A PESQUISA-AÇÃO EM GESTÃO DE INOVAÇÃO

THE ACTION RESEARCH IN MANAGEMENT OF INNOVATION

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Abstract: A fundamental methodological question guides this paper: how can managers and researchers of innovation learn from action research method? To address this question, we first state theoretical and empirical studies confirm action research methodology is useful for management of innovation, then we define and explore the characteristics and process of action research and value of it. In this paper, we review the papers about action research methodology, theoretical or empirical, relevant and valid for management of innovation and outline the action research cycle models related to management of innovation. In addition, we discuss about the philosophy of this method and describe the researcher skills required to engage in action research.
Keywords: Action Research. Management. Innovation.

Resumo: Uma questão metodológica fundamental orienta este artigo: como os gestores e pesquisadores da inovação podem aprender com o método de pesquisa-ação? Para abordar essa questão, primeiro afirmamos que estudos teóricos e empíricos confirmam que a metodologia de pesquisa-ação é útil para o gerenciamento da inovação, então definimos e exploramos as características e o processo de pesquisa-ação e o valor dela. Neste artigo, revisamos os artigos sobre metodologia de pesquisa-ação, teórica ou empírica, relevante e válida para a gestão da inovação e delineamos os modelos de ciclo de pesquisa-ação relacionados ao gerenciamento da inovação. Além disso, discutimos sobre a filosofia desse método e descrevemos as habilidades do pesquisador necessárias para se engajar em pesquisa-ação.
Palavras-chave: Pesquisa-Ação. Gestão. Inovação.

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Introduction

Action research is now commonly defined as a process of joint learning (about, how to, and with and from whom). Action research refers to a specific way of understanding and managing the relationship between theory and practice, between the researcher/ learner and the researched/ learned, etc. This relationship builds on dialogue as an important tool (Gustavsen, 1992; HJJ Van Beinum, Faucheux, & Van der Vlist, 1996). It is seen as an interactive and linguistic relationship, characterized by joint action, joint involvement and shared responsibility. Everyone participating in a process is jointly involved in discovering reality as well as the creation of new reality (Hans Van Beinum, 1998). The object of action research is a total social system with people/actors in different situations with their own individual feelings, thoughts, etc.

A researcher can come to a project or a process in order to be aware of as many small important daily steps and 'information quanta' as possible, is to manage the project or process himself/herself. This involves combining the roles of learner and manager (Ottosson, 2003).

Performing action research is a complex and difficult task as researchers attain a strong mental commitment to the processes they manage. Often it can be difficult not to be totally captured by the problems and all the details. In severe cases researchers will lose the total picture if he/she cannot withdraw from the daily work every now and then. Without a relevant frame of reference and a scientific environment where discussions on process findings can take place, there will be difficulties for less experienced researchers to evaluate their findings in a scientific manner (Ottosson, 2003).

Holter and Schwartz- Barcott (1993) pointed out that the core characteristics and differing approaches and uses of action research have not been systematically identified. As a result, an embracing definition of action research remains elusive and existing definitions tend to focus on the description of characteristics (McNiff & Whitehead, 2009).

It is generally recognized that there is no one method that is 'right' for action research. Any method could be used. What makes a piece of research 'action research', as opposed to mere audit or evaluation, is the commitment to change. As Bentz and Shapiro (1998) state:

> 'Action research is less a separate culture of inquiry than it is a statement of intention and values. The intention is to change a system, and the values are those of participation, self-determination, empowerment through knowledge, and change.'

Good action research emerges over time in an evolutionary and developmental process, as individuals develop skills of inquiry and as communities of inquiry develop within communities of practice. Action research is emancipatory, it leads not just to new practical knowledge, but to new abilities to create knowledge. In action research, knowledge is a living, evolving process of coming to know rooted in everyday experience; It is a verb rather than a noun. This means action research cannot be programmatic and cannot be defined in terms of hard and fast methods, but it is, in Leotard's sense, a work of art (P. Reason & Bradbury, 2001).

Given this as the broad aim, the choice of method may be more to do with the nature of the problem that one is seeking to understand and explain. For example, if there is genuine uncertainty about two approaches to teaching something, it may be appropriate to set up an experiment where one group of students is taught by one method, and the other by another (Cohen, Manion, & Morrison, 2000).

This paper will explore the themes and challenges facing managers and researchers as they attempt to use action research method in management of innovation.

What is action research?

The term 'Action Research' was launched in 1945 by John Collier (1945). Collier had the mission of recommending national programs to improve relations between ethnic groups in the USA. For that purpose, he searched for a new type of research that he called Action Research. His motivation was: "And since action is by nature not only specialized but also integrative to more than

the specialities, our needed research must be of the integrative kind. Again, since the findings of the research must be carried into effect by the administrator and the layman, and must be criticized by them through their experience, the administrator and the layman must themselves participate creatively to the research, impelled as it is from their own area of need." (Ottosson, 2003)

The 'Father of Action Research' is often regarded as Kurt Lewin (1946), who wanted to formulate a method 'to help the practitioner'. Lewin did not like research 'that only produced books' and claimed that 'nothing is as practical as a good theory' and that 'no action without research, and no research without action'. His view of social research was that priority should be given to practical work to improve inter-group relations. To do that, he proposed social management as a mode of action in planned change with planning, fact-finding and execution as consecutive steps. The researcher could, according to Lewin, take on the responsibility of giving advice on action/ management alternatives, evaluation of completed actions and management of experiments (Ottosson, 2003).

Hart and Bond (1995) presented a typology of action research that identified seven distinguishing characteristics: it has an educative base; it deals with individuals as members in groups; it is problem focused; it involves a change intervention; it aims at improvement and involvement; it involves cyclic processes; it is founded on collaboration. These characteristics were related to four action research types: experimental, organizational, professionalizing, and empowering.

To be fair to Hart and Bond, they did argue that their types were ideal and not prescriptive of action research. The action research reviewed did not fall into distinct types (Waterman, Tillen, Dickson, & De Koning, 2000). Waterman et al. noted that there are many different ways of potentially classifying action research according to, for example, level of participation, research methods, and topic. Ultimately, a multidimensional matrix would be required to explain the variations but that would become unwieldy and too complicated. Finally, a definition was considered to be most helpful. They expressed action research is a period of inquiry, which describes, interprets and explains social situations while executing a change intervention aimed at improvement and involvement. It is problem focused, context-specific and future-oriented.

Primary purpose of action research is to produce practical knowledge that is useful to people in the everyday conduct of their lives. A wider purpose of action research is to contribute through this practical knowledge to the increased wellbeing— economic, political, psychological, spiritual— of human persons and communities, and to a more equitable and sustainable relationship with the wider ecology of the planet of which we are an intrinsic part (P. Reason & Bradbury, 2001).

So action research is about working toward practical outcomes, and also about creating new forms of understanding, since action without reflection and understanding is blind, just as theory without action is meaningless. And more broadly, theories which contribute to human emancipation, to the flourishing of community, which help us reflect on our place within the ecology of the planet and contemplate our spiritual purposes, can lead us to different ways of being together, as well as providing important guidance (P. Reason & Bradbury, 2001).

Reason and Bradbury (2001) confirmed action research is participative research, and all participative research must be action research. Human persons are agents who act in the world on the basis of their own sense-making; Human community involves mutual sense-making and collective action. Action research is only possible with, for and by persons and communities, ideally involving all stakeholders both in the questioning and sense-making that informs the research, and in the action which is its focus.

Waterman et al. stated action research is a group activity with an explicit critical value basis and is founded on a partnership between action researchers and participants, all of whom are involved in the change process. The participatory process is educative and empowering, involving a dynamic approach in which problem identification, planning, action and evaluation are interlinked. Knowledge may be advanced through reflection and research, and qualitative and quantitative research methods may be employed to collect data. Different types of knowledge may be produced by action research, including practical and propositional. Theory may be generated and refined, and its general application explored through the cycles of the action research process (Waterman et al., 2000).

So the literature confirms the action research method is useful for creating different types

of knowledge by anticipating labors in a planned processes which Cheng-Hua Tzeng named the capability school innovation (Tzeng, 2009). In this perspective, systemic innovation relies on the dynamic capabilities of a firm (Wang & Ahmed, 2007), which can be defined as the 'firm's ability to integrate, build, and reconfigure internal and external competences' (Teece, Pisano, & Shuen, 1997). Institutionalized capabilities crystallize into routines, which are the so-called 'genes' in innovation (Nelson & Winter, 2009). Routines are 'most of what is regular and predictable about business behavior' (Nelson & Winter, 2009). By this definition, there are three classes of routines relevant to innovation: (1) the operating routine, (2) the investment routine, and (3) the search routine (Nelson & Winter, 2009). The most important of these is the search routine, which carries out innovation and resides in the research and development (R&D) department where innovations occur (Tzeng, 2009).

The essence of institutionalizing innovation can be described by the following mechanisms. First, systems/routines capture knowledge: 'It is through administrative systems that planning and policy are made possible, because the systems capture knowledge about the task' (Jelinek, 1979). Second, systems/routines generate innovation: 'As a system, the Objectives, Strategies, and Tactics generalizes a procedure for acquiring the requisite new knowledge, creating a shared pattern of thought regarding innovation' (Jelinek, 1979).

One can assume action research method can be routinized and of course can capture knowledge, but the more important benefit of action research method is that it can be used as search routine which is the core of management of innovation.

The philosophy of action research

There are philosophical notions that underpin action research. The most influential appear to be critical theory, dialectics, hermeneutics, praxis and phenomenology. These have been combined in a variety of ways, to provide philosophical frameworks for action research by key writers in the field. Those that appear to have informed healthcare action research are discussed later. For the promotion of understanding (and for the want of better terms), these have been called critical, participative and qualitative. Each framework will be discussed in turn, together with how it might influence certain practices in action research. However, the differentiation is somewhat artificial for there are probably more similarities between the different frameworks than differences. Furthermore, the work of action researchers included in the review did not draw exclusively on any one framework to understand or to justify their approach to action research. The process and outcome of action research, and the priority given to the types of knowledge generated, is dependent on the combination and emphases of the employed philosophies (Waterman et al., 2000).

Critical

This philosophical framework of action research is informed by critical theory, particularly by the writing of Habermas. This approach arose from a desire to democratize research in order to present a challenge to the institutionalization of research, which is viewed as being exclusive and exploitative (Waterman et al., 2000). An aim is to encourage those who are normally excluded from the process of informing it, thus making research participatory. Linked to this is the desire for social improvement. Advocates of this approach seek to criticize dominant conceptualizations of society that, in their opinion, may serve to disadvantage certain sections of society. They take the view that practice including research is socially, historically and discursively constituted. The notion of dialectics influences their stance (Waterman et al., 2000). Thus, the necessary interdependence of subjective and objective perspectives, individual and social perspectives, and practice and theory are embraced. Drawing on hermeneutical ideas, practice is viewed as a reflexive exercise, underpinned by meanings, values and intentions that are continually being informed and reformed by both the practitioners and the organizations in which they take place (Gadamer, Weinsheimer, & Marshall, 2004). This approach enlarges on the Aristotelian notion of praxis-of acting on the conditions of one's situation in order to change them (Meyer, 1995). In this context, Kemmis and McTaggart (2000) argued that to study practice means to change it but, also, that practice is changed in order to study it. In this approach, value is attached to both qualitative and quantitative research methods; they are seen as complementary. An eclectic stance is also taken on the development and

testing of theory, insomuch as local accounts of practice and/or general theoretical abstractions and statistically generalizations may be made (Waterman et al., 2000).

Participative

In another philosophical approach to action research, phenomenology, participation and ecological considerations are emphasized. Reason (P. E. Reason, 1994) urged action researchers to be aware of how Western thinking encourages a narrow and materialistic understanding of the world that alienates people from their own understandings and from the natural world. There is a sense of wanting to create a 'better and freer world' that 'liberates the human mind, body and spirit' (P. Reason & Bradbury, 2001). Primacy is given to the search for experiential, spiritual and practical knowledge by groups of inquirers. That being said, it is pluralistic in its acceptance of other kinds of knowledge. Group and individual reflection is promoted as a means of helping practitioners to engage deeply with experience and practice (P. E. Reason, 1994). Formal research methods (generally qualitative) may be incorporated and theories generated but this is not the key aim (Waterman et al., 2000).

Within firms, which are subject to routines, relationships among members are instruction-based. The process of routinizing activities proceeds as follows (Nelson & Winter, 2009). First, activities are transformed from being ad hoc to repetitive. By executing activities repeatedly, organizational members are able to commit the skills to memory, and this is known as 'remembering by doing'. In this way, routines serve as 'organizational memory'. Second, activities are transformed from being playful to serious. When organizational activities become less playful and more serious, which may even involve conflicts between members, routines keep everyone at bay; thus, routines serve as a 'truce'. Third, activities are transformed from idiosyncratic to standardized. In order for organizational capability to function smoothly, organizations must impose orders authoritatively to render anything deviant normal. In achieving this objective, routines serve as 'targets of control'.

Due to the collective nature of routines (Becker, 2004), individuals must behave in accordance with the routines of large established firms. As such, they become an element that may be placed, moved, and controlled by instructions. In a word, the above process is Taylor's systematic 'soldiering' (Coriat & Dosi, 1998). Dosi and Coriat state management of innovation is learning how to govern and learning how to solve problems to achieve the co-evolution of competences, conflicts and organizational routines (Coriat & Dosi, 1998). As we will see later, action research is a method for solving problems via participating.

Qualitative

In this philosophical perspective there is a critique of most organizational science that is informed by positivism. Susman and Evered (1978) argued that, above all, the findings from positivist science are not helpful in solving practical problems experienced by members of organizations. Drawing on phenomenology, priority is given to the subjective meaning of the behavior of those involved with change and research. The notion of the hermeneutical circle (Gadamer et al., 2004) is influential in this approach, that is, knowledge is only possible through pre-positions. In other words, without prior understanding, new knowledge is impossible to gain, and that understanding is constantly reconfigured as one moves from the particular to the general and back again, or from one person to another and back, and so on. Therefore, in this reflexive approach, it is thought necessary to understand the reasoning behind people's (including the action researchers') actions; this includes an examination of their intent, experiences, values and ethics. Through discourse and reflection with members of the organization, it is argued that a new understanding and resolution of the problem under investigation will occur (Waterman et al., 2000). It is obvious that management of innovation need this perspective.

The problem of oversimplification that occurs when attempting to understand the differences between perspectives is acknowledged. As stated previously, the differences are largely on emphasis. However, the philosophical perspectives partly help to explain the variations in the application of action research. Somekh (1995) proposed that the various applications arise because of the different cultures and values that people have, even within the same discipline. Somekh (1995) goes on to draw attention to the fact that action research, like all research, is a product of

its time and history, and that the backgrounds and experiences of action researchers will shape the type and focus of the action research process.

According to Dosi' review (1988) of microeconomic effects of innovation, features: (1) cumulativeness (derived from technological trajectories and paradigm), (2) uncertainty (derived from the fact that the direction of innovation is determined by random historical events), (3) irreversibilities (derived from the nature of 'lock-in'), and (4) interdependence (derived from reverse salients). Thus, technological change evolves in a path-dependent way, and there is no great leap forward. It shows action research philosophy is compliant with management of innovation.

Action research in management of innovation

There are an increasing number of research implemented with action research method in the field management, especially management of innovation. Innovation is a collaborative process which most of members of firms involved in, and collaborative management is viewed as a modality within the broad family of action research approaches (Canterino, Shani, Coghlan, & Brunelli, 2016).

The action research is a specific method supporting action learning, implemented in an open innovation project, and mitigated some of the inherent challenges of multi-actor collaboration by using empirical findings from a collaborative project implementing a collaborative innovation process (Yström, Ollila, Agogue, & Coghlan, 2017). Mazigo (2017) highlights the important role of action research in triggering and promoting social innovation processes in communities. Social innovation is a process involving the development and delivery of new ideas for improving human capabilities and social relations (Mair & Marti, 2006), Mazigo (2017) argues that well-designed and well-executed action research can provide participants with opportunities to reflect on and develop shared understandings of individual and societal challenges and their possible solutions. Well-designed and well-executed action research also can provide participants with opportunities to critique and test proposed novel ideas, strategies, services and products, thereby determining their effectiveness or ineffectiveness in facilitating the realization of envisioned social, economic and political goals. Furthermore, Kocher, Kaudela-Baum, and Wolf (2011) portray how action research has changed and enhanced SME's capability to innovate and Salehi and Yaghtin (2015) specify an action research model as a flexible loop which allows action (exploration and exploitation Innovation) and research (organizational learning and feedback system) to be achieved at the same time.

When and why use action research?

Waterman et al. (2000) studied action research papers in healthcare in the UK and found the papers have below characteristics:

Aims of them
- To improve the existing situation (related to management of innovation)
- To develop and implement innovation or intervention (related to management of innovation)
- To evaluate project outcomes
- To assess the existing situation: to identify needs for developing an appropriate innovation or intervention (related to management of innovation)
- To contribute to knowledge/ develop theory (related to management of innovation)
- To develop roles

Reasons for choosing action research in them
- Encourages participation (related to management of innovation)
- Results in change (of some sort) (related to management of innovation)
- Has a cyclic process, involving feedback (related to management of innovation)
- Contributes to understanding, knowledge and theory (related to management of innovation)
- Solves practical/concrete/ material problems (related to management of innovation)
- Educates (related to management of innovation)
- Acknowledges complex contexts
- Embraces a variety of research methods
- Evaluates change (related to management of innovation)

- Empowers and supports participants (related to management of innovation)

Issues addressed by them

- Professional education, skills training (related to management of innovation)
- Inappropriate or conflicting practices
- Lack of evidence
- Professional roles
- Health service provision (related to management of innovation)
- Communication and/or involvement (related to management of innovation)
- Targets, standards, guidelines
- Implementation of research in practice (related to management of innovation)
- Power

Outcomes of them

- Problem identification (related to management of innovation)
- Planning (related to management of innovation)
- Evaluation (related to management of innovation)

So according to the Waterman's study, action research is a good method for management of innovation because the aims, reasons for choosing method, issues and outcomes of action research is compatible with aims, issues and outcomes of management of innovation

Action research cycle models

Different schools of action research describe this cyclical process using lesser or greater number of steps. For example, Zuber-Skerritt refers to four phases, while Checkland's Soft Systems Methodology outlines seven steps or phases. In this sense the action research phases in differences approach as bellow:

Action research cycle Susman & Evered:

A more comprehensive form of the action research cycle from Susman & Evered (1978) is shown in Figure 1.
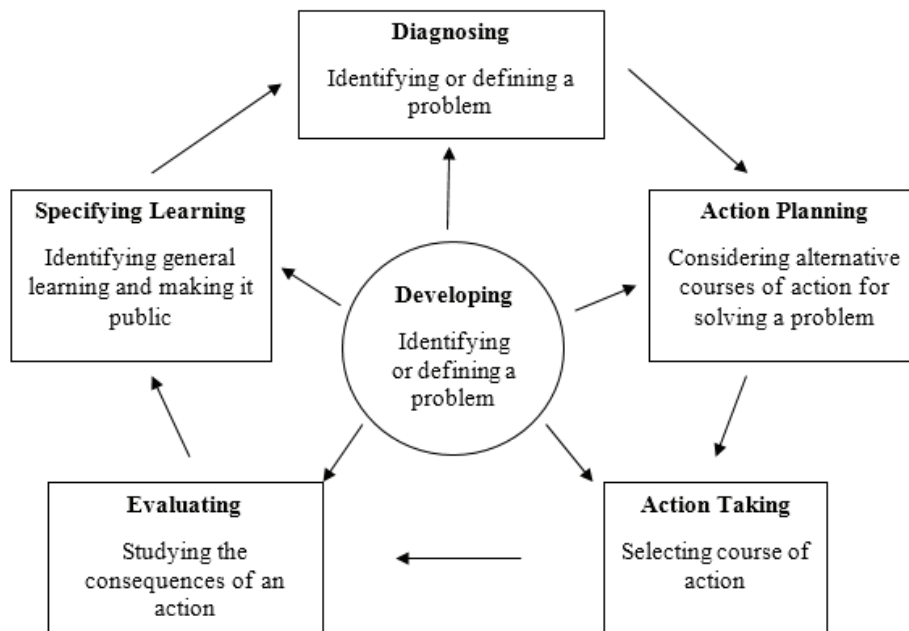

Figure 1- *Phases within an action research cycle from Susman and Evered*

While Susman & Evered (1978) consider all five phases to be necessary for a comprehensive definition of action research, they do acknowledge that action research projects may differ in the number of phases carried out in collaboration between the action researcher and the client system.

The iterative nature of action research from Damme

The virtue of action research is its responsiveness. It is what allows you to turn uncompromising beginnings into effective endings. It is what allows you to improve both action and research outcomes through a process of iteration (Dick, 1993). As in many mainstream science procedures, the use of repeated cycles enable the action researcher and his/her colleagues to converge on an appropriate conclusion (Figure 2).
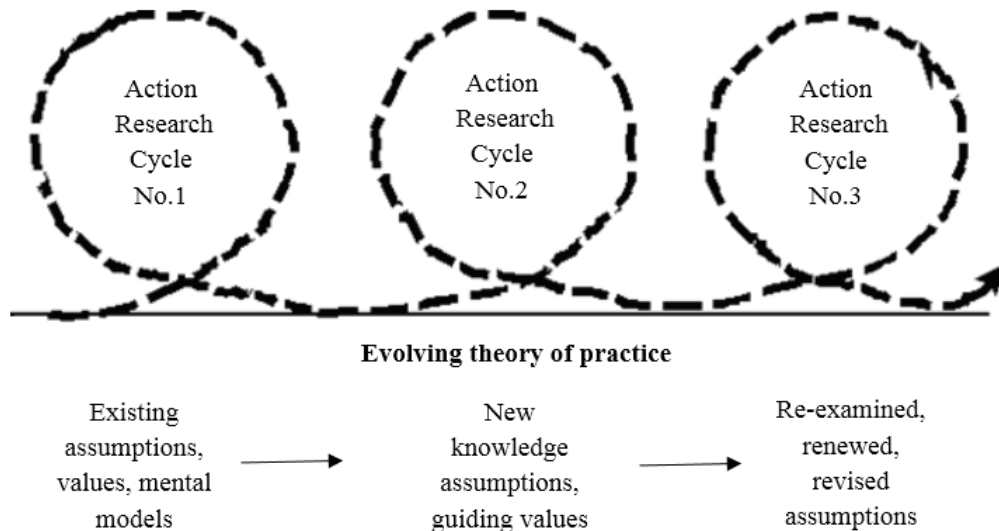

Figure 2 - *The iterative nature of action research from Damme*

It is by being deliberate and intentional about this process that you can maximize your learning. The rigor in action learning lies in the quality of the data and the interpretations of this to help people think about -- reflect on -- how they can improve the situation in question. "At each of the steps you learn something. Sometimes you are recalling what you think you already understand. At other steps you are either confirming your previous learning or deciding from experience that your previous learning was inadequate. This is equivalent to what Gummesson (2000) calls the 'hermeneutic spiral', where each turn of the spiral builds on the understanding at the previous turn. It is these - the responsiveness to the situation, and the striving after real understanding - which define action research as a viable research strategy" (Dick, 1993).

The process of reflection in action research

In some sense of the terms, action research tends to be cyclic, participative, qualitative and critically reflective. All of these features (except the last) can be seen as choices to be made by the researcher in the context of the problem being studied (Dick, 1993). And it is this process of critical reflection that distinguishes action research from everyday inquiry (Bunning, 1995; Dick, 1993; Wortley, 1996) and also makes it a particularly suitable approach with which to help develop the change needed for areas such as environmental management and sustainable development. Indeed, in the sense that action research seeks alternatives to the status quo that will both illuminate what exists and inform fundamental change, it is a form of critical theory and seeks to stimulate critical reflection among human agents so that they may more freely choose whether and how to transform their world (Argyris, Putnam, & Smith, 1985).

As Kemmis and McTaggart (2000) observe, to do action research one must plan, act, observe and reflect "more carefully, more systematically, and more rigorously than one does in everyday life: and to use the relationships between those moments in the process as a source of both improvement and knowledge". It is the process of reflection in this process, on one's own views as well as those of others, that provides the basis for learning -- enabling all those involved to develop a more holistic perspective of any given situation, within which they can best make their particular contribution.

The challenge for the action researcher lies in the fact that learning can be difficult, even at an individual level. Accepting new information that challenges the way we think and the things we do is, even with the best of will, difficult to undertake, to accomplish, and to sustain (Michael, 1995). Finding out about problems also implies that we may have to act to correct them. What often stops us doing this is an anxiety, or the feeling that if we allow ourselves to enter a learning or change process, if we admit to ourselves and others that something is wrong or not right, we will lose our effectiveness, our esteem, and maybe even our identity. Most of us need to assume we are doing our best at all times, and it may prove a real loss of face to accept and even "embrace" errors. Adapting poorly, or failing to realize our creative potential may be more desirable than risking failure and loss of esteem during the learning process (Kilvington, Allen, & Kravchenko, 1999).

Accordingly, as Argyris et al. (1985) suggest that the first match to any inquiry into a mismatch between intention and outcome is likely to search for another strategy that will satisfy the 'governing variables', the belief systems and values which the individual or organization is trying to maintain. For example if a land manager views his/her enterprise solely in terms of sheep production and notes that the vegetation condition of the land is deteriorating, the action strategy will likely be to try a different grazing regime. In such a case when new strategies are used to support the same governing variable (i.e. the land as a sheep production system) this is called single loop learning (Figure 3). A similar science example might arise in response to funder requirements for a scientist to be more participative. The response might be to find a 'friendly' group of people to work with that are happy to acknowledge the scientist as the 'unquestioned expert' - the governing variable.
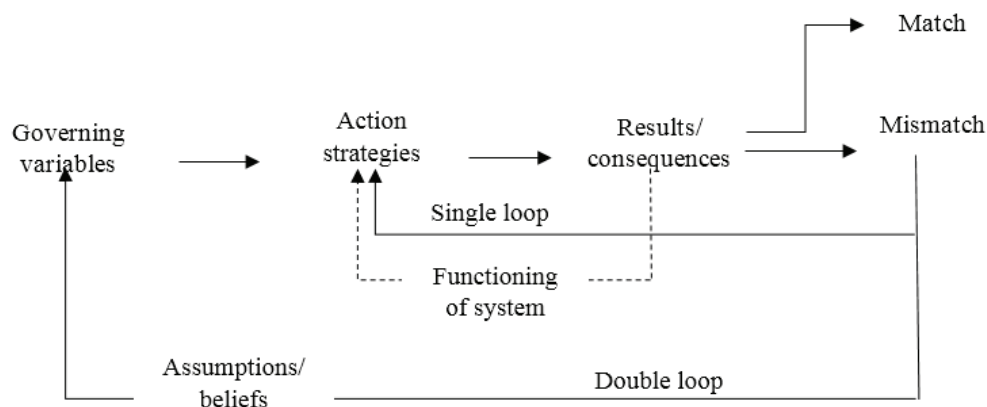

Figure 3- *Single and double-loop learning from Argyris et al.*

Developing double-loop problem solving approaches is thus a critical part of changing people's actions in respect to the environment. However, it also requires the action researcher to deal with the defenses of individuals and organizations -- which is no small undertaking! In many cases this will mean having to address situations in which participants may feel embarrassed or threatened. However, as Grudens-Schuck (1998) points out, unless research and education programs build specific processes for confronting people about unworkable theories and organizational defenses, the use of local knowledge and interpretations of events cannot be a sound foundation for collaborative learning and positive change.

Action Research Process from Lewin

Lewin (1946) outlined a set of procedures for action research in the context of social planning which are still adhered to today. Planning usually starts with something like a general idea. For one reason or another it seems desirable to reach a certain objective. Exactly how to circumscribe this objective, and how to reach it is frequently not too clear. The first step then is to examine the idea carefully in the light of the means available. Frequently more fact finding about the situation is required. If this first period of planning is successful, two items emerge: namely, an 'overall plan' of how to reach the objective and secondly, a decision in regard to the first step of action. Usually this

planning has also somewhat modified the original idea. The next period is devoted to executing the first step of the overall plan (Grundy & Kemmis, 1982).

Rational social management, therefore, proceeds in a spiral of steps each of which is composed of a circle of planning, action, and fact-finding about the result of action (R. A. Lewin, 1952). Basically the process of an action research project consists of a number of phases:

- initial reflection
- planning
- action
- observation
- reflection

Where possible or appropriate most projects go through several cycles or spirals of the basic phases. Like all descriptions of research endeavors, the action research spiral and the stages it describes are much more clear-cut than occurs in reality. Planning is seldom perfect, action reveals the need for further planning, backtracking occurs, and so on. Nevertheless it is useful to given an account of each phase separately in order to describe the action research process.

Action research as a cyclical process from Suojanen

Action research is a cyclic process, starting with the recognition of the problem, then planning the action, proceeding to carrying this out and finally evaluating the results obtained (Suojanen, 2001). According to Kemmis (2000), this process consists of four phases: planning, action, observation and reflection. Suojanen (2001) adopts Kemmis's ideas and further develops them. Her more specific model has been used in teacher education in Finland within the movement "Teachers as educators" (see Figure 4).

The model starts with analyzing the actual situation and visioning the course of action. This is followed by plan, action, observation and reflection. Reflection leads to a revised plan followed by a new action research circle.
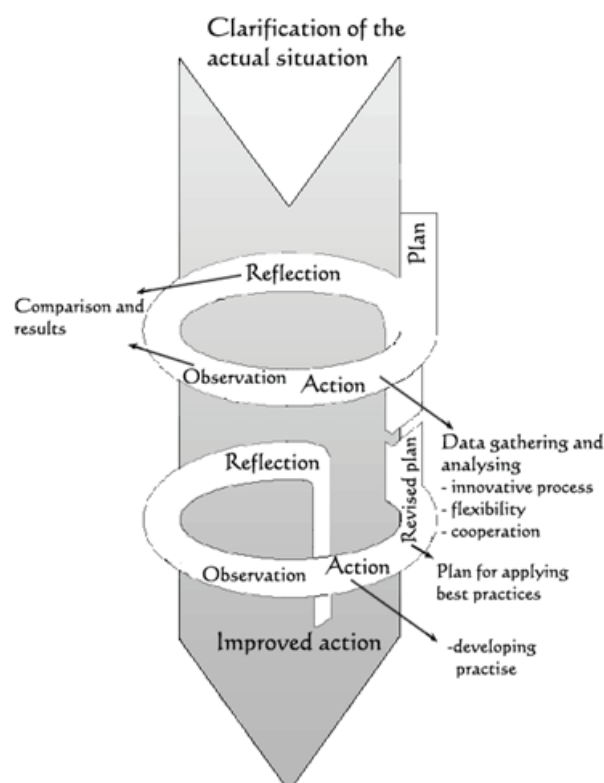

Figure 4 - the spiral of action research from Suojanen

However, even thought, in action research, preliminary analysis of the results is carried out throughout the research process, and the data received during the study (real-time reflection) already affects the action phase, the final reflection (retroactive and proactive reflection) is always necessary (Suojanen, 2001). This offers tools for the next cycle, starting with a revised plan.

The validity of action research is evaluated according to this spiral of planning-action-observation-reflection, which distinguishes it as a method from both the empirical-analytical and interpretative research approaches (Kemmis & McTaggart, 2000). Since action research concerns the interplay between theory and practice, this aspect should also be evaluated.

IRAP Action Research Phases

According to Calhoun (1994), the Indiana Reading Academy Project design a bow model for action research (which we use synonymously with "teacher inquiry" and "teacher research") as shown in Figure 5.
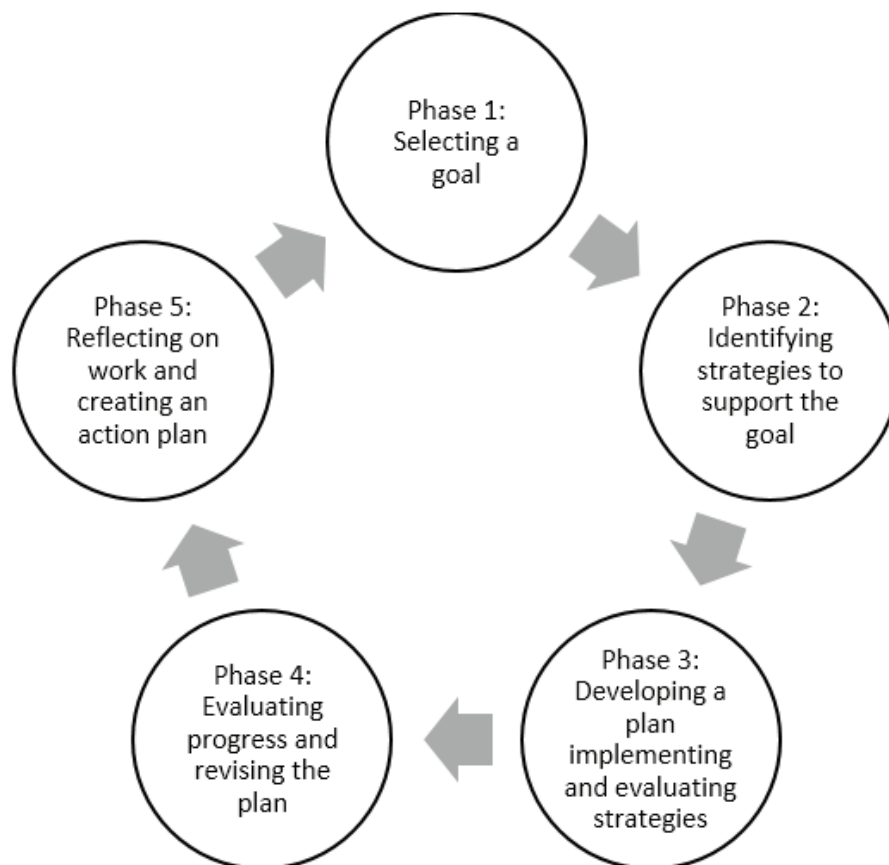

Figure 5 - IRAP Action Research Phases

Hopper's Phases of Action Research

Tinning (1992) reported that there are very few action research studies within physical education. This may be the case because physical education has tended to rely on a positivistic approach to validate and give credibility to research findings (Hopper, 1996). These approaches typically involve a theoretical construct or hypothesis that can be examined through the collection of quantitative data. This research involved a mixed approach using both quantitative data regarding students' participation and enjoyment and qualitative data regarding my own observations and reflections and those of my critical friend. My attraction to action research is that it focuses on naturally-occurring, ordinary events in natural settings, and enables the teacher to gain a better understanding of what "real life" is like (Miles & Huberman, 1994).
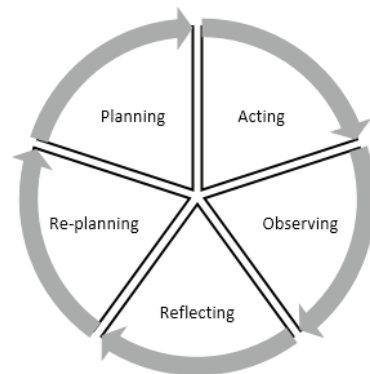
Figure *6* - Hopper's Phases of Action Research

Conclusion

As we stated, John Collier in 1945 launched term 'Action Research' for national programs to improve relations between ethnic groups in the USA (Collier, 1945). Nowadays action research is now commonly defined as a process of joint learning. Dosi and Coriat state management of innovation is learning how to govern and learning how to solve problems to achieve the co-evolution of competences, conflicts and organizational routines (Coriat & Dosi, 1998). So management of innovation is compatible with action research methodology.

According to Waterman et al. (2000) studies, action research is a good method for management of innovation because the aims, reasons for choosing method, issues and outcomes of action research is compatible with aims, issues and outcomes of management of innovation.

The pivotal factors identified from the action research process are which issued in management of innovation, such as below:

- Allows for problem identification by participants,
- Provides educational opportunities through sharing of experience, knowledge and ideas,
- Provide resources: funding, materials, time, staff
- Empowerment of participants
- Strategic mismatches
- Receptive to new ideas
- Develops appropriate innovations and practical knowledge

In summary action research methodology is useful for management of innovation, based on theoretical and empirical studies in action research methodology.

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