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Enhancing Web Course Design Using Action Research
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**ABSTRACT**

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4 ACTION RESEARCH

The main purpose of this chapter is to present a review of the central research method applied in this study. First of all, action research as a research paradigm is introduced. We then discuss how to do action research, and what are the advantages and disadvantages of action research. Finally, we set some guidelines for when to do action research. Such a review is an essential component of a research study of the present kind, because action research is not as well understood as are the most traditional research methodologies (Herr and Anderson 2005, 5). Defining action research clarifies the research setting and also helps us to understand the comprehensiveness of the research paradigm used.

4.1 Introduction to Action Research

Various terms related to action research have been used as synonyms. Different researchers use terms like action inquiry (Torbert 1999), action research (Lewin 1946; Kemmis 1985), action learning (Revans 1997), action science (Argyris, Putnam and McLain Smith 1985), and participatory action research (Whyte 1991). Ellis and Kiely (2000) clarify these terms comprehensively. According to them, action inquiry is “a cyclical process whereby knowledge is created in and for action” (p. 83). It includes four distinctive approaches: action research, action learning, action science, and participatory action research. Thus action inquiry is an umbrella term for the deliberate use of any kind of a plan-act-describe-review cycle for inquiry into action in a field of practice.

The idea of action research was developed by Kurt Lewin (Lewin 1946; Hopkins 1985, 33). He was not the first to use it, but “he was the first to develop a theory of action research that made it a respectable form of research in the social sciences” (Herr and Anderson 2005, 11). Action research is a phased spiral process that combines theory and practice through change and reflection in an immediate problematic situation. It is also called practitioner research, practitioner-led research, and practitioner-based research, because “action research is
conducted by practitioners who regard themselves as researchers” (McNiff, Lomax and Whitehead 2003, 12).

**Action learning**, defined by Reg Revans (1997, 5), is a social process of learning through action. The basic idea is to share knowledge, but action learning is at its best, when a learning group “discover[s] that no one knows the answer but all are obligated to find it” (Revans 1997, 5). Action learning usually starts with a question identified by the leaders. Experts then draw up a plan for how to solve the question, and find the answers by using knowledge and other available resources.

**Action science** is largely associated with the work of Chris Argyris (Argyris et al. 1985). He “wishes to return to action research its scientific dimension” and argues that “the problem-solving focus in action research has moved it too far away from the tasks of theory building and testing” (Herr and Anderson 2005, 14). Argyris et al. (1985) defined action science as “inquiry into how human beings design and implement action in relation to one other” (p. 4).

**Participatory action research** was originally defined by Paulo Freire (1970), but it was publicized first by Gaventa and Horton (1981), and later by Whyte (1991), Kemmis and McTaggart (2000), and Lewis (2001). Participatory action research emphasizes the importance of participation and group dynamics during the research process; research is seen as a form of social action (Freire 1970). Most of the participatory action research studies have been done by true collaboration between practitioners and researchers (Herr and Anderson 2005, 30).

In the present study we concentrate on a mode of action research that is “particularly appropriate where problem-solving and improvement are on the agenda” (Hart and Bond 1995, 3). In this study we use the term action research regardless of all the approaches that have emerged from different traditions. Some of these different traditions are also briefly reviewed to see what action research is about.

### 4.2 Theoretical Background of Action Research

Action research is often defined as “an interactive process involving researchers and practitioners acting together on a particular cycle of activities, including problem diagnosis, action intervention, and reflective learning” (Avison, Lau, Myers and Nielsen 1999, 94). It is directed towards an individual, a group, an institution, or a larger community in a certain situation (Syrjälä and Numminen 1988). Common to all action research traditions and methodologies is some kind of collaboration with actors in the field of study (Pålshaugen 2006, 149). Usually the researcher is a participant in the implementation of a system, but simultaneously he or she wants to evaluate a certain intervention technique. Usually the action researcher is not just an independent observer; (s)he becomes a participant, and the process of change becomes the subject of research. Action research has been used, especially, in the social sciences and education. In the
educational field action research has been used “as an individual route to professional development and as a collaborative route to professional and institutional change” (Herr and Anderson 2005, 17) – as in the present study.

The focus in an action research study is on the opinions and experiences of the participants involved in certain actions, functions, or phenomena (Syrjälä and Numminen 1988). The main goal of action research is to develop a new theory, compare or test a theoretical model against empirical results from action research (Yin 1989, 35-40), and to improve target practices as well as understanding the actions of participants. Action research can be simultaneously beneficial for problem-solving, theory expansion, and competence enhancement (Hult and Lennung 1980, 243). Researchers either improve practices and develop individuals, or transform practices and participants (Herr and Anderson 2005, 9). Action research “involves identifying the reasons for the action which are related to the researcher’s values, and gathering and interpreting data to show that the reasons and values were justified and fulfilled” (McNiff et al. 2003, 13). The environment gives meaning for actions taken toward finding a solution to the problem (Hult and Lennung 1980, 245). The results can be confirmed with repetition research or by multi-case study (Syrjälä and Numminen 1988). Hence, altogether action research seems to establish a well-formed framework, especially for collaborative pedagogical development and qualitative assessment. Typically action research is used in the social and educational sciences, but according to Baskerville and Wood-Harper (1996, 235), the discipline of information systems also seems to be very appropriate field for the use of action research methods.

Action research is a phased spiral process\(^{11}\) that is based on continuous reflection. It proceeds from planning to observations of actions and possible changes in actions based on reflection. During the process interpretation of an action in certain situation is formed through retrospection (Kemmis 1985). The analysis of possible changes in actions is based on participants’ self-evaluations and self-reflections.

Overall, action research is a research paradigm which involves a variety of research traditions. Within the paradigm there are several established methodologies. Each of these methodologies draws on a number of methods for information collection and interpretation, for example interviewing and content analysis. Figure 10 summarizes these three levels of the action research paradigm.

The concepts used to describe the action research paradigm vary. Different researchers discuss about modes, types, approaches, typologies, or perspectives of action research, but they all define three distinctive action research paradigmatic traditions rather similarly. Grundy (1990, 353) discusses the modes of action research: technical, practical, and emancipatory. Holter and Schwartz-Barcott (1993, 301-303) write about types of action research: a technical collaborative approach, a mutual collaborative approach, and an enhancement approach. McKernan (1991, 15-27) lists the typologies of action research as

\(^{11}\) Cf. Boehm’s Spiral model of software development (Boehm 1988, 64)
follows: the scientific-technical view of problem solving, practical-deliberative action research, and critical-emancipatory action research. McCutcheon and Jung (1990, 145-147) discuss the perspectives of action research: a positivist perspective, an interpretivist perspective, and a critical science perspective.

![Diagram of the three levels of the action research paradigm]

**FIGURE 10** The three levels of the action research paradigm

Different approaches or perspectives are typically used in different contexts (Hart and Bond 1995). However, in the literature all three research traditions are described in a similar way. Therefore, in this study these three research traditions are grouped as follows: technical, practical, and emancipatory action research. These three paradigmatic traditions will now be briefly summarized.

### 4.2.1 Technical Action Research

Technical action research is a scientific research tradition for solving social and practical problems, and testing theories in action (Grundy 1990; Holter and Schwartz-Barcott 1993). Research problems are defined in advance, and the goal is to improve practice through improving the practical skills of the participants (Grundy 1990) as well as to test a particular intervention or change based on a pre-specified theoretical framework (Holter and Schwartz-Barcott 1993, 301).

The behaviour of the participants is taken to be objective and testable, and it can be generalisable and predictable. The researcher identifies the problem and proposes a specific intervention, after which practitioners are involved who agree to collaborate with the research by implementing the intervention and assisting with data collection. Researcher bias can be minimized or even eliminated through the use of appropriate methodologies that are independent of the researcher (McCutcheon and Jung 1990).

In educational settings technical action research cases are characterized by teachers’ identifying discrete variables and positive hypotheses relevant to a problem, conducting a small experiment, and reporting the results (Taba and Noel 1990; McCutcheon and Jung 1990). A technical action research project is usually instigated by a person or a group of people who, because of their
greater experience or qualifications, would be regarded as experts or authority figures. Action is then designed to “produce”, “make”, or “create” something; therefore technical action research promotes more efficient and effective practices, systems, products, or formulation of hypotheses (McCutcheon and Jung 1990; Grundy 1990).

Technical action research promotes participation by practitioners in the process of improvement as well as the professional development of the participating practitioners (Grundy 1990). This tradition of action research results in the accumulation of predictive knowledge, the major thrust being on the validation and refinement of existing theories, essentially deductively (Holter and Schwartz-Barcott 1993). A “field experiment” in which scientists use an experimental design to test a hypothesis in a real-world situation, rather than a laboratory, is one example of technical action research (Holter and Schwartz-Barcott 1993).

4.2.2 Practical Action Research

The practical action research tradition is used to improve practice by developing and applying the personal knowledge and wisdom of the participants (Grundy 1990, 357). In a practical action research project research problems are defined in the situation while “researchers and practitioners come together to identify potential problems, their underlying causes, and possible interventions” (Holter and Schwartz-Barcott 1993, 301-302). The main goals are to understand practices, to reach mutual understanding, and to solve immediate problems that are connected with the process or tasks of education rather than the achievements or the end products of the inquiry (McKernan 1991, 20-21). Moreover, the goal is also to make some differences to how the participants feel, think, and behave.

In practical action research differences are introduced by individuals who gain a new understanding of their practice. Changes implemented by individuals tend to have a more lasting character, although they tend to be closely connected to the individuals who are directly involved in the change process; interventions are often lost when individuals leave the organization, group, or community. (Holter and Schwartz-Barcott 1993, 301)

4.2.3 Emancipatory Action Research

Emancipatory action research tradition involves the full involvement of all the important stakeholders in the social or educational system, including researchers, practitioners, policymakers, clients or learners, and community members (Holter and Schwartz-Barcott 1993, 302; Grundy 1990, 358). The purpose of emancipatory action research is to emancipate participants in the action from the dictates of compulsions of tradition, precedent, habit, coercion, and self-deception. It focuses upon particular practices, theoretical and organizational structures, and the social relations which support it. (Grundy 1990, 358; Holter and Schwartz-Barcott 1993, 302) Emancipatory action research underlines the
importance of participation from the organization’s members as a condition for successful results (Pålshaugen 2006, 149).

The goal in emancipatory action research is to assist practitioners in identifying and explicating fundamental problems, and to achieve mutual emancipation by raising their collective consciousness, underlying assumptions and values, and involving the practitioners in critical reflection on their practices and unwritten laws (Holter and Schwartz-Barcott 1993, 302). Emancipated strategic action follows from disposition of critical intent that motivates action and inquiry at all stages of emancipatory action research. It is important in the development of the theoretical perspective which informs and underpins a research project (Grundy 1990, 358).

According to Grundy (1990, 358), “the dynamic relationship between theory and practice in emancipatory action research […] entails the change and expansion of both [theory and practice] during the course of the project”. When a person reflects on theory in the light of practice, the form of knowledge that results is personal or tacit knowledge. This tacit knowledge can be acquired through the process of reflection on action. The interaction of theory and practice through the process of reflection, with participation of key stakeholders, is the core of participative action research.

4.3 Realizing Action Research

There are different ways to do action research. According to Hult and Lennung (1980, 246), there are three traditions of action research spanning different disciplines: 1) a school tradition that focuses on teaching and learning mostly in the field of education; 2) a community of development tradition that helps advance the cause of under-privileged groups; and 3) an organization tradition intended mostly for the effective design and development of organisations. Different methodologies and methods can be used in slightly different ways in each of these traditions.

While doing action research, first, the approach to follow has to be chosen: technical, practical, or emancipatory (see Section 4.2) – or more than just one of them. Each approach involves different methodologies, e.g., technical methodologies such as, Lewin’s (1947) original model, Patton’s (1990, 150-159) approach to solving a specific problem, or Checkland’s (1981) soft systems analysis; practical methodologies such as Elliott’s (1991) model; and emancipatory methodologies, such as Deakin model (Grundy and Kemmis 1990; Carr and Kemmis 1997). These different methodologies are briefly introduced in Sections 4.4-4.6. The role of the researcher is essential, and thus it has to be decided what role the researcher will take (see Section 4.7). Finally, appropriate methods need to be found for collecting and analysing data, and reporting the findings (see Sections 4.8-4.9).

Most of the action research methodologies similarly define the five main steps in spiral process model (Figure 11). While the models are different in
various ways, they share the steps of data collection and analysis, and taking action on an identified focus. Although each of the models uses different terms, in essence, they each include the use of data to act or react in relation to a defined problem or area of concern. According to most models, action research can be summarized as a spiral process that facilitates planning, acting, collecting, observing, reflecting, analyzing, reacting and evaluating in a manner that is systematic but flexible in nature.

Because several methodologies exist for planning action research, Hopkins (1985, 41-43) has defined the criteria, especially for teachers, for choosing appropriate methodology in educational settings:

1. The teacher’s primary job is to teach, and any research method should not interfere with or disrupt the teaching commitment.
2. The method of data collection must not be too demanding on the teacher’s time. The teacher needs to be certain about the data collection technique before using it.
3. The methodology employed must be reliable enough to allow teachers to confidently formulate hypotheses and develop strategies applicable to their teaching situation.
4. The research problem undertaken by the teacher should be one to which he or she is committed.
5. The teacher-researchers need to pay close attention to the ethical issues surrounding their work.

Next we consider action research methodologies by introducing a few examples in the following sections.
4.4 Technical Action Research Methodologies and Procedures

In technical action research methodologies, the goal is to solve existing technical or scientific problems (see Section 4.2.1). Some of these methodologies are briefly summarized next.

4.4.1 Lewin’s Model

Lewin’s (1947) action research model is composed of a series of steps that include 1) planning, 2) fact-finding, 3) execution, and 4) analysis. According to Lewin (1947), planning begins with a general idea or a difficult problem requiring a resolution. This is followed by further fact-finding, or “reconnaissance”, resulting in an overall plan of how to solve the problem (Figure 12). This planned action is implemented, and then monitored in an attempt to evaluate the effectiveness of the first action step, to plan the next step and to modify the overall plan. The reconnaissance (in Figure 12) shows if the plan and the resultant action performed as expected, while allowing the researcher to learn from the experiment.

![Lewin’s action research model (Lewin 1947)](image)

4.4.2 Patton’s Model

According to Patton (1990, 157), “action research aims at solving specific problems within a program, organization, or community” at specific points in time. Participants solve such specific problems by studying their own problems. They focus on these specific problems only, and there is no intention to generalize the results beyond these specific settings (Patton 1990, 157). The aim is to solve the problems, which are identified in advance, as quickly as possible.

Patton’s (1990) process cycle includes design, data collection, analysis, interpretation, and reporting. Usually process is assessed only on the basis of the feelings among the research participants and the feasibility of the solution gen-
erated. Moreover, the results are typically unpublished. According to Patton (1990, 162), a typical example of such research would be a self-study by members of certain group, organization, or community to learn how they can be more supportive of and help each other.

4.4.3 Taba-Noel Model

Taba (1962) applied action research stages to educational curricular problems. The model has a number of stages: 1) identifying problems, 2) analysis of problems, 3) formulating ideas or hypotheses, 4) gathering and interpreting data, 5) formulating action, and 6) evaluating the results of action (Taba and Noel 1990, 67; Taba 1962).

During the first step the concerns of teachers are identified. Problems have to come from the teachers themselves and be important to the teachers in order to involve them more closely in the research process. Often teachers are unable to state their concerns fully enough, so therefore “one task of problem identification is to correct the perspective on the problem and to begin the process of bringing the cause of the difficulty into focus” (Taba and Noel 1990, 67). However, problems need to be manageable to keep motivation sufficient for long-drawn-out research processes.

The first step also serves to obtain a diagnosis of the teacher: skills, perception, attitudes and capacity to accept changes. The process continues with a problem analysis during the second step to discover the possible dimensions of a problem or project, to identify its crucial aspects, and to clarify the focus. Problem analysis therefore involves several types of activities (Taba and Noel 1990, 68):

- An analysis of the causes and consequences of the difficulties mentioned in the problem statements
- An examination of the assumptions about causes made earlier
- A study of the research data available
- Securing some preliminary data in order to clarify the issues or to change teachers’ perspective on the problem

Problem analysis can be guided by tentative hypotheses: what might be the causes of or the factors in the difficulties mentioned in the problem statements as well as in whatever was revealed about the teachers themselves. These preliminary investigations help in focusing on the actual problems during the third step, formulating action hypotheses. “It is necessary to develop, invent, borrow and adapt a variety of research techniques” while trying to achieve a result in some action hypotheses (Taba and Noel 1990, 72).

After these hypotheses have been generated, it is possible to set up experiments as the fourth step. During the experimentation and action step, it is necessary to plan an experiment and its steps carefully. Experiments could include, e.g., the reshaping of curriculum content, a method of teaching, a plan for grouping, or a new emphasis in classroom procedures. A part of this step is
to help teachers acquire the new skills they might need for creating a successful learning experience. There is also a need to consider human relations factors to avoid psychological hazards, and guidance to enable teachers to be freed of their fears of making mistakes.

The last step in the Taba-Noel model is evaluation. It is important to keep records of both the changes in participants’ responses and the procedures and materials used, because the success of the experiment can only be assessed in terms of its effectiveness in producing the desired effects in the participants (Taba and Noel 1990, 73). There is also a need for teachers to secure objective evidence, such as records of performance, test data, and other tangible data, which can be subjected to careful comparative analysis.

4.4.4 Lippitt-Radke Procedure

Lippitt and Radke (1946, 172-175) developed a procedure for doing action research with the following major points:

1. A group-need to discover some facts exists or is created. Besides recognizing a problem, the group needs to be willing to solve it or do something to it. The process of finding solutions by themselves will be educational.
2. The groups, or their representatives decide ‘what do we need to know?’ The research group usually has excellent hunches or ideas about facts that are needed or questions worth asking, and where the answers that should be documented might be found.
3. Specific research instruments are constructed. The group will decide what would be the best instrument, or set of instruments, to do research from the methodological point of view.
4. Making decisions about sampling and learning to use the research tools reliably. Training should be given in the use of the sampling tools, adequate sampling in research designs etc. Special attention should be paid to challenging and fascinating problems and to refining the mechanics of the data collection and being objective.
5. Supervision of the data collection will help to ensure success and overcome problems of discouragement. Data collectors should be trained so as to avoid discouraging interviewed persons and unsuccessful interviewing.
6. Evidences of attitude change often appear during this phase of participation in fact-gathering. Adopting an “objectivity role” helps researchers to see things differently and concentrate on looking for facts.
7. Collaboration in putting the facts together and interpreting the facts requires the special skill of a research technician. The most successful projects share the workload between researchers and lay persons during the data gathering and analysis.
8. Sometimes more is needed than a change in the values and social perception of the individual or group. Often new knowledge is not enough to induce individuals to change their behaviour – there is a need for trying solu-
tions out, co-operative evaluation and perfecting solutions to ensure success.

9. Disseminating the facts to other groups by oral and written reports can be a final step – and a new first step. Sharing the results with other research groups stimulates the readiness of others to do similar research.

### 4.4.5 Checkland’s Methodology

Checkland’s (1981) ‘soft’ systems thinking approach is based on Jenkins’ (1976) hard systems thinking methodology. The proposition in this model is that “system is the name of a general model or paradigm which can usefully be employed to understand, explain or engineer aspects of the real world” (Checkland 1975, 278). Moreover, ‘problem’ is conceived in a very general sense: any perceived mismatch between what is seen to exist and what might exist in the same situation. The main idea is to use methodology both to decide what to do and to decide how to do it (Checkland 1975, 282).

Checkland’s methodology is presented in the form of a diagram in Figure 13. It represents a chronological sequence that is to be ‘read’ from 1 to 7. Checkland (1975, 279) assumes that the process will start with a relatively unstructured problem situation, Stage 1, where the goal is to define a problem or a need to be solved. In Stage 2 it is necessary to see the problem situation in a more structured way and to define a choice of objectives, e.g., physical needs and the system within which they must be met (Checkland 1976, 54). Possible and relevant alternative systems are selected in Stage 3 based on formulated and discussed ‘root definitions’, which express a view as to what is the essential nature of the relevant systems. According to Checkland (1975, 281), “root definitions express the chosen way of viewing the problem situation, and the aim in formulating them”.

According to Checkland (1975), with the formulation of root definitions systems thinking proper now begins. In Stage 4 hypothetical systems are analysed in the light of the objectives generated during the systems analysis. The goal is to make conceptual models of systems which meet all the requirements of the root definitions, including their implications. Formal comparison between the problem situation developed in Stage 2 and relevant alternatives constructed in stages 3 and 4 is done, and the selection of the most promising alternative is made during Stage 5. Stage 6 consists of defining changes which are agreed to be both desirable and feasible in the attitudes which exist in the problem situation. This could be done up to the prototype stage, if needed.

Finally during Stage 7, as a result of the work done in stages 2 to 5, one may return to the problem situation itself and make the desirable, feasible changes to the problem situation.
4.5 Practical Action Research Methodologies

The goal of practical action research is to understand practices and to solve immediate problems (McKernan 1991, 20). The different methodologies that could help researchers to achieve this goal are briefly summarized next.

4.5.1 Elliott’s Model

For Elliott, action research attempts to improve the quality of life in a social situation (Elliott, 1991). While Elliott’s model is based on Lewin’s model (see Section 4.4.1.), Elliott argues that the general idea should be allowed to shift, reconnaissance should involve analysis as well as fact-finding, and before evaluating the effects of an action in the implementation phase, the extent to which it has been implemented should be monitored (Elliott 1991, 70).

Elliott’s model of the action research process is outlined in Figure 14. Progress happens in cycles as in other models even if it is represented as a flow chart. The general idea is that the action researcher develops a personal interpretive understanding from working on practical problems, and that theoretical
understandings are constitutive of practical action and discourse (Elliott 1987, 157).

In Elliott’s model (1991) the first step is to identify and clarify the general idea, a state of affairs or situation that one wishes to change or improve. During the second step, reconnaissance, the facts of the situation are described and explained on the basis of critical analysis of the context in which those facts arise. Constructing the general plan is the third step. The key concepts here are confidentiality, negotiation, and control. Information gathered from others has to be kept confidential until it is known where and how to use it, usage need to be negotiated and agreed with that person, and if disagreement persists, interviewed persons have control, the final say.

Developing the next action steps, as the fourth step, includes decisions about the courses of action that are to be implemented next, and how both the process of implementation and its effects are going to be monitored. During the fifth step, the action researcher shifts from monitoring into a period of reconnaissance, and to generating ideas about future possibilities for action in the next cycle.
4.5.2 Ebbutt’s Model

Ebbutt (1985, 164) questioned Elliott’s model by claiming that the spiral is not the most useful metaphor or image to use to think about the action research process. Ebbutt (1985, 164-166) uses a series of successive cycles (Figure 15) that enable the possibility of providing evaluative feedback within and between the cycles of action.

![Ebbutt’s action research model](image)

**FIGURE 15** Ebbutt’s action research model (Ebbutt 1985, 166)

4.5.3 Sagor’s Model

Sagor’s (1993, 10-11) process of collaborative action research has five sequential steps: 1) problem formulation, 2) data collection, 3) data analysis, 4) reporting of results, and 5) action planning. Researchers identify the issues to be studied, the greatest professional concern, in the first step. During the data collection, the participants involved in the collection process devise a plan for collecting and assembling three sets of different data. This allows the researchers to compare and contrast the independent sets of data. Sagor (1993, 10) believes that data collection is “the heart of the five-step process”. It is the data that enables the teacher to look at the issue through different lenses.

Next the data are analyzed. It is during this step that the researchers look for trends or patterns and draw conclusions. During the fourth step, the researchers communicate their results. It is here that the education profession can benefit and learn the most. “Thus, it is imperative that teams of action researchers find as many appropriate forums as possible to share what they are learning about teaching and learning” (Sagor 1993, 11). The last step is action planning. During the last step decisions on how to use the research findings to plan and implement improvements are made.
4.6 Emancipatory Action Research Methodologies

In emancipatory action research the goal is to activate all the important stakeholders in the social or educational system to identify problems, critically reflect on their own practices and attitudes, and achieve mutual understanding by collectively changing their goals, strategies and established practices (Holter and Schwartz-Barcott 1993, 302; Grundy 1990, 358).

4.6.1 The Deakin Model

Deakin model was postulated at Deakin University in Australia by Stephen Kemmis and his colleagues (Grundy and Kemmis 1990; Kemmis 1985; Kemmis and McTaggart 1990; Carr and Kemmis 1997). They developed a four-step spiralling process of educational action research (Figure 16) that included: a) planning, b) acting, c) observing, d) reflecting, and e) re-planning (Kemmis and McTaggart 1990).

During the first step of the Deakin model educational researchers’ plan how they will change or how they will address a specific issue of concern. Research
questions are also developed. The researchers implement the second step to take action and experiment with ways that may lead to solutions. The third step, observing, is important for the data collection. During this step the researchers record specific elements for a series of lessons. This allows the researchers to look for trends.

The fourth step, reflecting, is used to reflect on the plan, action, and observations. After this guided reflection, the educational researchers re-plan and revise the original plan according to the data, and then continue through the spiral of acting, observing and reflecting. The process of action research is an intentional, results-aligned investigation that is group or personally owned and directed.

Kemmis and McTaggart (1990) stated that the uniting of the terms action and research signifies the primary features of action research. Action research is a systematic research process for teachers to use to take action on ideas in practice, to broaden knowledge and improve the processes of instruction, teaching, and learning.

4.7 Role of Researchers

Educational action research\textsuperscript{12} is usually either teacher research, where teachers are researching their own self or practices, or research on teaching, where others are researching teacher’s practices or behaviour (Cochran-Smith and Lytle 1993, 10-13). Researchers can participate in research in six different roles that are defined by insiders and outsiders. According to Herr and Anderson (2005, 17-19) these roles are 1) insider studying own self or practices, 2) insider in collaboration with other insiders, 3) insider in collaboration with outsiders, 4) reciprocal collaboration, which means insider-outsider teams, 5) outsiders in collaboration with insiders, and 6) outsiders studying insiders.

An insider is defined as a participant who is doing research work or who practices inside their organization (Herr and Anderson, 2005, 17-19). A typical insider is a practitioner whose teaching practices are the object of action research. An outsider is defined as a participant who designs the research that is carried out by teachers (insiders) in their classroom, or persons who are otherwise helping or guiding the research process (Herr and Anderson, 2005, 17-19). A typical outsider is a university researcher who is doing action research with school-based teachers, but is otherwise outside of the day-to-day practices of school-teaching; or a specialist who is relied on for methodological guidance.

There are possibilities and challenges for insider-outsider relations in research. According to Cochran-Smith and Lytle (1993, 10-13), teachers in practice do not seem to highly value results obtained from outsider research, which typically means university researchers doing research on teaching (how teachers teach). This is because in these studies the research questions usually

\textsuperscript{12} We focus here on educational action research.
emerge from study of the target discipline or analysis of the relevant theoretical and empirical literatures, and the findings are often generalized and reported outside of the context in which they were developed. In the case of insiders, teachers doing research, the research questions emerge from problems of practice, from the day-to-day experiences of teachers themselves, and are based on the knowledge of professional practice. In these studies the findings are closer to the context in which they were developed, and often useful beyond the immediate context, not just “laws about what works generically in classrooms” (Cochran-Smith and Lytle 1993, 15).

4.8 Methods of Data Collection and Gathering Evidence

Next we take a look at some of the data collection options available to a research team. Elliott (1991, 77-83) lists several methods of data collecting, e.g., diaries, profiles, document analysis, photographic evidence, tape or video recordings and transcripts, using an outside observer, interviewing, the running commentary, the shadow study, checklists, questionnaires, inventories, triangulation, and analytic memos. Hopkins (1985, 58-84) adds field notes, sociometric analysis, documentary evidence (like memos, letters, position papers, examination papers, and newspaper clippings), shadowing (also Sagor 1993, 34), and case studies. Kemmis and McTaggart (1990, 100-105) also list anecdotal records, ecological behavioural descriptions, logs, item sampling cards, and portfolios. Next some of these methods are briefly summarized in alphabetical order.

4.8.1 Case Study

Hopkins (1985, 81) defines a case study as a relatively formal and fairly definitive analysis of a specific aspect of teaching behaviour or research spaced life. A case study usually requires a full case study report that includes a statement of intent, description of procedures and process, results and implementation, and a meta-analysis (Hopkins 1985, 117).

According to Hopkins (1985, 81), the main advantages of using a case study in action research are the simplicity of plotting the progress of a course or a participant’s or group’s reactions to teaching methods, and a tendency to obtain a more accurate and representative picture of a research situation than the other research methods. The disadvantages are that case studies tend to be time consuming and that feedback is often only available to teacher after a considerable lapse of time.

4.8.2 Diaries

According to Elliott (1991, 77), it is useful for both teacher and participants to keep a diary during the action research project. A diary can contain both unstructured and structured entries including personal observations, feelings, re-
actions, interpretations, reflections, hunches, hypotheses, and explanations (Kemmis and McTaggart 1990, 101). Participant diaries provide an interesting contrast to the field notes kept by the teacher on the same topic.

At its best diaries are excellent ways of obtaining honest feedback on a particular teaching episode, to gain an indication of the general research environment climate, or to assess the progress on an individual participant (Hopkins 1985, 64). Teachers or researcher can also write a diary about contacts, meetings, notices, and observations.

The main advantages of the diary can be listed as follows: provides feedback from the participant’s perspective, provides the possibility to focus on either a specific teaching episode or on the general research environment climate, can be part of a lesson, helps to identify individual participant problems, improves the quality of teaching through involvement of the participant, and provides the basis for triangulation (Hopkins 1985, 65). The disadvantages of the diary are lack of established practices in the research environment, difficulties for participants to record their thoughts and feelings, participants’ inhibits participants discussing their feelings with the teacher, and the obviously subjective accounts of participants.

4.8.3 Documentary Evidence

Hopkins (1985, 78-79) defines memos, letters, position papers, examination papers, and newspaper clippings as documentary evidence. Elliott (1991, 78) adds syllabuses and schemes of work, curriculum reports, minutes of meetings, work cards and assignment sheets, sections from textbooks, and samples of a participant’s written work. Different documents can provide relevant information on the issues and problems under investigation (Elliott 1991, 78). The use of such material might provide background information and understanding of issues that would not otherwise be available (Hopkins 1985, 78).

The main advantages of documentary evidence can be listed as follows: illuminates issues surrounding a curriculum or teaching method, provides context, background and understanding for a particular curriculum or teaching method, and provides an easy way of obtaining other people’s perceptions (Hopkins 1985, 79). The disadvantages of documentary evidence are the time needed to obtain documents, difficulties obtaining all or some documents, and the unwillingness of some people to share ‘confidential’ documents.

4.8.4 Field Notes

According to Hopkins (1985, 59), keeping field notes is a way of reporting observations, reflections, and reactions to research problems. A field note is a written record of observations, interactions, conversations, situational details, and thoughts during the study period. Ideally, the field notes should be written right after a lesson or a session, as this makes it is easier to reconstruct problems and responses accurately and retain conscious awareness of one’s original thinking.
Field notes can be of a number of different types, e.g., issue-oriented, when observations focus on a particular aspect of a teacher's teaching or behaviour, general reflections of impressions, or an ongoing description of an individual participant (Hopkins 1985, 59). The main advantages of field notes can be listed as follows: very simple to keep, provide good on-going record, give first-hand information that can be studied conveniently, act as an aide-memoire, help to relate incidents and explore emerging trends, and helps teachers if they intend to write a case study (Hopkins 1985, 60). The disadvantages of field notes are the need to fall back on aids such as question analysis sheets, tapes and transcripts for specific information, impossibility to record conversations, time demands, and conceivable subjectivity.

4.8.5 Interviews

Interviewing is usually used when there is a need to focus on a specific aspect of teaching or a research situation in detail, to improve the research situation climate, or if teacher-participant discussion can better provide general diagnostic information. Interviewing is a good way to find out what the situation looks like from the other interacting participants' points of view (Elliott 1991, 80). According to Hopkins (1985, 66-70), interviewing can take four forms based on between whom it occurs: teacher-participant, observer-participant, participant-participant, or occasionally teacher-observer.

Interviews can be structured, semi-structured, or unstructured (Elliott 1991, 80). In structured interviews, the questions are determined by the interviewer. Typically the aim of this approach is to ensure that each interviewee is presented with exactly the same questions in the same order, usually based on some questionnaire (Hirsjärvi, Remes and Sajavaara 1997, 203). This enables that answers can be reliably aggregated and that comparisons can be made with confidence between sample sub-groups or between different survey periods. In the unstructured interview the initiative for raising the relevant topics and issues is left to the interviewee. The interviewer merely sets the theme or topic, possibly asks the interviewee to expand, explain or clarify some points. In semi-structured interviews there is typically some predetermined topic or issue to discuss, but the form and order of the questions is free (Hirsjärvi et al. 1997, 203).

The main advantages of interviewing are the following: the interviewer is in direct contact with the participant, the interviewer is able to seek the desired information directly, the interview can be done in either lecture time or outside the class, and problems can be followed up immediately when they arise and information obtained while minds are still fresh (Hopkins 1985, 68). The disadvantages of the interviewing are time demands and difficulties getting participants to explain their thoughts and feelings.
4.8.6 Questionnaires

Questionnaires are a good way to elicit other people’s observations and interpretations of situations and events (Elliott 1991, 81-82). They are a quick and simple way of obtaining wide-ranging and rich information from participants. Typical questionnaire forms are the postal or internet questionnaires and the controlled questionnaire (Hirsjärvi et al. 1997, 191-192). The postal or internet questionnaire is mailed to participants, and after answering they mail it back to the researcher. The controlled questionnaire is either delivered personally in research situation or gathered personally after a stated period of time.

Typically questionnaires contain open, multiple-choice, or scaled questions (Hirsjärvi et al. 1997, 193-195). An open question includes a question with on empty space or textbox for the answer. A multiple-choice question includes question and preset, numbered responsive alternatives. It is also possible to include an open responsive alternative, where the respondent can add his or her own personal response. A scaled questionnaire presents alternative statements and the respondent chooses the most applicable one. A typical scale is the Likert scale with 5 to 7 points.

The main advantages of the questionnaire in use are ease of administration - quick to fill in and easy to follow up, provides direct comparison of groups and individuals, provides a lot of feedback from different points of view, and the data are quantifiable (Hopkins 1985, 74). The disadvantages of the questionnaire are the time needed for analysis, extensive preparation to get clear and relevant questions, difficulty of creating questions that explore in depth, dependence for effectiveness on reading ability and comprehension of the respondent, respondents’ possible reluctance to answer candidly, and attempts to produce ‘right’ answers.

4.8.7 Portfolios

Kemmis and McTaggart (1990, 102) define portfolios as collections of materials compiled for a purpose. Portfolios might contain any kind of matters and documents relevant to the researched situation, such as minutes of relevant meetings, correspondence related to the progress and behaviour of a participant, or correspondence and documents related to a target issue.

According to several studies (e.g., Niikko 2000, Kankaanranta 1998, Heikilä 1999), an advantage of the portfolio is the richness of the available documents, but at the same time this can also be an enormous disadvantage, because it enlarges the amount of data for analysis. This requires that someone accurately selects the most relevant documents.

4.8.8 Video Recordings

In classroom settings video recording can be used to record lessons in whole or in part (Elliott 1991, 79). “It allows the teacher to observe many facets of his or her teaching quickly, and provides heuristic and accurate information for diag-
nosis” (Hopkins 1985, 70). Often, interesting and relevant episodes from recordings are later transcribed into written form for analysis, and different methods are used to examine specific aspects of teaching (Elliott 1991, 79; Hopkins 1985, 70).

According to Hopkins (1985, 60), the main advantages of video recordings are the possibility to constantly review all the target teaching situations, to diagnose the origin of problems, to capture the behavioural patterns of teacher and participant, and to chart clearly patterns of progress over long periods.

4.9 Analysis of Action Research Data

The analysis of action research data can be divided into four stages (Becker 1958; McKernan 1991, 227-232; Hopkins 1985, 107; Sagor 1993, 48-57):

1. Selection and definition of problems, concepts, and indices
2. Defining data frequencies
3. Interpretation
4. Reporting results

In the following sections, we take a closer look on each of these stages.

4.9.1 Selection and Definition of Problems, Concepts, and Indices

During the first stage, Selection and definition of problems, concepts, and indices, the collected evidence is processed, that is, edited, coded and sampled conceptually and theoretically (McKernan 1991, 227). Then themes, issues, or factors that seem to emerge from the data are identified, and problems for further investigation are defined (Sagor 1993, 48; Becker 1958, 654). According to Sagor (1993, 48), these emerging items are generally of two types: (1) items that come up repeatedly or (2) idiosyncratic items that seems particularly noteworthy. Usually, during this stage, the researcher has also established a number of hypotheses that begin to explain what is happening in the research situation (Hopkins 1985, 110).

4.9.2 Defining Data Frequencies

During the second stage, the Defining data frequencies, the data is mapped by noting the frequency of recurrence of issues, themes, and units (McKernan 1991, 229). The goal is to find out which of these are worth pursuing during the later research (Becker 1958, 656). It also concerns the validation of the hypotheses: whether the evidence truly supports the researcher’s theories or not (Hopkins 1985, 110-111; Sagor 1993, 49). There are a few techniques that can be used to establish the validity of the hypotheses: saturation, triangulation, matrixes, or
grounded theory (Hopkins 1985, 110-113; Sagor 1993, 49-52). These techniques are briefly introduced in Section 3.10.

4.9.3 Interpretation

The third and final stage of the data analysis is Interpretation (Hopkins 1985, 113; McKernan 1991, 230-231). The goals are to create meaning out of the observations and constructs, spot relationships among the data, and to draw a larger picture, i.e., build a model of the research data by incorporating the individual findings into a generalized model that best explains the data one has assembled (McKernan 1991, 230-231; Becker 1958, 657), or to elaborate and modify existing theories as incoming data are meticulously played against them (Strauss and Corbin 1994, 273). The model built during this stage gives the teacher information on how to change his or her teaching situation, and serves as a springboard for the next action research cycle (Hopkins 1985, 114).

4.9.4 Reporting Results

Before reporting the results, Becker (1958, 659) recommends the careful rechecking and rebuilding of models to ensure that every item of information is assessable and taken account. According to Sagor (1993, 58), “the reporting of research is not often discussed in action research”. In many cases, teachers who engage in action research have no need to present their results to anyone except to themselves, particularly if the research is to be used solely for improving their teaching (Hopkins 1985, 117). However, the results could be replicated on another occasion, and therefore presenting the results in some form would help to disseminate knowledge of good practices and improve the quality of teaching (Sagor 1993, 58-59, 64).

The form of the report will depend upon the audience of the study (McKernan 1991, 231; Sagor 1993, 62-64). It could be, e.g., a written publication, a presentation, or a discussion in a meeting. Sagor (1993, 60) reminds us that because action research reports are developed by and for practitioners, “the most important consideration should be to choose a methodology that will tell the story accurately and effectively”. McKernan (1991, 231) lists a few basic rules for reporting the results:

- Contains clear exposition
- Ensures fair conditions based on careful selection of concepts and indicators
- Reconstructs an adequate explanation of the findings and the process which generated them
- Summarizes first the problem studied and present summary tables of the main findings
- Interprets what the findings mean within the study context and their possible the integration with theoretical perspectives
- Settles whether the actions taken have improved or not improved the problem
- Poses new lines of research or new proposals for inquiry into the teaching situation

The diversity of the evidence and data gathered also has an effect on the form of the action research report, i.e., on how to deal with mixtures of media including videotapes, photographs, charts and figures, written narratives, audiotapes, and oral presentations (Sagor 1993, 60). The basic content of a successful report is generally as follows (Sagor 1993, 60-62; Hopkins 1985, 117):

- **Introduction** to the context of an executed action research project to clarify the purpose of the study, including the site where the research was conducted, the focus of the research, and possible pertinent characteristics of the staff and learners.
- **A description of the research process** explaining clearly and concisely to others what has been done during the research and what kinds of research procedures have been followed by describing the research design, techniques of data collection, verification of concepts, and what has actually occurred.
- **An analysis of the data** to show what has been found during the research: the research outcomes, theoretical implications, actions taken as a result, and the evaluation of those actions. Typically, this includes examples of evidence: segments of interviews, portions of videotaped lessons, or testimonials from teachers and learners.
- **An action plan** stating the importance of the findings and the implications of the study: what is going to be done to improve the observed teaching situation. This reviews the whole process, concludes the utility of the research, and defines things that should be done differently next time.

### 4.10 Techniques for Establishing Validity of Hypotheses

As stated in Section 4.9.2., there are a few techniques that can be used to establish the validity of the hypotheses: saturation, triangulation, matrices, or grounded theory. Each of these techniques is briefly introduced next.

#### 4.10.1 Saturation

In saturation “the hypothesis or category generated from observation is tested repeatedly against the data in an attempt to modify or falsify it” (Hopkins 1985, 111) as follows:

- If after repeated testing a hypothesis or category is found wanting, it is then discarded.
- The hypothesis or category might have been conceptualized crudely and, through testing, the concept is modified, refined and amplified.
- Although the process of falsification is never complete, there comes a time when repeated observation leads neither to refutation nor amplification and only serves to support the hypothesis.

At the point, as the utility of observation decreases, saturation can be said to have occurred and the hypothesis has been validated.

4.10.2 Triangulation

Triangulation is typically seen as the use of multiple methods in the study of the same phenomenon (Campbell and Fiske 1959). Denzin (1978, 294-304) classified the concept of triangulation into four types, according to the focus:

1. **Data triangulation**: involves the collection of data from multiple sources for the same study, provides an opportunity to examine 1) how an event is experienced by different individuals, groups of people, or communities, 2) at different times, or 3) in different settings (Mitchell 1986, 20); data from one source is used to validate data from another source (Kimchi, Polivka and Stevenson 1991)

2. **Investigator triangulation**: involves multiple observers, two or more investigators with diverse research training backgrounds examine the same phenomenon (Mitchell 1986, 20); removes the potential for bias that might occur in a single-investigator study

3. **Theoretical triangulation**: various theoretical points of view, perspectives or hypotheses are critically examined within the same study (Mitchell 1986, 20); competing hypotheses are developed and tested using the same data set; tests existing theories in the field of study when alternative theories are examined

4. **Methodological triangulation**: two or more research methods or procedures of data collection (such as multiple data collection methods, multiple data analysis techniques, or methods from both qualitative and quantitative research) are used in a single study (Mitchell 1986, 21); used in the examination of complex concepts; the most common type of triangulation (Burns and Grove 1993, 278)

Kimchi et al. (1991) define also a fifth type of triangulation, **analysis triangulation**, where the same data set is analyzed with the use of two or more differing analytical techniques. The purpose is to evaluate the similarity of the findings. Moreover, when researchers combine multiple sources of data, observers, theoretical perspectives, methodologies, and analyses in one study, the research procedure is defined as a **multiple triangulation** (Denzin 1978, 304); that is the use of more than one of the five types of triangulation presented here.

Triangulation is used in qualitative research “to compare all the measures from different sources to determine the validity of the findings” (Burns and
In action research a special form of data triangulation is the most common type of triangulation. According to Elliott (1982), triangulation is a procedure for organizing different types of evidence into a more coherent frame of reference or relationship so that they can be compared and contrasted.

Triangulation provides access to relevant data about a teaching situation: 1) the learners explain how the teacher’s actions influence the way they respond in the situation; 2) a participant observer collects data about the observable features of the interaction between teacher and learners; and 3) the teacher has an opportunity to test and perhaps revise his or her own teaching actions on the basis of more sufficient data.

4.10.3 Matrices

According to Sagor (1993, 49), data can also be sorted by drawing up a matrix (Figure 17). Across the top of the matrix, as column headings, each of the research themes or categories that emerged during the previous stage are written. On the vertical axis, either individual sources of data (different data collection methods) or, if only one data source is used, data from individual respondents are placed.

<table>
<thead>
<tr>
<th></th>
<th>Previous experience</th>
<th>Parent involvement</th>
<th>Relationship with teachers</th>
</tr>
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<tbody>
<tr>
<td>Surveys</td>
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<tr>
<td>Interviews</td>
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<tr>
<td>Archival Evidence</td>
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</tbody>
</table>

As members of a research team read through the raw data, they look for supporting data for each theme or category, and write it in the appropriate space on the matrix. It is possible to add new themes or categories to the matrix, if needed, during this phase. A completed matrix serves as a visual representation of the data.

4.10.4 Grounded Theory

Originally Glaser and Strauss (1967, 3) defined grounded theory as “a way of arriving at theory suited to its supposed uses”, or “an initial, systematic discovery of the theory from the data of (social) research”. Moreover, generating a theory from the data means that most hypotheses and concepts not only come
from the data, but are systematically worked out in relation to the data during the course of the research (Glaser and Strauss 1967, 6). They defined the stages of the theory as follows (Glaser and Strauss 1967, 105-113):

1. **Comparison of incidents applicable to each theme or category** is done by coding each incident into as many themes or categories as possible, and comparing it with previous incidents and groups coded in the same theme or category. At some point, stop coding and record a memo on ideas.

2. **Integration of categories and their properties** is done by coding and comparing incidents with properties of the theme or category that resulted from the initial comparisons of incidents during the first stage.

3. **Delimiting the theory** is based on delimiting features of the constant comparative method to prevent it becoming an overwhelming task. Delimiting occurs at two levels: the theory solidifies or the list of categories is reduced.

4. **Writing theory** is based on coded data, a series of memos and a theory formulated during the previous stages.

The main difference between this and other qualitative methods is that the grounded theory combines general approaches, the explicit coding procedure and the style of theory development, to generate theory more systematically (Glaser and Strauss 1967, 101-102).

However, during the past four decades, grounded theory has begun to live its own life and nowadays we have different interpretations of grounded theory: the early version by Glaser and Strauss (1987), and versions according to Glaser (1978), Strauss (1987), or Strauss and Corbin (1990), among others (e.g. Charmaz 1990; Kools, McCarthy, Durham and Robtrecht 1996). According to Dey (2007, 80), in these various interpretations we can distinguish questions and themes that they tend to have in common:

1. Grounded theory is conceived as a way of generating theory through research data rather than testing ideas formulated in advance of the data collection and analysis.

2. The use of grounded theory requires an innovative approach to data selection, where sites and sources are selected flexibly for their theoretical relevance in generating comparisons and extending or refining ideas.

3. Grounded theory relies on qualitative data, mostly observation and unstructured interviews in the initial stages and more structured forms of data collection in later stages when the study becomes more focused.

4. Data analysis is based on ‘coding’ data into categories for the purpose of comparison as well as identifying and refining properties.
5. In grounded theory, the data collection stops when the categories reach ‘theoretical saturation’, that is, when further data no longer prompt new distinctions or refinements to the emerging theory.

4.11 Quality of Data Collection and Gathering Evidence

The traditional criteria for judging quality in quantitative research are internal validity, external validity, reliability, and objectivity. Sagor (1993, 28) also highlights these qualities in action research, although he replaces objectivity with generalisability. However, the use of these terms in qualitative work has been questioned by several researchers (e.g. Heikkinen and Syrjälä 2006; Heikkinen, Huttunen and Syrjälä 2007; Stenbacka 2001; Whittemore, Chase and Mandle 2001; Long and Johnson 2000; and Golafshani 2003). Healy and Perry (2000) assert that the quality of a study in each paradigm should be judged on that paradigm’s terms. The basis for this criticism is the difference in the purpose of these two mainstream research paradigms: quantitative research seeks to explain something, while qualitative research seeks to generate understanding (Stenbacka 2001, 551). Stenbacka (2001, 551) identifies four quality concepts in qualitative research: validity, reliability, generalisability, and carefulness. Reliability and validity are essential criteria for quality in the quantitative paradigm, but in the qualitative paradigm the terms credibility (cf. internal validity), transferability (cf. external validity), dependability (cf. reliability), and confirmability (cf. objectivity) are essential criteria for quality, and thereby establish the trustworthiness and rigor of the research (Lincoln and Guba 1985, 300). To this end, in the context of narrative action research, Heikkinen et al. (2007) have defined own five principles for validation.

4.11.1 Credibility

According to Trochim (2002), the credibility criterion involves establishing that the results of qualitative research are credible or believable from the perspective of the participant (insiders) in the research. Since from this perspective, the purpose of qualitative research is to describe or understand the phenomena of interest from the participants’ viewpoint, the participants are the only ones who can legitimately judge the credibility of the results. If action research is to be viewed as credible, the solution to the problem must actually solve the problem (Mills 2003, 85).

According to Greenwood and Levin (1998, 81-85), the credibility of action research can be assessed in three ways:

1. By assessing workability, that is, whether the actions taken in the action research process result in a solution to the problem.
2. By assessing whether the inquiry is making sense out of the tangible results; the focus is on examining how meaning is constructed through deliberative processes.

3. By assessing the possibility of "transcontextual modelling", that is, meanings created in one context are examined for their credibility in another situation through a conscious reflection on similarities and differences between contextual features and historical factors.

Lincoln and Guba (1985, 301-316) describe a series of techniques that can be used for establishing credibility as follows: prolonged engagement (including persistent observation and triangulation), peer debriefing, negative case analysis, referential adequacy, and member-checking.

4.11.2 Transferability

Transferability refers to the degree to which the results of qualitative research can be generalized or transferred to other contexts or settings (Lincoln and Guba 1985, 290; Erlandson, Harris, Skipper and Allen 1993, 31-32). From a qualitative perspective transferability is primarily the responsibility of the one doing the generalizing. The qualitative researcher can enhance transferability by doing a thorough job of describing the research context and the assumptions that were central to the research. The person who wishes to "transfer" the results to a different context is then responsible judging how sensible the transfer is. Therefore, transferability can be established by using thick descriptions that provide the widest possible range of information, making transferable judgments on the part of potential appliers possible (Lincoln and Guba 1985, 316).

4.11.3 Dependability

The traditional quantitative view of reliability is based on the assumption of replicability or repeatability. Essentially, it is concerned with whether we would obtain the same results if we could observe the same thing twice. But we cannot actually measure the same thing twice. This is because by definition, if we are measuring twice, we are actually measuring two different things. In order to estimate reliability, quantitative researchers construct various hypothetical notions (e.g., true score theory) to try to get around this fact.

The idea of dependability, on the other hand, emphasizes the need for the researcher to account for the ever-changing context within which research occurs. The researcher is responsible for describing the changes that occur in the setting and how these changes affect the research approach (Trochim 2002). According to Guba (1981, 81), there can be no credibility without dependability. Therefore, it is not always necessary to demonstrate dependability separately, although this type of relation dependability is very weak. Dependability can be established by using inquiry audit, overlapping triangulation, or replication (Lincoln and Guba 1985, 317-318).
4.11.4 Confirmability

Qualitative research tends to assume that each researcher brings a unique perspective to the study. Confirmability refers to the degree to which the results could be confirmed or corroborated by others. Various types of data can be used in action research, from interviews, observations, document review, focus groups, and surveys to role play. The inclusion of different data sources can increase their confirmability through such techniques as triangulation (Levy 2006, 382-383; Reason 1994). There are a number of strategies for enhancing confirmability (Lincoln and Guba 1985, 318-327). The researcher can document the procedures for checking and rechecking the data throughout the study. Another researcher can take a "devil's advocate" role with respect to the results, and this process can be documented. The researcher can actively search for and describe negative instances that contradict prior observations. And, after a study, one can conduct a data audit that examines the data collection and analytical procedures and makes judgments about the potential for bias or distortion.

Confirmability can be established by using the following techniques (Lincoln and Guba 1985): confirmability audit, audit trail, triangulation, or reflexivity. An audit trail can be used to accomplish dependability and confirmability simultaneously.

4.12 Summary of Action Research

In this study we are about to implement action research in educational settings. Therefore we conclude our discussion of action research here from the educational point of view.

Action research can provide and address solutions to real-life problems in the classroom by combining theory with practice to start a critical process (Avvison et al. 1999; Bawden 1991, 10). According to Calhoun (2002, 18), "action research can change the social system in schools and other education organizations so that continual formal learning is both expected and supported". The key principles of action research involve strategies to improve teaching and learning by using data feedback in a cyclical process (Kelly 1985, 136-137).

During the action research process teachers will become more aware of the educational process, options, and possibilities for not only the classroom, but for the entire school or educational institute (Merrill 2004, 6). Johnson (1993) noted that teachers embarking on action research improve their understanding, methodology, and approach to the teaching process. Kelly (1985, 138) also highlights the increasing understanding of the totality of a given situation. According to Ziegler (2001, 4), "teachers become more critically reflective about their practice, gain confidence in their abilities, become more active professionally, make valuable connections with peers, increase their interest in research", and "transform their practice for the benefit of the adults they serve."
The action research process is efficient because people collaborate, and share their insights and resources to get the job done. For example, teachers are forced to share their thoughts and best teaching practices to improve their teaching environment. Action research assists in practical problem solving and expands scientific knowledge such that both are performed collaboratively (Kelly 1985, 134-135). This type of inquiry is a powerful learning experience that engages people in a meaningful, active, and reflective research process (Ziegler 2001, 4). Action research fosters supportive, open, and respectful working alliance amongst members (Stark 2006, 30). It increases the individual’s motivation (Stark 2006, 30), enhances the competencies of the respective actors (Kelly 1985, 134), and develops the profession’s knowledge base (Sagor 1993, 3; Stark 2006, 30-31).

The strength of action research is the in-depth and first-hand understanding the researcher obtains (Benbasat, Coldstein and Mead 1987). The results can be structured and reported in various ways and from different perspectives according to recipients’ different needs. From the reliability point of view it is important to report the different phases and methods used as exactly as possible (Syrjälä and Numminen 1988). During the action research cycle results and recommendations formed during the previous stages are implemented in practice instead of being studied from the outside (Kelly 1985, 136).

During the action research process participants might also learn or strengthen some unexpected skills, such as communication skills, learning skills, writing skills through writing their own articles, critical reading, or performing skills when presenting their work and results at a forum, or a deeper level of reflection (Stark 2006, 31-32). Action research also results in positive changes within the workplace, such as improved communication channels within the organization, improved staff and learner moral, more empowered learners and work colleagues, and more effective team-working (Stark 2006, 32).

Action research is seen as an excellent way of improving pedagogical practices. The main goal is to develop a new theory, compare or test a theoretical model against the empirical results obtained from action research, and to improve target practices as well as understanding of participants and their actions. Action research seems to establish a well-formed framework, especially for collaborative pedagogical development and qualitative assessment.

There are several ways to execute the action research process. Which approach or model to use depends on the research goals and setting. The evaluation criteria for action research are not as clear as they are for other research methods. It might be hard to evaluate the success of an action research process. However, credibility, transferability, dependability, and confirmability have been stated by several scholars as the four most important qualities of the results of action research that should be discussed before collecting research data with different methods (see Section 4.11). The analysis of the research data includes (see Section 4.9.):

1. Selection and definition of problems, concepts, and indices
2. Defining data frequencies,
3. Interpretation of data and model-building
4. Reporting results

Within the context of the action research approach, it would be impossible to replicate the setting given that it is a live, actual organizational or teaching situation with all its inherent complexity. “What matters therefore is to document as much relevant data as possible, as accurately as possible given the circumstances, be reflective on what the data mean, apply a thoughtful analytical framework to the data, and arrive at some valid insights that contribute to knowledge in some significant way” (Marshak and Heracleous 2005, 75). The form of the report will depend upon the audience of the study as well as on the diversity of the evidence and data gathered.

According to previous studies, action research can provide and address solutions to real-life problems by combining theory with practice. It can also improve teachers’ understanding, methodology, and approach to the teaching process. This has a significant effect when we move into another learning environment. However, in some cases, typically in technical and emancipatory action research (see Sections 4.2.1 and 4.2.3), the expected outcome of the research, a solution to some predefined problem, is stated but the actual outcome, the solution, is not known and might only emerge over time (Morton 1999, 220; Walker and Haslett 2002, 528-529). On the other hand, mostly in practical action research (see Section 4.2.2), there is no actual problem to solve. There is a motivation to improve practices and the whole action research process starts by setting that as the problem. In these cases there are some expectations regarding the outcome, but because the changes made are made by individuals who have gained a new understanding of their practice, the results are more unpredictable.