

Developing Professional Practice through Action Research: Theory- generative approaches in practitioner research

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Key theoretical approaches in this chapter: Action research and reflective practice

Carr (2005) discusses the practice of theorising practice as one akin to the Aristotelian concept of practical philosophy. His discussion of the tensions between practical relevance and academic rigour reveals a pair of polar opposites, each discussion being conceived and articulated separately, and aimed at two separate audiences, which, he claims, gives an impression of the pair having irreconcilable aims and purposes. In reflecting on his own professional life and practice, he highlights the need for context-dependant practical concerns in theorising.

Bridges (2003) discusses the centrality not only of philosophy, but of *philosophising* in action research, and recounts the extent to which Elliott's (1991) model of action research requires an exploration of personal philosophy, and also enquiry into the consequences of practice. He reminds us that it is easy to both see and represent action research contrasting with, or oppositional to philosophical approaches to practice, and directs us back to such a philosophising and theorising articulation.

Action research is therefore considered in this chapter as that process which serves to consider, reflect on and analyse practice. Carr (2005) suggests that it is the most appropriate way to understand the role of educational theory in the professional development of teachers in that it simultaneously changes and theorises the changes in practice.

Key Texts

Bridges, D. (2003) A Philosopher in the Classroom, *Educational Action Research*, 11 (2), 181-196

Carr, W. and Kemmis, S. (1986) *Becoming Critical: Education, Knowledge and Action Research*, London, The Falmer Press.

Elliott, J. (1991) *Action research for educational change*, Milton Keynes, Open University Press.

An introduction to the research project

There has historically been difficulty in getting girls to engage in the study of A-Level Physics. Research I completed in 2000 (McAteer, 2000) indicated a decline over a ten year period, in the percentage of those students qualified (by virtue of their GCSE grades) to take the subject at A Level. The project started by setting the scene and mapping out the extent of this trend through a curvilinear regression analysis, calculating the gradient, or rate of decline of uptake for both boys and girls in the province of Northern Ireland. While there was a noted decline in the uptake trend in the previous ten years for both girls and boys, the rate of decline was greater for girls (7.28% per year) than for boys (4.84% per year)

The project sought to understand some of the reasons for this province-wide trend through both historical analysis and contemporary exploration. Following this, I attempted to address these concerns on a small scale through a classroom-based action research project in my own classroom.

During an initial (reconnaissance) period, interviews were carried out in a sample of three secondary schools to gain a wide perspective on perceptions and experiences of, and attitudes to, physics and physics education. Ten teachers and sixteen students were interviewed through audio-recorded semi-structured interviews. In addition, a range of classroom observations was undertaken, data on student perceptions of and attitudes to (physical) science education were collected via the Weinreich-Haste (1981) sentence completion test, and the Mead and Metraux (1957) *Draw a Scientist* (DAST) test, student focus groups were convened, and school-based documentation and other legislative documents examined. The sentence completion test required children to complete sentences in relation to their perceptions of scientists, reasons they would or would not like to be a scientist, and reasons they would or would not like to marry a scientist, while the DAST asks that children to draw freely an image of a scientist. Finally, a reflective diary was kept throughout the study as a means to produce a running commentary on the project, to record observations, and crucially, in a theory building approach, a space in which to become initially analytic, spot emergent themes and theoretical insights, and hence continuously review and refine the research approach.

Alongside this 'field' research, analysis of the curriculum documentation, and historical evidence on the evolution of science as a professional and educational activity revealed that the post-1988 reform curriculum drew heavily on a model of science rooted in the 19th century, where mathematical (rather than biological) sciences were of prime importance, and were indeed, its public "face". The role of women in the practice of science and science education was limited, partly because of women's limited access to the school system, but also because of social mores and norms which suggested that elements of science were inappropriate for them in terms of intellectual challenge (women being considered at the time intellectually inferior to men), social and moral challenge (in that women's participation would challenge the 'normal' domestic function of women, and disrupt social structures) and challenges of moral decency (where meetings of natural history groups might discuss reproduction or other intimate matters deemed inappropriate for women). The British Association for the Advancement of Science (BAAS) at the start of the 19th century was governed by men, and rules regarding admission made by these men. Women therefore, were granted limited access, but had no voting rights through which to change the limitations placed on their membership (Phillips, 1990). Thus, an historical analysis was suggestive of a model of science based on a logic of certainty and rules, an epistemology that was considered 'difficult' and structures which were exclusive of women.

Students in the interviews, described physics to me as difficult, rule-bound, overly mathematicised, and irrelevant to their lives. Classroom observations, followed by student focus groups revealed a pedagogy of "direction", where investigative science (a central strand of science curricula) was taught in a formulaic way, with students being (often subtly, and unrecognised by teachers) encouraged to get "right" answers. Many very able students found the experience of physics education lacked creativity and bore little relation to the things in life that interested them. Despite children in the study having female science and physics teachers, there was a clear stereotyping of scientists as male, devoid of emotion, and obsessed with their work. (There seemed to be a separation of the role of scientist and science teacher, which is something the study at that stage did not pursue further).

As a physics teacher at the time, I was concerned that students found physics education such a negative experience, and wanted to ameliorate this. Action research, described by Elliott (1991) as an approach whose fundamental aim is to improve practice, seemed a way

in which I could search for both understanding, and practical solutions. Winter summarises this succinctly

Although the possibility of change is grounded in the distinction between action and research, it requires equally an intimate and principled linkage between the two, in order that the 'findings' of research can be translatable back into the world of action. (Winter, 1987: 21)

Action research as a theory generative approach to this concern seemed an appropriate way not only to generate deep understanding about the nature of "problem" itself, but to help me to make informed judgments about possible actions I could take to address it.

Theories explained and their use justified in the context of this research project

In discussing the role of theory in this action research project, it is pertinent to provide an initial introduction into the conceptual and methodological bases employed. My premise was that theoretical constructs would not be identified at the start, but would emerge through iterative data analysis processes during the progressive cycles of action research. . (see Fig. 1 for an illustration of one cycle) Much of that data would be generated from my practice.

It [action research] has a very specific purpose, enabling professionals to understand their practice better, and use that enhanced understanding in order to effect changes in practice. (McAteer and Dewhurst, 2010: 34)

Rather than produce data to test particular hypotheses or theoretical frameworks, I intended my study to yield data which would generate testable hypotheses and theory. This inductive approach to research is well documented in educational and other fields of study (Mintzberg (1979), Van Maanen (1988) and Carr (1980 and 1986)). Building on the concept of "grounded theory", as by Glaser and Strauss (1967), it advocates an iterative approach to data analysis, allowing emergent themes to feed into the development of data-derived theory. Its starting point is the 'clean slate'. In practice, this involves the articulation and suspension of preconceived notions about relationships and outcomes at the outset.

There is also a question in relation to the definition of 'theory' and the extent to which a theory is generalisable. Within the confines and purposes of my study my working definitions derived from an adaptation of Pfeffer's (1982) definition that a good theory is parsimonious, logically coherent, and testable, and as Eisenhardt (2002) suggests, results in new insights. Thus, my study should yield elegantly simple insights, be grounded in the data, providing for myself and others, insights into elements of practice, and a means by which to address concerns.

The fundamental aim of the study was to understand and improve a situation within my own practice and its broader context. Many practitioners find themselves similarly faced with such real-life problems. Following the work of Stenhouse in the 1970s, the concept of classroom based research was developed as a means of teachers' professional development. He suggested that the work of the teacher be researched by teachers themselves. Modern usage of action research owes much to this heritage. He felt, however, that this research should be supported and guided by professional researchers who would also identify the focus for the research (Stenhouse, 1975). Action research, unlike other forms of research, was designed to address specific and particular practice based problems,

developing specific and particular understanding, action hypotheses and actions steps in response to these practical problems, generating theories of practice.

Elliott developed the model, suggesting that teachers should themselves identify the focus of the research, in an effort to understand '*the social situation in which the participant finds himself*' (Elliott, 1978: 355). Identifying a reciprocal relationship between theory and practice, he suggested that '*theories are not validated independently and then applied to practice. They are validated through practice.*' (Elliott, 1981: 1)

In order to maintain the reciprocation between research and action, between theory and practice, action research is operationally cyclical, the findings of each cycle informing the planning and carrying out of the next. Various representations of cycle are used, many of which derive from models of Kemmis and McTaggart (1981) or Elliott (1981 and 1991).

The model I chose to use in my study was Elliott's (1991), in which an initial concern is identified and considered through a fact finding or *reconnaissance* period. Initial analysis allows for the development of 'action hypotheses', which inform the plan of 'action steps', which are then 'implemented, monitored and evaluated'. Initial findings are then used to inform revision of the general plan and development of the next action steps. This self-reflective and evaluative process can proceed through a number of cycles, each having the potential to further review and refine the initial concern or question (or indeed, as if sometimes the case, re-formulate it based on new understandings) with the subsequent action steps tending asymptotically to resolution of the issue. In the project described here, this process was undertaken through three such cycles, each comprising contemporaneous analysis and theorising of practice that informed professional learning the planning of action hypotheses and the development of future action steps.

In action research, the research itself becomes part of the practice researched, while the practice becomes a research practice. Given the dynamic nature of my concerns, and my desire to both develop my understanding and my practice in relation to them, action research provided a suitable framework.

Action research therefore has the ability to transform both the nature and the possibilities of both action and research, providing a powerful means by which practitioners can enhance the potential for their practice to become *praxis*, or 'practical philosophy'. The action researcher, is in the words of Bridges (2003), *a philosopher in the classroom*.

The application of theory to the research

Within an action research paradigm, conceptualised as "*an embodiment of democratic principles in research*", (Carr and Kemmis, 1986: 164) the notion of "applying" theory can be problematic in that there is a hierarchical assumption that theory is the academic understanding that is applied to, and hence subordinates the lesser practice. This section deals therefore with the **relationship** between theory and practice in the project. As Winter says

However, although the possibility of change is grounded in the distinction between action and research, it requires equally an intimate and principled linkage between the two, in order that the 'findings' of research can be translatable back into the world of action (Winter, 1987: 21)

The first round of student interviews in the project yielded insights into their experiences and perceptions of science. One student gave a damning indictment of both the curriculum and the pedagogy of physics, saying

*... you copy things off the board and you learn them, and you're tested and there's not much creativity in it....
In a set of results in an experiment, there's basically one conclusion you can draw that's right or wrong...*

Another, discussing the role of investigative work in the curriculum suggested that in reality, it was not at all investigative

it's like you were discovering things that there was a set rule to, there was nothing really to ... explore.

This had resonances with the GCSE reports of Physics investigations that I had been marking at the time, which included such conclusions as

... this proves that my hypothesis was true and that my experiment was a success.

And:

... in general I am satisfied with my investigation. My predictions were proved correct.

Initial findings like these informed reflection during the reconnaissance phase of action research. Models like those of Ghaye and Ghaye (1998), and Moon (2006) support a critically reflective analysis of findings, leading to the subsequent theorising of practice in order to develop contextualised understanding of specific problems or concerns.

A challenge, however for practitioners is to accept and act on the implications of findings that test our normality.

Paradigmatic assumptions, are ... the hardest for us to challenge, as they represent the way in which we have learned to see and understand the world. Most of us are highly resistant to such challenges...(McAteer et al. 2010)

The particular challenge of this 'practical philosophising' is its inherent imperative to change practice. Day in his 1993 paper discusses the 'confrontation' of our professional learning in a way that links the outcomes to future, informed action. Analysis of my research data allowed the development of theoretical descriptors of the current situation in science education, and the proposal of alternatives, which were used to generate a more holistic model and practice of science education for students.

The relevance and effectiveness of using theory

Using a theory generative, or theory building approach to researching the "problem" of girls in physics opened up for me an unexpected and unknown world. While the initial question had been about girls in physics, successive iterations of data analysis allowed me to understand that there were questions about boys in physics also. The production of initial statistical data precipitated a series of "why" questions, leading me to pursue a qualitative investigation that might help me understand, and do something about the situation.

As Mintzberg (1979) puts it

Theory building seems to require rich description...we uncover all kinds of relationships in our hard data, but it is only through the use of this soft data that we are able to explain them (Mintzberg, 1979: 587)

Interviews with the young people opened to me their experiences of science and physics education from an entirely different perspective. Their articulations of science education experiences, alongside their cultural perceptions of science and scientists drew me to question just where this model of the science curriculum had arisen. In the late 20th century when science had experienced a significant shift from its underpinning of certainty and predictability located in a Boolean logic, to a binary, and later a fuzzy logic, the culture and practice of school science owed much of its structures and associated pedagogies to a model of science developed and professionalised by the British Association for the Advancement of Science (BAAS) in the 19th century. Giving hierarchical superiority to the mathematicised sciences, and promoting a male dominated social, cultural and epistemological practice of science, the BAAS model of science was still exerting its logically inconsistent influence at the cusp of the 21st century.

Action research in its cyclic approach to data collection, analysis, and hypotheses testing allows the initial question to shift, and new sources of data or methods of data collection to be explored. Eisenhardt (2002) suggests that this is not only legitimate, but necessary in theory building research approaches, talking of the “controlled optimism in which researchers take advantage of the uniqueness of a specific case and the emergence of new themes to improve resultant theory” (Eisenhardt, 2002: 16-17)

In addition, as is a central tenet of action research, the production of contextualised understandings and insights provided the supporting evidence for the subsequent production of contextualised plans of action. For the practitioner researcher, this process emulates and reinforces Stenhouse’s (1975) concept of the curriculum as a process, '*procedures, concepts and criteria, which cannot adequately be translated into the performance levels of objectives*' and its issues are subject of '*speculation*' rather than '*mastery*'. (Stenhouse, 1975: 85)

Summary conclusions and recommendations

- *The discovery of the appropriate theories*

The approach I have taken could in some respects be seen as a rather eclectic mix of philosophical and philosophising approaches. Given the broad reach of the study, this was felt to be appropriate in that it allowed for a data-driven approach to analysis. Thus, when issues of gender arose, for example, it was considered appropriate to explore feminist perspectives, and standpoint theory as a means of understanding the phenomena revealed through the data. Similarly, when issues relating to the nature of science were raised, analysis involved an exploration of the history and philosophy of science. This degree of match between the data themselves, and the analytic tools echoes what Green (1999: 106) has called, concerns with “the particular”.

- *The ease or difficulties with understanding the theories*

For many researchers new to data-driven, theory-generative approaches, a particular stumbling point can be, paradoxically, a tendency to ignore the data. Practitioners in policy led practice can find it difficult to listen to the data, responding instead to contemporary policy or “flavour of the month” approaches. In addition, the new, and often insecure researcher may find the “voice of authority” of texts initially more

seductive and persuasive, and thus accord those views more credibility than their own data. This can result in a tendency to make the data “fit” a pre-chosen theoretical framework, rather than let the data suggest the arrival at, or indeed derivation of theory.

- *The difficulties of application to data and texts*

A particular difficulty of data driven approaches is lack of predictability in the research process. The iterative nature of an action research, or grounded approach has been well documented as a source of some concern to practitioners, and can lead to a loss of confidence in the process (and the ability to engage in it). The range of literature to be consulted cannot be pre-specified, and this may heighten feelings of insecurity in new researchers.

- *What the application of the theories revealed*

In-depth investigations of a particular and contextualised concern is of significant value to practitioners concerned with developing deeper understanding, and formulating possibilities for improving that situation. This contextualisation and specificity allows practitioners working in complex and dynamic environments to formulate possible problem-solving approaches specifically matched to the context. In the context of this research, pursuing a data-driven approach allowed a much fuller understanding of the cultural and historical derivation of contemporary concepts of science and science education to be reached than might otherwise have been done. This in turn, helped explain some of the disrupt between student and teachers expectations of science, and their experiences of it.

- *How the absence of these theories might have impaired understanding*

In many practice-based contexts, policy concerns dominate, and practitioners can become overly dependent on “off the shelf” solutions to perceived problems. Without the deep exploration of the reconnaissance phase of, for example, an action research approach, it is possible that the manifestation of a particular problem or issue may be misconstrued in terms of its ordinary causes, and hence responded to inappropriately. Given the initial concern in the project about the decline in the uptake of physics at A-Level, particularly by girls, it is almost certain that without the deep exploratory phase of this project, the possible explanation for the phenomenon might simply have related to theories of gendered choices, rather than the historical and philosophical theories of science and science education, and indeed their relationship with gender issues.

- *The limitations of the theories*

Despite the potency of such a grounded approach to analysis and professional learning, it is important that practitioners do not over-claim the significance of their findings. Another important potential limitation of this type of work is the privileging of the author’s voice. The use of participant, validation group feedback can help ameliorate this

- *Reflection and recommendations of the experience*

Those practitioners engaging in such an open-ended exploration of practice would benefit from reading the work of Cook (1998) and Mellor (1998), both of which describe and discuss not only the “messiness” of action research, but also its

necessity in the process. Many metaphors exist to describe the process and the affective experiences of undertaking it, with Schön's "swampy lowlands" and "lily pads" probably being the best known (Schön 1983). Having steered a course through such a process, however I can testify to the rewards, both in terms of professional practice, and also academic development. Sharing that experience enriches it further, and enables a more confident journey through it.

Recommended Further Reading:

Carr and Kemmis (1986)

Described by some as "a hard read", the book has also been described by Carr himself as having been "a hard write", this text is considered by many a seminal and influential book, providing a critical theory insight into the nature, function and purposes of action research, and an ongoing discussion of the theory-practice relationship. It worth reading this text, even in part, for its richness and depth of meaning.

Pine (2009)

Combining a sound philosophical and epistemological analysis of the conceptual bases of action research, this text also addresses pragmatic and practical matters in a way that is accessible to practitioner researchers. Beginning action researchers will find it both supportive, but with appropriate intellectual challenge. The structure of the book, in making "Practicing Action Research" the third section (rather than the first, as is the case in many such texts), following discussions of the conceptual underpinning, and the validity of action research, provides a refreshing, and useful backdrop to the practice-based issues involved in doing this type of research

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