specific and demands a more rigorous methodology. This chapter presents the methodology of academic research, many of the generic processes of research writing, and suggestions for applying the concepts to various disciplines. The chapter ends with a brief look at the structure of a research paper.

SCOPE AND IMPORTANCE OF RESEARCH IN PHYSICAL EDUCATION

Physical education plays a part in the lives of almost all children and young people's education around the world. If the physical education experiences of those young people

are to be positive and effective, then we need to know something about how it is taught, who is teaching it, what is being taught and how it can be improved.

In doing so, we can make a contribution to improvements in education, schooling, teaching and learning. Physical education can challenge and inspire. It can lead to life changes in terms of improved health, learning achievements and the development of positive relationships. While traditionally a subject in the curriculum our interests go beyond this to include extra-curricular activities associated with Physical Education such as field trips and sports clubs.

Researchers within the Physical Education Research Forum aim to engage in research that enhances our understanding of what effective teaching and learning is so that current policy, practice and professional development can be improved, challenged and even transformed.

Current policies in many countries around the world, views physical education in both primary and secondary schools as a logical site for the provision of opportunities for children and young people to be physically active. Furthermore, PE teachers are increasingly tasked with the responsibility to educate students about ways to lead a healthy and activity lifestyle. This logic is directly associated with global health concerns about the prevalence of chronic conditions such as cardiovascular disease and other major health risks related to sedentary lifestyle and obesity.

PE is associated with health and wellbeing, as a primary site for student engagement in the development of knowledge and understanding of issues related to health. Consequently, researchers within the Physical Education Research Forum aim to better understand this position for PE and what it means for teaching, learning and student experience. Importantly, group members also aim to challenge this position for PE, question the extent to which PE and PE teachers should be responsible for developing students' physical health, and the extent to which current practice in PE can improve children and young people's social, emotional and mental health.

CLASSIFICATION OF RESEARCH: BASIC, APPLIED AND ACTION RESEARCH, LOCATION OF RESEARCH PROBLEM, CRITERIA FOR SELECTION OF A RESEARCH PROBLEM AND QUALITIES OF GOOD RESEARCHERS

Research comes in many shapes and sizes. Before a researcher begins to conduct a study, he or she must decide on a specific type of research. Good researchers understand the advantages and disadvantages of each type, although most end up specializing in one.

For classification of research we shall look from four dimensions:
1. The purpose of doing research;

2. The intended uses of research;

3. How it treats time *i.e.,* the time dimension in research; and

4. The research (data collection) techniques used in it.

The four dimensions reinforce each other; that is, a purpose tends to go with certain techniques and particular uses. Few studies are pure types, but the dimensions simplify the complexity of conducting research.

PURPOSE OF DOING RESEARCH

If we ask someone why he or she is conducting a study, we might get a range of responses: "My boss told me to do"; "It was a class assignment"; "I was curious." There are almost as many reasons to do research as there are researches. Yet the purposes of research may be organized into three groups based on what the researcher is trying to accomplish - explore a new topic, describe a social phenomenon, or explain why something occurs. Studies may have multiple purposes (*e.g.,* both to explore and to describe) but one purpose usually dominates.

EXPLORATORY/FORMULATIVE RESEARCH

You may be exploring a new topic or issue in order to learn about it. If the issue was new or the researcher has written little on it, you began at the beginning. This is called *exploratory research.* The researcher's goal is to formulate more precise questions that future research can answer. Exploratory research may be the first stage in a sequence of studies. A researcher may need to know enough to design and execute a second, more systematic and extensive study.

Initial Research Conducted to Clarify the Nature of the Problem

When a researcher has a limited amount of experience with or knowledge about a research issue, exploratory research is useful preliminary step that helps ensure that a more rigorous, more conclusive future study will not begin with an inadequate understanding of the nature of the management problem. The findings discovered through exploratory research would the researchers to emphasize learning more about the particulars of the findings in subsequent conclusive studies. Exploratory research rarely yields definitive answers. It addresses the "what" question: "what is this social activity really about?" It is difficult to conduct because there are few guidelines to follow. Specifically there could be a number of goals of exploratory research.

Goals of Exploratory Research:

1. Become familiar with the basic facts, setting, and concerns;

2. Develop well-grounded picture of the situation;

3. Develop tentative theories, generate new ideas, conjectures, or hypotheses;

4. Determine the feasibility of conducting the study;

5. Formulate questions and refine issues for more systematic inquiry; and

6. Develop techniques and a sense of direction for future research.

For exploratory research, the researcher may use different sources for getting information like,

- Experience surveys,
- Secondary data analysis,
- Case studies, and
- Pilot studies.

As part of the experience survey the researcher tries to contact individuals who are knowledgeable about a particular research problem. This constitutes an informal experience survey. Another economical and quick source of background information is secondary data analysis. It is preliminary review of data collected for another purpose to clarify issues in the early stages of a research effort. The purpose of case study is to obtain information from one or a few situations that are similar to the researcher's problem situation. A researcher interested in doing a nationwide survey among union workers, may first look at a few local unions to identify the nature of any problems or topics that should be investigated. A pilot study implies that some aspect of the research is done on a small scale. For this purpose focus group discussions could be carried out.

DESCRIPTIVE RESEARCH

Descriptive research presents a picture of the specific details of a situation, social setting, or relationship. The major purpose of descriptive research, as the term implies, is to describe characteristics of a population or phenomenon. Descriptive research seeks to determine the answers to *who, what, when, where*, and *how* questions. Labour Force Surveys, Population Census, and Educational Census are examples of such research. Descriptive study offers to the researcher a profile or description of relevant aspects of the phenomena of interest. Look at the class in research methods and try to give its profile - the characteristics of the students. When we start to look at the relationship of the variables, then it may help in diagnosis analysis.

Goals of Descriptive Research:
1. Describe the situation in terms of its characteristics *i.e.,* provide an accurate profile of a group;
2. Give a verbal or numerical picture (%) of the situation;
3. Present background information;
4. Create a set of categories or classify the information;
5. Clarify sequence, set of stages; and
6. Focus on 'who,' 'what,' 'when,' 'where,' and 'how' but not why?

A great deal of social research is descriptive. Descriptive researchers use most data -gathering techniques - surveys, field research, and content analysis

EXPLANATORY RESEARCH

When we encounter an issue that is already known and have a description of it, we might begin to wonder *why* things are the way they are. The desire to know "why," to

explain, is the purpose of *explanatory research*. It builds on exploratory and descriptive research and goes on to identify the reasons for something that occurs. Explanatory research looks for causes and reasons. For example, a descriptive research may discover that 10 percent of the parents abuse their children, whereas the explanatory researcher is more interested in learning *why* parents abuse their children.

Goals of Explanatory Research:

1. Explain things not just reporting. Why? Elaborate and enrich a theory's explanation.
2. Determine which of several explanations is best.
3. Determine the accuracy of the theory; test a theory's predictions or principle.
4. Advance knowledge about underlying process.
5. Build and elaborate a theory; elaborate and enrich a theory's predictions or principle.
6. Extend a theory or principle to new areas, new issues, new topics:
7. Provide evidence to support or refute an explanation or prediction.
8. Test a theory's predictions or principles.

THE USES OF RESEARCH

Some researchers focus on using research to advance general knowledge, whereas others use it to solve specific problems. Those who seek an understanding of the fundamental nature of social reality are engaged in basic research (also called academic research or pure research or fundamental research). Applied researchers, by contrast, primarily want to apply and tailor knowledge to address a specific practical issue. They want to answer a policy question or solve a pressing social and economic problem.

BASIC RESEARCH

Basic research advances fundamental knowledge about the human world. It focuses on refuting or supporting theories that explain how this world operates, what makes things happen, why social relations are a certain way, and why society changes. Basic research is the source of most new scientific ideas and ways of thinking about the world. It can be exploratory, descriptive, or explanatory; however, explanatory research is the most common.

Basic research generates new ideas, principles and theories, which may not be immediately utilized; though are the foundations of modern progress and development in different fields. Today's computers could not exist without the pure research in mathematics conducted over a century ago, for which there was no known practical application at that time.

Police officers trying to prevent delinquency or counselors of youthful offenders may see little relevance to basic research on the question, "Why does deviant behaviour occur?" Basic research rarely helps practitioners directly with their everyday concerns.

Nevertheless, it stimulates new ways of thinking about deviance that have the potential to revolutionize and dramatically improve how practitioners deal with a problem. A new idea or fundamental knowledge is not generated only by basic research. Applied research, too, can build new knowledge. Nonetheless, basic research is essential for nourishing the expansion of knowledge. Researchers at the center of the scientific community conduct most of the basic research.

APPLIED RESEARCH

Applied researchers try to solve specific policy problems or help practitioners accomplish tasks. Theory is less central to them than seeking a solution on a specific problem for a limited setting. Applied research is frequently a descriptive research, and its main strength is its immediate practical use.

Applied research is conducted when decision must be made about a specific real-life problem. Applied research encompasses those studies undertaken to answer questions about specific problems or to make decisions about a particular course of action or policy.

For example, an organization contemplating a paperless office and a networking system for the company's personal computers may conduct research to learn the amount of time its employees spend at personal computers in an average week.

BASIC AND APPLIED RESEARCH COMPARED

The procedures and techniques utilized by basic and applied researchers do not differ substantially. Both employ the scientific method to answer the questions at hand. The scientific community is the primary consumer of basic research. The consumers of applied research findings are practitioners such as teachers, counselors, and caseworkers, or decision makers such as managers, committees, and officials.

Often, someone other than the researcher who conducted the study uses the results of applied research. This means that applied researchers have an obligation to translate findings from scientific technical language into the language of decision makers or practitioners. The results of applied research are less likely to enter the public domain in publications. Results may be available only to a small number of decision makers or practitioners, who decide whether or how to put the research results into practice and who may or may not use the results.

Applied and basic researchers adopt different orientations towards research methodology. Basic researchers emphasize high standards and try to conduct near-perfect research. Applied researchers make more trade-offs. They may compromise scientific rigour to get quick, usable results. Compromise is no excuse for sloppy research, however. Applied researchers squeeze research into the constraints of an applied setting and balance rigour against practical needs. Such balancing requires an in-depth knowledge of research and an awareness of the consequences of compromising standards.

TYPES OF APPLIED RESEARCH

Practitioners use several types of applied research. Some of the major ones are:

- *Action research:* The applied research that treats knowledge as a form of power and abolishes the line between research and social action. Those who are being studied participate in the research process; research incorporates ordinary or popular knowledge; research focuses on power with a goal of empowerment; research seeks to raise consciousness or increase awareness; and research is tied directly to political action. The researchers try to advance a cause or improve conditions by expanding public awareness. They are explicitly political, not value neutral. Because the goal is to improve the conditions of research participants, formal reports, articles, or books become secondary. Action researchers assume that knowledge develops from experience, particularly the experience of social-political action. They also assume that ordinary people can become aware of conditions and learn to take actions that can bring about improvement.

- *Impact Assessment Research*: Its purpose is to estimate the likely consequences of a planned change. Such an assessment is used for planning and making choices among alternative policies - to make an impact assessment of Basha Dam on the environment; to determine changes in housing if a major new highway is built.

- *Evaluation Research*: It addresses the question, "Did it work?" The process of establishing value judgment based on evidence about the achievement of the goals of a programme. Evaluation research measures the effectiveness of a programme, policy, or way of doing something. "Did the programme work?" "Did it achieve its objectives?" Evaluation researchers use several research techniques (survey, field research).

Practitioners involved with a policy or programme may conduct evaluation research for their own information or at the request of outside decision makers, who sometime place limits on researchers by setting boundaries on what can be studied and determining the outcome of interest. Two types of evaluation research are formative and summative. *Formative evaluation* is built-in monitoring or continuous feedback on a programme used for programme management. *Summative evaluation* looks at final programme outcomes. Both are usually necessary.

ACTION RESEARCH

Action research is either research initiated to solve an immediate problem or a reflective process of progressive problem solving led by individuals working with others in teams or as part of a "community of practice" to improve the way they address issues and solve problems. There are two types of action research: participatory action research and practical action research. Denscombe (2010) writes that an action research strategy's purpose is to solve a particular problem and to produce guidelines for best practice.

Action research involves actively participating in a change situation, often via an existing organization, whilst simultaneously conducting research. Action research can also be undertaken by larger organizations or institutions, assisted or guided by professional researchers, with the aim of improving their strategies, practices and knowledge of the environments within which they practice. As designers and stakeholders, researchers work with others to propose a new course of action to help their community improve its work practices.

Kurt Lewin, then a professor at MIT, first coined the term "action research" in 1944. In his 1946 paper "Action Research and Minority Problems" he described action research as "a comparative research on the conditions and effects of various forms of social action and research leading to social action" that uses "a spiral of steps, each of which is composed of a circle of planning, action and fact-finding about the result of the action". Action research is an interactive inquiry process that balances problem solving actions implemented in a collaborative context with data-driven collaborative analysis or research to understand underlying causes enabling future predictions about personal and organizational change (Reason and Bradbury, 2002). After six decades of action research development, many methods have evolved that adjust the balance to focus more on the actions taken or more on the research that results from the reflective understanding of the actions. This tension exists between,

1. Those who are more driven by the researcher's agenda and those more driven by participants;
2. Those who are motivated primarily by instrumental goal attainment and those motivated primarily by the aim of personal, organizational or societal transformation; and
3. 1st, to 2nd, to 3rd person research, that is, my research on my own action, aimed primarily at personal change; our research on our group (family/team), aimed primarily at improving the group; and 'scholarly' research aimed primarily at theoretical generalization or large scale change.

Action research challenges traditional social science by moving beyond reflective knowledge created by outside experts sampling variables, to an active moment-to-moment theorizing, data collecting and inquiry occurring in the midst of emergent structure. "Knowledge is always gained through action and for action. From this starting point, to question the validity of social knowledge is to question, not how to develop a reflective science about action, but how to develop genuinely well-informed action – how to conduct an action science". In this sense, performing action research is the same as performing an experiment, thus it is an empirical process.

MAJOR THEORIES

Chris Argyris' Action Science

Chris Argyris' Action Science begins with the study of how human beings design their actions in difficult situations. Humans design their actions to achieve intended

consequences and are governed by a set of environment variables. How those governing variables are treated in designing actions are the key differences between single-loop learning and double-loop learning. When actions are designed to achieve the intended consequences and to suppress conflict about the governing variables, a single-loop learning cycle usually ensues.

On the other hand, when actions are taken, not only to achieve the intended consequences, but also to openly inquire about conflict and to possibly transform the governing variables, both single-loop and double-loop learning cycles usually ensue. (Argyris applies single-loop and double-loop learning concepts not only to personal behaviors but also to organizational behaviors in his models.) This is different from experimental research in which environmental variables are controlled and researchers try to find out cause and effect in an isolated environment.

John Heron and Peter Reason's Cooperative Inquiry

Cooperative inquiry, also known as collaborative inquiry was first proposed by John Heron in 1971 and later expanded with Peter Reason and Demi Brown. The major idea of cooperative inquiry is to "research 'with' rather than 'on' people." It emphasizes that all active participants are fully involved in research decisions as co-researchers.

Cooperative inquiry creates a research cycle among four different types of knowledge: propositional knowing (as in contemporary science), practical knowing (the knowledge that comes with actually doing what you propose), experiential knowing (the feedback we get in real time about our interaction with the larger world) and presentational knowing (the artistic rehearsal process through which we craft new practices).

The research process includes these four stages at each cycle with deepening experience and knowledge of the initial proposition, or of new propositions, at every cycle.

Paulo Freire's Participatory Action Research (PAR)

Participatory action research has emerged in recent years as a significant methodology for intervention, development and change within communities and groups. It is now promoted and implemented by many international development agencies and university programmes, as well as countless local community organizations around the world.

PAR builds on the critical pedagogy put forward by Paulo Freire as a response to the traditional formal models of education where the "teacher" stands at the front and "imparts" information to the "students" who are passive recipients. This was further developed in "adult education" models throughout Latin America.

Orlando Fals-Borda (1925–2008), Colombian sociologist and political activist, was one of principal promoters of "participatory action research" (IAP in Spanish) in Latin America. Published "double history of the coast", book that compare the official "history" and the non-official "story" of the north coast of Colombia.

William Barry's Living Educational Theory Approach to Action Research

William Barry (Atkins and Wallace 2012), defined an approach to action research which focuses on creating ontological weight. He adapted the idea of ontological weight to action research from existential Christian philosopher Gabriel Marcel (1963). Professor Barry (Barry, 2012) was influenced by Jean McNiff's and Jack Whitehead's (2008) phraseology of living theory action research but was diametrically opposed to the validation process advocated by Whitehead which demanded video "evidence" of "energy flowing values" and Whitehead's atheistic ontological position which influenced his conception of values in action research.

Barry explained that Living educational theory (LET) "[It is] a critical and transformational approach to action research. It confronts the researcher to challenge the status quo of their educational practice and to answer the question, 'How can I improve that I'm doing?'

Researchers who use this approach must be willing to recognize and assume responsibility for being a 'living contradictions' in their professional practice – thinking one way and acting in another. The mission of the LET action researcher is to overcome workplace norms and self- behaviour which contradict the researcher's values and beliefs. The vision of the LET researcher is to make an original contribution to knowledge through generating an educational theory proven to improve the learning of people within a social learning space. The standard of judgment for theory validity is evidence of workplace reform, transformational growth of the researcher, and improved learning by the people researcher claimed to have influenced..." (Atkins and Wallace).

THE ACTION RESEARCH PROCESS

Educational action research can be engaged in by a single teacher, by a group of colleagues who share an interest in a common problem, or by the entire faculty of a school. Whatever the scenario, action research always involves the same seven-step process.

These seven steps, which become an endless cycle for the inquiring teacher, are the following:

1. Selecting a focus
2. Clarifying theories
3. Identifying research questions
4. Collecting data
5. Analyzing data
6. Reporting results
7. Taking informed action.

Step 1—Selecting a Focus

The action research process begins with serious reflection directed towards identifying a topic or topics worthy of a busy teacher's time. Considering the incredible demands

on today's classroom teachers, no activity is worth doing unless it promises to make the central part of a teacher's work more successful and satisfying. Thus, selecting a focus, the first step in the process, is vitally important.

Selecting a focus begins with the teacher researcher or the team of action researchers asking:

- *What element(s) of our practice or what aspect of student learning do we wish to investigate?*

Step 2—Clarifying Theories

The second step involves identifying the values, beliefs, and theoretical perspectives the researchers hold relating to their focus. For example, if teachers are concerned about increasing responsible classroom behaviour, it will be helpful for them to begin by clarifying which approach—using punishments and rewards, allowing students to experience the natural consequences of their behaviors, or some other strategy—they feel will work best in helping students acquire responsible classroom behaviour habits.

Step 3—Identifying Research Questions

Once a focus area has been selected and the researcher's perspectives and beliefs about that focus have been clarified, the next step is to generate a set of personally meaningful research questions to guide the inquiry.

Step 4—Collecting Data

Professional educators always want their instructional decisions to be based on the best possible data. Action researchers can accomplish this by making sure that the data used to justify their actions are *valid* (meaning the information represents what the researchers say it does) and *reliable* (meaning the researchers are confident about the accuracy of their data). Lastly, before data are used to make teaching decisions, teachers must be confident that the lessons drawn from the data align with any unique characteristics of their classroom or school.

To ensure reasonable validity and reliability, action researchers should avoid relying on any single source of data. Most teacher researchers use a process called *triangulation* to enhance the validity and reliability of their findings. Basically, triangulation means using multiple independent sources of data to answer one's questions. Triangulation is like studying an object located inside a box by viewing it through various windows cut into the sides of the box. Observing a phenomenon through multiple "windows" can help a single researcher compare and contrast what is being seen through a variety of lenses.

When planning instruction, teachers want the techniques they choose to be appropriate for the unique qualities of their students. All teachers have had the experience of implementing a "research-proven" strategy only to have it fail with their students. The desire of teachers to use approaches that "fit" their particular students is not dissimilar

to a doctor's concern that the specific medicine being prescribed be the correct one for the individual patient. The ability of the action research process to satisfy an educator's need for "fit" may be its most powerful attribute. Because the data being collected come from the very students and teachers who are engaged with the treatment, the relevance of the findings is assured.

For the harried and overworked teacher, "data collection" can appear to be the most intimidating aspect of the entire seven-step action research process. The question I am repeatedly asked, "Where will I find the time and expertise to develop valid and reliable instruments for data collection?", gives voice to a realistic fear regarding time management. Fortunately, classrooms and schools are, by their nature, data-rich environments. Each day a child is in class, he or she is producing or not producing work, is interacting productively with classmates or experiencing difficulties in social situations, and is completing assignments proficiently or poorly. Teachers not only see these events transpiring before their eyes, they generally record these events in their grade books. The key to managing triangulated data collection is, first, to be effective and efficient in collecting the material that is already swirling around the classroom, and, second, to identify other sources of data that might be effectively surfaced with tests, classroom discussions, or questionnaires.

Step 5—Analyzing Data

Although data analysis often brings to mind the use of complex statistical calculations, this is rarely the case for the action researcher. A number of relatively user-friendly procedures can help a practitioner identify the trends and patterns in action research data.

During this portion of the seven-step process, teacher researchers will methodically sort, sift, rank, and examine their data to answer two generic questions:
- What is the story told by these data?
- Why did the story play itself out this way?

By answering these two questions, the teacher researcher can acquire a better understanding of the phenomenon under investigation and as a result can end up producing grounded theory regarding what might be done to improve the situation.

Step 6—Reporting Results

It is often said that teaching is a lonely endeavor. It is doubly sad that so many teachers are left alone in their classrooms to reinvent the wheel on a daily basis. The loneliness of teaching is unfortunate not only because of its inefficiency, but also because when dealing with complex problems the wisdom of several minds is inevitably better than one. The sad history of teacher isolation may explain why the very act of reporting on their action research has proven so powerful for both the researchers and their colleagues. The reporting of action research most often occurs in informal settings that are far less intimidating than the venues where scholarly research has traditionally been

shared. Faculty meetings, brown bag lunch seminars, and teacher conferences are among the most common venues for sharing action research with peers. However, each year more and more teacher researchers are writing up their work for publication or to help fulfill requirements in graduate programmes. Regardless of which venue or technique educators select for reporting on research, the simple knowledge that they are making a contribution to a collective knowledge base regarding teaching and learning frequently proves to be among the most rewarding aspects of this work.

Step 7—Taking Informed Action

Taking informed action, or "action planning," the last step in the action research process, is very familiar to most teachers. When teachers write lesson plans or develop academic programmes, they are engaged in the action planning process. What makes action planning particularly satisfying for the teacher researcher is that with each piece of data uncovered (about teaching or student learning) the educator will feel greater confidence in the wisdom of the next steps. Although all teaching can be classified as trial and error, action researchers find that the research process liberates them from continuously repeating their past mistakes. More important, with each refinement of practice, action researchers gain valid and reliable data on their developing virtuosity.

THREE PURPOSES FOR ACTION RESEARCH

As stated earlier, action research can be engaged in by an individual teacher, a collaborative group of colleagues sharing a common concern, or an entire school faculty.

These three different approaches to organizing for research serve three compatible, yet distinct, purposes:
- Building the reflective practitioner.
- Making progress on schoolwide priorities.
- Building professional cultures.

Building the Reflective Practitioner

When individual teachers make a personal commitment to systematically collect data on their work, they are embarking on a process that will foster continuous growth and development. When each lesson is looked on as an empirical investigation into factors affecting teaching and learning and when reflections on the findings from each day's work inform the next day's instruction, teachers can't help but develop greater mastery of the art and science of teaching. In this way, the individual teachers conducting action research are making continuous progress in developing their strengths as reflective practitioners.

Making Progress on Schoolwide Priorities

Increasingly, schools are focusing on strengthening themselves and their programmes through the development of common focuses and a strong sense of esprit de corps.

Peters and Waterman (1982) in their landmark book, *In Search of Excellence*, called the achievement of focus "sticking to the knitting." When a faculty shares a commitment to achieving excellence with a specific focus—for example, the development of higher-order thinking, positive social behaviour, or higher standardized test scores—then collaboratively studying their practice will not only contribute to the achievement of the shared goal but would have a powerful impact on team building and programme development. Focusing the combined time, energy, and creativity of a group of committed professionals on a single pedagogical issue will inevitably lead to programme improvements, as well as to the school becoming a "center of excellence." As a result, when a faculty chooses to focus on one issue and all the teachers elect to enthusiastically participate in action research on that issue, significant progress on the schoolwide priorities cannot help but occur.

Building Professional Cultures

Often an entire faculty will share a commitment to student development, yet the group finds itself unable to adopt a single common focus for action research. This should not be viewed as indicative of a problem. Just as the medical practitioners working at a "quality" medical center will hold a shared vision of a healthy adult, it is common for all the faculty members at a school to share a similar perspective on what constitutes a well-educated student. However, like the doctors at the medical center, the teachers in a "quality" school may well differ on which specific aspects of the shared vision they are most motivated to pursue at any point in time.

Schools whose faculties cannot agree on a single research focus can still use action research as a tool to help transform themselves into a learning organization. They accomplish this in the same manner as do the physicians at the medical center. It is common practice in a quality medical center for physicians to engage in independent, even idiosyncratic, research agendas. However, it is also common for medical researchers to share the findings obtained from their research with colleagues (even those engaged in other specialties).

School faculties who wish to transform themselves into "communities of learners" often empower teams of colleagues who share a passion about one aspect of teaching and learning to conduct investigations into that area of interest and then share what they've learned with the rest of the school community. This strategy allows an entire faculty to develop and practice the discipline that Peter Senge (1990) labeled "team learning." In these schools, multiple action research inquiries occur simultaneously, and no one is held captive to another's priority, yet everyone knows that all the work ultimately will be shared and will consequently contribute to organizational learning.

WHY ACTION RESEARCH NOW?

If ever there were a time and a strategy that were right for each other, the time is now and the strategy is action research!

This is true for a host of reasons, with none more important than the need to accomplish the following:
- Professionalize teaching.
- Enhance the motivation and efficacy of a weary faculty.
- Meet the needs of an increasingly diverse student body.
- Achieve success with "standards-based" reforms.

Professionalizing Teaching

Teaching in North America has evolved in a manner that makes it more like blue-collar work than a professional undertaking. Although blue-collar workers are expected to do their jobs with vigilance and vigour, it is also assumed that their tasks will be routine, straightforward, and, therefore, easily handled by an isolated worker with only the occasional support of a supervisor.

Professional work, on the other hand, is expected to be complex and nonroutine, and will generally require collaboration among practitioners to produce satisfactory results. With the exploding knowledge base on teaching and learning and the heightened demands on teachers to help all children achieve mastery of meaningful objectives, the inadequacy of the blue-collar model for teaching is becoming much clearer.

When the teachers in a school begin conducting action research, their workplace begins to take on more of the flavour of the workplaces of other professionals. The wisdom that informs practice starts coming from those doing the work, not from supervisors who oftentimes are less in touch with and less sensitive to the issues of teaching and learning than the teachers doing the work. Furthermore, when teachers begin engaging their colleagues in discussions of classroom issues, the multiple perspectives that emerge and thus frame the dialogue tend to produce wiser professional decisions.

Enhancing Teacher Motivation and Efficacy

The work of teaching has always been difficult. But now it isn't just the demands of the classroom that are wearing teachers down. Students increasingly bring more problems into the classroom; parental and societal expectations keep increasing; and financial cutbacks make it clear that today's teachers are being asked to do more with less. Worse still, the respect that society had traditionally placed upon public school teachers is eroding, as teacher bashing and attacks on the very value of a public education are becoming a regular part of the political landscape. Consequently, teacher burnout has become the plague of the modern schoolhouse.

Many teachers now ask, "Am I making any difference?" Regardless of all the negative pressures on teachers, the sheer nobility of the work keeps many dedicated educators on the job, but only so long as they can get credible answers to the "efficacy" question. However, without credible evidence that the work of teaching is making a difference, it is hard to imagine the best and brightest sticking with such a difficult and poorly

compensated line of work. Fortunately, evidence has shown that teachers who elect to integrate the use of data into their work start exhibiting the compulsive behaviour of fitness enthusiasts who regularly weigh themselves, check their heart rate, and graph data on their improving physical development. For both teachers and athletes, the continuous presence of compelling data that their hard work is paying off becomes, in itself, a vitally energizing force.

Meeting the Needs of a Diverse Student Body

In a homogeneous society in which all students come to school looking alike, it might be wise to seek the one right answer to questions of pedagogy. But, as anyone who has recently visited an American classroom can attest, it is rare to find any two children for whom the same intervention could ever be "right on target." The days are gone when it was possible to believe that all a teacher had to do was master and deliver the grade-level curriculum. It is now imperative that classroom teachers have strong content background in each of the subjects they teach, be familiar with the range of student differences in their classrooms, and be capable of diagnosing and prescribing appropriate instructional modifications based upon a knowledge of each child's uniqueness.

Crafting solutions to these dynamic and ever changing classroom issues can be an exciting undertaking, especially when one acknowledges that newer and better answers are evolving all the time. Nevertheless, great personal satisfaction comes from playing a role in creating successful solutions to continually changing puzzles. Conversely, if teachers are expected to robotically implement outdated approaches, especially when countless new challenges are arriving at their door, the frustration can become unbearable.

Achieving Success in a Standards-Based System

In most jurisdictions standards-driven accountability systems have become the norm. Although they differ somewhat from state to state and province to province, fundamentally these standards-based systems have certain things in common. Specifically, most education departments and ministries have declared that they expect the standards to be rigorous and meaningful, and that they expect all students to meet the standards at the mastery level.

The stakes in the standards movement are high. Students face consequences regarding promotion and graduation. Teachers and schools face ridicule and loss of funding if they fail to meet community expectations. Of course, none of that would be problematic if we as a society knew with certainty how to achieve universal student success. However, the reality is that no large system anywhere in the world has ever been successful in getting every student to master a set of meaningful objectives. If we accept the truth of that statement, then we need to acknowledge the fact that achieving the goal of universal student mastery will not be easy. That said, most people will agree it is a most noble

endeavor in which to invest energy and a worthy goal for any faculty to pursue. The reality is that our public schools will not prevail with the challenges inherent in the standards movement unless they encourage experimentation, inquiry, and dialogue by those pioneers (the teachers) who are working towards meeting those challenges. For this reason, it is imperative that these 21st century pioneers, our classroom teachers, conduct the research on "standards attainment" themselves.

So the time is right for action research. The teachers, schools, and school systems that seize this opportunity and begin investing in the power of inquiry will find that they are re-creating the professional practice of education in their locale as a meaningful and rewarding pursuit. Conversely, school systems that enter the 21st century unwilling to invest in the "wisdom of practice" will likely find it increasingly hard to fill their classrooms with enough teachers who are both capable of and willing to tackle the challenges that lie ahead.

LOCATION OF RESEARCH PROBLEM

The research process consists of a number of steps. The first step in any research is selecting the topic, which could start from the broad area of interest. There is no set formula for the identification of a topic of research. The best guide is to conduct research on something that interest you. Nevertheless, there could be a variety of sources like: personal experiences, emerging curiosities from the issues being reported in the mass media, developments in the knowledge, solving problems (relating to an organization, a family, education, and economy), and "hot" issues pertaining to every day life.

Broad area of interest could be 'labour unions.' As one could see from the literature, there is a large number of books and perhaps thousands of articles covering various aspects of labour unions. These articles and books have been written by researchers hailing from different subject specialties and using variety of perspectives. Therefore the researcher should narrow down the topic to some specific aspect of labour unions. For example, to what extent do the labour unions protect the rights of female workers?

TECHNIQUES FOR NARROWING A TOPIC INTO A RESEARCH QUESTION

In order to narrow down the focus of research, try to get the background information from different sources.

For example:

• *Examine the literature.* Published articles are an excellent source of ideas for research questions. They are usually at an appropriate level of specificity and suggest research questions that focus on the following:

– Explore unexpected findings discovered in previous research.

– Follow suggestions an author gives for future research at the end of an article.

– Extend an existing explanation or theory to a new topic or setting.

– Challenge findings or attempt to refute a relationship.

- – Specify the intervening process and consider linking relations.
- *Talk over ideas with others.*
  - – Ask people who are knowledgeable about the topic for questions about it that they have thought of.
  - – Seek out those who hold opinions that differ from yours on the topic and discuss possible research questions with them.
- *Apply to a specific context.*
  - – Focus the topic onto a specific historical period or time period.
  - – Narrow the topic to a specific society or geographic unit.
  - – Consider which subgroups or categories of people/units are involved and whether there are differences among them.
- *Define the aim or desired outcome of the study.*
  - – Will the research question be for an exploratory, explanatory, or descriptive study.
  - – Will the study involve applied or basic research?

FROM THE RESEARCH QUESTION TO HYPOTHESES

Tentative answers to the research question help in the identification of variables that could be used as explanatory factors for building up the argumentation in the development of propositions relevant to the topic.

In our example the factors may be the prospects of membership of female workers of labour unions, actual membership, support of their men folk for membership, participation in the general body meetings, membership of the executive body of labour union, and so on. These very propositions become the basis of testable hypotheses. Similarly, the inventory of the propositions is helpful in developing the theoretical framework for the research project.

PROBLEM DEFINITION

After the interviews and the literature review, the researcher is in a position to narrow down the problem from its original broad base and define the issues of concern more clearly. It is critical that the focus of further research be unambiguously identified and defined. Problem definition or problem statement is a clear, precise, and succinct statement of the question or issue that is to be investigated with the goal of finding an answer or solution.

For example the problem could pertain to,
- Existing business problems where the manager is looking for a solution,
- Situation that may not pose any current problems but which the manager feels have scope for improvement,
- Areas where some conceptual clarity is needed for better theory building, or
- Situations in which a researcher is trying to answer a research question empirically because of interest in the topic.

SPONSORED RESEARCHES

So far we have been discussing research project primarily from the perspective that a researcher is likely to carry the study on his/her own initiative. Although such an initiator can be a business manager or Organizational Management trying to arrest some of the issues in the organization, yet the actual researcher may be a hired consultant. In such a situation the researcher has to ascertain the decision maker's objectives.

There might simply be some symptoms, and just like the iceberg principle, the dangerous part of many business problems is neither visible to nor understood by business managers. These symptoms are the management dilemmas which have to be translated into management question and then into research question(s). The management may hire the services of research specialists to do this assignment. As a result the management dilemmas get identified and delineated in the *Terms of Reference,* and consultants may be engaged to carry out the study. In such situations many of the steps (review of literature, theoretical framework, and hypotheses) that have been discussed earlier may be skipped. Certainly the management takes the research decisions keeping in view the urgency of the study, timing of the study, availability of the information, and more importantly the cost benefit equation of the study.

THE RESEARCH PROPOSAL

A research *proposal* is a document that presents a plan for a project to reviewers foe evaluation. It can be a supervised project submitted to instructors as part of an educational degree (*e.g.,* a Master's thesis or a Ph.D. dissertation) or it can be a research project proposed to a funding agency. Its purpose is to convince reviewers that the researcher is capable of successfully conducting the proposed research project. Reviewers have more confidence that a planned project will be successfully completed if the proposal is well written and organized, and carefully planned. The proposal is just like a research report, but it is written before the research project begins. A proposal describes the research problem and its importance, and gives a detailed account of the methods that will be used and why they are appropriate.

A proposal for quantitative research has most of the parts of a research report: a title, an abstract, a problem statement, a literature review, a method or design section, and a bibliography. It lacks results, discussion, and conclusions section. The proposal has a plan for data collection and analysis. It frequently includes a schedule of the steps to be undertaken and an estimate of the time required for each step. For funded projects the researchers need to show a track record of past success in the proposal, especially if they are the going to be the in charge of the project. Proposals usually include curriculum vitae, letters of support from other researchers, and record if past research.

Research Proposal Sections:
- Introduction
    - Background of the study
    - Objectives

- – Significance
- Research Design
  - – Data collection technique (survey, experiment, qualitative technique)
  - – Population
  - – Sample
  - – Tool of data collection
  - – Data Gathering
  - – Data processing and analysis
- Report writing
- Budget
- Time Schedule
- Team of Researchers.

CRITERIA FOR SELECTING A RESEARCH PROBLEM

A research problem is some difficulty either of a theoretical or practical character that an individual or business encounters and desires to get a solution for the same. The research problem undertaken for study should be diligently selected.
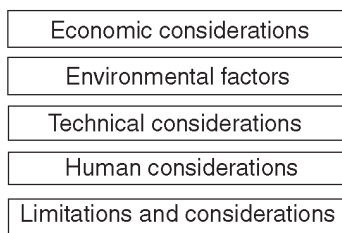
| Economic considerations |
| Environmental factors |
| Technical considerations |
| Human considerations |
| Limitations and considerations |

Fig. What is the Criteria for Selecting
a Research Problem?

The following important considerations should be borne in mind while selecting the topic:

- *Economic Considerations:* Research design work cost money. The value of the expected results should be commensurate with the efforts put in. Small research topics that can deliver considerable returns quickly should be chosen over long term research problems whose gains may be hard to anticipate.
- *Environmental Factors:* Controversial topic shouldn't be selected for research, until and unless very much justified. The selection of research problem needs to be preceded by a preliminary study. Topics which are very narrowly defined or have a vague outcome must not be attempted. Additionally it is thought that a researcher should be knowledgeable about the domain area in which he/she wants to conduct the research study.
- *Technical Considerations:* The researcher should be sure that sufficient technical knowledge is accessible with which to undertake the research problem. Whereas

large problem throws up a number of subjects that are independent of each other, it is advisable to have small individual research problems instituted on each topic.

- *Human Considerations*: In cases where resistance to change or reaction is likely to be high, people's involvement and contribution should be ensured.
- *Limitations and Constraints of Research problem:* These are as follows:
  1. Time limit: The research should be accomplished by the proposed date.
  2. Resource Constraints: The research study should be well within the established resources allotted for it.
  3. Policy Constraints: The research problem must provide considerations to policy constraints.

QUALITIES OF A GOOD RESEARCHERS

- *An analytical mind:* "As a market researcher you are constantly analysing a variety of factors. Why does the client ultimately want to do this research? What is the appropriate methodology? When should this research take place? What are the appropriate questions to ask and how? Why did the respondent say that? What are the findings telling us? Why are they telling us that? How do I best communicate the findings? *etc.* On a daily basis researchers must be able to take a step back and analyse the situation presented to them. The obvious answer is not necessarily the right one" (Gareth Hodgson) "You have to be able to see the bigger picture as well as the detail. People often find it easier to do one or the other- it is a skilled researcher that can do both simultaneously" (Richard Walker)
- *A people person:* "This is important for clients –buyers of research would rather work with professional AND friendly consultants. Also for respondents – to get the best out of interview/ focus group participants" (Richard Walker)
- *The ability to stay calm:* "It can be really stressful as a researcher sometimes, especially when you have pressing deadlines or are experiencing problems with a data set, for example. When these situations occur, you just have to keep focused and think logically – there will always be an end point, even if it doesn't feel like it!" (Bethan Turner)
- *Intelligence:* "Research requires critical analysis but most of all common sense" (Liz Brierley)
- *Curiosity:* "You may have the necessary intelligence but if you are not curious enough then you won't be passionate about delving deeper to unearth more insight" (Anthony Shephard) "At the end of the day, the role of a market researcher is to find out about other people's business and tell it to other people. To be a market researcher you have to have an inherent interest in what other people think (potentially about absolutely anything!), and the nosier you are, the greater depth of information you can extract" (Gareth Hodgson).

- *Quick thinker:* "Things don't always go to plan so you need to be able to think fast" (Anthony Shephard)
- *Commitment:* "It's a tough job – the hours can be long, the deadlines short" (Richard Walker)
- *Excellent written and verbal communication skills:* "So different audiences can clearly understand the findings of the research and what it means for them" (Jo Iaconianni)"You have to have excellent written communications and be fluent in the language of business" (Richard Walker)
- *Sympathetic:* "Having a sympathetic ear when listening to some respondents' moans and groans is always a good skill to have!" (Liz Brierley)
- *Systematic:* "Check, check and check again. It sounds simple but I've definitely learnt that building in a proper amount of time for checking your work always pays dividends. This can be applied to all parts of the research process" (Bethan Turner)