

CHAPTER 2

Research methodology

“Action research consists of a family of research methodologies which pursue action and research outcomes at the same time.” (Dick, 1997:1)

1 Introduction

This study was done on the change or evolution from the traditional convergent and content-based ways of practising education, training and development to achieve the products of learning (i.e. primarily tests and examinations), towards alternative practices of divergent and outcome-based ways of assessment of the process of learning (e.g. the gathering of evidence of competence against the unit standards or qualification).

Research often includes a variety and an integration of research methodologies. This chapter addresses the following aspects:

- The objectives of the study [section 2]
- The discussion of the different relevant types of research [section 3] to determine the rationale for an appropriate research methodology [section 4] for this study
- The proposed application of this study methodology to this study [section 5]

2 The objectives of the study

Educational research can have exploratory, explanatory or descriptive objectives. Table 8 is a comparison of the characteristics of these objectives from Garbers (1996:295-296) and Mouton & Marais (1993:45,123). It explains the decision to categorise this study as an exploratory study by indicating the context with a tick (✓).

Table 8: Comparison of research objectives in context of this study

Objective	Characteristics	This study	Data collection methods	This study
Exploratory studies	<p>The focus is on a relatively unknown research area to:</p> <ul style="list-style-type: none"> ➤ Gain new insights ➤ Explicate the central concepts and constructs ➤ Determine priorities for further research ➤ Develop new hypotheses ➤ Undertake preliminary investigation prior to a more structured study <p>Methodology</p> <ul style="list-style-type: none"> ➤ A review of related literature ➤ A survey ➤ An analysis of present examples <p>Considerations</p> <ul style="list-style-type: none"> ➤ Open and flexible researcher and research strategy to examine new ideas ➤ Activities that will give insight and better comprehension 	<ul style="list-style-type: none"> ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ 	<ul style="list-style-type: none"> ➤ Surveys ➤ Field work in an authentic environment, less control and longitudinal ➤ Qualitative / Inductive 	<ul style="list-style-type: none"> ✓ ✓ ✓
Explanatory studies	<p>The focus is to:</p> <ul style="list-style-type: none"> ➤ Indicate cause and effect between variables <p>Methodology</p> <ul style="list-style-type: none"> ➤ Indicate the relation between variables in terms of the quantification of data, e.g. direct or indirect proportionality 		<ul style="list-style-type: none"> ➤ Experimental and quasi-experimental ➤ Experimental control ➤ Structured direct and indirect observation ➤ Qualitative / Inductive ➤ Surveys are representative, longitudinal (over a period of time), cross-sectional and independent of a specific context 	
Descriptive studies	<p>The focus is on an accurate description of:</p> <ul style="list-style-type: none"> ➤ Individuals, groups or a phenomenon <p>Methodology</p> <ul style="list-style-type: none"> ➤ Statistical analysis and classification ➤ Correlation between the variables 	<ul style="list-style-type: none"> ✓ ✓ ✓ 	<ul style="list-style-type: none"> ➤ Surveys – Structured observation, questionnaires, and interviews ➤ Representative of group, longitudinal ➤ Quantitative / Deductive ➤ Qualitative / Inductive 	<ul style="list-style-type: none"> ✓ ✓ ✓ ✓

The information in Table 8 indicates that the objective of this study is primarily an exploratory study but it is supported by elements of a descriptive study. It aims to achieve the following:

- Gain new insights and give an accurate description of the phenomenon, i.e. the integrated assessment in outcome-based education, training and development through preliminary investigation prior to a structured study as described in Chapter 3, Chapter 4, Chapter 5, Chapter 6, Chapter 7, Chapter 8 and Chapter 9
- Explicate the central concepts and constructs as discussed in the National Qualification Framework in Chapter 3, Chapter 4, Chapter 5, Chapter 6, Chapter 7 and Chapter 8
- In the final analysis the research will focus on the correlation between the variables of the different assessment strategies and the performance of the learners Chapter 8
- Determine the priorities for further research and develop new hypotheses with reference to assessment in outcome-based education, training and development in South Africa as in Chapter 9

3 Types of research

To verify the best type of research, the concepts of deductive and inductive logic have to be clarified. Deductive and inductive logic distinguish between the aims of the reasoning in this study.

3.1 Deductive logic

Deductive logic aims to reason from the *general to the specific*, i.e. the researcher starts with a clear conceptual framework in a structured research environment of conceptualisation, operationalisation and contextual frameworks using quantitative approaches to prove a theory.

3.2 Inductive logic

Inductive logic aims to reason from the *specific to the general assumptions*, i.e. the researcher starts with a vague idea in a less structured research environment of conceptualisation, operationalisation and contextual frameworks using qualitative approaches to evolve in relations and coherence between the entities (Garbers, 1996:287).

Deductive and inductive logic can be seen as complementary in research (Mouton & Marais, 1993:118).

A vague idea that the evaluation methodologies for the qualification were inappropriate and that the learners' results were unreliable because of a remarkable discrepancy between the so-called semester mark, the examination mark and therefore the final mark for the learners necessitated this study [Chapter 7]. Inductive logic and qualitative approaches were used to develop a more structured conceptual framework that indicated the changes that had taken place from the *specific to the general assumptions* about assessment in outcome-based education, training and development, i.e. to develop a better understanding, and providing an holistic overview of outcome-based education in South African context with special reference to an integrated and generic process of assessment of competence against the unit standards or qualification [Chapter 3].

In Chapter 7 a deductive logic and quantitative approaches were used to develop a clear conceptual framework in a structured research environment of the conceptualisation and operationalisation from the *general to the specific*. It indicates that if the specific outcomes and assessment criteria in a unit standard or qualification are unconditionally and unambiguously clear, the learner constantly performs according to the assessment instruments used to measure the competence of the learner.

Both deductive and inductive logic were used in the interpretation of the results of this study.

4 Qualitative research and quantitative research

The use of qualitative or quantitative research distinguishes the choice of the data collection and interpretation of data in research.

4.1 Qualitative research

Qualitative research acts on inductive logic with no specific and pre-determined conceptual framework and aims for better understanding of human behaviour (Garbers, 1996:186; 287,291; Mouton & Marais, 1993:164). Qualitative data analysis helps to make sense of massive amounts of data, reduces volume information, identifies significant patterns and constructs a framework for communicating the essence of what the data reveal (Sebastian, Egan, Welch & Page, 1996:148).

Table 9 is a summary of qualitative research methodology principles adapted from Mouton & Marais (1993).

Table 9: Qualitative research methodology principles

Principle	Description
Rationale	To understand the phenomenon
Concepts and Constructs	Meaningful words that result in more depth
Hypothesis	General aim of research and will emerge as the research proceeds
Observation	Subjective; the researcher was involved in activities, spontaneous and coincidental observation and providing of examples, unstructured and open-ended
Outcome of the study	To determine relations between variables (constructs)

The following aspects were considered for application of qualitative data analysis in this study.

- Setting up a coding system where the training centres and the learners were coded to be able to identify learners [Chapter 4]
- Taking note of learners with special needs as well as ethnographic and cultural diversity
- Classifying the collected data according to a common set of themes emerging afterwards from the data and as summarised in Table 10

Table 10: Themes for data collection emerging from the data

Theme	Sub-sections of theme
Chapter 4 Learning programme	<ul style="list-style-type: none"> ➤ Introduction ➤ The requirements for a registered qualification ➤ The design and development of the learning programme ➤ Evaluation of the design and development of the learning programme
Chapter 5 Facilitation of learning	<ul style="list-style-type: none"> ➤ Introduction ➤ Clarification of terminology ➤ The facilitation of learning ➤ Evaluation of the facilitation of learning
Chapter 6 Evidence of learning: portfolio	<ul style="list-style-type: none"> ➤ Introduction ➤ The portfolio of evidence of learning ➤ Requirements for a portfolio ➤ Evaluation of the portfolio of evidence
Chapter 7 Assessment of learning	<ul style="list-style-type: none"> ➤ Introduction ➤ The legislative and educational concepts of outcome-based assessment ➤ Assessment and the learning programme ➤ Assessment and the facilitation of learning ➤ Assessment and the portfolio of evidence ➤ Outcome-based learning⁷ and calibrated assessment of competence against the unit standards or qualification ➤ Conducting assessment ➤ Evaluation of the assessment of learning
Chapter 8 Quality assurance	<ul style="list-style-type: none"> ➤ Introduction ➤ The legislative structures of quality assurance ➤ Educational aspects of quality assurance ➤ Checklist for quality assurance ➤ Evaluation of quality assurance

4.2 Quantitative research

Quantitative research acts on deductive logic with a clear conceptual framework and aims to prove what is right or wrong with human behaviour (Garbers, 1996:186,286,290; Mouton & Marais, 1993:164). Quantitative data analysis intends to prove relationship between variables.

Table 11 is a summary of the quantitative research methodology principles (Mouton & Marais, 1993).

⁷ Refer Chapter 3 for explanation of "outcome-based learning"

Table 11: Quantitative research methodology principles

Principle	Description
Rationale	To explain and describe the phenomenon
Concepts and Constructs	One and only one connotation
Hypothesis	Well formulated in the beginning of the study and unconditionally true or false
Observation	Objective, researcher keeps at a distance, well-planned observation and examples, pre-determined, structured and categorised information
Outcome of research	Accept or decline a hypothesis

The following aspects were considered for a quantitative data analysis:

- Developing a unique framework for assessment of learning against the competence of the learner with reference to the specific outcomes and assessment criteria in the unit standards or qualification [Chapter 7]
- Collecting data as the result of the assessment process and interpreting it in terms of the competence of the learner against the specific outcomes and assessment criteria of the unit standards or qualification [Chapter 7]
- Analysing data as described in Chapter 7

5 Action Research

Kurt Lewin (1948) is often cited as the originator of action research providing a research methodology for researchers who are not always very clear about the outcome of the study processes, or the way in which to achieve the outcomes (Robertson, Trotman and Galbraith, 1997:10). Robertson *et al*, 1997:11,15) states that "(T)he most important benefit of action research should be *the improvement of practice rather than the production of theory ... as an intervention into the everyday life of people involved*".

Action research is not absolute or static (Zuber-Skerrit, 2000a:1). The purpose of this section is, however, not to give an in-depth comparison of the different action research models that have evolved since Lewin introduced this study methodology and as reported by Hodgkinson (1997:12-21)⁸. The emphasis is rather on the application of action research as the best research methodology for this study because of the cyclical iterative process, rigour, responsiveness, flexibility to change and the contribution to improve the phenomenon that is researched (Dick, 1993, 1997; Hodgkinson, 1997; Isaac & Michael, 1971; Zuber-Skerrit, 2000a:2).

⁸ The models for action research as reported by Hodgkinson (1997:16):

- Staged: Elliot (1981) and Ebbutt (1983)
- Cyclical: McLean (1995)
- Spiral: Stringer (1996), Zuber-Skerrit (1992) and Temmis & McTaggart (1981)

5.1 Conceptualisation of action research

The conceptualisation of action research is summarised in Table 12. Similar concepts are highlighted to simplify the synthesis.

Table 12: The conceptualisation of action research

Author(s)	Conceptualisation of "action research"
Dick (1993:3)	<p>"Action research is a methodology which has the dual aims of action and research ...</p> <ul style="list-style-type: none"> ➤ Action to bring about change in some community or organisation or program ➤ Research to increase understanding on the part of the studyer or the client, or both (and often wider community)."
Dick (1997:1)	<p>Action research consists of a family of research methodologies that pursue action and research outcomes simultaneously.</p> <p>It tends to be:</p> <ul style="list-style-type: none"> ➤ Cyclic: similar steps tend to occur in similar sequence ➤ Participative: clients and informants are involved as active partners in the process ➤ Qualitative: it deals more with language than numbers ➤ Reflective: critical reflection upon the process and outcomes are important parts of each cycle
Hart (1996)	<p>"Action research is no more than trying out an idea and seeing what happens and then modifying what you do in the light of your observations. It's what good teachers are doing all the time."</p>
Kemmis & McTaggart (1997:5,6)	<p>"Action research is a form of <i>collective</i> self-enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social and educational practices, as well as their understanding of these practices and the situations in which these practices are carried out."</p> <p>"Action research provides a way of working which links theory and practice into one whole: ideas-in-action."</p>
Isaac and Michael (1971)	<p>"Purpose: To develop new skills or new approaches and to solve problems with direct application to the classroom or working world setting."</p>
Zuber-Skerrit (2000a:2,16)	<p>"Action research is a cyclical iterative process of action and reflection on action."</p> <p>Action Research is collaborative, critical and self-inquiry by practitioners into a major problem or issue of mutual concern in their organisation."</p>

The following conclusion can be made from Table 12:

- Action research is about real-life action, i.e. to bring about a change by solving a problem
- Action research is about life-long research, i.e. cyclic, iterative and to modify and improve understanding of theory and practice
- Action research is a collaborative group activity and involves people with different perspectives

5.2 The characteristics (key points) of action research

According to Dick (1997:1-2,4,5), Gabel (1995:1), Kemmis & McTaggart (1997:22), Reeves (1996) Welman (2001:38) and Zuber-Skerrit (2000a:16) action research reveals characteristics as summarised in Table 13.

Table 13: The characteristics (key points) of action research

Principle	Comment for this study
Collaborative It involves the responsible participants who act to improve education contributing to the solution of the problem	All the participants in this study contributed to the solution of the problem and were actively involved
Compiling evidence People put their practices and ideas to the test by collecting evidence that could indicate where they went wrong	<ul style="list-style-type: none"> ➤ The co-ordinator collected evidence to apply for a better understanding ➤ The learners collected evidence of competence against the unit standards or qualification
Changing <ul style="list-style-type: none"> ➤ A research design that may be continually adapted to accommodate new information ➤ Improving education and learning from the consequences of change 	<ul style="list-style-type: none"> ➤ The research design changed to adjust to the situation because of new evidence ➤ The learners accepted challenges to change and admitted that their learning had improved
Critical analysis Analysing situations in a collaborative environment results in better practices	All participants contributed to better practices through critical analysis and comments
Cyclic / Self-reflective spiral <ul style="list-style-type: none"> ➤ Similar steps tend to recur in a similar sequence; shorter cycles tend to be more effective and promote rigour ➤ The cyclic nature of action research supports responsiveness and flexibility, which will adjust misleading research questions at the beginning, and help to refine questions in each cycle for better action and research ➤ A critical reflection upon the process (planning, acting, observing, reflecting) and outcomes is an important part of each cycle. This is more flexible than other research methods, and leaves the researcher to make appropriate choices 	This study took place over six years of iterative and cyclic activities that eventually contributed to improvement in assessment practices in education, training and development
Experiential As in real-life	This was a real-life experience over six years
Flexibility It is more flexible than conventional research and being adaptive allows changes	The flexible nature of this study provided for changes in the process to develop a better understanding of assessment practices in South African education, training and development
Formative Changes take place all the time	Changes happened continuously during the study and incorporated the option to adapt
Informal No hierarchy, everybody contributing towards the solution of the problem	The co-ordinator, facilitators and the learners all contributed to the solution

[Table 13 to be continued on next page]

Table 13: The characteristics (key points) of action research (continued)

Principle	Comment for this study
Keeping record / Personal journal Record of activities and changes Describe what is happening as accurately as possible Record of progress and reflections, useful for reflections	The co-ordinator kept accurate record of all activities as far as possible
Participative <ul style="list-style-type: none"> ➤ The researcher, clients and informants are involved as active participants in the research process to improve their own practices ➤ In some situations the researcher may maintain a separate role and the informant may have a limited source of information at his disposal ➤ Participants can become co-researchers 	Learners became co-researchers in the application of the learning content
Political process Changes affect people, sometimes creating resistance to change	Learners expressed their concerns about changes and were resistant to change
Problem solving Solve problems in completely unknown situations	All participants gained problem solving skills
Qualitative / Quantitative <ul style="list-style-type: none"> ➤ Qualitative: It deals more with language than with numbers ➤ Although action research tends to be more qualitative, it may sometimes be a mix between qualitative and quantitative research ➤ Qualitative information increases responsiveness 	Both quantitative and qualitative data collection methods were used in this study
Reasoned justification Evidence validates the judgements	Enough evidence was collected to validate judgements
Self-confidence Contributes to participants' empowerment of self-confidence and to accept a challenge	Self-confidence of all participants increased as was evident from the feedback
Start small <ul style="list-style-type: none"> ➤ Start with one person and extend ➤ Defining small cycles leads to powerful questions 	This study started with only 14 learners and one educator in a content-based learning cycle
Subjective Be careful not to be subjective	Discussions between participants prevented subjectivity
Systematic learning A systematic learning process in which people act deliberately though remaining open to surprises	This action research is a systematic process of increasing changes and people acting deliberately to bring about the changes
Theorising <ul style="list-style-type: none"> ➤ When people theorise they become eager to understand and develop rationales for practices ➤ Theory granted in experience and practice 	This action research was about the theory to change present practices of assessment

This study adheres to the characteristics of action research as shown by Table 13.

5.3 The rationale for action research

Action research is a model of inquiry and provides a practical framework for qualitative investigations with the aim to solve shortcomings in educational activities (Gabel, 1995:1,2). Robertson *et al* (1997:9) describe one of the major benefits of action research as that “the practitioners poses questions and also searches for and tries out their own solutions”.

The rationale for action research and how it has been applied in this study is explained in Table 14 (Dick, 1993:4,5,11; Dick, 1997:5,6; Gabel, 1995:1).

Table 14: The rationale for action research and the application thereof

Rationale	Application in this study
A need for <i>openness</i>	There was no predetermined plan
It can be readily <i>adjusted</i> to the demand of the situation	Changes were made when problems were encountered
It can be used as part of <i>normal activities</i>	This study is part of the everyday activities of presenting the qualification and educators at work
Practitioners of action research can <i>learn from their experience</i>	The participants learned from their experience while they were registered for the qualification and adapted to changes resulting from their experience
Practitioners of action research can <i>make changes</i> that will enhance one another	Numerous changes were made in the process
Action research prevents any <i>data collected to be abandoned</i>	All data are used to report on in this thesis
Action research can result in the eventual interpretation of <i>information</i> that will be <i>richer</i>	The final analysis resulted in invaluable information that can be used to guide further research
Action research can ensure <i>greater involvement</i> of all participants after an initial vague beginning	It took some time to get all participants involved. Educators in the present context still expect the lecturer to be the leader and only source of information
<i>All participants are included</i> and become active members of the study process	All learners became actively involved as the research process progressed
The <i>end result emerges</i> from the <i>data</i> over the course of the study	The end result emerging from this study must include a better understanding, and providing an holistic overview of outcome-based education in South African context with special reference to an integrated and generic process of assessment of competence against the unit standards or qualification

The synthesis from Table 14 is that action research is suitable for this study.

5.4 Action research design

Kemmis & McTaggart (1997:18) indicate that action research addresses issues in *educational practice* and this is in accordance with the purpose of this thesis, i.e. to improve *educational practice* with reference to assessment practices in outcome-based education, training and development. It is to determine a way to inform educators and learners about assessment in outcome-based education, training and development by introducing them to the legislative and educational concepts, the learning programme, the facilitation of learning, the portfolio of evidence of learning, the assessment of learning and the quality assurance of the process.

Action research design can be described as an iterative, integrated and cyclic process proceeding in a systematic spiral of steps as in Figure 1 (Dick, 1997:3; Gabel, 1995:2; Isaac & Michael, 1971; Kemmis & McTaggart, 1997:10; Robertson *et al*, 1997:16). There are four moments:

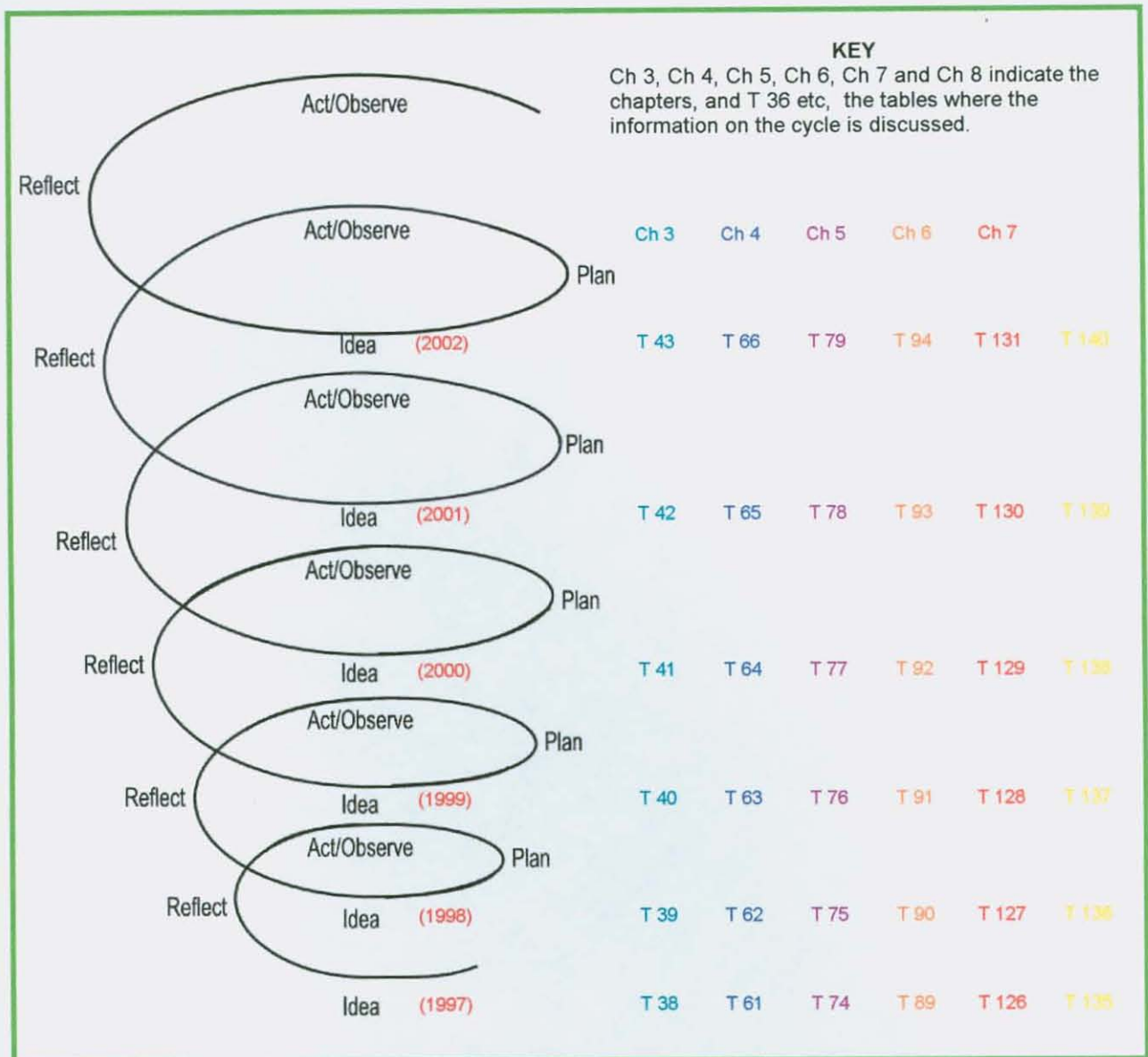
- **Realising an idea or problem:** some kind of improvement or change is desirable
- **Planning:** must be flexible and responsive
- **Action and observation:** realising that it is never possible to anticipate everything that needs to be done
- **Evaluation / reflection**

The steps in the sequence are inseparable. Although there seems to be no real hierarchy, they tend to recur in more or less similar order, progressing towards the *action* and *research* outcomes. The idea or problem leads to planning and the planning is embedded in the action, observation and reflection. Action research is therefore a dynamic and integrated process where these steps or moments repeat themselves until sufficient understanding of the problem or a final goal has been achieved (Gabel, 1995:3; Kemmis & McTaggart, 1997:15).

Another essential aspect of action research is that it is *not individualistic*. As we are social beings, the activity of the group is the focus of action research and there are no time constraints on action research (Kemmis & McTaggart, 1997:15, 16).

Action research in this study is visually represented in Figure 1. Reading from the bottom up, Figure 1 indicates the iterative and increasing spiral effects that reflect the continuous improvement in the understanding of the problem: the idea – plan – act / observe – reflect sequence as applied in this study. Inside the graphic are the six cycles and on the right hand side are the referring chapters and tables where the information on the development of the investigation is explained.

Figure 1: Representation of the action research model in this study



The following sections explain the iterative nature of action research in this thesis with reference to Figure 1.

5.4.1 Idea / Problem

The first moment was to identify the idea or problem that Isaac & Michael (1971) phrase as follows: "What needs improvement or might be developed as a new skill or solution?"

In this study the idea evolved from the following major problem:

How should valid, reliable, fair, quality assured assessment of learning in outcome-based education, training and development be implemented?

The following questions regarding assessment were addressed to solve the major problem:

- What are the legislative policies and educational philosophical requirements? [Chapter 3]
- What are the requirements for the qualification? [Chapter 3, Chapter 4]
- What does the learning programme involve? [Chapter 4]
- What does the facilitation of learning involve? [Chapter 5]
- How will the learners be guided to compile a portfolio? [Chapter 6]
- How will the assessment be conducted? [Chapter 7]
- How will quality assurance be done? [Chapter 8]

5.4.2 The research action plan

The second moment was to formulate a flexible plan keeping in mind that social action is unpredictable and therefore risky (Kemmis & McTaggart, 1997:11).

There were four actions (Isaac & Michael, 1971; Kemmis & McTaggart, 1997:77).

- Reviewing of the literature to determine if others have a similar problem
- Formulating a testable hypothesis stating it in clear, specific pragmatic language
- Arranging the setting including the following procedures and conditions:
 - Describing the thematic concern (assessment of learning)
 - Outlining the action group (target population)
 - Giving a rationale for specific changes
 - Explaining how the process is going to be monitored
 - How evidence is going to be collected
- Trying to address the question: What are the particular things to do in an attempt to meet the objectives or to solve the problems?

5.4.3 Action and observation

The third moment in action research was the action and observation and involved the implementation of the study action plan. The purpose of the intervention was to answer the “action” (research) question in action research: “How?”

The “action” took place under normal conditions and in real time. It was dynamic, required instant decisions with practical judgement. The co-ordinator collected the evidence in the following manner (Kemmis & McTaggart, 1997:12,13,78):

- Organising the participants to determine who is responsible for what
- Practicing flexibility
- Documenting the effects in a journal or diary for analysis and interpretation

5.4.4 Evaluation / Reflection

The fourth and last moment in action research is the evaluation and reflection of all activities. The information was collected, recollected and then critically reviewed. The increased understanding that emerged from this critical reflection was applied and used in designing the next cycle. Reflection sought to make sense of processes through discussion among participants and developing further strategies while asking the following questions (Dick, 1997:2; Kemmis & McTaggart, 1997:13,87; Zuber-Skerrit, 2000b:2):

- “What have I learnt?”
- “What re-planning is necessary?”
- “What further alternative actions may be appropriate?”

5.5 The participants in action research

According to Robertson *et al* (1997:43) action research needs:

- People who wish to change the status quo to improve learning
- A common agreement about collective decisions
- Recognition as a facilitation team
- Regular meetings
- Provision for practical assistance and support

Researchers and participants are usually equally involved in effective action research and they all negotiate meaning from the data through communication and flow of information (Dick, 1997:3; Gabel, 1995:4) [Chapter 4].

The participants were all the stakeholders sharing a common role or activity i.e.:

- All the learners registered for the qualification
- All the educators who were accredited by the higher education institution to present the qualification
- The acting national co-ordinator who is the author of this thesis

A partnership was established between the participants to increased honesty and accuracy on reported information by designing anonymous reporting systems (Dick, 1993:21) [Addendum 1 and Addendum 2].

5.6 Methods and instruments in action research

The methodology and precision used to document what happens transforms ‘action’ into ‘research’. Action research sacrifices control in favour of responsiveness and on-the-spot experimentation. It requires written reports of all the moments, i.e. planning, acting, observing and reflecting, to legitimise action research as formal research (Kemmis & McTaggart, 1997:100; Robertson *et al*, 1997:41). Table 15 records the different report examples, which must be read in conjunction with Table 6.

Table 15: Written report examples in action research in context of this study

Example	Comment	This study
Anecdotal records	Accurate description of events [Addendum 4]	✓
Field notes	Similar to anecdotal records, but including subjective impressions and interpretations [Addendum 5]	✓
Ecological behavioural description	More open than anecdotal or field notes [Addendum 2]	✓
Document analysis	Existing documents for analysis of information [Chapter 3]	✓
Diaries	Personal accounts private or open [Addendum 4]	✓
Logs	Organised with respect to time allocations for events [Chapter 4]	✓
Item sampling cards	About six cards for a number of topics	
Portfolio	Collection of materials and including different artefacts [Addendum 17; Addendum 18]	✓
Questionnaires	Written questionnaires: open-ended or closed [Addendum 1]	✓
Interviews	For flexible planned, or unplanned, structured [Addendum 2]	✓
Interaction schedules and checklists	May be used for real-life recordings [Chapter 4, Chapter 5]	✓
Tape recordings	Useful for one-on-one or small groups	
Video recording	Activities [Chapter 7]	✓
Photographs and slides	For "critical incidents", activities [Chapter 7]	✓
Test of student performance	To assess achievement, diagnose weaknesses [Addendum 13]	✓

Dick (1997:4) and Newman (1990:55) argue that action research is *primarily qualitative*, but in some cases *quantitative methods are appropriate*. Documentation and instruments comprises of interviews, observations and collections of work [Chapter 6, Chapter 7].

In order to observe and monitor the implementation of an outcome-based learning environment, a number of different data-collection methods and instruments were used as indicated in Table 16.

Table 16: Data collection methods and instruments in action research in this study

Measure	Data collection methods	Instruments
Qualitative measures for data-analysis in Chapter 3, Chapter 4, Chapter 5, Chapter 6	<ul style="list-style-type: none"> ➤ Literature review ➤ Survey ➤ Interviews ➤ Diary ➤ Observations ➤ Synchronous and asynchronous communication 	<ul style="list-style-type: none"> ➤ Report ➤ Checklists ➤ E-mail ➤ Video ➤ Fax facilities ➤ Photos
Quantitative measures for data analysis in Chapter 7	Checklists and questionnaires	<ul style="list-style-type: none"> ➤ Paper-based questionnaires ➤ Computer-based questionnaires ➤ Assessment matrix ➤ Tests ➤ Portfolio of evidence

A combination of quantitative and qualitative techniques was used in gathering data and evidence for the study. Quantitative techniques, including surveys and questionnaires, were used to generate information on the calibration of assessment. Qualitative techniques, including interviews, observations and content analysis of discussion transcripts, were also used to monitor the process of design, development and implementation of the learning programme.

5.7 The outcomes of action research

Dick (1997:3) refers to “*action outcomes*” as well as “*research outcomes*” for action research. The action outcomes of action research are directed towards determining the next moment in the research after reflection. In this study the research outcomes of the action research are directed to develop a better understanding, and providing an holistic overview of outcome-based education in the South African context with special reference to an integrated and generic process of assessment of competence against the unit standards or qualification.

5.8 The evidence of action research

Multiple data sources increase the quality, validity and reliability of the evidence and include as many objects as possible (Dick, 1997:6).

5.8.1 Validity

Validity refers to the fact that the research will actually measure what it is supposed to measure (Mouton & Marais, 1993:68). The researcher included all the participants and used multiple data sources and other resources to increase the validity of the results.

5.8.2 Reliability

The reliability of research results addresses the question whether the same methods used by different researchers and / or at different times would produce the same results (Mouton & Marais, 1993:81).

To ensure reliability of the results, the research was conducted as follows:

- The feedback form more than one training centre in South Africa could be compared
- The input and feedback from different educators could be compared
- The participants were different learners with different prior knowledge and educational and cultural background
- The feedback from all the participants were included
- The data was collected, and the research was conducted over a period of time

5.8.3 Triangulation

Including multiple sources of data collection (triangulation) in a research project increases the reliability of the observations (Mouton, 1993:92). For triangulation in action research, where a variety of methods are complementary and may correct certain shortcomings in the result, the options as presented in Table 17 were applied (Dick, 1993:10; Hodgkinson, 1997:23; Mouton & Marais, 1993:93).

Table 17: Options for triangulation of data

Option for triangulation	Application in this study
Data triangulation – (different sources) Different sources (informants) or different but equivalent samples of informants	<ul style="list-style-type: none"> ➤ Different facilitators (each venue had their own facilitator) ➤ Different learners' scenarios and cultural diversity
Investigative triangulation - (different people do it) Different research settings (also for generalisation of the results)	<ul style="list-style-type: none"> ➤ Different venues (between seven and twelve) ➤ Different facilitators (each venue had their own facilitator) ➤ Different learner scenarios and cultural diversity
Theoretical triangulation – (different philosophies) Same informant responding to different questions which address the same topic from somewhat different directions	The same outcomes were used from different unit standards to determine the learners' responses
Information collected at different times	Information was collected at different venues at different times within the timeframe of one calendar year
Different researchers	All the trainers, as well as the learners became co-researchers. Different learners joined the team when they registered for the qualification
Methodological triangulation – (different methods)	Different methods were used to gather data and interpret overlapping data, e.g. observation, interviews, e-mail, performance tasks, tests, questionnaires, records, diaries

5.8.4 Generalisation

Action research very often does not provide for generalisation. In this study it is necessary to generalise, but it is only possible only as far as the results are valid and reliable within different venues on a national level.

6 The proposed application of action research for this study

Dick (1997:5) summarises good action research as a multiple of cycles, with planning preceding action and critical analysis in the end, inclusive in each cycle the use of multiple data sources and an attempt to disprove the interpretations arising from earlier cycles.

Riding, Fowell and Levy (2002:1) argue that action research can contribute to activities within the higher education sector concerned with quality issues and with assessment initiatives.

The cyclic nature of this study is embedded in the presentation of the qualification between 1997 and 2002, and for the purpose of this study a cycle is defined as one calendar year of presentation. It can be presented in a table format of which Table 18 is a template that summarises the methodological framework on the application of the action research. It is elaborated on and builds up in every chapter to support the openness and the striving for a real understanding of the study problem (Dick, 1993:10). Chapter 8 presents the complete tables of cyclic events of action research in the context of this study [Table 135 to Table 139]. Table 18 is the template summarising the aspects taken into consideration for the development of action research in this study.

Table 18: Action research application in this study

The cyclic, spiral and iterative nature of the action research in this study						
Cycle	Legislative framework and educational concepts in South African education Chapter 3	Learning programme Chapter 4	Facilitation of learning Chapter 5	Evidence of learning: portfolio Chapter 6	Assessment of learning Chapter 7	Quality assurance Chapter 8
Year						
Idea						
Plan						
<ul style="list-style-type: none"> ➤ Thematic concern ➤ Action group ➤ Rationale for changes ➤ Monitor process ➤ Evidence collected 						
Action / Observe						
Reflect / Evaluate						

7 Summary

This chapter argued for the selection of action research as the appropriate research methodology for this study. This argument can be summarised as follows:

- Action research contributes to solving authentic problems with critical analysis (higher order cognitive skills) and life-long learning (Zuber-Skerrit, 2000b:18). This study is a real-life experience and contributes to life-long learning and investigation to develop a better understanding, and providing an holistic overview of outcome-based education in South African context with special reference to an integrated and generic process of assessment of competence against the unit standards or qualification.
- Action research is most effective when the end results emerge from the data because of the appropriate choices (Dick, 1997:5). The end results in this study were not prescriptive, but emerged from the collection and interpretation of the data.
- All data collection and interpretation of data are done in plausible ways, i.e. the aim is to look for evidence, integrate practice with the literature and merge interpretations with quality data (Dick, 1993:8).
- Action research can be used as either for investigative or pilot research, or for diagnosis and evaluation (Dick, 1997:3). This study was conducted with the purpose to investigate alternative assessment practices in South African education, training and development.
- Mashile (2001:137,132) and Zuber-Skerrit & Perry (2000:84) argue that the ideal is that the core action research project has to be part of the PhD candidate's fulltime work, as it is in this case a real-life, significant problem in the workplace. This fieldwork is included here because action research also supports the critical outcomes of South African outcome-based education.
- Most action research is qualitative and some a mix of qualitative and quantitative. It provides enough flexibility to even allow "fuzzy methods to answer fuzzy questions" (Dick, 1997:3,4).

This action research model is implemented in the following chapters in an integrated and holistic manner to solve the research problem.