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INNOVATION AND LEARNING

- a theoretical enquiry into the relationship
between innovation and learning.

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ABSTRACT

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Title: Innovation and Learning
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Background: Increasing demands of renewal and change on individuals and organisations require continuous learning and innovation in order to gain competitive advantages. This requires strategic planning. To do this, precise conceptions of what is to be planned are needed. In colloquial language, innovation and learning have come to be somewhat vague concepts, which warrants clarification as to the contents of and relationship between the two concepts.

Purpose of enquiry: To determine, analyse and discuss the conceptual relationship between innovation and learning, based on a thorough theoretical review. To identify learning aspects of the innovation process and aspects of innovation in the learning process. To clarify the relationship between innovation and learning as concepts, and to try to make the two concepts understandable in terms of each other.

Method: A hermeneutic approach was used to conduct a theoretical review and analyse a multitude of textual sources in order to uncover conceptual relationships between innovation and learning.

Results: A number of parallels were found that could explain innovation in terms of learning, and to some extent learning in terms of innovation. These results were somewhat limited on account of the disparity of contents between the existing literature in the respective fields of innovation and learning.

Key-words: Innovation, Learning, Concept of innovation, Concept of learning, Organisational development, Organisational change, individual learning, organisational learning

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1. Introduction

This, the introductory chapter, serves as a depiction of the circumstances that make up the main focus and background of the study at hand. In cases where concepts are introduced to support the introductory argumentation, it should be noted that these, when deemed necessary, are further elaborated on in the theoretical parts of this thesis. Further, a description of the purpose- and questions of enquiry for the study is given, along with delimitations imposed on the former, that in essence serves as a description of what the study does and does not comprise. Moreover, the pedagogical relevance of the general problem area is discussed. Finally, a description is given of the disposition of the study and its content parts.

1.1 Setting the context

1.1.1 The organisational need for renewal and change

The days are gone, when it was possible for an organisation to gain competitive advantages in relation to its competitors solely by having acquired the latest, most modern technology. Although technology still plays an important role in organisational life, this role has come to change somewhat. Technology is quite evidently one of the key factors in almost any enterprise of later date, however nowadays it is more or less taken for granted that enterprises have access to the latest technological advancements (Rohlin, Skärvad & Nilsson, 1994).

The prospects of competitive advantages has come to be concentrated around the organisation's *aggregate* resources, which here is to be understood as the traditional production input in general and the competence of the co-workers in particular. The development and addition of new technology continuously raises the demands on the level of co-worker competence in a broad sense - production has become increasingly knowledge intensive. Subsequently, the demands on the organisations to create, sustain and develop knowledge in different forms are ever rising (Persson & Nilsson, 1999; Ds 1994:18).

As a result of the societal developments at large of later years, the discourse in the field of organisational research and practice, to a great extent has come to revolve around the need for renewal and change, and how this best can be facilitated. One conclusion of this discourse is that the organisational ability for renewal and change has come to be one of the most rudimentary requirements for organisational survival (Nilsson & Pålsson, 1998).

Thus, a need for working actively with the processes of renewal and change has been recognised. In the organisational setting this can be done, either by adapting to new conditions within or outside the organisation, or by continuous strategic planning of change work and the subsequent operational execution of these plans.

Hendry, Arthur and Jones (1995) point out that the intra-organisational work with processes of change and renewal necessarily has to be a task that is dealt with reactively, by adaptation to new conditions, or proactively, through continuous strategic and developmental work. Two of the most important facilitators of renewal and change, that have to be stimulated in order to achieve a furthering of organisational activities, are innovation and learning.

1.1.2 Learning, renewal and change

Learning in organisations, as Björkegren and Rapp (1999) have shown, can be viewed as a change of thinking. Since organisations do not have any cognitive capacities of their own, the individuals and the sum of individual learning are the base of organisational learning. Learning in the organisational setting through the interaction of the individual co-workers is one of the most important sources of assimilating, creating and communicating new knowledge, and thus the basis for facilitating renewal and change.

Stein (1996), indicates the importance of guiding the learning in the organisation by seeing to it that learning can be facilitated in organised forms. An arrangement of this sort can be viewed as a form of co-ordination of organisational resources in order to attain individual and collective goals.

1.1.3 Innovation, renewal and change

Innovation, according to Drucker (1985), is the means by which change can be exploited as an opportunity for a different business or a different service. Hence, innovation can take advantage of changes that has already occurred or are under way. At the same time though, innovation can also either act as a catalyst of change or in itself constitute change. Thus, innovation can be both the exploiter as well as a facilitator of change.

Qvale (1995) argues that, even though innovation in its essence is a phenomenon originating in the individual mind, deriving from individual knowledge and competencies, in business organisations today, creativity and innovation are less often the outcome of individual genius, rather more often the result of proper organising, which allows for innovation to occur.

1.1.4 Rationale for the conceptual study

As we have seen, there is a need for organising for renewal and change, which can be done by facilitating innovation and learning on the individual and organisational levels in the organisation. In the organisational setting the central question here will of course be: *How is this to be done?*

Before being able to answer this question though, it can be argued that it is of the greatest importance to obtain, what Lundmark (1998) refers to as a *base of interpretation*, that is accomplish a thorough gathering of information that is relevant to the subsequent planning of measures intended to promote, in this case, learning and innovation. It can also be argued that this base of interpretation should include a description of what it actually is that should be accomplished by the measures taken. In this, the relevant concepts/phenomena striven for should be defined and the relationship between them determined. The risk otherwise, seems to be that whatever decisions are made and whatever measures taken, will be quite loosely tied to the real goals of the organisation.

As a further incentive for conducting a conceptual analysis it can be argued that, for example, different languages may attach different meanings to the same concepts or corresponding words. Though this might be of little surprise, this phenomenon also occurs between groups that speak the same language. The language usage often reflects the adaptation that has taken place within the group that use the language (Björngen, 1992). This means that no matter what concept/-s are pondered or discussed, in this case e.g. learning and innovation, it is of interest to examine what meaning is attached to the particular concept/-s by a particular individual or

group. In other words, the discourse of any given concept will inevitably differ, depending on who expresses their opinion. Therefore it is of interest to take a closer look at what is comprised by different discourses, that in themselves are distinguished by the context in which they occur.

The basis for the study at hand, deriving from what has been said so far, is really rather simple, in that it is based on an assumption that innovation as well as learning are key factors in the facilitation of renewal and change. Albeit innovation and learning are not the sole determinants of renewal and change, they are assumed to be of great importance. Hence, it is of interest to, firstly seek to determine what the respective concepts of innovation and learning actually involve in terms of meaning in different contexts, and secondly to try to find the relationship between them.

Must there be a relationship? As we have seen and as will be further elaborated on, the concepts of innovation and learning appear together, appear in the same settings and contexts, and are both seen as facilitators of renewal and change. Therefore, there should be *some* form of relation between them, albeit this relationship might be of an indirect nature.

The main rationale of this study is that, in determining this relationship of sorts, it should be possible to articulate how the respective phenomena are seen to affect each other, which should be of interest for future students of renewal and change in the organisational arena.

1.2 Purpose of enquiry and research questions

1.2.1 Purpose of enquiry

The purpose of enquiry for this study has emerged from my interest in the fields of education and organisational development, and the possibilities that lie in the former for the realisation of the latter. This interest helped form an initial purpose which thereafter was furthered and continuously refined throughout the theoretical review.

The purpose of this study is to determine, analyse and discuss the conceptual relationship between innovation and learning, based on a thorough theoretical review. Thus, an important component of this purpose is to identify learning aspects of the innovation process and aspects of innovation in the learning process. This in other words means that one strife of the study is to clarify the relationship between innovation and learning as concepts, and another essential part is to make the two concepts understandable in terms of each other.

1.2.2 Research questions

The study is of an exploratory nature. Deriving from this, the purpose of enquiry was consciously formulated in somewhat general terms. Two more specific research questions were made the focus of the further theoretical investigations:

- What is the relationship between innovation and learning, on a conceptual level?
- How can, or to what extent can, the concepts of innovation and learning be discussed in terms of each other?

1.3 Delimitations

At this point, it is of some use to describe the specific delimitations imposed on the study at hand. These, in turn depict what issues the study *deals with* and what issues it *does not address*.

It can be argued that this study:

- focuses on theoretical, rather than on practical aspects;

One important aspect to keep in mind is that the study is concerned with the theoretical aspects of the processes examined. Fortunately, or unfortunately depending on which view one chooses to take, reality supersedes what can be contained in a theoretical review. Thus, the picture given of different aspects of the processes of learning and innovation will be somewhat limited in comparison to an empirical/practical study of issues of the same processes. On the other hand, in order to be able to do such empirical studies, a comprehensive review and understanding of mentioned theoretical aspects is needed. This in turn then justifies the exploratory design of the immediate study. The point here is that, from a somewhat pragmatic viewpoint, a study with a purely theoretical focus will inevitably tend to over-simplify some aspects of whatever process studied. However, in the process of more or less consciously and deliberately ignoring certain aspects that otherwise might have contributed to the over-all depiction of a subjective reality, other aspects can be examined, described and analysed with additional stringency, than would otherwise be the case.

- focuses on conceptual content, rather than on practical manifestations of the concepts at hand;

Since this is a study of conceptual relationships, and thus based on theoretical deliberations, a natural delimitation is that it is solely concerned with how the concepts have been described in the research conducted in the respective fields.

The study does not aim at examining results of any pedagogical practice as such. Rather, the underlying point of departure for the study is that the concepts studied have an impact on how this practice presumably could be executed.

- focuses on the concepts from an individual level, and the consequences this has on the aggregate ditto;

The processes of innovation and learning are initially assumed to be phenomena that basically occur at the level of the individual, though this, in the organisational setting, produces important consequences on the aggregate level of the organisation.

- focuses on discussing, whenever possible what consequences different conceptual views might have in the organisational/work-life setting.

1.4 The problem at hand and it's pedagogical relevance

What is pedagogics? As is the case with most scientific disciplines, the most basic question, of what the disciplinary content actually is, often is the hardest to answer. This of course is a fact because the answer to the question is closely tied to how the researcher chooses to view the different subject matters, in what intra-disciplinary tradition the researcher has been educated, active in etc.

It might be fruitful though, to relate the study at hand to some past views on pedagogics in order to position the study and point to its intra-disciplinary relevance.

Stensmo (1994) offers a description that refers to pedagogics as embracing the communication of values, norms, proficiencies and skills, which is facilitated by education in the form of fostering and teaching, where fostering entails the affective, emotional aspect of the learners psyche, and teaching comprises the cognitive, intellectual aspect.

Tedenljung and Rudenhammar (2001), describe pedagogics in a work-life setting as the scientific study of processes of influence in work-life. This implies the theoretical, methodological, and practically applicable grounds that identify and take into account prerequisites for learning-, knowledge- and competence-processes, as well as the specific content that is directly significant for the character of vocational skills.

Leino and Leino (1992) refer to pedagogics as a discipline which is a practical activity, which purpose is to help the individual to adapt to society and by doing this, support society's continuance and development. Having said this, Leino and Leino define pedagogics as a kind of distinctly directed influence, that is exercised towards a living creature in society; with the prerequisite that this influence has a certain predetermined goal that acts in concordance with the overall goals of society.

From this it is possible to deduct that one of the central elements of pedagogics is some form of communication, that involves a process of influence. That is, the influence of one individual on some other. It could also be said that, at its best, communication between two individuals works two ways - the influence is reciprocal.

It can also be argued that pedagogics involve the scientific study of theoretical, methodological and practical issues and aspects pertaining to the educational process and end-results of the influence effort, in the work-life setting comprised of learning, knowledge and competence.

Further, pedagogics in an organisational/work-life setting can be said to involve influence that aims at helping the individual to adapt to life in the organisation and through this help the individual to assist in the development of the organisation and the procurement of organisational survival.

As has been proposed above (paragraph 1.1) organisational development and survival is, to a great extent, founded on the ability for renewal and change which in turn are based on the learning and innovation of the individuals that make up the organisation. In the same above passage was also mentioned the fact that different people/practitioners use the same concepts, albeit in substance attach different meanings to them and that, in order to be able to execute different forms of strategic planning or programmes that aim at organisational change, it is of great importance to establish the intra-conceptual content and inter-conceptual relationships of the concepts that is given topical interest.

It is within this pedagogical framework this study operates and it is within these boundaries that it becomes pedagogically relevant. Thus, in terms of final analysis, it is basically concerned with what, deriving from Stensmo (1994), can be labelled analytical pedagogical

philosophy, in that it in its essence is concerned with the answer to the question of: what is the *purport* of the concepts?

1.5 Disposition of the study

An overview of the study at hand offers the following disposition:

- Chapter *one*, offers a description of the general problem area and the chosen problem of enquiry.
- In chapter *two* an account is given of the methodological stances taken and subsequent choices made that resulted in the chosen mode of procedure.
- Chapter *three* explores the concept of innovation. In this, different views on innovation are discussed and compared.
- Chapter *four* discusses different views on learning, individual, collective, and organisational.
- The discussion in chapter *five*, revolves around the theoretical accomplishments that deal with innovation and learning as related concepts, that is, attempts at discussing innovation and learning in terms of each other.
- Finally, chapter *six* offers an in-depth comparison and analysis of the theoretical notions that have been discussed in earlier chapters. The chapter is divided into two parts. The first part is characterised by a discussion of the theoretical notions in relation to each other, whilst the second part is more speculative in nature, drawing on the theoretical deliberation to discuss possible consequences/implications.

2. Method

In this chapter, an account is given of the methodological considerations made in the carrying through of this study. The chapter is divided into three principal parts: Points of departure (2.1-2.4), Procedure (2.5-2.6), and Quality aspects (2.7).

Points of departure, describes the different assumptions and choices made, that constitutes the basis for and leads up to the actual carrying out of the study, i.e. my basic views and assessments of how the problem area at hand can be viewed. Procedure, deals with the more practical aspects of the study, such as criteria for search and choice of literature, and principles guiding processing and analysis of gathered information. Quality aspects, describes an assessment of different quality aspects in relation to the study.

2.1 On points of departure

In my opinion, scientific method in its essence is about making choices. Some choices might have their basis in the chosen purpose of enquiry, whilst others may have their grounds in the foreknowledge and values that the researcher brings to the study. Whatever the case may be, these choices will inevitably produce certain consequences in the turnout of any given study. My point here being, that in order to make these consequences at least implicitly clear to the reader of this text, I've tried to describe the grounds on which the method used has been chosen, how it has been used and how I've tried to use the methodological stances taken, to secure the overall quality of the study.

2.1.1 Choosing a method of enquiry

When confronted with the problem of choosing a method with which to examine a chosen problem area, it can be argued that there are three major points of departure, to which some thought has to be given. *Initially*, it is important to assess what kind of information the investigation demands in terms of what kind of information is actually needed. In doing this it is necessary to describe why some pieces of information might be of interest and others not. *Secondly*, it is of central interest to find out and assess what information that is de facto available, i.e. what information is readily available. *Finally*, some time should be spent considering what alternate methods might be used to examine the problem at hand. This basically involves an assessment of the different possible methods that might be used to shed light on the problem area and the pros and cons of what the different procedures might contribute to the investigation (Bystedt, 2000).

Deriving from what has been said so far, it might be a good idea to recapture the purpose of enquiry, in order to have some frame of reference for the following elaboration on the methodological choices made and stances taken:

The purpose of this study is to determine, analyse and discuss the conceptual relationship between innovation and learning, based on a thorough theoretical review. Thus, an important component of this purpose is to identify learning aspects of the innovation process and aspects of innovation in the learning process. This in other words means that one strife of the study is to clarify the relationship between innovation and learning as concepts, and another essential part is to make the two concepts understandable in terms of each other.

2.1.2 A qualitative approach

Patel & Tebelius (1987a) point to the fact that the qualitative approach allows for the researcher to interpret and appraise different aspects of the information available, and by doing this becomes an active part of the research process. By contrast to a quantitative approach, which aims at measuring and describe different phenomenon, the qualitative approach is used when the researcher strives for knowledge that seeks to make an inventory of, interpret and understand different phenomenon. On this subject, Svenning (1996) argues that, because the qualitative approach is based upon interpretation rather than on measurement, it brings sensitivity to the investigation, whilst it at the same time loses the precision that a quantitative approach might have contributed.

Because the qualitative approach to science requires the aspect of interpretation, it also implies an aspect of subjectivity. In fact the qualitative approach, broadly speaking builds upon subjectivity, and it is something that the researcher never can distance him or herself from (Gubrium and Holstein, 1997). This also means that the research will be a result of, and built upon, the researchers subjective judgements, which in turn is constructed by his or her foreknowledge of the problem area based on different forms of values and experiences. This, as a natural fact, is an absolute requirement for the researcher to be able to interpret the data gathered (Patel & Tebelius, 1987a).

The qualitative approach, as Starrin (1994) puts it, allows for the discovery of variations, structures and/or procedures in yet not known or dissatisfactory known phenomenon, properties or meanings. That is, the qualitative approach allows for exploration of certain phenomenon in order to give an accurate description of it's contents.

In this process, it's possible to apply the investigative strategy of induction, or as Hartman (1998) labels it, analytical induction. Analytical induction essentially involves gathering of data in order to develop theory as a result of the analysis of the data. Wallén (1996) describes induction as an approach to science, that implies that the researcher makes observations and try to summarise regularities into theories. The inductive way of studying a specific topic, can be seen as a first step on the way of creating knowledge in a field where there is no prior theories. An inductive method of enquiry implies an unprejudiced way of enquiring into a particular field of questions, which entails that the researcher at all times try to keep an open mind in relation to the information that he or she is faced with. By using an inductive approach, the researcher, as Mertens (1998) puts it "*...can attempt to make sense of a situation without imposing pre-existing expectations on the phenomena under study.*".

As we have seen earlier, the choice of method of enquiry rests on the establishment of what kind of information is available and what kind of knowledge the study aims at. This study aims at assessing and analysing an inter-conceptual relationship between two concepts, learning and innovation. In this, it's implied that the information available, and indeed desirable, is comprised of theoretical descriptions of the two concepts. It can also be deduced that the knowledge the study aims at, is of an theoretical nature. Therefore it can be concluded that the study at hand requires a qualitative approach. The study was initiated by the fact that there seems to exist much knowledge and writings about learning and innovation respectively, but little seems to be known of the inter-conceptual relationship between them, which implies and justifies an exploratory approach to the study. As a further consequence, in order to receive an as unbiased picture of the problem area as possible, utilising an inductive approach to studying the inter-conceptual relationship is warranted.

2.2 On perspective of enquiry

2.2.1 The significance of the foreknowledge and values of the researcher

In order to furnish the reader with a reasonable opportunity to make an assessment of the qualities of the material presented in a research report, it is of central importance that the possibility exists to relate the material to a given perspective. Perspective, in this sense, means that the researcher declares and clarifies his or her own understanding of and values towards the studied problem area, i.e. from what perspective the problem area has been studied. Thus, the conscious and/or unconscious choices made by the researcher in terms of perspective of enquiry, will inevitably result in that certain phenomena or data will be seen as relevant in relation to the chosen perspective and others not. In this way, the choice of perspective can be viewed as an important delimitation to the research work, that the reader has to be made aware of in order to be able to fully grasp its contents (Svenning, 1996). Furthermore, the choice of perspective depicts the fact that the researcher, through his or her values and foreknowledge of the problem area, inevitably will subject the gathered material to a subjectively founded assessment and processing. This will also shape the presentation of any material, which becomes especially evident in qualitative studies (Maltén, 1997).

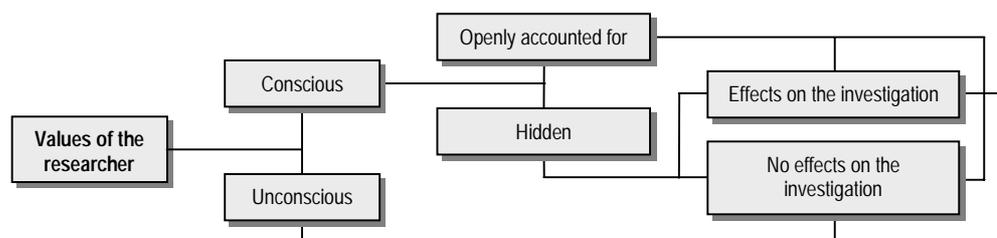


Figure 2.1 Values of the researcher: relationship to research outcome (Freely from Lundahl & Skärvad, 1992, p. 73).

The importance of describing the foreknowledge of the researcher is illustrated in figure 2.1, which depicts the fact that a presumptive reader should be given as much information as possible concerning the perspective from which the author describes and analyses a certain field of enquiry. The description of the researcher's foreknowledge that is offered the reader should thus include enough information, explicitly as well as implicitly, for the reader to assess what values the researcher/author brings to the study, and how this might have come to affect the end-results.

I would like to establish the opinion that it is in fact impossible to describe in minute detail all that is encompassed by my own foreknowledge. Naturally, the variables are to many. Therefore, I have made an effort of making the following description of the factual relationship between the study at hand and the perspective/-s imposed by my foreknowledge. This description, in my opinion, offers an implicit picture of the actual foreknowledge in a relatively wide understanding, that I bring to this study. My point here being that, because I cannot describe my foreknowledge in minute detail, I have instead chosen to do it in relatively general terms. This could of course be construed as a problem in terms of inter-subjectivity. I have however chosen to view this situation as a possibility instead of a problem, mainly as it allows for the presumptive reader to make up his/her own mind of what my foreknowledge

actually is, rather than me telling him/her how it should be understood. In any case, this course of action is the only one that comes close to concurring with the otherwise described mode of investigation which, as will be evident below, involves the art of interpretation.

I have chosen to describe my perspective of enquiry in several steps, further elaborating what has been said so far about perspective of enquiry:

- *Superordinate perspective*, which basically describes the scientific-paradigmatic home-
stead of this study and the principal basis for interpretation.
- *Subordinate perspective*, which requires knowledge of the superordinate perspective to be
comprehensible. The subordinate perspective refers to the foci that are specific to this
study.

2.3 Superordinate perspective

2.3.1 The interpretative/constructivist paradigm

In order to determine to what paradigm this study belongs, it is vital to make an appraisal of the factors that determine a paradigm: *ontology*, *epistemology* and *methodology*. To do this, it's possible to ask three questions (Guba & Lincoln, 1994):

- *Referring to ontology*: What is the nature of reality?
- *Referring to epistemology*: What is the nature of knowledge and the relationship between
the knower and the would-be-known?
- *Referring to methodology*: How can the knower go about obtaining the desired knowledge
and understandings?

This study orientates itself towards an interpretative/constructivist paradigm.

An interpretative/constructivist paradigm, as Mertens (1998) puts it, rests on an assumption that reality is socially *constructed* by people involved in the research process. The research is a product of the values of the researcher and cannot be independent of them. The *ontological* assumptions associated with an interpretative/constructivist paradigm include that multiple realities exist, and that these realities are time and context dependent.

In terms of *epistemology*, the interpretative/constructivist paradigm holds that the enquirer and the enquired-into are interlocked in an interactive process. Through the interpretation of data, the researcher through his or her own values and foreknowledge, influences how data is understood and at the same time the researcher is influenced by the data in a way that might change his or her values. The consequences might be that the focus of the study changes slightly, which is something that the researcher needs be aware of (Mertens 1998).

If researchers accept the ontological and epistemological assumptions associated with the interpretative/constructivist paradigm, they will choose to carry out the study using qualitative methods in order to gain an understanding of the constructions held by people in a specific context (Mertens, 1998).

2.3.2 Hermeneutics

In having determined the paradigmatical domicile of the study, it becomes important to link this to the fact that the study is comprised of a theoretical review, e.g. a study of literature and not in a sense a study of people in their natural environment as such.

Hermeneutics is one of the major analytic modes within the interpretative/constructivist paradigm, and indeed perhaps one of the founding elements of this particular tradition of qualitative analysis (Mertens, 1998). The background to this is that hermeneutics can be construed both as an underlying philosophy and a specific mode of analysis. As a philosophical approach it provides the philosophical grounding for interpretivism, while it as a mode of analysis proposes a way of understanding textual data (Bleicher, 1980).

Hermeneutics, derived from the Greek mythology, where Hermes was the messenger of the gods of Olympus, and the subsequent interpreter of their wishes, has evolved somewhat over the years. In the dark ages it described a method of interpreting the Bible. The classical idea behind hermeneutics was that there is a uniformity between the thought and the expression this eventually gets. By reading a particular text, there is something more to be said than is overtly evident in the text. In the processing of qualitative material, such as a text, the researcher interacts with the text in a way that makes the interpretation in itself dependent on the researcher's power of insight. It is therefore of outmost importance that the interpreter is open-minded so that new aspects of the text are allowed to stand out (Tebelius, 1987). By reviewing the text as a textual creation, it is possible to penetrate deeper into the text and get a better grip on what is said, whilst it also allows for a better and deeper understanding of the issue at hand (Hellspång & Ledin, 1997).

In terms of cognitive approach, Sjöström (1994) indicates that the hermeneutic approach within the scientific fields of education, psychology and sociology is characterised by its object of study, the unique actions of man and phenomena seen in their contexts. The knowledge objective is the knowledge of how the tenor and intention of unique people and phenomena, seen in their respective contexts of time, space, and meaning can be understood, or to clarify the meaning of uniquely human phenomena and contexts.

Wallén (1996) talks of hermeneutics as the art of interpretation of meaning in a wide understanding, and states that this interpretation can include the meanings of texts, symbols, experiences etcetera. The interpreter has a foreknowledge in the form of linguistic and cultural community, that has to be articulated and made conscious. Furthermore, in the act of interpreting the interpreter shifts between the perspectives of the parts and the whole. Incongruences between the parts and the whole is observed. Every new part of a text read, can lead to a new way of understanding previous parts. The interpretation advances by the shifting between the immediate part worked with and the growing whole. Interpretation must be done in relation to a context. In interpreting, the researcher must also give thought to the situation in which, for example a text has originated, and at the same time also in which situation the researcher finds him-/herself. Patel (1987), and Holme and Solvang (1991), point to the fact that interpretation of documents is the result of an interplay between facts; the *author* of the original document; his/her culture and age; and the *researcher*, and his/her thoughts on the present culture and age.

In collecting data for a hermeneutic study it is possible to utilise a wide variety of techniques as long as the work within these are well documented. For example one can observe, participate in activities, converse, interview, study documents or study environments. The point of this versatility being, that whatever mode of procedure one uses is an acceptable scientific method as long as it allows one to find answers to the questions of enquiry (Sjöström, 1994).

Ricoeur (1974), who has argued the possibility to use the *text* as the sole basis for hermeneutic interpretative work, suggests that interpretation is the work of thought which is comprised by deciphering the hidden meaning in the apparent meaning, in unfolding the different levels of meaning implied in the literal meaning.

Thus, from Ricoeur's deliverance, in terms of interpretation, there are several levels of meaning in a text. The hermeneutic approach allows for these to be uncovered in order for the full meaning of a text to emerge.

The interpretative activity embraced by a hermeneutic investigation is often explained by using what has come to be known as the *hermeneutic circle*, which in its essence describes how an understanding through interpretation comes about and how such an interpretation can be justified (Hartman, 1998). Kvale (1997) describes the hermeneutic circle in terms of that the creation of understanding of a text comes about through a process in which the individual parts eventually can change the original anticipated meaning of the whole, which in turn can come to change the meaning of the individual parts and so on. A hermeneutic interpretation of text of this kind is basically a everlasting process, though in practical terms it ceases when one has come to what one considers a valid, homogenous meaning, that is considered free from internal contradictions. An alternative denomination of this process is offered by Andersen (1998), who chooses to call the phenomenon the *hermeneutic spiral*, which supposedly alludes to the fact that the process in itself is a form of change, an evolution in understanding.

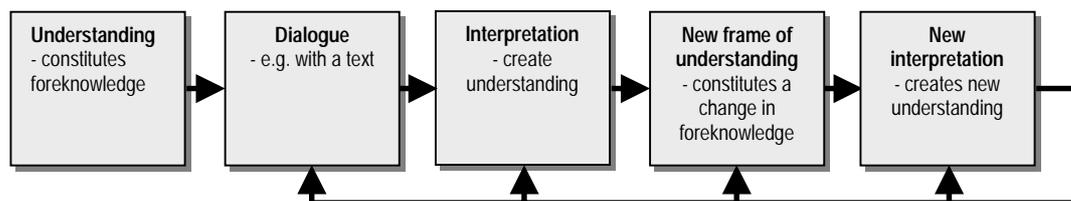


Figure 2.2. The hermeneutic circle or spiral (adapted from Andersen, 1998, p. 193).

The hermeneutic circle, as Gadamer (1976) describes it, refers to the dialectic between the understanding of the text as a whole and the interpretation of its parts, in which descriptions are guided by anticipated explanations. From this follows that we can have an expectation of meaning from what has gone before. The movement of understanding "*is constantly from the whole to the part and back to the whole*"; "*It is a circular relationship...*"; "*...the anticipation of meaning in which the whole is envisaged becomes explicit understanding in that the parts, that are determined by the whole, themselves also determines this whole.*" (p. 117).

Gadamer's reasoning implies the notion that our interpretation of a text inevitably will be affected by, and indeed built upon our foreknowledge, which underlines the importance for the researcher to give some form of ample description of his or her values and foreknowledge. As we have seen the appraisal of the individual foreknowledge, allows the researcher the possibility of actually being aware of what might come to influence how he or she interprets a specific text, and strive to avoid this or point to the fact, either way it should be described in report of the research.

2.4 Subordinate perspective

As I've stated above, the superordinate perspective of the study concerns the overall standpoints regarding what constitutes reality, knowledge and what this entails in the form of methodological positioning. While the superordinate perspective takes a stand on somewhat philosophical issues, the subordinate perspective of this study is concerned with the different foci of this particular study.

2.4.1 An individual vs. an organisational perspective

In the study I've used a predominantly individual perspective. By this I mean that in assessing different aspects of the theories or lines of argumentation studied, I have started off from a standpoint focusing on the individual. This is based in my foreknowledge of the respective areas and is something that I wish to emphasise in relation to any presumptive reader of this study. I consider learning as well as innovation, at their most basic levels, to be the results of individual mental modulations, and therefore essentially the "property" of the individual.

The main interest of this study has therefore been the consequences that different stipulations will have, seen from an individual perspective. Having said this, there is of course a further notion that has to be considered: in the organisational setting, what has consequences for the individual, will also have consequences at the aggregate level of the organisation itself. This statement builds upon the assumption that the organisation in its simplest form, as Bruzelius and Skärvad (1995) point out, is a collective of individuals working in a co-ordinated way towards some shared goal.

The fact that consequences relevant at the individual level will exert influence on the aggregate level of the organisation has resulted in that this has also been taken into consideration in the further analysis of the theoretical contents of this study.

2.4.2 Knowledge objectives of this particular study

As stated in the purpose of enquiry, I want to determine, analyse and discuss the theoretical/conceptual relationship between the concepts of learning and innovation. In this is implied that I want to analyse the contents of the respective concepts through the descriptions of these available in literature. In terms of analysis, this means that having a hermeneutic approach to the study, I have tried to interpret the different theoretical deliverances with regards to tenor and intentions in relation to an assessment of their respective contexts of time and place, all in order to be able to create a comprehensive representation of what is said about the respective concepts as such and of the relationship between them. The objective here has been, by the possibilities of the hermeneutic approach, to analyse the concepts respectively in order to create some understanding of their inter-conceptual relationship.

Drawing on what has been said about the hermeneutic circle/spiral, researcher foreknowledge and values may come to effect the outcome of a given study (e.g. Hartman, 1998; Andersen, 1998; Kvale, 1997; Lundahl & Skärvad, 1992; Gadamer, 1976). This is described in figure 2.3. I have striven to describe the basic aspects that constitute my foreknowledge and the values I bring to the study at hand. As mentioned, it is my hope that this will help the presumptive reader to make his/her own assessment of how my foreknowledge and values might have come into play in terms of the final results of the study.

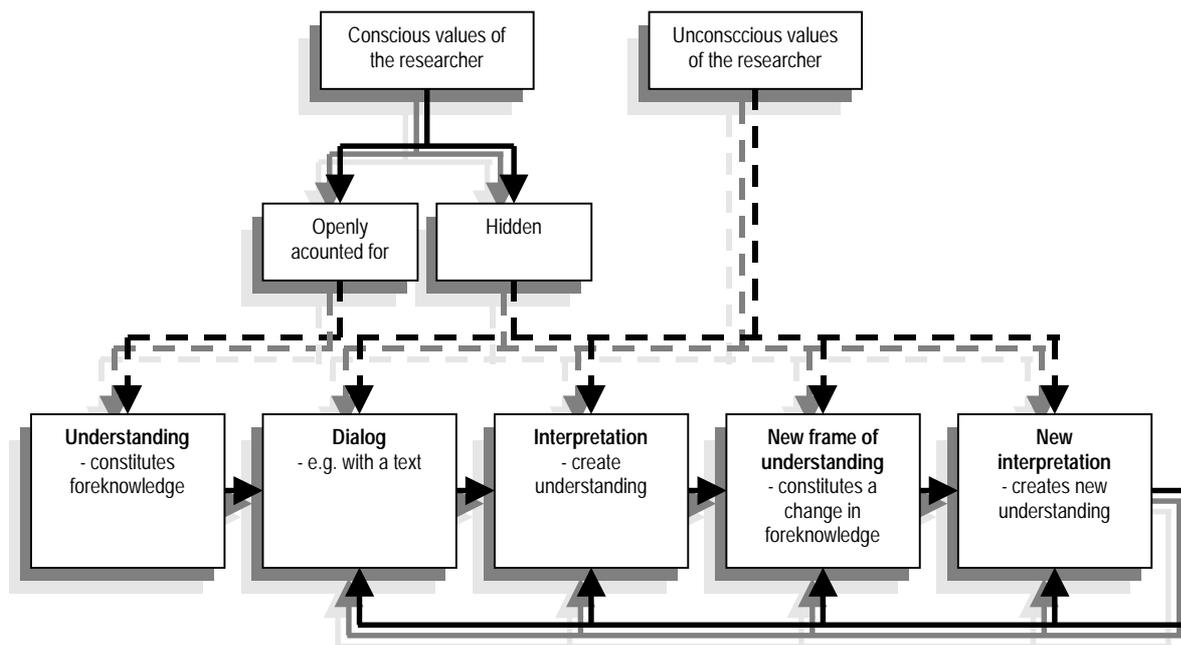


Figure 2.3. The possible influence of researcher values on the steps in the hermeneutical circle/spiral.

2.5 On Procedure

2.5.1 A theoretical review

As the study aims at assessing a theoretical relationship between two concepts through a theoretical review, something should be said about the nature of the theoretical review as an approach to advance knowledge in a particular area.

Mertens (1998) argues that *"The review of literature can be seen as an end itself, either to inform practice or to provide a comprehensive understanding about what is known about a topic"* (p. 35), and that the review of literature, as long as the researcher keeps an open mind throughout, often can be seen as a way of sharpening conceptual frameworks.

The method of producing knowledge through a theoretical review can be viewed as a form of what is called *histography*, which is a way of conducting historical research or gathering and analysing historical evidence/data. In general, there are four principle sources of historical evidence/data: *Primary sources* (original books, documents etc); *Secondary sources* (for example writings of specialists in a particular field); *Running records* (i.e. files or statistical documents); and *Recollections* (words or writings of individuals on their past lives - based upon memory) (Mertens, 1998; Neuman, 1997).

In viewing the theoretical review as a histographical form of conducting science, and taking the hermeneutic approach into account, the most preferred source of data is the above mentioned primary sources, which in the case of the present study would entail original research. Also, what was described as secondary sources may be of some value in that they may offer expert opinions which help further the study.

The *Publication Manual* of the American Psychological Association (APA-manual) (1983) describes two forms of reporting research that mainly or solely concern themselves with theoretical issues, *review articles* and *theoretical articles*. The *review article* constitutes critical evaluations of material that has already been published. By organising, integrating and evaluating previously published material the author considers the progress of current research toward clarifying a problem. The review article is in a sense tutorial in that the author:

- Defines and clarifies the problem;
- Summarises previous investigations in order to inform the reader of the state of current research;
- Identifies relations, contradictions, gaps, and inconsistencies in the literature, and
- Suggests the next step or steps to be taken in order to solving the problem.

The *theoretical article*, is in many respects very similar to the review article. The theoretical article involves a process in which the author draws upon existing research literature to advance theory. In this process the author traces the development of theory in order to expand and refine theoretical constructs. An alternative to this, is that the author may analyse existing theory, to for an example demonstrate the superiority of one theory over another or to point to flaws or inconsistencies. The difference between the review- and theoretical article is that the latter only presents empirical results when these clearly affects theoretical issues.

My way of approaching what I have chosen to label a *theoretical review*, has been to consider it indeed to be historiographical research and that it is the primary- and to some extent secondary sources described by Mertens (1998) and Neuman (1997) that are of foremost interest in this particular study. I have concluded that a theoretical review, as it needs to be designed for the study at hand, will take into account different aspects of what the APA-manual has called a review article and a theoretical article. The theoretical review will therefore consist of a combination of the two forms of articles described. In this it is notable that the theoretical review:

- Starts off by defining and clarifying the problem;
- To an extent exerts some form of summary of what has been said of the problem area in the past;
- It identifies relationships, and contradictions etc when these are evident;
- Unless the problem is solved, suggestions of further investigations are made.

At the same time the theoretical review concerns itself with more or less strictly theoretical questions, in which process it draws upon existing research in order to refine theoretical constructs. This design of the theoretical review, will in my view produce the most useful information and subsequent knowledge. It will also give the required leeway of the hermeneutic approach described.

2.5.2 Searching for literature

2.5.2.1 The search strategy

Having determined the overall strategy of making a theoretical review, it should be stressed that one of the principal demands of a study of this kind, is the necessity of finding relevant material. In order to secure this, a well developed search strategy is needed.

Bell (1995) describes a number of initial steps in reference to conducting a literature search, that needs to be taken once the topic/purpose of enquiry has been established. This process

involves defining terms and concepts, i.e. determining what key-words the search should start off with. Further, a number of basic variables has to be determined in reference to the literature searched for, such as what languages the search should include; what time-span the literature publication-years may extend over; what kind of material might be of interest, i.e. book, journals, dissertations, theses. Finally, it has to be determined what sources might produce results, e.g. where it is likely that relevant material can be found.

In having pondered on investigating the problem area at hand for some time, I had beforehand been able to distinguish a few key-words that might be of use. This was done by reading articles in journals based on my interest in the field, but also by talking to, amongst others lecturers in the field of *Innovative Project Management* and *Educational science*. This has also led me to conclude that the bulk of the relevant literature in the fields of innovation and learning has been written in the English language. Having somewhat limited skills in languages other than my native language Swedish and English, I decided that the literature search would only include these languages.

Concerning the year of publication of the literature searched for and subsequently chosen, I reached the conclusion that, stemming from the purpose of enquiry and in order to give a just and accurate picture of the problem area, no literature could or should be beforehand excluded solely based on the fact that it had not been published recently.

As an extension of this reasoning, in the search for material, all kinds of literary sources were of interest for further investigation. By this I mean, that whatever source that dealt with or was connected somehow to the concepts of learning and innovation, be it books, journals, dissertations or theses, were of interest to the study.

2.5.2.2 *The search*

Thus far I have spoken about the overall principles guiding the search for literature, or if you will, the principles that lay the basis for this search. The strategy for *actually* searching for the literature itself is dependant on how and where relevant material can be found.

Backman (1998) points to the fact that there are three principal ways of searching for literature:

- *Consultation*, which includes contacts with experts, colleagues, public authorities and attendance at seminars and congresses.
- *Computer-based search*, by consulting reference databases and quotation indexes.
- *Manual search*, for example in bibliographies, lists of references (e.g. in books or articles) and what might be referred to as *skimming*, i.e. going through books or articles in a somewhat haphazard way in order to find relevant material.

A somewhat similar instruction is given by Mertens (1998), who underlines the importance of developing a search strategy and identifies amongst others three sub-steps to the process of acquiring theoretical material/data:

- *Identify preliminary sources*, which can be done by searching databases, abstracts, indexes or the Internet,
- *Identify primary research journals*, which includes working through the reference lists of either relevant books or journals,

- *Access personal networks*, which basically includes discussing the topic with people that are likely to have some information to contribute to making an initial depiction of the problem area or of where to find relevant material.

As I've touched on before, my basic apprehension of the problem area has been shaped by my own reading of journals and books, and discussions with individuals that have to be considered to be experts in the fields of innovation and learning. These discussions have yielded a great number of interesting advice on what material and which sources to use, and to some extent also on where these could be found, in the form of books and journals.

In the further endeavour to search for interesting and relevant literature that discuss the chosen problem area, I have primarily used the following search-engines/databases:

- *LIBRIS Database* and the *LIBRIS Articles Database*, Union Catalogues of Swedish libraries;
- *LOLITA*, union catalogue of the Lund University Libraries;
- *VEGA*, union catalogue of the Malmö University College Libraries;
- *MALIN*, union catalogue of the municipal library of Malmö;
- *BOOKIT*, union catalogue of the municipal library of Lund.
- *Academic Search Elite (EBSCO)*, full-text and abstract database of Social sciences;
- *Business Source Premier (EBSCO)*, full-text and abstract database of Economics and Management;
- *ERIC*, American reference database of literature on education research and practice.
- *Emerald Library*, full-text and abstract database of MCB University Press.
- *Ideal*, full-text and abstract database of Academic Press.
- *Kluwer Online*, full-text and abstract database of Kluwer Academic Publishers.
- *Science Direct*, full-text and abstract database of Elsevier Publishers.

Additional searches has also been conducted on the Internet using the *AltaVista*, *YAHOO!* and *LYCOS* search-engines.

Initial search keywords were (in English; then Swedish): *innovation, entrepreneurship, invention, change, organisational, renewal, learning, concept, knowledge, management, leadership, strategic; innovation, entreprenörskap, uppfinning, förändring, förnyelse, lärande, begrepp, koncept, kunskap, management, ledarskap, styrning, strategisk.*

As a result of further investigations into the problem area an additional number of keywords were added to the search(in English, then Swedish: *action, experiential, group, team, creativity; handling, erfarenhetsbaserat, grupp, team, kreativitet.*

Truncated searches and boolean combination searches were used when this was deemed viable. It should be noted that the reason for doing multiple searches in Swedish libraries is that there might be some incongruity in how specific literature is categorised at different libraries. The multiple search, therefore is one way of securing the most accurate and complete literature search possible, and hence not to miss out on potent and important sources of information.

Further literature searches have been conducted manually, mainly by working through the reference lists in literature that, partly have been acquired by the computer based literature search mentioned above, partly has been recommended to me by people I've talked to

throughout the work with this thesis, and literature has also been screened by applying the somewhat haphazard method of "scouring the shelves".

2.5.2.3 *The choice of literature*

In keeping a more or less open mind in the search for literature, the case of actually selecting literature can be construed as having been somewhat more structured. In this, my idea has been that literature that uphold an acceptable level of scientific value adds value to my own study, i.e. using scientifically relevant literature is a prerequisite of the scientific value in the present study.

Furthermore, I consider the scientific value of a study of literature to have at least three principal components: the literary sources themselves, my selection of one source over another, and the subsequent analysis of these sources. Thus, the choice of literary sources serves as an assistant step in securing the scientific value of the study at hand.

It is possible to argue that the study of qualitative values, which put the researcher in the focus of the research process, adds somewhat specific demands on the manner in which the research is conducted. The scientific value becomes more a question of ethics, than of verification. The scientific credibility therefore, becomes a result of an assessment of the researchers mode of procedure (Patel & Tebelius, 1987b). It is conceivable to extend this kind of reasoning to the choice of and analysis of literary sources. In choosing one literary source over another, the researcher expresses his or her preferences and values in a way that, in retrospect should, in concurrence with the description of how the search and selection of sources was conducted, depict the value of science produced. In this way, the selected literary sources can be judged with regards to whether they uphold an acceptable level of scientific value and are relevant for the problem area, which in part at least extends to the scientific value of the study at hand.

What then constitutes an acceptable level of scientific value in literary sources? Besides, and to some extent complementary to, the quite obvious fact that literature searched for in general and literature subsequently chosen in particular, should be relevant to the questions at hand, Merriam (1994) suggests a number of criteria that might be helpful in determining the scientific value of literary sources,:

- *The authority of the author:* Is the author an authority in the particular field? Has he or she conducted extensive empirical work or contributed innovative theories, which in turn has generated new/more research? Is the author often cited or quoted by other authors and represented in a wide number of bibliographies pertaining to the field of study?
- *Empirical support:* Is the material and reasoning supported by empirical material?
- *References:* What are the contents of the list of references? Does the author build on his or her own research or the research of others?
- *Year of publication:* What is the year of publication of the book or article?
- *Overall quality:* What is the quality of the source? Is the analysis well thought through? Does the investigation appear to have been well planned? Does the source comprise an original way of looking at the area of interest?

All along the way, facing different sources, I've tried to make an assessment of what contributions the respective authors/sources might have brought to the area. I've also tried to assess from case to case whether empirical support was evident or needed, in order to make an opinion of the value of different sources. In this is also implied that I've, since this has been possible, used almost exclusively primary sources.

The lists of references, which I mentioned above as important sources, have also been important sources of determining the value of specific sources, in that they have given me indications of what kind of theoretical foundation the different specific sources rests on.

As has been noted above, I've found no use for making the year of publication one of the criteria of selecting literature. Choosing more recent literature, which in itself might be a good idea in some studies, would have contributed nothing to the study at hand. On the contrary in fact, I've made a point of ignoring *when* the different materials have been published. This has been done with the distinct purpose of keeping an open mind and to try to get an as versatile picture of the problem area as possible, and in this focus instead on *what* the different sources contribute in form of information and opinions on the area of interest. In the latter lies of course, an appraisal of the overall quality of a source in order to assess whether it was of value to my own investigation or not.

2.5.2.4 Criticism of the sources

Patel (1987) describes the fact that in the selection process there is a clear and definite risk of the researchers foreknowledge and values coming into play in a way that results in that a somewhat biased picture is presented of a specific problem area. The researcher tends to choose sources from a specific perspective. By doing this it is of course possible to describe a certain area with some bravura, but at the same time the overall picture is lost. It is self-evident that this process might be conscious or unconscious, and therefore it is important to keep it in mind in any study. Thurén (1991) concurs in this and argues that of all the material that is screened during the work-process, some statements are sifted out immediately because they basically just are not plausible or because of their self-evident unlikelihood. This sifting-process, that is based in the researchers foreknowledge, is labelled historical criticism of sources. Patel (1987) points to the fact that it is important to focus on that the chosen material corresponds to probable facts. What is to be construed as probable facts is ultimately up to the researcher to decide, which can be viewed as a problem in that the researcher alone chooses the material to use. Therefore, as far as this is possible, the researcher should strive to adopt an as objective position as possible in relation to the material that is available, and subsequently gathered.

Throughout this study, as elaborated on above, I have endeavoured to keep an as open mind as possible, partly in relation to the sources searched for and subsequently chosen in reference to the literature being as comprehensive as possible with regards to the problem area as such, and partly I've tried to reflect over and describe, my own foreknowledge and what influence it might have on my choice of literature.

In relation to the fact that I have tried to analyse the inter-conceptual relationship of concepts that represent quite different perspectives, I consider it unlikely that there should be some form of bias of choosing one perspective over another. I am of the opinion that this is avoided by the chosen design of the study.

I have throughout the study striven at using primary sources, with the purpose of staying as true as possible to the researchers and authors of original studies, i.e. being able to give an as accurate picture of what findings actually were made in the original studies, thus avoiding the problems of the additional line of interpretation that secondary sources produce.

Finally, the fact that this is a thesis in the field of education, one could argue that the literature used should exclusively consist of reports of research done in the field of pedagogics. This would of course not be possible in that it would entail a situation in which the heterogeneous concept of innovation could not be addressed.

2.6 On Processing and Analysis

Deriving from the purpose of enquiry of the present study, and what has been said about the hermeneutic approach to analysing the contents of texts (paragraph 3.2.3), it has been my aim to try to uncover whatever meanings and intents the authors have attached to the different texts. This has been deemed especially important since the overall purpose of the study has been to analyse an eventual relationship between two concepts that have developed in two essentially different scientific disciplines. Because of this inter-disciplinary focus and comparative analytical intention, which might be labelled *comparative conceptual analysis*, the different meanings and intents therefore become extra important aspects of the texts, even more so than perhaps would be the case in other types of scientific studies.

The hermeneutic approach was applied to the areas of innovation and learning respectively. When studying for example innovation, each additional source presumably added to and changed my foreknowledge, creating a new frame of reference to be applied to new sources (compare to paragraphs 3.2.3 and 4.2.4). The fact that multiple sources were used in the analysis can therefore be seen as adding a certain value and depth to an hermeneutic approach.

Supporting this, and on the note of analysing documents, Patel (1987) points to that examining a topic using multiple sources of different origins, can contribute to the creation of understanding of a given area, and thus help create a more holistic picture of the examined area. In this, the documents should not be considered as separate, rather as parts of a greater whole, hence being able to shed light on each other, and thereby increase understanding of the phenomena.

Drawing further on the hermeneutic approach, in terms of processing and analysis, the different texts can be seen as describing parts of, or contextual aspects pertaining to the respective areas, in this case innovation or learning. It was identifying and drawing on these aspects that allowed for an inter-conceptual comparison to be made.

In practice, this mode of processing and analysis entailed making an attempt to make an extensive inventory of what theoretical notions existed in the respective areas. The respective sources were then examined and analysed for meaning and intent, which allowed for a picture of the contextual factors to be drawn, thereby supplying the basis for a discussion on the meaning of, and relationship between the two concepts.

2.7 On Quality aspects

In order to secure the scientific qualities of any given study, and to give the presumptive reader a chance to assess these qualities, it should be considered good practice for the author of any scientific text to describe how and to what extent he/she has considered quality aspects in the carrying out of the study. It could be argued that, while it serves as a source of information to the reader, it also serves as a tool for the author in the strive for producing a high quality product. It should be noted that the quality concepts discussed here have been developed to

assess quality in empirical studies of qualitative data. However, by extension, it should be possible to use these to discuss the quality of a theoretical review as well.

2.7.1 Credibility

According to Mertens (1998), credibility in social research refers to the correspondence between descriptions of perceptions of social constructs and the way the researcher portrays these viewpoints.

In the case of the theoretical review, “perceptions of social constructs” can be seen as the theoretical deliberations that were used as sources of data. Credibility in this case then, is dependent on my interpretation of these sources. In terms of securing this, I have, by all means possible, striven to be as true as possible to the intents of the different authors. I have also tried to describe the process by which interpretation has been modelled. The purpose of this being that the reader should be given an opportunity to assess, amongst other things, the credibility of my depiction of the examined theoretical areas.

2.7.2 Confirmability

Mertens (1998) describes confirmability as the correspondence between the researchers interpretation of the data and actual conditions, i.e. the degree of objectivity. To ensure confirmability in qualitative studies, it must be possible to track the data back to its source, and the manner in which the data has been interpreted must be made explicit.

In the study at hand the data, in this case literary sources, are easily traced through the reference system. The principal way of ensuring confirmability in this study is the description of the mode of enquiry. There are of course problems to this notion. One is that of translation. There is a clear and evident risk that meaning get changed in translation. This may particularly be the case in theoretical reviews, since all of the data is written material. In the study at hand this has posed two problems. The first is that meaning may get changed when I interpret (meaning-wise of course, but also language-wise in the case of foreign literature) the material, i.e. I misinterpret the original author’s intention. The second problem posed by translation is that when I get hold of a given source, meaning may already have been changed by the particular author’s translation of *his/her* sources from a foreign tongue to his/her own, or by the author’s misinterpretation of the original intent of his/her sources.

Parallel to the mentioned ways of ensuring confirmability, I have considered the notion of ethics. In the theoretical review, ethical considerations in my opinion revolve, partly around the relationship between the author and the studied material, and the author taking pride in trying to interpret the intents and meanings contained in the sources. Also, there is an ethical relationship to consider between the author and the presumptive reader. Patel (1987), describes meticulousness, carefulness, and thoroughness as key concepts to ensure quality in studies of qualitative data. In my opinion, the adherence to these concepts are also a good way of ensuring an ethically sound relationship not only in terms of the interpretation of literary sources, but also between author and reader of the scientific text.

2.7.3 Transferability

Transferability refers to the possibility of generalising the results of a study to other situations or contexts. In qualitative research, this responsibility rests on the reader of a given study. The

researcher on the other hand, has the responsibility to provide the reader with a detailed description, that enables the reader to make such a judgement. This description, sometimes referred to as a “thick” description should contain in-detail depictions of the time, place, context and culture, in which the study was conducted (Mertens, 1998).

Firstly, it is my opinion that the possibility of generalising results of theoretical studies is somewhat limited. The results are comprised of my interpretation of the sources examined, and are valid as such, but probably not beyond that. Having said this, I feel that there still can be a point to conducting theoretical reviews in order to advance or clarify theory, which then in turn can make up the basis for *further studies, experimentation or recommendations* towards practice.

Since this particular study is of theoretical and not empirical data, I have tried to furnish the reader with an as comprehensive description as possible of the theoretical strands discussed. This I have tried to do by initially describing the general field in which the respective theories can be found, to then go into the particulars of the respective theories. Parallel to this, and with the reader’s possibilities of assessing the value of and grounds of my interpretations in mind, I have also offered quite an extensive description of the mode of enquiry.

2.7.4 Authenticity

According to Guba and Lincoln (1989), *authenticity* refers to whether the presentation provides a fair and balanced picture of the different views that is represented in the area studied.

Considering the authenticity of the study at hand, and keeping in mind the question of foreknowledge described earlier, I have tried to keep an open mind, partly in choosing, and partly in presenting the material that is discussed. In doing this, I am also aware of that as the study of the different areas progressed, the open-mindedness may have been somewhat more limited in that, to gain some stringency in the discussion, the field of theoretical sources was narrowed down somewhat. This, in my mind, should be evident to the reader by the fairly general starting points of each of the theoretical chapters, which then narrows in on and focuses on more specific theoretical strands.

2.7.5 Dependability

Dependability, parallels what in a post-positivist paradigm is construed as reliability, which means stability over time. In a constructivist/interpretive paradigm, change is expected over time, but should be tracked and be publicly inspectable. To test for dependability in this way, an inquiry could be made to attest for the quality and appropriateness of the inquiry process (Mertens, 1998).

I consider the dependability criterion to be of lesser importance in the case of a theoretical review. The possibility of change over time discussed by Mertens is of no relevance in the respect that the sources used to conduct literary reviews, written material of varying kinds, is in a way static. What has been written is a *fait accompli*, and cannot be changed, at least not in the edition examined.

2.7.6 Summarising quality aspects

Using a qualitative approach, the researcher does not eliminate his/her subjectivity in order to get high quality data, rather the data *should* contain the researchers impressions and experiences. The qualitative data is therefore detailed descriptions of the researcher's authentic impressions and experience of what has been studied (Neuman, 1997). Patton (1990), holds that what in the quantitative research tradition is referred to as validity and reliability, in terms of qualitative data is much controlled by the researchers ability, sensitivity, and integrity.

To summarise, it can be concluded that quality concerns are an important aspect to consider in any study that claims to be scientific. It is therefore important also, for the author to describe in some detail the points of departure, assumptions, and modes of enquiry, the study is based on. Furthermore it is important to describe the analytical modes used to reach results or come to conclusions. While it is of central importance to describe *how* the enquiry has been conducted, it is also important to describe *why* a particular mode has been chosen and used. In this way the reader is furnished with the opportunity to assess whether the data is relevant and the conclusions drawn are feasible in relation to the data used. The more elaborate the description of the grounds for choosing a particular method, and the data and conclusions this has produced, the higher the probability that the reader is able to assess whether the results are credible and possibly generalisable to other settings.

3. Innovation

This chapter aims at, in a broad sense, describing different aspects of the concept of innovation. Thus, innovation in general is described, along with conceptual- and procedural aspects of innovation. In this, different contextual provisions are also discussed. The chapter serves, jointly with chapters 4 and 5, as foundation for the comparative and consequential discussions offered in chapter 6.

3.1 Further delimitations

At this stage, (anticipating the discussion on the chosen method of enquiry offered in 6.7) before continuing further, some important notes should be made. Drawing on the introductory parts, the focus of this study is described to be a strictly conceptual discussion of learning and innovation, and the relationship between them. The nature of the multi-disciplinary available data/material on innovation and learning, i.e. the literature, suggests that an all out, all-excluding conceptual discussion of innovation and learning is not possible to make.

When the concepts of innovation and learning are dealt in the available literature, much more than the conceptual level is discussed. This has come to have consequences for the present study. What is referred to as concepts has in reality come to be expanded to include somewhat more than originally was intended. In the following deliberation, concept; area; phenomena; terms; notion; and words, are all used to identify/determine innovation and learning.

It has come to be my opinion that innovation as well as learning are concepts deeply rooted in practice, and that they therefore do not lend themselves easily to strictly practice-bereft discussions.

Gradually realising the overall nature of the literature available, I have had a choice of either changing the purpose of enquiry to suit the emerging picture of innovation and learning, or to stay true to the chosen hermeneutic approach and thus stray from/expand my initial intentions, in terms of what to study. I have chosen the latter for a number of reasons. *Firstly*, I am of the opinion that it would have been somewhat dishonest in relation to future readers to change the purpose of enquiry, even though that would perhaps have been the “easiest way out of the problem”. *Secondly*, even though I am aware of that the study loses some stringency by expanding the initial intentions, I am of the opinion that the study also gains stringency in relation to the method and approach used. *Thirdly*, the picture drawn of innovation and learning and the relationship between them, as it has come to be, is far more comprehensive than it could ever be, had the discussion solely revolved around a *strictly* conceptual level. *Fourthly*, and of some importance, I have found the perspective from and context in which innovation and/or learning are viewed, has a far greater impact on what meaning is attached to the respective notion and how these can be understood separately and in concert, than does the conceptual level.

3.2 Innovation - a multi-faceted phenomenon

As has been mentioned earlier, concepts that are in use in different settings, and therefore by different groups of people, tend to be attributed as having somewhat different meanings (cf. Björger, 1992). This also seems to be evident as far as the concept of innovation is concerned. In an attempt to make an inventory of different definitions of innovation, Vedin (1995) found an excess of 400 attempts at defining the concept. These definitions of course differed from

each other to a greater or lesser extent, however the fact that they numbered >400 says something about the ambiguity that seems to surround the concept.

Chaharbaghi and Newman (1996) argue that organisations, as a result of the societal developments of later years, constantly are reminded that innovation constitutes one of the utmost important aspects of competitive performance. It is often true enough, that terms lend themselves to a universal and exact definition. The problem is that the concept of innovation, its meaning, lies somewhat unresolved for those wishing to become innovating organisations. This is because the concept of innovation affects all individuals in an organisation and encompasses many complex social issues. As a result, innovation "...can be interpreted too broadly or differently by individuals with different world views, thus appearing to mean everything and ultimately nothing." (p. 5). Hence, for innovation to become a viable goal, of organisations and the individuals that make up the organisations respectively, it must first be understood. A mass of knowledge is readily available, which guides organisations on how to compete effectively. The problem is that there is no common perspective to link the different studies. Innovation is viewed differently, focusing on and emphasising different aspects, such as marketing, technology or organisation. The result is that different studies constitute limited insights in to the phenomena, which in reality contributes little to an overall integrated understanding of the meaning of, and management of innovation.

Although innovation in colloquial language often is thought of as being a *thing*, which thereby would ascribe the concept solely technical attributes, Drucker (1985) maintains that the technological side of innovation is very important, albeit some of the most important innovations of modern man has in fact been accomplished in the economic or social realms. Furthermore, it is the economic and social innovations that pave the way for technological innovations, in that they provide the actual foundation for technological innovation. The obvious and much used example of this is the Japanese development in the years following World War II. Though it is true that a great number of technological innovations has come out of this development, these would never had been possible, was it not for the preceding Japanese innovation on a societal level, in the form of educational reforms and so on. Thus, Drucker establishes, the concept of innovation is first and foremost an economic or social phenomenon, rather than a technical term.

Deriving from most definitions, the concept of innovation appears to be a fairly straightforward, uncomplicated affair. The incentive carrot of the possibility of creating competitive advantages in their respective markets, naturally makes organisations *in corpore* to rally to the support of in-organisational innovation.

Thus, there is no *one* theory on innovation, there is no consensus on what the concept entails. The numerous approaches that have been adopted stray from each other in varying degree, but they all contribute to the over-all discipline that is innovation research. It should probably be noted though, that different views on what constitutes innovation and what the concept envelops, will have implications on the organisational exertions in the practical implementation of efforts to stimulate innovation. The following deliberation is aimed at displaying a picture of what is argued as being some of the more prominent and central parts of the theories available today. In any case it takes aim at serving as a depiction of a somewhat more holistic view on innovation.

3.3 Some attempts at explaining or defining innovation

Below are some attempts at defining or explaining innovation. In this capacity, these examples are not intended to be seen as representative in a quantitative respect, rather, they are examples of some of the existing qualitative differences between various explanations of innovation.

Schumpeter¹, who introduced the concept of innovation in the respect that it is used today, and therefore has had a great impact on how it is perceived, describes production as the combination of different materials and efforts. Thus, innovation in Schumpeter's sense is production in a new way, i.e. realising new (different) combinations of the materials and efforts at our disposal (Schumpeter, 1994).

For Sundbo (1998a) innovation basically expresses a renewal of elements in producing companies, and thus innovation can be defined to constitute one of the following natures:

- A new product or a new service product
- A new production process
- A new form of organisation or management
- A new form of marketing or general marketing behaviour, which also includes a different relation to the state and other parts of the public regulatory system, or other of society's organisations or specific customers.

"Innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or a different service." (Drucker, 1985, p. 17). Further it is stated that, innovation *"...is the act that endows resources with a new capacity to create wealth. Innovation, indeed, creates a resource."* and that *"Equally, whatever changes the wealth-producing potential of already existing resources constitutes innovation."* (Drucker, 1985, p. 27). Resource should here be understood as something humans have found a use for, and that therefore has an economical value. Drawing on Drucker's reasoning, any measure taken towards enhancing the value of these resources, constitutes innovation.

"Innovation means to realise something new. Since it is new, it is needed - using a tautology - that new ground is broken.; there are no ready-for-use formulas or systems, because then everybody would follow these, and the new would not be a surprise - it would not be new." (SOU 1993:84, p. 7, transl.).

Rogers (1995) describes innovation as being an idea, practice, or object that is perceived by an individual or other unit of adoption (e.g. group, organisation, society, and such). The subjective perception is of central importance. Hence, it matters little whether or not an idea is objectively new in relation to the time lapsed between its first use or discovery. The newness perceived by the individual determines his or her reaction to the idea. If the idea seems new to the individual - it is an innovation. Newness in an innovation is therefore not just new knowledge. Someone might have known about an innovation for some time but not yet developed a favourable or unfavourable attitude toward it, nor have adopted or rejected it.

Innovation is *"...the first successful application of a product or a process."* (Cumming, 1998, p. 22).

¹ For an extensive and comprehensive discussion of the work of Joseph A. Schumpeter, see Shionioia (1995).

Innovation "...is essentially the innovation process that depends upon the accumulation and development of relevant knowledge of a wide variety." (Fisher, 2001, p. 200).

Innovation is "the intentional introduction and application within a role, group or organisation of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit role performance, the group, the organisation or wider society." (West & Farr, as cited in Barker & Neailley, 1999, p. 61).

As can be seen, the different definitions and explanations add different aspects to the picture of what innovation is or should be. The definition by *Schumpeter* focuses on change in production methods in order to increase the economic output of a given production process, i.e. increasing the difference between output and input in the production process. *Sundbo*, describes the variety of different forms innovation can take in the organisational arena, thus allowing for a somewhat broader interpretation of the concept. *Drucker*, following the same path as *Schumpeter*, focuses on the economic outcome of business activities, though describing innovation as the tool of the entrepreneur, not in actual terms the factual outcome of the entrepreneurial activity. Thus *Drucker* underlines the processual aspects of innovation. *SOU 1993:84*, focuses on the realisation of something new, and the implicitly drives at the entrepreneurial task of finding new ways of doing things. *Rogers*, brings the concept of perception and diffusion into focus. That is, a phenomenon is not new until it: a) has been conceived, b) has been diffused, and c) is perceived as new by the potential unit of innovation adoption. *Cumming's* definition focuses on the elements of primarity, success, and implementation. That is, in order for the application of the new product or process, it necessarily has to be done first (in relation to competitors), and the implementation has to be successful. This means that it is not enough to point to the problem and how it could be solved - the solution has to be effectuated and the results evaluated. *Fisher*, equalises innovation as general concept with the actual process of innovating. In doing that, focus is also placed on the fact that the development process is dependent on the acquisition of knowledge that furthers the creative process and helps make informed decisions in relation to the innovative activities. Finally, *West and Farr* focus on the human aspects, of production in a wide understanding, in that they add the beneficiaries of innovation. Innovation is seen as the means by which human performance can be furthered in order to ultimately be propitious to some human entity.

The common denominator of all these attempts at defining or explaining innovation is the notion of *newness*. In fact, *Johannessen, Olsen and Lumpkin (2001)* has found that one of the prevailing topics in the bulk of innovation research literature revolve around the issue of newness. In order to be able to isolate some form of definition and measure of innovation, it is therefore important to seek to address three basic questions in relation to newness: what is new, how new, and new to whom? Deriving from that all innovation presupposes change, determining answers to these question may be a good way to distinguish innovation from mere change.

3.4 The concept of innovation

In relation to what has been said so far, it is possible to examine the concept of innovation further and elaborate on aspects affecting innovation, different ways of categorising innovation, characteristics of innovation, and sources of innovation.

3.4.1 The integral cornerstone parts of the innovation concept

3.4.1.1 *The Idea*

The concept of an idea is originally a Platonian construct, where it means archetype or prototype, but has since come to denote conception in a broad understanding (SOU 1993:84).

The idea is in its essence a thought, that has not yet been realised, proven, or tested (Gurteen, 1998).

Implied in SOU 1993:84, is that the idea, in relation to the invention is the somewhat broader concept in that the idea often includes some form of business and/or marketing idea.

3.4.1.2 *The Invention*

The boundaries between invention and innovation are somewhat diffuse. In fact, there is a qualitative difference between them, though a thoroughly clear-cut distinction between them is hard to make, basically because it does not exist. This is because they often are inextricably linked to each other. Innovation may occur after quite some time has lapsed since the actual invention was conceived. It can be said though, that an invention is a solution to a perceived problem, and thus one of the first steps of innovation (Clipson, 1991).

It appears to be uncertain whether the concept of invention should be an exclusive epithelium for technical advancements. The solution to, for example, problems of how to organise and manage work, how to render other processes than technical more effective does logically not necessarily have to entail technical solution, but can be of a non-technical nature. Thus, it could be argued that the idea and the invention are somewhat two sides of a coin, that is, conceptions of how to solve a perceived problem, albeit the idea includes conceptions that to some extent go beyond the original problem, and therefore constitutes a slightly broader concept.

3.4.1.3 *Creativity*

SOU 1993:84 defines creativity as: the ability to accomplish something new and useful. It is quite obvious that such a definition leads to more questions of what is to be considered new and what is to be considered useful. In discussing these questions SOU 1993:84 settles by saying that it should though be sufficient that the creative result is somehow economically utilised.

When examining the concepts in terms of each other, creativity, is the process of generating ideas, whilst innovation can be seen as the sifting, refining, and in the end, the implementation of those ideas. In this, creativity is about finding possibilities through divergent thinking, while innovation is concerned with finding actual ways of implementing the ideas, which requires convergent thinking. In other words, creativity is about generating ideas, and innovation is about putting the ideas into action (Gurteen, 1998). On the notion of creativity as a specific way of thinking, Howe (1998) concludes that creativity always has been seen as a much valued human capability. Attempts to assess creativity as a stable attribute of individuals have not been successful, and findings tend to contradict the view that creative kinds of thinking are fundamentally different from other kinds of thinking.

Ford and Gioia (1995) conclude that the world of later years, can be viewed as a world of organisations, rather than one of individuals. As a result of this, the character of human achievement, to an ever increasing degree is seen in the light of organisational sponsorship, rather than individual accomplishment. The organisational setting imposes a number of specific implications on creativity. A number of factors come in to play, and influences creativity. Examples of these are:

- Interaction patterns between employees,
- The degree of trust between team members,
- The design of incentive, appraisal and reward systems,
- Political issues that influence, and therefore are part of the creative or innovative decisions,
- The access to, and competition for, available resources,
- The history and culture of the organisation,
- Internally driven versus customer-driven philosophies.

3.4.1.4 The Entrepreneur

As a concept, entrepreneur, meaning someone starting up a new business in order to do something new, was introduced into the economic discourse, along with the concept of innovation, by Schumpeter at the beginning of the last century (SOU 1993:84).

Schumpeter describes innovation as the end-results of the workings of the entrepreneur. In this process the successful entrepreneur exercises an indirect leadership of sorts, in that the entrepreneur leads the means of production into new channels, and making others, would-be entrepreneurs follow the entrepreneurial example. In either case, the leadership of the successful entrepreneur is for obvious reasons an involuntary one (Schumpeter, 1994).

Sundbo (1998a) adds a somewhat more contemporary notion to the entrepreneurial concept, in that the entrepreneur is actually dealing with innovations in the understanding of new elements in production, and in this understanding is a "starter" of a new business, albeit, this can take place within an existing enterprise. In the larger corporations of later years, entrepreneurs, or so-called corporate entrepreneurs (often referred to as *intra-preneurs*) in an organisation, fight to carry through an idea, often contrary to the established norms in the organisation. As for all entrepreneurship, the idea converted into innovation has to be new, albeit it does not have to be conceived by the entrepreneur him- or herself.

Thus nowadays, on account of the diversified role of the entrepreneur, a somewhat more general definition of the role of the entrepreneur might be justified. Such a definition is offered by Bruyat and Julien (2000), who state that "...the entrepreneur is the individual responsible for the process of creating new value..."; "...- in other words, the individual without whom the new value would not be created." (p.169).

3.4.2 Categorising innovation

In describing different categories of innovation, it is possible to make a distinction between *radical* (or revolutionary) innovation and *incremental* (or evolutionary) innovation.

3.4.2.1 Radical innovation

Radical innovation, is often the result of individual inventions, and as such represents an obvious *discontinuity* in relation to existing products or processes. As a rule, implementing radical innovations requires new production techniques and/or organisational changes, (Fairtlough, 1994).

Thus, this type of innovation creates a *radical* shift in how production, in a wide understanding, shall be perceived onwards, that is, as a radical leap forward.

Engulfed in the radical innovation, is the possibility of creating shifts in the competitive relations of any given market, hence shifting the competitive interrelationship between existing actors and/or allowing a new actor to enter the market (Vedin, 1999a,b).

An interesting observation, made by Johannessen, Olsen and Lumpkin (2001), is that the more the economic unit, that recognises the newness of an innovation increases in size, the more radical the innovation is generally considered to be.

Sundbo (1998b) points out that radical innovation is very scarce and that the very majority of innovations are *incremental*.

3.4.2.2 Incremental innovation

Incremental innovation is the kind of innovation that, much through experiences made, goes on continuously in any organisation, and is often specific to the particular organisation in which it is made and always branch-specific (Fairtlough, 1994).

Incremental innovation is characterised by that the development caused, is visible to the observer as gradual changes/improvements (Vedin, 1999c).

Drucker (1985) argues that in order for change to constitute innovation, it necessarily has to entail a shift, rather than a change. This means that gradual, "smallish" changes aren't to be construed as innovation, in that they basically are improvements on existing entities. The same argument is also supported by Schumpeter (1994).

Sundbo (1998a) establishes the fact that the distinction between an innovation and a normal process of change, often is very difficult to make, drawing on the fact that over time, all social phenomena change, but "*the concept of innovation will lose its relevance if its reduced to merely denoting any social or economic change.*" (p. 14). Thus, even incremental innovations must include a qualitative leap/shift through the introduction of a new element.

Hence, the nature of incremental innovations is that of gradual changes, which must be of some qualitative substance in order to be separated from change that naturally occurs over time. The leap/shift in how future production is perceived, must therefore be - incremental.

3.4.3 Characteristics of innovations

Innovations can be categorised as having one of the following characteristics (Sundbo, 1998a):

1. Technological
2. Intellectual

3. Physical movements (that are not technological), e.g. a new transport concept (but without change in technology)
4. Behavioural, e.g. a new strategy for the company's market behaviour, or a new form of organisation.

Rogers (1995) describes a number of characteristics of an innovation that helps explain its rate of adoption:

- *Relative advantage*, which is the degree to which an innovation is perceived as better than the idea it supersedes. This could be measured in economic terms, or on factors as social prestige, convenience or satisfaction. The individual or other unit of adoption's subjective perception as to the advantageous qualities of the idea, is what matters. The greater the relative advantage of an innovation is perceived by the individual or other unit of adoption, the more likely and rapid its rate of adoption will be.
- *Compatibility*. This is the degree to which an innovation is perceived to be consistent with the existing values, past experiences, and need of potential adopters. An idea that is incompatible with the values and norms of a social system will not be adopted as rapidly as an innovation that is readily compatible. The adoption of the former often requires a prior adoption of a new value system, which is a somewhat slow process.
- *Complexity*, is the degree to which an innovation is perceived to be difficult to understand and use. Innovations that are readily understood will be adapted more rapidly.
- *Trialability*, describes the degree to which an innovation can be experimented with on a limited basis. An innovation that is trialable represents less uncertainty to potential adopters, than an innovation that is not trialable. A high degree of trialability therefore, is a good indicator of an innovation's possibilities for adoption.
- *Observability*, represents the degree to which the results of an innovation is visible to others. If an individual can readily see the results of an innovation, he or she is more likely to adopt it.

3.4.4 Sources of innovation

Drucker (1985) holds that systematic innovation "...therefore consists in the purposeful and organized search for changes, and in the systematic analysis of the opportunities such changes might offer for economic or social innovation." (p. 31). In order to accomplish this, it is important to monitor seven sources of innovative opportunity in the organisational setting:

1. *The Unexpected* - which might be the unexpected success, the unexpected failure, or the unexpected external occurrence. These has to be analysed and then be made point of departure for innovative action. It is important to realise that not only success is of interest for analysis, when it comes to identifying opportunities for innovation. By asking the same question of for instance How and Why, may lead to that the scrutiny of the unexpected failure or unexpected events outside the organisation, also contributes with information on how innovation can be achieved.
2. *Incongruences* - which might be differences between reality such as it is, and reality such as it is assumed to be, or is considered to ought to be. In other words, differences between what is, how this is perceived or how it should be.
3. *Process Need* - innovation based on process need usually starts in a situation where the organisation is aware of a problem, an existing need, but cannot quite conceive a solution. Then, starting with the goal of an existing process, a systematic work with the process in combination with new knowledge, that might contribute the/a missing link, may facilitate the creation of a new and improved process.

4. *Industry and Market structure* - changes in industry structure or market structure that catches everyone unaware, may contribute opportunities for innovation.
5. *Demographics* - demographic changes may drastically change the basis for an organisation's activities, and are therefore important aspects to keep an eye on, thus being able to exploit these changes rather than be struck by them.
6. *Changes in Perception* - changes in perception, mood, and meaning are important sources of innovation. An example of such changes that has occurred in the past, was the care-free attitude of early post-World War II USA, where the confidence in ever better days ahead, shaped what we today label the "society of consumption". Likewise, economic trends are also potential sources of innovation.
7. *New knowledge* - new knowledge, created outside the organisation, may offer great opportunities for innovation. Thus, it is important to watch out for such developments. (Drucker, 1985).

Ahmed (1998), establishes that it has been shown that *culture* is one of the primary determinants of innovation. Culture has a multitude of elements that may enhance or hinder tendencies to innovate. Though the question of what comprises an innovation culture is somewhat complex, it can be said that most definitions suggest that "*culture is the pattern of arrangement or behaviour adopted by a group (society, corporation, or teams) as the accepted way of solving problems. As such, culture includes all the institutionalised ways and the implicit beliefs, norms, values and premises which underline and govern behaviour.*" (p. 32). Thus, in order to establish an innovation culture it is vital to focus on inter-personal aspects in the organisation, rather than solely concentrate all efforts in the direction of production.

In relation to innovation culture, Hurley and Hult (1998), argue the importance of *innovativeness* and *the capacity to innovate*. Innovativeness is the notion of openness to new ideas as an aspect of the organisation's culture, and is a measure of the organisation's orientation toward innovation. The innovativeness works in concert with various structural aspects of the organisation to affect the capacity to innovate, which is the ability of the organisation to adopt *or* implement new ideas, processes, or products successfully. Innovativeness in an organisation's culture, combined with available resources and other organisational resources, creates a greater capacity to innovate, and thus the possibility of competitive advantages and higher levels of performance.

Amongst other things, different types of organisations and differences in organisational structure might enhance or inhibit the innovation in an organisation. Hence follows that types of organisations that involves low *control* of employee activities, and high *co-ordination* of the information flow between different functions in the organisation (usually referred to as organic or organic organisations). Also, a looser, informal organisational structure that is somewhat non-authoritarian in nature will contribute to and nurture innovation in the organisation (Roffe, 1999; Fairtlough, 1994).

3.5 The process of innovation

3.5.1 The process that is

Organisations tackle the issue of innovation basically by following one of two possible routes: by coping, that is by adapting to what others have innovated, or developing their own innovations. The first route is probably useful when the organisation *already enjoys* competitive advantages, such as low wages or protected markets. The second route is essential for those

wishing to *acquire* competitive advantage, and is basically valid no matter what kind of innovation that is of interest (Martinez Lorente, Dewhurst & Dale, 1999).

It is important to note that innovation is not to be considered to be a static entity or be seen as some form of “one-off” occurrence. Rather, in the ideal situation, innovation work should be a continuous, on-going activity, thus making it a natural, all-including part of the operational activity of any organisation (Chaharbaghi & Newman, 1996; Qvale, 1995; Drucker, 1985).

Thus it is an important aspect to keep in mind, that it is not just the actual innovation that is to be considered as a process. The continuous innovation work in the organisation must also be contemplated as, and focused on as one of the pivotal organisational processes, one that ensures organisational survival, through competitive advantages.

As has been stated before, for innovation to be a *fait accompli*, more is demanded than the simple pointing out of what is wrong/missing, and what could be done to correct it. To innovate means to *do* something. Whatever idea is contemplated, must be implemented and it must be possible to evaluate the results (e.g. Barker & Neailey, 1999; Cummings, 1998).

3.5.2 The process that is not

If we then actually view innovation from a processual perspective, initially it can be said that opinions exist that argue the non-existence of any particular innovation process - that is, there is no such thing as an innovation *process* (e.g. Vedin, 1995; SOU 1993:84). This might seem as a somewhat strange stance to take, given that the bulk of literature in the field of innovation research speaks of an actual innovation process and what characterises such a process (cf. Sundbo, 1998a,b; Huiban & Bousina, 1998; Rogers, 1995; Schumpeter, 1994; Hagedoorn, 1989;). However, there is an important point being made here, which in its essence deal with the fact that there logically cannot be *one* process, one universal recipe for how to "conduct" innovation. Rather, it is argued that the, as it is referred to instead, the innovation *activities*, will be specific for each specific setting, e.g. organisation.

Albeit, it is not possible to identify a general process of innovation, that would be universally applicable in any given setting, it is possible to discuss the principal parts that each process of innovation can, and most likely will, contain.

3.5.3 Phases in the innovation process

The innovation process can be described by contemplating three different periods, or phases, in the innovation process (Huiban and Bousina, 1998; Sundbo, 1998a):

- *First*, there is a *conception* phase, that is closely linked to formal knowledge and abstraction skills. It is during this phase that the initial apprehension of a problem or possibility occurs. Based on this understanding of the situation, ideas are generated.
- *Secondly*, a *decision* phase, that occurs when the possibility of innovation has been established. This phase is concentrated around the question of whether to implement or not. In an organisation, this phase is both informational and hierarchical, in that the idea/-s has to be diffused (communicated to people concerned), and management decisions has to be made to the effect of implementation.
- *Finally*, a phase of *implementation*, and through the concrete know-how of the producing units of the organisation, further *development* of the ideas - thus, an innovation is accomplished.

This is of course a simplified model, as is the case with all models of this phenomenon, that overtly describes a seemingly linear model of the innovation process. In reality, these phases are intrinsically overlapped, through feedback in different forms. Furthermore, the kind of innovation considered will shift the inter-phase weight of importance between the phases. The first two phases will be the most essential in the case of radical innovation, whilst incremental innovation most probably demands somewhat more work during the implementation and development phase.

As far as process- and organisational innovations are concerned, they are typically developed in production departments or as ideas in top-management. The decision is made by top-management, who carries out the implementation/development phase in co-operation with the management of the relevant production departments. In cases of innovation concerning work processes or work organisation, the employees are as a rule involved in the implementation/development. The main difference in this respect, regarding large vs. smaller organisations, is that the division of labour in the innovation process often is greater in large organisations, thus incorporating the whole organisation in the innovation process, much more so than is the case with smaller organisations (Sundbo, 1998a).

Cumming (1998) suggests a similar model, though accentuating more strongly the aspects of creativity and the successful application of the innovation. In figure 3.1 are also illustrated some of the factors that have a positive effect on the different phases of the innovation process. Although this model primarily is designed with technological innovation in mind, it serves as an excellent depiction of the complex supportive environment that is desirable in facilitating the different steps of successful innovation.

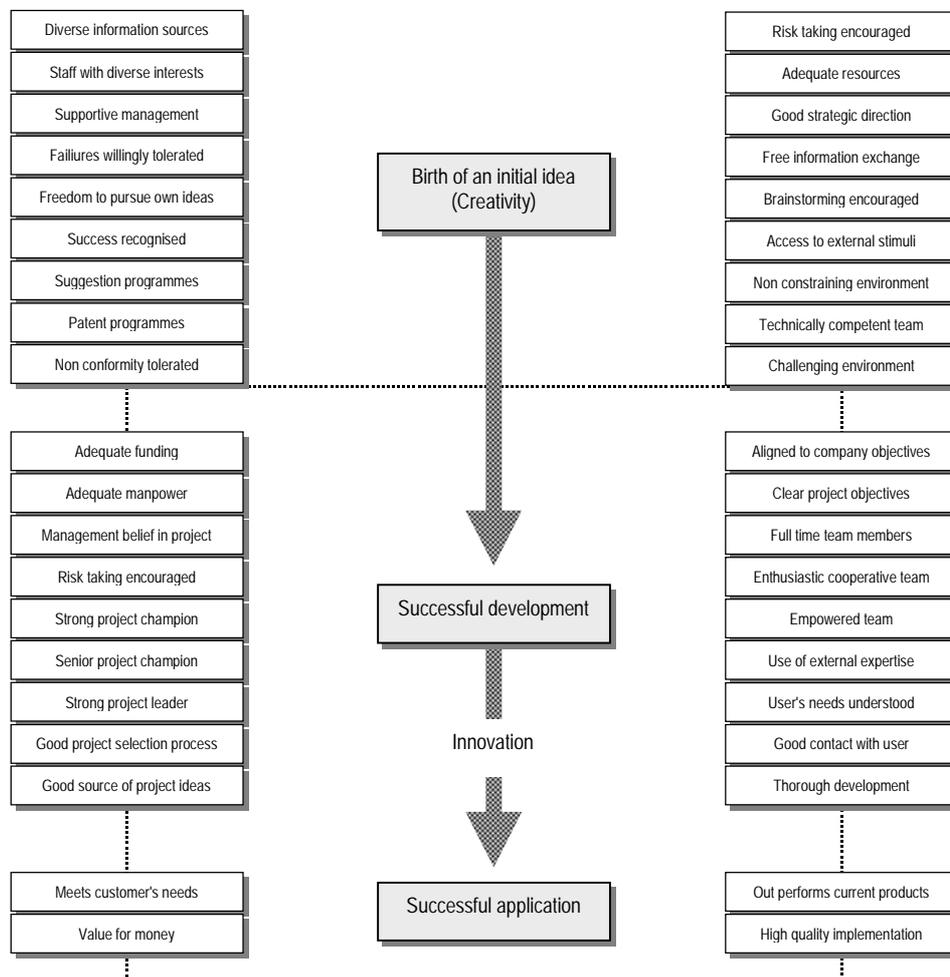


Figure 3.1. Factors having positive effect on the different steps in the innovation process (Cumming, 1998, p. 22).

Rogers (1995) also describes a model of innovation that essentially corroborates what has been said so far. In this model, figure 3.2, Rogers describe six main phases/steps in the development of an innovation.

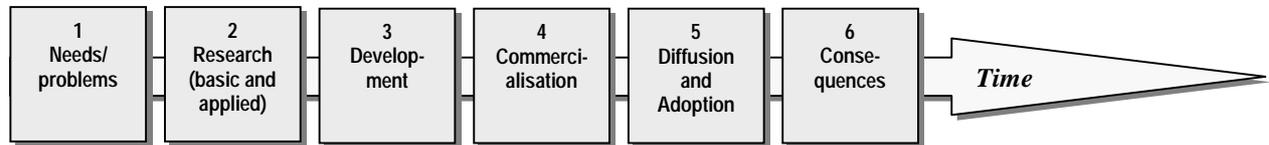


Fig. 3.2 *The six main phases of the Innovation-Development Process* (freely from Rogers, 1995, p. 133).

- *Step 1* in this model describes the recognition of a *problem* or a *need* in, or outside, the organisation. This stimulates the initial idea of actually correcting the problem.
- *Step 2*, deal with the fact that many, but not all, innovations come out of *research*. Basic research is defined as original investigations that strive for the advancement of scientific knowledge that does not have the specific objective of applying new-found knowledge to practical problems. The results of basic research are used in applied research, which in its essence comprises scientific investigations with the specific aim of solving practical problems.
- *Step 3*, is *development*, which is defined as the process of putting a new idea into a form that suits the needs of an audience of potential adopters, e.g. members of the organisation or clients in a wide understanding.
- *Step 4*, *commercialisation*, is the production, manufacturing, packaging, marketing, and distribution of a product that embodies the innovation.
- *Step 5*, *diffusion and adoption*, is a crucial point of the innovation-development process. It involves the decision to start diffusing the innovation to potential adopters, and in reality it serves as the implementation phase of the innovation process.
- *Step 6* finally, involves the consequences that arise as the innovation diffuses and is adopted, that is, as the innovation comes into use.

Thus figure 3.2 describes a model of the innovation process that at a first glance appears to be a quite linear, straightforward process. However, the six phases are somewhat arbitrary in that they do not necessarily occur in the exact order described, and in the case of certain innovations, phases might come to be omitted.

For an example, Sundbo (1998a) points out that, when the innovation is of a non-technological nature, the Research-phase is as a rule omitted. Innovations spring out of the actual work-process, rather than from systematic research. But, deriving from Drucker's (1985) notion of *New Knowledge* as a source of systematic innovation, and Martinez Lorente, Dewhurst and Dale's (1999) notion of organisational *coping* in terms of innovation, it can be said that while the organisation does not do its own research, it probably benefits from research done by others. Hence, results from the field of organisational research and reports of "best-practice", is likely something that organisations in general should keep updated with, in order to facilitate in-organisation innovation.

In the case of, for an example innovation towards organisational processes, commercialisation is probably a phase that is readily omitted, unless one counts this as a phase that coincides

with the diffusion of the innovation. That is, innovation that is designed to improve the internal processes of the organisation, must reasonably be "sold" to the employees in order to make the process of implementation a smoother ordeal.

3.5.4 The innovation-decision

The innovation-decision is the decision made by an individual or other unit of adoption, based on the knowledge of an innovation, to adopt or reject it. This decision can be distinguished into three different main types (Rogers, 1995):

- The *optional* innovation decisions, that are choices made by an individual independent of the decisions of other members of a social system, to adopt or reject an innovation.
- The *collective* innovation-decisions, are choices made through consensus decisions amongst the members of a social system.
- The *authority* innovation-decisions, are choices made by a few individuals in a system, who possess power, status, or technical expertise.

The type of innovation-decision will most probably produce implications in the final consequences of an innovation, provided of course that the innovation decision initially was to adopt.

3.5.5 Re-invention

Another important aspect of the innovation process, brought forward by Rogers (1995), is the concept of re-invention. This basically entails the fact that an innovation is not an invariant quality or entity, that does not change as it is diffused and implemented. Re-invention is defined as the degree to which an innovation is changed or modified by its user in the process of adoption and subsequent implementation. As a phenomena, re-invention is rather usual. The more loosely held the innovation is, the more likely it is that it will be re-invented by its users. The main point here being, that the individual does not just play an passive role, in the adoption of a new idea.

Reinvention is seemingly a would-be prominent problem when it comes to non-technical innovations, perhaps most so when we deal with in-organisation processes, designed to improve performance. What seems to be of great importance, is the continuous evaluation of the consequences of an innovation, thus enabling an assessment of what corrections needs to be made in terms of implementation - or the reverse - how the innovation needs to be reassessed, by the fact that the re-invented innovation out-performs what was originally contemplated.

4. Learning

This chapter aims at depicting the concept of learning and how it might be construed. In essence, this chapter tries to answer the questions: What is learning? What is organisational learning and what implications does organisational learning produce? It should be noted that the disposition of this chapter differs somewhat from the chapter on innovation. The reason for this being that the concepts are different and therefore warrants different handling. This chapter is divided into three principal parts. Firstly, some general ideas on the concept of learning are discussed. Secondly, the concept of experiential learning is described in order to illustrate the process of learning. Finally, the concept of learning in organisations, organisational learning is further explored. This chapter, as well as the former serves as basis for the further comparative and generative deliberations in chapters 5 and 6.

4.1 The concept of learning

Learning is, as in the case of innovation, a concept on which numerous perspectives can be taken, and thus a concept of which contents there is no consensus. As is the case with innovation, learning can be seen as a process or an end-product, as means or ends. At the end of the day, what is construed as learning depends on what researchers or practitioners alike are trying to explain and how they go about explaining it, thus any explanation, as we will see, will in a way result in the now (in-)famous acronym *WYSIWYG* – What You See Is What You Get.

4.1.1 Some initial provisional notes

4.1.2.1 Conceivable situations of learning

When talking about learning and the situations this may be situated in, it might be a good idea to define what these situations may entail.

On the notion of life-long and life-wide learning, Skolverket (1999) concludes that life-long learning, referring to continuous learning throughout the life-cycle, has become a necessity as a result of the societal developments of later years, by which knowledge to a greater extent than before, has become a perishable “good”. At the same time, life-wide learning is also something that should be given close attention, in the sense that learning takes place not only in the formal educational systems. Thus:

- *formal education*, is the organised education within the framework of the formalised educational system, i.e. child-care, youth education, higher education and adult education,
- *non-formal education*, refers to organised education that takes place outside, or on the side of, the formal educational system. Examples of non-formal education are labour market education, vocational training, competence development, adult education/popular education (*folkbildning*, *transl*), and other educational training courses.
- *informal learning*, lacks a clear educational situation, since it takes place outside what may be construed as explicitly organised education. Thus, the source of informal learning could potentially be any situation in which the individual engages, such as the work-place, organisational activities, the family, and everyday life.

It should be noted, as does Garrick (1998), that a division like this is somewhat misleading in the respect that the different kinds of learning and situations can over-lap each other to some degree. Not the least is this true of informal learning, that can occur, and most probably will, in formal- and non-formal educational situations.

4.1.2.2 Further delimitations - Adult learning

The following deliberation deals with the learning of adults, the principal difference between the learning of children and adults being, as Ellström (1992) explains, the utilisation of learning strategies. To make an initial generalisation, adults should for an example, to a higher degree than the young, put their trust in and utilise earlier acquired knowledge and experiences for learning in new situations. The use of the term adult learning, does not entail any further presumptions considering the mechanisms of learning as a function of age.

4.2 Perspectives on learning

As Müllern and Östergren (1995) explains, much research in the field of learning has historically been concentrated around the study of the individual, in terms of behaviour, and cognitive processes. In later years though, through what Matthews and Candy (1999) describes as an increasing focus on learning in organisations, much research effort has been put into studying the importance of the context/-s in which the individual/-s learn.

As was the case with innovation, different definitions or explanations of learning focus on different aspects of what might be construed as a “whole”, that is the notion of learning. On this note, it can be of some use to take an initial view at some illustrative explanations of learning, in order to establish some *central issues* concerning learning and what it is construed as embracing. These initial, *tentative* notions will then be discussed further in the following sections of this chapter.

The rationale for the division of perspectives below, is the different results a given study of learning within the respective perspectives would result in, i.e. what knowledge about learning each perspective would produce.

4.2.1 Learning as changes in behaviour

“Learning refers to the change in a subjects behavior or behavior potential to a given situation brought about by the subjects repeated experiences in that situation, provided that the behavior change cannot be explained on the basis of the subject’s native response tendencies, maturation, or temporary states (such as fatigue, drunkenness, drives, an so on).” (Bower & Hilgard, 1981, p. 11).

“Learning may be defined as a relatively permanent change in behavior that results from practice.”(p. 285). In this four kinds of learning can be readily distinguished:

- *habituation*, in which an organism learns to ignore a familiar and inconsequential stimulus;
 - *classical conditioning*, in which an organism learns that one stimulus follows another;
 - *operant conditioning*, in which an organism learns that one response leads to a particular consequence;
 - *complex learning*, in which learning involves more than the formation of associations.
- (Atkinson, Atkinson, Smith & Bem, 1993).

The cited definition of learning from *Bower and Hilgard*, suggests that for learning to have taken place, a change in the individual's behaviour or its potential to behave/act, must be evident, and that this change is brought on by the individual's repeated exposure to certain stimuli that are present in a given situation.

In the case of *Atkinson et al.* the first three kinds of learning, *habituation*, *classical conditioning*, and *operant conditioning*, refers to strictly behavioural psychology, in that what is studied is behavioural change. This change in behaviour is caused by the subject learning to respond in a certain way on a specific stimulus. The fourth kind of learning, *complex learning*, ventures beyond learning induced by the formation of associations. It should be noted that complex learning is not a single approach to learning, rather it would appear to be all approaches that are not strictly behaviouristic in nature. Though this kind of learning to be successful appears to require behaviour change as an end-result, it incorporates a cognitive perspective of learning, which hold that the pivotal point of learning lies in the individual's ability to mentally represent aspects of the world, and subsequently act on these mental representations. In many cases these mental representations are associations between stimuli or events, which makes these cases correspond to classical or operant conditioning. In other cases representations appear to be more complex. Examples of this is when an individual creates a mental map over its surrounding physical environment, or when an individual creates mental representations that helps him/her to understand and use abstract concepts like, for an example, *cause*. Also, cases exist where the operations performed on mental representations seem more complex than associative processes. These operations may result in a form of mental trial-and-error procedure, in which the individual tries out different possibilities, before acting and thus possibly changing his/her behaviour. This also enables the possibility of *strategy*, which makes it possible for an individual to successfully plan ahead its actions (Atkinson et al, 1993).

Thus, the main focus, and overall characteristic of a behaviouristic perspective on learning, is that for learning to have taken place, an individuals behaviour has to have changed or have the potential to change.

There are some major criticisms of the behavioural perspective on learning. The main critique revolves around that not every aspect of human learning can be described in terms of behaviour. Müllern and Östergren (1995) argue that behaviourist psychology studies indicators of learning, i.e. changes in behaviour, and also point to the fact that one of the main criticisms towards behavioural psychology is the cognitive learning approach notion that not all learning results in behavioural changes. The problem it is argued, in terms of behavioural psychology, is that the absence of behavioural changes indicates that no learning has taken place. Also, behavioural changes may very well be the result of learning, though they may be of less interest in understanding learning in itself. Catania (1992), describing the viewpoint of the behaviourists, argues that from a behaviourist perspective, observable behaviour is the only available measure in terms of learning. Hence, ideas or feelings in some direction must have their origins in the individual's dealings with the world, and therefore in past behaviour. Taking the "other side", that of the cognitivists, Catania (1992) points out that processes must occur in our dealings with the world that cannot be observed through behaviour. Thus, mental processes that have to do with, for an example trying to remember a word that we know that we know but cannot recall directly, represent processes that do not display themselves in the form of behaviour. The cognitivists therefore argue that if we can find out something about such processes, it must be relevant to our understanding of learning. What the discussion between the two perspectives as a rule involves is a dispute concerning how to view behaviour.

To sum up this discussion, the main focus of the behavioristic approach to learning appears to be concerned with the *causes of learning* and the *results of learning* rather than the actual process itself.

Having said this much about a behavioural perspective on learning, it is now time to examine the mentioned adversary, the cognitive approach to learning.

4.2.2 Learning as cognitive processes

Although, some things has already been said about the nature of the cognitivist view of learning, some additional points can readily be made.

Cognitivist psychology sets out to study the learning process, that is, the learning mechanisms of the individual (Müllern & Östergren, 1995). The cognitive approach implies delving into the “black-box” of the mind. The cognitive psychologist endeavours to discover what goes on in the minds of individuals by analysing their mental activities such as thinking, remembering and problem solving (Henriksson, 1999). Thus, the main focus of the cognitivist perspective is the individual and the internal intellectual processes of the individual. In the case of learning, interesting phenomena are those that involve coding and interpreting information, memory storage of information, and the actual mental processing of information. (Andersson, 2000).

To define learning, Howe (1998) describes learning as the result of active mental processing. As a result of learning, the individual gains various kinds of skills and also acquire useful knowledge. This description, which in a way is a rather simplistic definition of learning, focuses on the individual and its *active* mental processing. This differs from, say, the above mentioned habituation, classical- and operant conditioning, that in essence involve the creation of simple associations. The definition also focuses on the results of what is construed as learning, in this case *knowledge of how to* (skills) and *knowledge of* (knowledge useful to the individual). Finally, the definition underscores, in a broad sense, through active mental processing, the actual process of how we learn.

However, in focusing on the individual in the study of learning, the cognitivist tradition has come under some criticism, above all during later years. Andersson (2000) and Ellström (1996) argue that the point of departure in the cognitivist perspective on learning is a non-negotiable view on learning, why the individual therefore is focused on as a sorter of information, i.e. information is a given entity. This would mean that the individual, although being active in the processing of information, is a somewhat passive receiver of that information. This is a stance that has been strongly criticised amongst others by researchers who stress the importance of taking the context in which learning occurs into account, in order to be able to grasp learning as a phenomenon.

4.2.3 Learning in context

This far we have viewed learning as a fairly individual affair. As argued by Lave and Wenger (1991), from a socio-cultural perspective, it is also possible to view learning as socially constructed. Learning is thus explained and based on the notion that the individual is an active part of its environment. The individual is a participator in society, which means that the individual, in all his/her functions is *situated*. Then, to understand learning, the *context* in which it takes place must be incorporated in the overall assessment. Hence, the individual’s way of functioning and developing is to be understood as a result of its way of actively participating in the context that he/she is a part of (be it society, an organisation etc.). To study learning therefore, is to take into account the situation and environment that learning takes place in and adhere to the notion that individuals, acts, and the surrounding world are to be seen as

elements of *interplay* in the social world. Learning, therefore, can be seen as a co-operative act, rather than a strictly individual one.

The social world is comprised by objective conditions, and the actors subjective and inter-subjective understanding of it. Taking this view emphasises the reciprocal relationship between individual, action, and the world. In describing the social world, it should be seen as implicit in the learning process. A description of the social world should therefore also offer an analysis of the cultural, political, and economical biased opinions that characterises the context the individuals participate in (Lave & Wenger 1991).

On a similar notion, Säljö (2000) argues, that learning to a great extent is partly a question of having information, skills and understanding, and partly also to be able to determine what information, skills and what understanding is relevant in a certain context. Thus, the understanding of how human beings acquire modes of thought and skills, and the ability to use them in new contexts, is at the heart of our understanding of learning and development. Also, an important starting point in understanding learning and the problems of learning is the need of comprehending situations from a perspective that one self does not represent.

Deriving from the fact that the contextual perspective identifies learning as situated, and hence takes into account the context in which learning takes place, this perspective has frequently been used to facilitate understanding of organisational and work-life situations (Andersson, 2000).

Some criticism has been directed towards the contextual perspective as well. Ellström (1996) describes some of this in stating that the contextual perspective might be somewhat limited because of the strong connection between individual learning and the context, what is learned is limited to what the context allows for.

4.2.4 Possibilities of combining perspectives

There are of course pros and cons in adopting each of these perspective in regards to what possibilities they offer to understand learning as a phenomenon. As we have seen the behaviouristic approach to learning offers a somewhat limited picture of what learning actually is, and in ignoring individual cognitive processes, rather describes the *results* of an otherwise obscure learning process. In my opinion, to study the complex nature of human learning, it is necessary to go beyond what is more or less overtly observable in the form of behavioural changes. This perspective, presented mainly to put the evolution of the study of learning in perspective, will therefore be left to its own devices for now, the discussion instead focusing on the cognitivist and contextual perspectives.

The cognitivist and contextual perspectives differs on a number of points, but should not be seen as mutually exclusive, rather they are to be viewed as complementary in the strife for understanding learning in natural (work-life) situations (Ellström, 1996; Müllern & Östergren, 1995). Ellström (1996) argues that different situations demand different approaches to understand learning. The cognitivist perspective might be more useful in understanding:

- Less experienced individuals' work;
- The handling of abstract information, rather than sensory experience;
- Work in linear production-systems;
- When there is great pressure to justify decisions to outsiders;
- Work in structured, well-known, and well-defined problem-situations.

On the other hand, the contextual perspective can be more of use in describing and understanding:

- Experienced individuals work;
- Work connected to great time-pressure;
- Work in complex production-systems;
- Work in unstructured, unfamiliar, and poorly defined problem-situations.

By this differentiation between the two perspectives, it could be argued that it in essence is different kinds of learning that are to be studied by assuming the different perspectives. As Ellström (1997; 1996; 1992) describes, two principal levels of learning can be identified, *lower order learning* or *adaptive-oriented learning*, and *higher order learning* or *development-oriented learning*.

- Lower order learning/adaptive-oriented learning – in which the individual learns something based upon certain given (or considered given) tasks, goals and pre-requisites, without questioning or try to change the task, goal, or prerequisites.
- Higher order learning/development-oriented learning – in which learning entails that the task, goals, or prerequisites are not given, or are not considered given. The individual or group assume the responsibility of identifying, interpreting and formulating the task, or if the task is given, starts off by investigating the meaning of, background of, and desirability of the task and otherwise given prerequisites.

It is important to note that opinions may differ on what level/kind of learning is possible and desirable to pursuit in an organisation. Also, depending on what kind of learning is desired, the learning situation, work design, and general organisation has to be adapted to facilitate the particular level/kind of learning.

On a similar notion, Entwistle and Marton (1986), contrasts the notion of learning as (a) an individual's ability to successfully reproduce a given mass of knowledge at command, to (b) learning conceived as a change in the individual's understanding, as a result of restructuring of ideas in relation to a studied phenomenon. In relation to this, it is important to note that acquiring knowledge of facts sometimes, for example in the case of the novice, is an important step of learning. Though in the long run, the organisation of learning should focus on the creation and development of the individual's understanding and conception of the meaning of any given phenomena. In this it is also important to note that these two conceptions of learning in no way can be ranked as one being better than the other. Different situations demand the one, whilst others may require the other.

Thus, it can be concluded that at least two different levels of learning can exist, and that there are situations that require the one, whilst others require the other, and to study them, different approaches seem to be appropriate. To reach an understanding of a given situation a combination of the above mentioned perspectives appears to be called for. Also, to stimulate learning, different forms of organisational design aspects has to be taken into consideration.

4.3 Space of action and its results

Closely related to the different levels of learning is the *space of action* that the individual has to practice what he/she learns. In fact, the space of action will to a great extent come to decide what level of learning is accomplished (Ellström, 1996; 1992). Lundmark (1998) describes three aspects, in relation to organisational constraints, that are central to the understanding of what is learned, *potential-*, *actual-*, and *perceived* space of action. The potential space of action embraces what the individual, in relation to his/hers competencies, *could* do. The actual

space of action describes what the individual actually *can* do. Finally, the perceived space of action, explains what the individual *perceives* that he/she can/is allowed to do. The space of action is one of two vital requirements for the more practical application of what is/has been learned. The other naturally being that something actually has been learned. Ellström (1997; 1996; 1992) describes space of action as the degree of freedom that an individual has, in terms of choosing and interpreting tasks, goals, methods of accomplishing these, and the evaluation of the final results. In this, two cases can readily be identified. In the first case, one or more of these aspects are given or taken for granted, for example by regulatory means. In the other case, the individual to a great extent has to rely on his/her own judgement and authority to define and evaluate tasks, methods, and/or accomplished results. Deriving from what degree of freedom the learning situation contains in relation to these aspects, four different types of learning can be identified.

ASPECT OF THE LEARNING SITUATION	TYPES OF LEARNING/LEARNING-LEVELS			
	Reproductive learning	Productive learning		Creative learning
		Method controlled	Problem controlled	
Task	Given	Given	Given	Not given
Method	Given	Given	Not given	Not given
Result	Given	Not given	Not given	Not given

Table 4.1. Four types of learning as a function of the space of action (degrees of freedom) that exists in the learning situation (Ellström, 1996, p. 24)

As depicted in table 4.1, *reproductive learning*, or the lowest learning-level, involves a situation in which task, method, and results are given beforehand. Thus the individual learns to accomplish tasks or solve problems in a certain way to reach the prescribed goals. This type of learning resembles different kinds of conditioning that are based on distribution of reward/punishment, or is based upon trial-and-error methods, imitation, or model-learning. *Productive learning*, is comprised of two types of learning. They have the notion in common that the task is given or taken for granted, and they are separated by the different degrees of freedom that the individual enjoys in choosing the method of conduct. In the *method controlled learning* situation, both task and method is given beforehand. In the *problem controlled learning* situation, it is only the task that is given, thus the individual himself or herself chooses method and evaluates the result. The *creative learning* situation, or the highest learning-level, in essence entails that the individual must use his/her own judgement and authority to define the task, choose method of conduct, and evaluate the final results. Thus, defining learning and different levels of learning like this, the reproductive-, method controlled-, and problem controlled learning situations, will correspond to what above was referred to as lower order learning/adaptive-oriented learning. Hence, the creative learning situation corresponds to what was construed as higher order learning/development-oriented learning (Ellström, 1997; 1996; 1992).

4.4 The process of learning

4.4.1 Finding the middle way

As we have come to conclude, there are different perspectives on learning and what causes it, what it is comprised of and what the end-results might be. Also, to be able to gain insight in the enigma that is learning, it has been evident that learning cannot, or at least should not be viewed and assessed from one perspective alone. How this could be solved is what this section serves to answer.

Ellström (1992) sums up the scholarly discussion on the concept of learning by reducing it to what he has found to be its essential common denominators: *"By learning is here referred to relatively lasting changes in an individual, as a result of that individual's interplay with his or her environment."* (p. 67, *transl.*). Ellström further points out that a definition like this cannot stand on its own, *what* is learned and *how* it is learned must be specified. A similar note is made by Lachman (1997), who stresses the importance of conceptually keeping learning and the *product* of learning apart, in order to achieve stringency in the discussion of learning.

Defining learning in the above way, a change in the individual is described as a prerequisite of learning and the contextual interplay as the triggering factor. To try to assess learning through such a definition requires a combination of the different perspectives, which as we have seen, can appear to be somewhat complicated. Something is needed to link the perspectives together, and in this some alternate courses of action are conceivable.

In trying to overcome the differences between the different perspectives on learning, Ellström (1992), suggests competence¹ as an over-bridging concept, and thus defines the product of learning as: *"By learning, is here referred to relatively permanent changes in an individual's competencies and knowledge as a result of that individual's interplay with his/her environment."* (p. 67, *transl.*). This definition, unlike the previous, describes the *what* and the *how* of learning. The end product of learning, competence, is described as changes in the individual that embrace knowledge, intellectual- and manual skills, as well as attitudes, social skills and personality-related traits.

Ellström's view on how learning is achieved, the learning process, will be further elaborated on below. Before that, another view on how the gap between different perspectives on learning can be bridged, is going to be given some scrutiny.

4.4.2 Learning by experience

4.4.2.1 A pedagogical process

As we have seen, depending on how learning is defined, the process of learning will inevitably come to encompass different aspects. A purely cognitivist view will focus exclusively on the individual cognitive processes, while a contextual view will hold that human learning is inextricably tied to the context in which it takes place and that this has to be taken into account in the assessment of learning. We have also concluded that, in order to depict learning justly, both these views should be incorporated in the analysis.

¹ As the notion of competence is a somewhat more complicated issue than it might appear to be at a glance, much more so than would be viable to divulge here, the interested reader is instead referred to Söderström (1990) for a thorough discussion on the matter.

Forsberg, Hede, Lundmark and Söderström (1984) suggests a model for studying pedagogical processes, that takes into account the different perspectives (Figure 4.1).

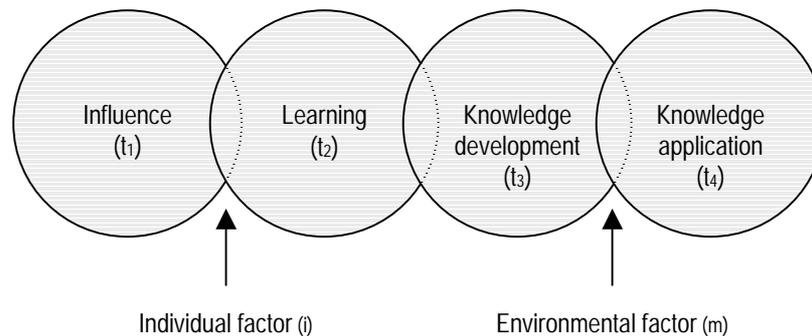


Figure 4.1. The study of pedagogical processes in the work-life setting. (Forsberg, Hede, Lundmark & Söderström, 1984, p. 47).

- **t₁** - The process is initiated by the individual being exposed to a situation of influence. This influence situation can of course take different forms. It could be comprised of a work situation, reading a book, a discussion with friends, or watching a film or television.
- **t₂** - The influence brings about that the individual, on a more or less unconscious level, chooses and appropriates some factors of the situation, which elicits an individual learning process.
- **i** - *What* is chosen and *how* this is appropriated is to a great extent related to the earlier experiences, motivation, interest etc, of the individual. This is described in figure 4.1 as the Individual factor (i).
- **t₃** - Some of what is learned is readily forgotten, whilst other things turn out to be of use, interesting, or attractive to hold on to. The latter entails that of what is learned, the individual holds on to and *restructure* some parts. This is then in different ways integrated with what pre-existing knowledge the individual brought to the particular learning situation, and this then forms the individual's collected knowledge resource at a given point in time.
- **t₄** - It is of course desirable, but not always possible, that the individual can utilise the knowledge obtained.
- **m** - In the possibilities of using new knowledge, the environment (m), seems to be of great importance. Some environments promotes the use of new knowledge, whilst others hinders it. In the same way that the individual factor (i) varies between individuals, the environmental factor probably explains some of the effects, or lack of effects, of for an example educational efforts.

(Forsberg, Hede, Lundmark & Söderström, 1984).

Thus, this model takes into account the input in the learning situation, defined as *influence*, recognises that there is an *individual learning process*, and that this process is influenced by factors directly associated with the individual learner. Furthermore, the model relays that a phase of knowledge development follows the learning process, and that the subsequent application of the knowledge developed, will be, as we have concluded before, greatly dependent on environmental factors, such as space of action. What this model lacks, to be of further use here, is a description of the *actual* process of learning.

It could at this point be of interest to take a closer look at a model that describes the process of *how* something can be learned.

4.4.2.2 *Experiential learning*

A way of incorporating the different perspectives on learning, what it is, and how it happens, is to add another to the discussion, *learning based on experience*. As Kolb (1984) puts it: “*Learning is the process whereby knowledge is created through the transformation of experience.*” (p. 38).

On the same notion, Miller and Boud (1996) describe learning as: “*...the process which takes this experience and transforms it in ways which lead to new possibilities, which may involve changes in actions, ways of viewing the world or relationships.*” (p. 8).

Dewey (1991), in essence describes that learning can be the result of two principal experiential processes. The first of these, is trial-and-error, which leads to “rule of thumb” decisions. The extent of value of this type of learning process is closely tied to what problem is being solved, and the extent of the trial-and-error explorations. The second experiential process is reflective activity, which involves the perception of relationships, and the making of connections between the different parts of an experience. Comparing the two, the process involving reflective activity is believed to be the most effective in terms of problem-solving and learning.

To understand what these definitions/explanations of learning brings to the discussion, it might be a good idea to initially determine an answer to the question: What is experience?

Experience is defined by Webster’s Third New International Dictionary (1993) as (*shortened for convenience*) **a**) *trial or test*; **b**) *direct observation or participation in events*; **c**) *knowledge, skill or practice derived from direct observation or participation in events*; **d**) *the sum total of the conscious events that make up an individual life (including all that we know and feel and do, all our facts and theories, all our emotions and ideals and ends)*; **e**) *something personally encountered, undergone, or lived through*; **f**) *something by which the organism is stimulated or moved*; **g**) *philos. The act or process of perceiving or apprehending, the content or particular result of such experience, the discriminative reaction or the nonconscious response of an organism to events or happenings within its environment.*

Kolb (1984) argues that experience has two dimensions, one subjective and one objective. The *subjective* dimension of experience refers to the individual’s internal state, thus the cognitive apprehension of a phenomenon. The *objective* dimension of experience describes the same phenomenon in objective terms, hence as an aspect of the environment in which the individual “experiences” the phenomenon.

Miller and Boud (1996) describe experience as “*...the totality of the ways in which humans sense the world and make sense of what they perceive.*” (p.8). Experience in this interpretation, includes all the input of the context that is perceived as meaningful by the individual.

Experience then, can be construed as having at least two dimensions: the individual’s subjective apprehension of what goes on around him/her in a fairly wide understanding, and also what may be construed as an objective truth of what is going on in the context in which the individual exists. The latter seems somewhat of a problematic notion, since it appears to be

difficult to actually be able to decide what is to be seen as objective. Who is going to decide this? The objective side of any phenomenon in this perspective therefore seems to be a purely theoretical construction, something that can be discussed as existing in a theoretical sense, but taken no further.

The process of transforming experience into knowledge, has been described as a cyclical process consisting of four steps (Kolb, 1984):

- Concrete experience – which is the individual's immediate apprehension or understanding of a phenomenon in his/her environment,
- Observation and Reflection – which entails that the concrete experience is scrutinised and observed from different perspectives. The initial immediate understanding is then transformed by being confronted to the cognitive structures of the individual,
- Formation of abstract concepts and generalisations – the concrete experience is understood in a more profound way, that enables the individual to formulate his/her understanding as abstract concepts. This can be done by generalisation or the formulation of a theory,
- Testing implications of concepts in new situations – the new-found, experience-based understanding is used to make decisions or solve problems, that are actively experimented/tested with in new situations, and hence, the cycle starts over.

The model of experiential learning, figure 4.2, which is inspired by the work of theorists like Lewin, Dewey, and Piaget, aims at combining and thereby integrating different perspectives on learning, and in doing this taking into consideration perspectives focusing on experiences, perception, understanding, and behaviour (Kolb, 1984).

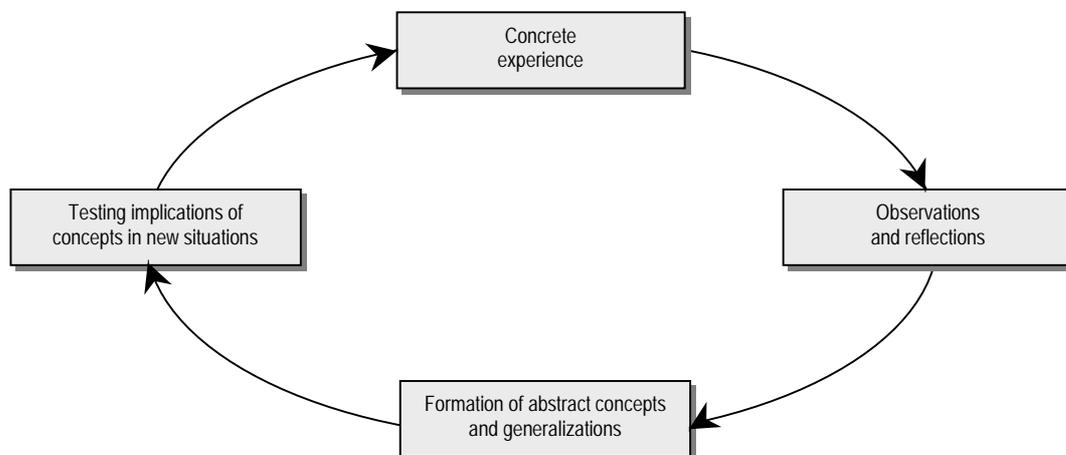


Figure 4.2. The Experiential Learning Model (Kolb, 1984, p. 21; Wolfe & Kolb, 1984, p. 128).

Wolfe and Kolb (1984), in describing Experiential Learning, holds that it is “*a model of human learning and adaptation processes consistent with the structure of human cognition and the stages of human growth and development*” (p. 128).

Deriving from the four-stage model the learner, in order to be effective, needs four different kinds of generic adaptive abilities:

- Concrete experience abilities – the ability to involve him- or herself fully and openly in new experiences without bias,
- Reflective observation abilities – he or she must be able to observe and reflect on the new experiences from a number of perspectives,

- Abstract conceptualisation – which is the ability to create concepts that integrate his/her observations into logically sound theories,
- Active experimentation – that is the ability to use the created theories to make decisions and solve problems.

An important aspect to note is that the model requires the learner to be both concrete and abstract, virtually at the same time, and that it is not likely that an individual will exceed in mastering the use of all these abilities in any given learning situation. Instead, a presumptive learner continually chooses which set of these opposing learning abilities will be prevalent in a given situation. That is, the learning abilities described above can be sorted into, and viewed as belonging to two primary dimensions of the learning process. The first dimension consists of, on the one side the concrete experiencing of events, and abstract conceptualisation on the other. The second dimension has active experimentation on one side, and reflective observation on the other. The result is that, in the process of learning, the learner in varying degrees will move from being an actor to being an observer, and from specific involvement to general analytical detachment (Kolb, 1984; Wolfe & Kolb, 1984).

According to Kolb (1984), an important aspect to note in relation to the two dimensions is that the consequences observed by the individual, has a feed-back function. Thus, the feed-back the individual gets, is integrated through the individual's reflection on and processing of his/her new experiences, and subsequently connects these to earlier experiences.

To give further depth to the model, it is possible to view the different forms of knowledge produced in the model. Assuming, as Kolb (1984) does, that the process of learning involves the transformation of experience into knowledge, the central idea is that learning, and therefore knowing, requires both a grasp of experience and some form of transformation of that representation. For learning to occur, either one of these on its own is not sufficient. Hence, the simple perception of experience is not enough, nor can transformation alone be construed as learning. To begin with, there must be something to transform, some experience that is being acted upon (Kolb, 1984).

Further explaining the previously mentioned dimensions, the abstract/concrete dimension represents a dialectic of *prehension*, consisting of two different and opposing processes of taking hold of or grasping experience in the world (Kolb, 1984);

- Comprehension – reliance on conceptual and symbolic representation,
 - Apprehension – reliance on tangible, felt qualities of immediate experience;
- and the active/reflective dimension represents a dialectic of *transformation*, consisting of two opposed ways of transforming that grasp of experience, either through;
- Intention – internal reflection,
 - Extension – active external manipulation of the external world.

Thus, four elementary forms of knowledge can be described (Kolb, 1984):

- *Divergent knowledge* – experience grasped through apprehension and transformed through intention,
- *Assimilative knowledge* – experience grasped through comprehension and transformed through intention,
- *Convergent knowledge* – experience grasped through comprehension and transformed through extension,
- *Accommodative knowledge* – experience grasped by apprehension and transformed by extension.

As a result of the individual's hereditary equipment, particular past life experience, and the demands of the environment, individuals usually develop a *learning style*, that accentuates some learning abilities over others. These learning styles are closely linked to the two basic dimensions described earlier: *Abstract - Concrete*, and *Action - Reflection*.

Four prevailing learning styles can be identified:

- *The Converger* - who excels at *abstract conceptualisation* and *active experimentation*, and thus through hypothetical-deductive reasoning distinguishes him-/herself at focusing on specific problems.
- *The Diverger* - who's learning strengths are the opposite of the Converger, in that he or she is best at *concrete experience* and *reflective observation*, and thus excels in the ability to view concrete situations from many perspectives and to organise many relationships into a greater whole. Hence, the generation of ideas is an ability that distinguishes the Diverger.
- *The Assimilator* - has dominant learning abilities that entail *abstract conceptualisation* and *reflective observation*. Individuals with this learning style are characterised by the ability to create theoretical models. Inductive reasoning, i.e. in assimilating disparate observations into an integrated, logically sound, explanation.
- *The Accommodator* - which in turn has the opposite strengths of the assimilator. He or she excels at *concrete experience* and *active experimentation*, hence the strengths of this learning style lie at doing things, e.g. carrying out plans or involving him-/herself in new experiences. Strengths also include the ability to adapt to the immediate circumstances, i.e. if the plan or theory does not fit the facts/circumstances, it will readily be discarded. Problems are to a great extent solved by applying trial-and-error methods, or relying heavily on information by other individuals, rather than on his or her own analytical ability.

(Kolb, 1984; Wolfe & Kolb, 1984).

Integrating these learning styles into the model of experiential learning, it is possible to give further depth to the model, hence illustrating the different kinds of knowledge produced and further accentuating the characteristics of the different learning styles (Figure 4.3).

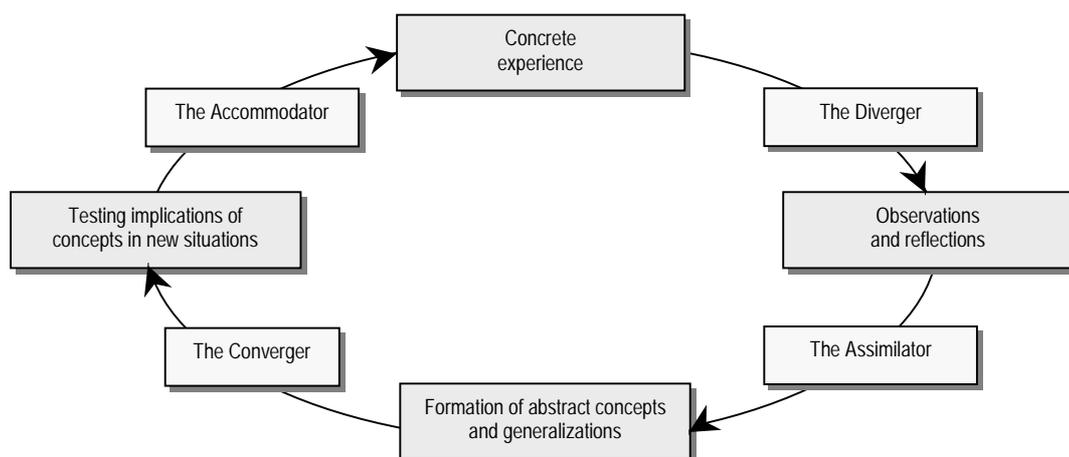


Figure 4.3. The Experiential Learning Model (freely after Wolfe & Kolb, 1984, p. 128).

On a practical note, deriving from Hård af Segerstad, Klasson and Tebelius (1996), for the individual, knowledge of his/her learning style can be an important step/tool for enhancing the

learning experience, and subsequently “learn to learn”. Main (1985) corroborates this, and further establishes that there is a wide repertoire of reflective techniques that can help the development of learning skills, such as reflection on the learning process or learning styles, i.e. reflection by the individual on his/her own motivation in the learning situation. The point here being that there are possibilities, not only to enhance efficiency in the learning situation, but also the meaningfulness of the learning situation, subjectively and objectively.

On the notion of learning to learn, besides the fact that different individuals develop different learning styles, different individuals also, in the learning situation, administer different *learning strategies*. For an example, deriving from Svensson (1986), two different strategies, that can be more or less *atomistic* or *holistic* can be identified, the first being a strategy that in essence involves learning the individual parts of what is experienced, while the second involves learning the overall meaning of the experience. On a basic level, learners utilising a holistic learning strategy are more efficient learners, in terms of understanding what is learned. A similar note is made by Andersson (2000) who differentiates between *content learning* and *process learning*, where content learning is focused on the individuals attempts to accumulate knowledge, incorporating facts to memory, and process learning that to a greater extent focuses on experience, and its implications.

As a passing note on experiential learning, some criticism can be directed to the fact that not all learning is based on the individuals experience, learning can also be indirectly based on the experiences of others (Müllern & Östergren, 1995). The notion of being able to learn from others is also advanced by Bandura (1977), through what is labelled *Social Learning Theory*. This theory in essence advances a notion of the possibility for an individual to learn something, not only through direct experience of a phenomenon. Instead, it is also possible for this individual to learn through/from observing and imitating another individual that has some skills or knowledge, that would otherwise have had to be developed by the initial individual.

Summing up the discussion on experiential learning, Miller and Boud (1996) point out five key propositions, that characterise this view on learning, and add some final notes on its meaning:

- *Experience is the foundation of, and stimulus for, learning*
 - it is important to recognise that every experience is a potential learning opportunity. The effects of experience influence all learning. Therefore, what learners are attracted towards, what is avoided, and how different tasks are approached, all is related to what has gone before.
- *Learners actively construct their own experience*
 - every experience is influenced by the unique past of the learner and the present context. The principal influence of how learners construct their experience is the cumulative effect of their personal and cultural history. Because of each individual’s past history, he/she is tuned in to some aspects of the surrounding world, but not others. The meaning of experience is not a given, being subjected to experience the individual attaches his/her subjective interpretation to it, and thus ultimately defines the meaning of events.
- *Learning is holistic*
 - learning is as a rule experienced as a continuous whole. Though experiences may be perceived as separate, there is continuity between them. Further, it is impossible to dissociate learners from their own contexts, the processes they are involved in, or from their past experience.
- *Learning is socially and culturally constructed*

- As the individual constructs his/her experience, he/she does this in the context of particular social settings, cultural values, and political- and economic circumstances. Experience, while being the basis for learning, also distorts, constrains and limits. The context, and the influence it has on the individual, is something that the individual cannot go beyond, even though critical reflection on experience can expose assumptions that are taken for granted by the individual.
- *Learning is influenced by the socio-emotional context in which it occurs*
 - Emotions and feelings are to be construed as facilitating as well as hindering learning. In this, it is important to note that some of the tensions and contradictions between individual interests and interests in the surrounding context is manifested.

The quintessential conclusion of this discussion is that experiential learning is a view on learning that takes into account different perspectives on individual learning, hence allowing for cognitive and contextual aspects to be considered and drawing the picture of what learning is, or at least how it can be construed to be. The, in this text much cited Ellström, will now get the final word on individual learning, further developing the learning model suggested by Kolb.

4.5 Action and levels of action

The experiential learning cycle, as described by Kolb (1984), that stresses experience and the reflection upon experience as key determinants of learning, has been somewhat elaborated on and further developed by Ellström (1997; 1996). The principal point to this modified cycle is that it focuses on different levels of action as describing individual differences in how individuals act and consequently learn. The main critique directed towards the experiential learning cycle is that it in essence appears to be somewhat rationalistic, and therefore perhaps not at all times corresponds to reality. One of Ellström's main arguments is that human action sometimes and to varying degrees is based upon routine or intuition.

Ellström (1997; 1996) describes the process of learning as a dynamic between routine and reflection, in which routine and reflection can be viewed as extremes on a scale of cognitive awareness. Learning is, as has been discussed (4.3), to a great extent dependent on the space of action that, to different degrees enables the individual to influence the environment and his/her own actions, in the quest of solving problems or obtaining certain goals. Based on his/her knowledge and interpretation of tasks and goals, the individual forms a plan of action. In accordance with this plan the individual acts or refrains from acting. The individual then observes, interprets and reflects on his/her action in relation to the consequences that this has on the task. The different steps in this process, labelled action- and learning cycle are:

- Formulation of task and goal,
- Interpretation of the task, based on knowledge (“mental models”) of the problem area,
- Development of a plan of action, which in its essence is a solution to the perceived problem,
- Execution of action/acting, which is the active testing/experimentation of the conceived solution,
- Observation of the consequences or effects of the action,
- Identification and interpretation of the observations made,
- Reflection on, and valuation of the consequences or effects of the action, in relation to the task and goals.

As mentioned, to understand differences in human action, it is pivotal to take into account the fact that individual action sometimes is based on routine or intuition, and influenced by the environment in which it takes place. This kind of action does not have any distinct, thoroughly devised plans of action. Routine-based action may sometimes be a very complex notion indeed, even though the level of cognitive awareness is low. To explain differences of this kind in human action, it is conceivable to speak of different, hierarchically differentiated *levels of action regulation*. As described in figure 4.4, these levels describe in essence the cognitive processes that guide human action (Ellström, 1997; 1996).

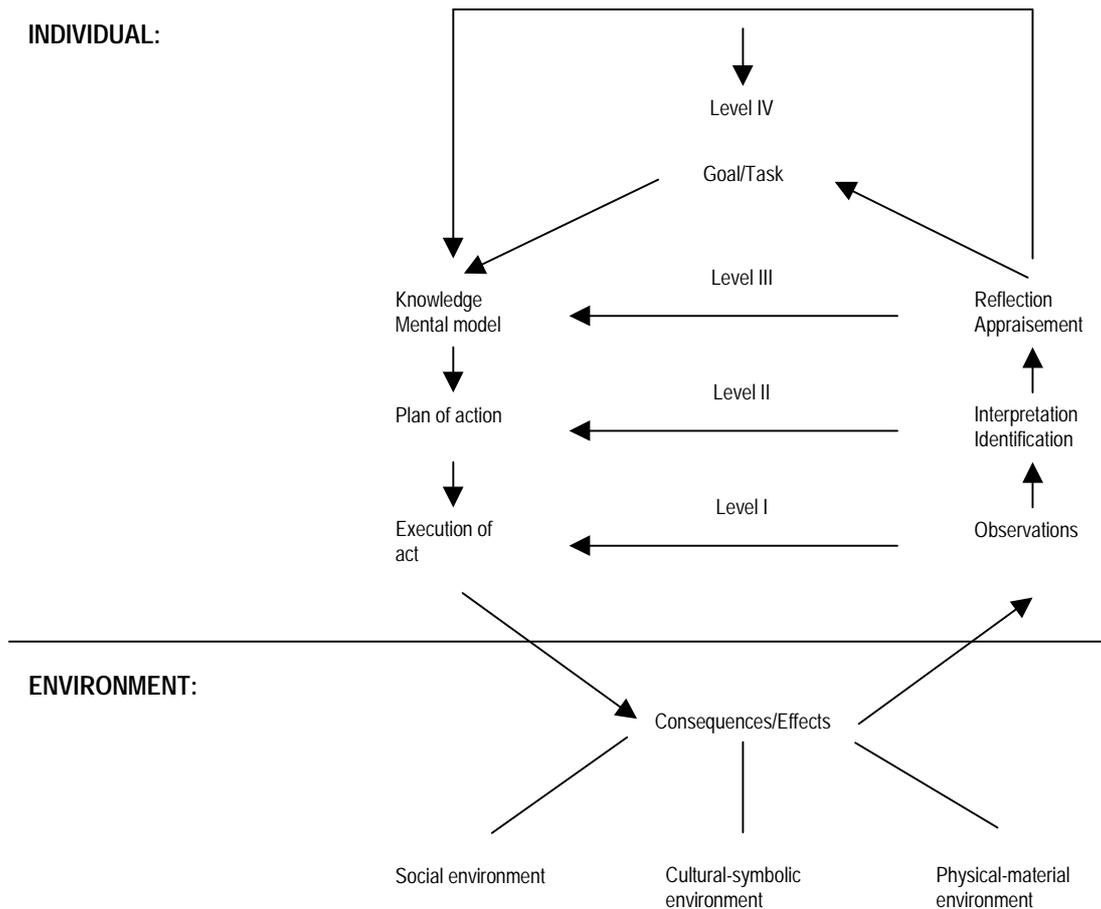


Figure 4.4. Different levels of action in relation to the action- and learning cycle (Ellström, 1997, p. 45; 1996, p. 29).

The different levels in figure 4.4 can be described as:

- The *routine based level* (Level I), encompasses automated actions that are conducted without conscious control. This level describes action that is based in well-learned skills, motoric as well as intellectual. If asked, an individual as a rule cannot give an account of the knowledge that the action is based on. To a certain degree therefore, it is possible to argue that this level of action is based on implicit or tacit knowledge. It is also important to note that this automated action, in complex situations, is necessary to relieve the indi-

vidual, and allow him/her to devote mental capacity to matters that require active decision-making, and thus economising the mental capacity of the individual.

- At the *rule based level* (Level II), action is guided by more or less unconscious rules, algorithms, or rules of thumb, all in the way of “if A happens, then do B”. The origins of the rules that the individual acts on, are often in instructions received or conclusions drawn by the individual based on earlier experience. A basic requirement of this level of action is the individual ability to identify and interpret happenings in the environment, in order to be able to decide what rule is applicable in the specific situation.
- The *knowledge based level action* (Level III), is guided by conscious analytical reasoning, by which the individual takes into account his/her goals, earlier experiences, and knowledge of the environment. This reasoning is based on knowledge that is organised in mental models, essential for the ability to identify, interpret and value information and feed-back from earlier actions. Action on this level is primarily required in new situations or familiar situations, when problems arise that cannot be resolved the way the individual is used to.
- *Reflective action* (Level IV), is comprised of action based on continuous reflection on the task given or chosen. In an organisational setting this also entails continuous reflection by the individual of his/her own actions, the goals of the organisation, and the underlying values that helped forming these goals. This type of reflection requires the individual to be able to distance him-/herself from his/her actions and the surrounding environment and thereby being able to consider alternate courses of action and also to critically analyse the assumptions leading up to action.

The different levels should not be seen as mutually exclusive, rather they are to be considered complementary and of equal value, the principal point being that they are effective for and in different situations (Ellström, 1997; 1996)

To sum up the discussion on levels of action, knowledge, and learning, a summary is presented in table 4.2.

LEVEL OF ACTION	LEVEL OF KNOWLEDGE	LEVEL OF LEARNING
Routine based action	Implicit (tacit) knowledge	Reproductive learning
Rule based action	Procedure knowledge (“knowing-how”)	Method controlled learning
Knowledge based action	Theoretical knowledge (“knowing that”)	Problem controlled learning
Reflective action	Meta-cognitive knowledge	Development oriented (creative) learning

Table 4.2. Connections between levels of action, knowledge, and learning (Ellström, 1997, p. 47; 1996, p. 32).

Actions, and their implications, amongst other aspects of learning, will be further scrutinised in the next parts, where learning at an aggregate level will be discussed, on the issues of *learning in groups/collectives* and *organisational learning*.

4.6 Collective learning – learning in groups and organisations

This far, the focus on the learning process has been on the individual. As has been stated before, Lave and Wenger (1991) argue that there is no human activity that is not situated, that is closely tied to the context, in which it takes place. Learning, therefore is to be seen as participation in the social world, and is a result of, amongst other things, the individuals interaction with other individuals. This is true of the sole individual. But, what if we choose to view a collective or a group of individuals? How does this affect how learning can be viewed? As Mattsson (1995) argues, individually constructed knowledge is of value first when it is put to test in the collective environment. If the subjectively constructed knowledge cannot be inter-subjectively understood, the knowledge will remain isolated, if it does not become inter-subjective at a later stage. Thus, it could be argued that the knowledge the individual has gained by learning through reflection, is of less value if it can not be diffused in the social setting.

There are a number of processes to be studied when it comes to the phenomenon of individuals interacting in collectives or groups. Much work has been put into the study of group formation and development (cf. Bion, 1961; Napier & Gerschenfeld, 1993). These types of studies, focusing primarily on the psychological aspects of the group experience (i.e. group dynamics), add little to the topic of this particular study. Instead, it seems more productive to continue the chosen path of studying action-oriented theories that focuses on learning at an aggregate level.

Hunter, Bailey and Taylor (1999) define group-learning or co-operative learning as: “...when a group of people are learning together and contributing to one another’s learning.” (p. 112). It is also argued that as the individuals learn, the group learns too. This further implies a second dimension to learning as we have discussed it thus far – the existence of collective learning. To Blumfeld and Golembiewski (1976), learning can take place in two different situations, that entail substantially different learning-goals. The first is that of formal or non-formal learning, where learning often enough is seen as connected to something that lies outside the individual – cognitive matters or technical skills. The formal- or non-formal learning situation therefore, is one of *performance*. The second situation is informal learning in groups, where the goals of what is to be learned is placed inside the individual. The aim is for the individual to develop new insights of him-/herself as a person, to analyse behaviours and the effects these have on others, to better understand what relations he/she has to others, to better understand what impressions he/she makes on groups and organisations etc. This form of experience based learning focuses mainly on *individual/personal change*. The main point to this kind of argumentation is that learning in groups poses some particular problems that needs to be addressed, in particular the interplay between the individual and the group has to be taken into close consideration. As Harris (1996) puts it: “...there are both personal (internal) and group (external) factors relevant to the learning process which may either promote or inhibit an individual’s (or team’s) learning...” (p. 169). In other words, the individuals are still the principal learning subjects, but the social nature of the group situation adds something to the equation, and therefore has to be taken into account in the study of learning.

4.7 Action theory

As we have seen (paragraph 4.5) individual action can be an important indicator of learning taking place. In this section, the theories of action of Argyris and Schön will be further scrutinised in order to depict learning in groups and what may facilitate or hinder it. One of

the advantages of this kind of reasoning is that it in practice encompasses and is applicable on the *individual*, *group*, as well as *organisational* level. Argyris (1982) points to the fact that problems in groups not only are problems on the individual level, rather the existing values (of the group or organisation), influenced the individuals' communicative behaviour in a way that resulted in problems. Thus, it is often of little use to discuss individuals, groups, and organisation as separate entities, rather they are all important parts of the context in which they figure, exerting reciprocal influence on each other.

In terms of action, there is a difference between what people say they do and what they actually do. What individuals say they do, is described by Argyris and Schön (1978; 1974) as their *espoused theory*. This concept involves the basic assumptions, norms, and values that an individual identifies as guiding his/her behaviour. Though a description of the espoused theory may very well be consistent with reality/what is actually being done, Argyris and Schön argue that this is actually not the case in many occasions. Instead the action strategies of individuals are based on *theories-in-use*, which are unconscious cognitive maps, consisting of norms and values *actually* controlling the individuals' intentions, actions, and behaviour. The main rationale for these theories-in-use is that they are unconsciously developed coping strategies, developed as a result of the confrontation of the individuals espoused theory with reality, i.e. what the individual considers *should* be done confronted with what actually *can* be done. Argyris (1982) talks of theories-in-use as describing our general ideas of the conditions under which we live and act. These ideas are always connected to situations, such as we have experienced them, and such as they have come to have a place in our mental representations of the world. Since these cognitions are the basis of our actions, theories-in-use, always result in *theories of actions*, that is conceptions of why someone else acts as he/she/they do.

Argyris (1982; also Argyris & Schön, 1978; 1974) describe the reciprocal learning processes that may be active in the group setting as being one of two ideal-types of learning scenarios: single-loop and double-loop learning. These learning scenarios will be described in the following section.

4.7.1 Single-loop learning

In terms of learning, the theories-in-use and espoused theory, results in a learning situation, in which the individuals believe they have correct opinions of the reasons to each others actions. Contextual factors, such as the cultural norms and social rules of the situation, or interpersonal competition, hinder the individuals from verifying their assumptions of each other in an open dialogue. This results in a situation where the outlook on learning is meagre, as a result of the communicative milieu (Argyris, 1982).

Argyris and Schön (1978; 1974; also Argyris, 1994) label this learning situation *single-loop learning*. What is learned, are the presupposed, often non-expressed notions that exist in the form of theories-in-use and theories of actions between individuals. Since open communication is not possible in this situation, human interaction is crippled, and therefore the learning possibilities constrained. What is learned enables the individual to correct faults in the situation, or adapt to existing circumstances. The individual can also introduce new routines, but does not partake any pro-active measures or change his/her basic perspective on what is being done and why.

In practice, Argyris, Putnam and Smith (1985) relay that studies of managers in organisations, has shown that even though a variety of different espoused theories can be evident, the

variation in theories-in-use, is very limited. Argyris (1994; 1990) argues that these theories-in-use are *Model I* theories-in-use. As such, they are unconsciously designed to be defensive routines of the individual, based on four different kinds of *governing variables*, that the actor seeks to fulfil:

- To achieve goals, solely based on one's own opinion of these goals (unilateral control),
- To win, and consequently not to lose,
- To repress the expression of all kinds of negative emotions, and not to upset other people,
- To act rationally, non-emotionally.

Along with these governing variables follows a set of behavioural strategies, that include:

- To advocate one's views without encouraging enquiry, remain in unilateral control and hopefully win,
- To unilaterally save face, one's own and other's, minimising the risk of upsetting others and thereby making them defensive.

In the group or organisational setting, Argyris and Schön (1978; 1974; also Argyris 1994; 1990; Argyris et al, 1985) offers a model, *O-I* (O indicating organisation), that depicts problem solving and learning, in the case where Model I is used. Model O-I describes an organisation that is characterised as a limited learning system. Defence mechanisms may entail the individual blaming others, or the collective as a whole, for problems, not realising that he/she is a part of the overall problem. Also, attempts at defending or avoiding feelings of helplessness, will make the group or organisation ineffective, as a result of the existing and continuously reproduced defensive routines.

4.7.2 Double-loop learning

How then is the individual, group or organisation to come to terms with this situation, with the incongruity between espoused theory and theories-in-use? Schön (1983) underlines the importance of reflection, and in this distinguishes two forms:

- *Reflection-in-action*, which entails that the thinking during the execution of action, contributes to re-shaping what is being done, while its being done
- *Reflection-on-action*, is the notion of considering what has been done, in order to examine how the results have come to be, i.e. create a picture of the origins and consequences of the actions performed.

Then, reflection can be established to be of importance, and foremost the reflection on what has been done in order to analyse the outcome more thoroughly. Argyris and Schön (1978; 1974; also Argyris 1994; 1982) promote the notion of *double-loop learning*. This entails changing the governing values of the individuals (as individuals, group-members, or members of an organisation). If successful, this change will produce brand new strategies of action, new theories-in-use, based on double-loop learning. To be able to double-loop learn, it is essential that the individuals trustfully ask each other about:

- The ideas they have of each other,
- The goals they have in a particular case,
- The actions they expect of each other,
- The prospects of common action.

Double-loop learning involves the individual having a inquisitive approach to the situation he/she finds him-/herself in. This means that, as a result of reflection, actions and the assumptions on which action is designed may be changed. As a result of the individual responsibility of identifying and defining the situation, task, or problem, it is important to ask,

not only how the problem should be solved, but also what the problem actually is and why the problem exists.

As Leymann & Gustavsson (1990) point out, this seems like a fairly simple, straightforward notion, however in reality it demands a dialogue between the individuals that require them to divulge their own strategies, which in a competitive society as ours, might come to hurt them. Lave and Wenger (1991) also hold that in fear of being replaced or set aside, individuals may be reluctant to share knowledge and access to tasks. To facilitate double-loop learning therefore, trust between individuals must initially be established.

To double-loop learn also requires the utilisation of another model for guiding action than Model I. Instead, individuals must use what Argyris (1994; 1990; also Argyris et al, 1985) labels *Model II*, and thus develop *Model II theories-in-use*. This model of action rests on three principal governing values:

- Action should be based on well-founded information,
- Choices should be free and informed,
- Internal commitment.

To the specific individuals, Model II reasoning is often not new. The governing values often enough correspond to their espoused theories.

In order to illustrate the problem solving and learning activities of a group or organisation that is capable of double-loop learning, Argyris and Schön (1978; 1974; also Argyris 1994; 1990; Argyris et al, 1985) describe a *Model O-II*. This model is present in organisations where the individuals use Model II to guide their actions. Instead of just advocacy, as is the case with Model I actions, Model II also includes the active enquiry by the individuals. This combination of advocacy and enquiry rooms potential double-loop learning. An important note to make in relation to Model O-II, is that it allows for both single-loop *and* double-loop learning in the learning system – naturally, not all learning must result in the changing of the governing variables.

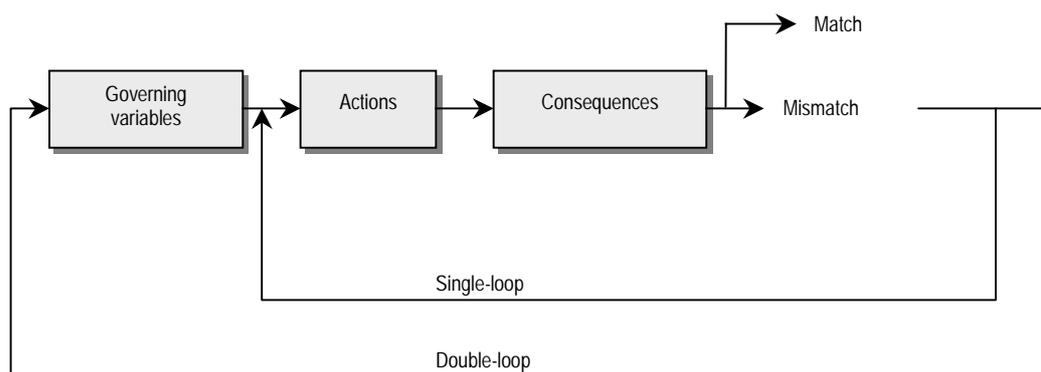


Figure 4.5. Single-loop and double-loop learning (Argyris, 1994, p. 8).

Figure 4.5 (Argyris, 1994), describes the processes of single-loop and double-loop learning. Single-loop learning is evident when intended consequences and actual consequences match each other, or when mismatches are corrected by changing actions. Double-loop learning

occurs when mismatches are corrected by first examining and altering the governing variables, the preferred states the individuals are acting towards, and then examining and changing the actual actions. Furthermore, learning does not take place until a match or mismatch is produced. The detection of problems or invention of a solution to these problems, is not sufficient to be construed as learning. Learning therefore, requires the solution to a detected problem to actually be produced, to be acted on.

4.7.3 Deuterolearning

Deuterolearning, sometimes referred to as meta-learning (cf. Andersson, 2000), the way it is interpreted by Argyris and Schön (1996), is a second-order learning, that in essence means “learning how to learn”. In the case of the individual this deuterolearning is to be construed as the shift from Model I to Model II theories in use. This individual deuterolearning is the crucial determinant of organisational deuterolearning, the shift from O-I to O-II learning systems. In other words, deuterolearning is the means by which enquiry into the governing variables of action is facilitated.

4.8 Organisational learning

Having said as much about the theoretical apparatus of Argyris and Schön, some additional points in reference to learning in organisations can be made, some of which has already been touched on, some not.

4.8.1 The notion of organisational learning

The issue of the learning organisation is a much talked about, thoroughly disputed, and ardently discussed concept. One of the key issues is that of who learns. The organisation or the individual? Or both? Or what? Another principal question, closely linked to who learns is how this learning is accomplished, i.e. how does the organisation learn, and what is it the organisation learns?

As we have established thus far, the individual learns and subsequently changes his/her behaviour and possibly his/her conceptions of the surrounding world. This may or may not have implications on an aggregate level, changing the behaviour of groups or organisations.

It can be, and often is, argued that organisations as such can learn. Fiol and Lyles (1985) hold that organisational learning is more than the cumulative learning of the individuals that make up the organisation. Rather, according to Millak (1998), the organisation can learn, through the storage of knowledge in different forms, hence implying some form of organisational memory. Hedberg (1981), on the notion of organisational memory, argues that, since it is possible for individual members of the organisation to leave, organisations retain the “sediments” of past individual learning, after the learners themselves may have left. Axelsson (1996) holds that the individual learning and knowledge development in the organisational setting, to some extent will be stored in the organisational structure, and then make up organisational knowledge that can be categorised as:

- *Scientific research-knowledge*, which in essence is connected to the operations of the R&D department (if such exists) of an organisation. In this, it is partly a notion of contributing to the development of products or production processes, partly of the development of possibilities for the organisation to partake in dialogues on developmental

issues, which in turn can help in the overall process of knowledge development, and the attraction of personnel and partners. The scientific research knowledge therefore has implications, partly for the organisations ability to develop new knowledge, partly for its ability to assimilate and utilise existing knowledge.

- *Organisationally transferred explicit knowledge*, that, “belongs” to the organisation in a different way than is the case with scientific research knowledge. This kind of knowledge is to be referred to as meta-learning, which here is described as the development of concepts, views, and values in the organisation.
- *Learning related knowledge*, that is directly dependent on the organisations ability to learn. This form of knowledge can be said to embrace the ability (routines, systems, and procedures) to learn by own experiences, as well as the experiences of others. (cf. Argyris & Schön, 1996).

A fourth aspect of organisational knowledge is the knowledge carried by the individuals themselves. This is the kind of knowledge, or expertise, that the individual can bring into the organisation, but also take with him/her when leaving the organisation. From an organisational perspective it is imperative to, in as much as it is possible, try to transfer the individual knowledge into organisational knowledge, and also to try to attract the individuals that have the, from the view-point of the organisation, most relevant knowledge.

According to Handy (1995), a learning organisation can be either an organisation that learns or an organisation that supports the learning of its members, but should preferably be a combination of the two. Fiol and Lyles (1985) offer the following definition: “*Organisational learning means the process of improving actions through better knowledge and understanding.*” (p. 803). This suggests the importance of organisational learning as the development of better practice, or in accordance with Denton (1998), the development of superior actions, in relation to what the learning process starts off with.

It appears to be possible to deduct that organisational learning involves both individual learning, as well as the development of organisational memory, and as Denton (1998) points out, further individual learning gradually adds to the organisational memory, hence the organisation learns.

Granberg and Ohlsson (2000) hold that a learning organisation is “...the organisation that creates favourable conditions for co-worker learning, and that utilises this learning in the organisational strife for influencing, and adapting to the surrounding world (p. 33, *transl.*). This kind of definition also points in the direction of modified organisational behaviour, purposely designed to further the organisations interests in relation to the setting in which it operates.

As seen here, and as Denton (1998) develops further, there is a range in the definitions of what organisational learning is, or what constitutes a learning organisation. Deriving from theoretical deliberations though, some limited conclusions can be drawn about the nature of a learning organisation. In claiming to be an learning organisation, an organisation must be able to generate new ideas, to propose new/novel ideas to solve its problems, and to be in general terms, creative. The proposition of creativity cannot stand alone, the organisation also has to have the ability to act on the ideas generated, and to evaluate ideas in order to be able to reject ideas that are not suitable. To facilitate these processes, the learning organisation needs to be aware of and closely study the/its surrounding world, and profoundly willing to change its behaviour. Thus, generating ideas makes the notion of a learning organisation possible, but it

is the processes of evaluating, selecting and implementing generated ideas that are the main characteristics of a learning organisation.

4.8.2 Facilitating organisational learning

Argyris (1992) acknowledges that it is not the organisation as such that produces what results in learning. Rather, it is the individuals acting as agents of the organisation who produce the behaviour that leads to learning. Organisations on the other hand, can create conditions that may significantly influence what individuals frame as a problem, how they design a solution, and what action is produced to solve a problem.

Again, individuals actions and learning can be established to be the foundation of organisational learning. What then, can be done to facilitate this learning in organisations?

Denton (1998) identifies a number of characteristic aspects that are pivotal to the learning organisation, some of which are:

- *Learning strategy* – learning should be construed as a deliberate and conscious part of the overall strategy of the organisation. The creation of new knowledge should be seen as central to the work of the organisation. The possibility of diffusion of new knowledge developed in some part of the organisation should be seen as a source of organisational learning.
- *Flexible structure* – a simple, stream-lined structure is needed, that helps learning in the company, through reduced bureaucracy and the encouragement of cross-functional co-operation. Teams, small groups of people who work closely together, adds to the possibilities of organisational learning. Networks are in effect teams operating outside the organisation, and as such they are a key to not only combine the existing knowledge of individuals in a group, but also the ability of its members to create new knowledge.
- *Blame-free culture* – learning should be valued and encouraged, and the atmosphere should be blame-free, which in turn encourages experimentation, and thus learning. Empowering the employees should be seen as a way of securing the commitment of the co-workers.
- *Vision* – the organisation should try to develop a clear vision of the future which is shared by all quarters. Another important aspect of this is the establishment of an overarching goal which encourages every member in the organisation to pull in the same direction to achieve this goal,
- *External awareness* – the organisation should use scenario planing, benchmarking and related techniques to scan its environment. This allows for anticipation of change and preparation for the organisations response to changes in the external environment,

To facilitate individual learning, and thereby organisational learning, Ellström (1992) suggests that the organisation of work should consider:

- *The necessity of goals, as well as the possibility of reflection and critical appraisal of set goals.* The organisational goals should be clearly formulated, in order to benefit co-worker motivation and possibilities of learning. Also, and just as important, is the need for the goals to be, *firstly* understood and accepted by the co-workers, *secondly* the co-workers should have been given the opportunity to partake in the formulation and discussion of these goals, and *thirdly* the co-workers should be given the opportunity (time, space) to continuously reflect on the set goals in relation to work-modes and achieved results, and if so is felt needed, actively work towards changing goals and/or work-modes.

- *The necessity of tasks with a high learning potential.* The work-tasks should have what may be construed as optimal complexity, offer the possibility for the individual to use his/her space of action, in terms of decisions on a) how a task is to be dealt with, b) when the task is to be executed and the time-frame of execution. The tasks should also be designed to offer possibilities of knowledge development and holistic understanding of technical as well as socio-organisational aspects of the work-situation. Further, the work-situation should, to an as high degree as possible, be free from technical or socio-organisational constraints on the individual's possibilities to utilise the space of action that the work-tasks offer. The work-situation should also offer possibilities of collaboration with other individuals, and possibilities of conducting tasks with varying physical activity and under varying circumstances.
- *The necessity of an organisational culture that supports and encourages learning.* The organisational culture of an organisation will largely influence the individual's apprehension of his/her space of action in relation to the work-situation. Space of action, will here be dependent on the individuals self-esteem, experiences of similar situations, and the conception of other people's experiences in similar situations. Hence, socially constructed and relayed information comes into play. Much of this socially constructed information is stored in the, in varying degrees explicit or implicit, norms, rules and conceptions of what the natural, possible, and desired ways are for the members of an organisation to apprehend and act in different social situations.
- *The necessity of integrating informal learning in work-activities and planned education.* The relationship between informal learning in work-activities and planned education, is one where both is needed to cover the individual's learning needs. Some aspects can be learned in the situations of day-to-day work, whilst others may need to be relayed to the individual in formalised education. The main reason for this is that planned education can help the individual systemise and expand on the knowledge acquired during work. To assist in this, educational models should:
 - start off in actual problems and developmental needs in the organisation;
 - be based on the individual's experiences of problem solving in practice;
 - be conducted in forms that allows for a dialogue between different groups of personnel, and between personnel and experts;
 - be planned and executed in close co-operation with those who are directly affected by the educational effort.
- *The necessity of organising for production as well as learning.* In real terms, organisations should organise the overall activities in a way that allows for production (i.e. action), but also for learning (i.e. reflection). This means that possibility and occasion must be created, for discussing goals and planning, to try out different courses of action, and also to reflect on the overall organisational activities and the consequences these produce.

As can be seen from these facilitative issues of organisational learning, two of the central aspects brought forward are *structure* and *culture*. Whilst neither organisational structure nor culture are organisational phenomena that can be fully or justly described here, some basic points can readily be made.

4.8.3 Organisational structure

4.8.3.1 Structural differences

Structure, can be construed as the objective side of the aspects facilitating (or hindering) organisational learning. The overall structure of organisations can of course conceivably take

numerous forms, probably more than could ever be described here. Therefore it can be of some use to simplify this by saying that two principal general structures have been dominant until present time. Rohlin, Skärvad and Nilsson (1994) describe these as the *mechanic* organisational structure and the *organic* organisational structure (compare 3.4.4).

- The *mechanic organisational structure*, was/is the dominant organisational paradigm of the industrial society. The main characteristic of such an organisation, is that the tasks and problems of the organisation are broken down into highly specialised areas. Each individual performs his/her tasks, that have been defined further up in the organisational hierarchy. Work-methods, routines, and authorities are precisely defined and controlled by instructions and superordinate decisions. Communication is primarily vertical. Information flows upwards, and decisions and instructions flow downwards in the organisational hierarchy.
- In an *organic organisational structure*, tasks and patterns of action are less pre-determined, and cannot as easily be divided up between individual co-workers in a hierarchy. The members of the organisation instead perform their tasks with starting-point in their knowledge of the super-ordinate objectives of the organisation. Work-methods, routines, and authorities are continuously re-defined and developed further via dialogues and co-operations in a variety of directions. Authorities in the organisation are based less on formal position, than on competence and knowledge. Control is exerted based on super-ordinate goals, values, and ideologies, rather than by rules, instructions, and control-systems.

The eye-catching difference between the two types of organisational structure is illustrated in figure 4.6.

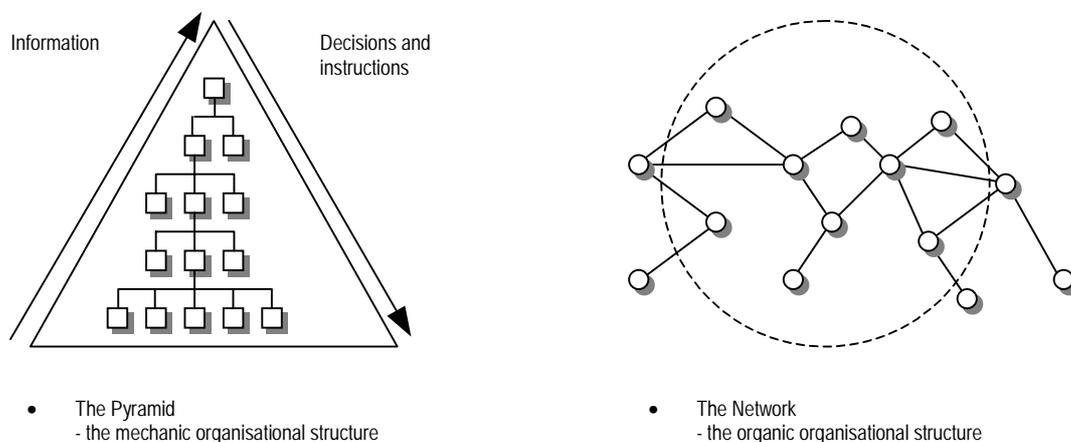


Figure 4.6. Principal sketch of two different organisational structures (Rohlin, Skärvad & Nilsson, 1994).

To use the terminology of Argyris and Schön as it was described in 4.7.1-4.7.2, the striking difference between the organisational structures described is, that the mechanic organisational structure most probably produces Model I behaviour, and the organic organisational structure will show behaviour that is more in the line of Model II behaviour.

Also, the organic organisational structure is more dependent on the contacts individuals establish within, as well as outside the organisation. This can, to exemplify, be done either by

the construction of teams (within the organisation), or by networking (within and outside the organisation).

4.8.3.2 Teams/Networks

Senge (1990), argues the importance of team learning as a facilitator of organisational learning. The team should develop a mode of learning, that is characterised by the team-members being aware of how they complement each other, the recognition of shared goals, and the possibility of double-loop learning.

On a similar note Axelsson (1996) holds that, to promote learning in organisations, different forms of organisational changes are needed, such as work-enrichment, work-expandment or self-regulating teams. By doing this the utilisation of the individuals competencies is facilitated and further developed via informal learning in the day-to-day work.

Denton (1998) views teams as an important bridge between individual and organisational learning. Teams learn to operate more effectively, and thus may develop practice that is superior to that of other parts of the organisation. When this practice is appropriated by the organisation as a whole, organisational learning occurs. Also, as a complement or as an alternative to teams, networks (inter- and intra-organisational) can be seen as a way of learning from the practice of others.

As a final point to this discussion on organisational structure, Mattsson (1995) argues the importance of creating a creative work environment, and thus organise, socially as well as physically, in order to facilitate learning. Naturally, teams work closely together in a social sense. Further, the physical attributes of the work environment, such as small distances between work-stations or co-workers, contribute much to the overall learning of the individuals and teams.

4.8.4 Organisational culture

Culture, can largely be seen as the subjective side of the facilitative aspects in relation to organisational learning.

Lundberg (1996) holds that “...organizational culture both fuels and fosters learning in organizations, as well as learning by organisations. *Managing for learning by members and by the organization is managing with and through culture.*” (p. 507).

What then, is organisational culture? Ellström (1992) gave some hints above. To further clarify, organisational culture, as defined by Alvesson (1993), is the ideas, conceptions, meanings, values, and symbols that are common to and shared by a certain group. In the organisational setting this may entail the organisation as a whole, or parts of it. Culture then, is to be viewed not as behaviour, even though behaviour will be affected by culture. Rather, culture is what goes on in the individuals collective emotional- and mental world (compare to paragraph 3.4.4).

Depending on how culture is viewed, the sources behind it may differ. From a anthropological/sociological perspective, it is the individuals, by influence of each other and preceding generations, in for example, an organisation that develop notions about their existence, and act on the meaning they ascribe their work and work-organisation. From a

managerial perspective, the management of an organisation is the principal agent in forming the organisational culture, which is seen as something that can be controlled in order to further the organisational goals (Alvesson, 1993).

To summarise this discussion of organisational learning, what it is and what facilitates it, an illustration (Figure 4.7) of organisational learning, and its overall usefulness, might be warranted to refresh memory of the process discussed.

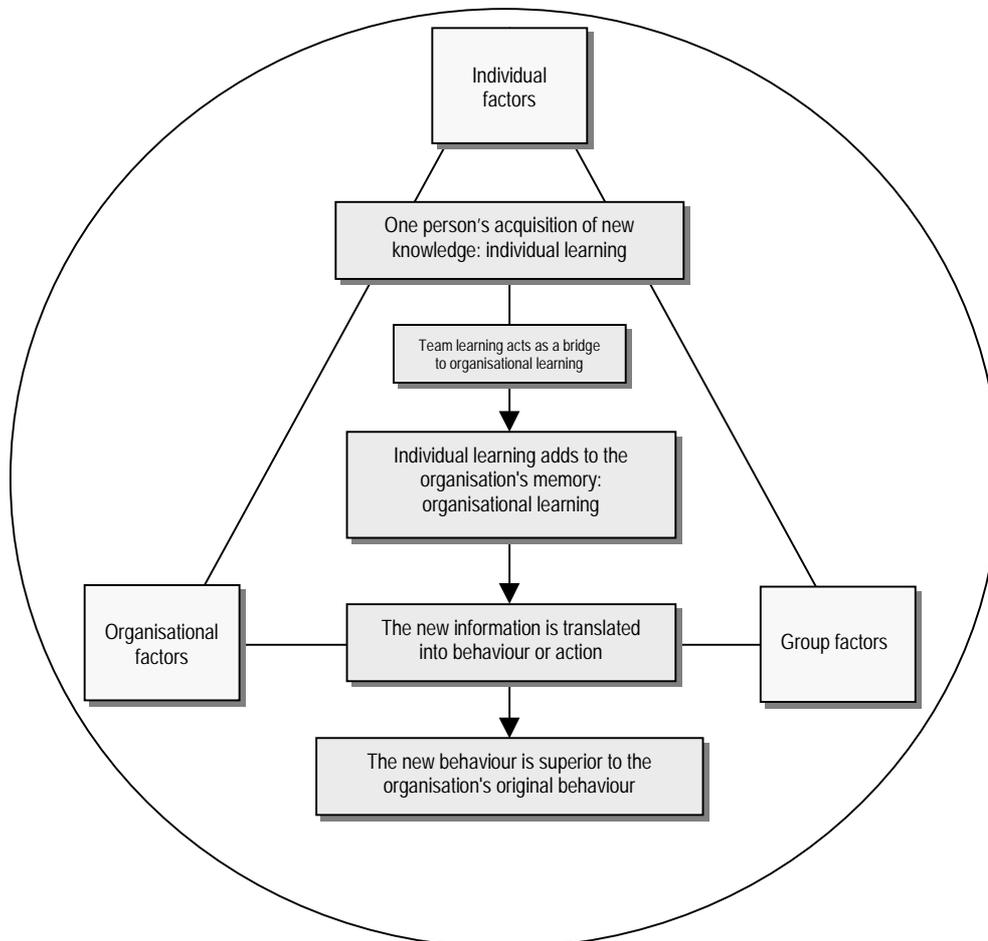


Figure 4.7. The usefulness of organisational learning (adapted and modified from Denton, 1998, p. 159).

Having discussed different notions of innovation and learning separately, the next section, deals with the meagre but existing theoretical deliberations that discuss innovation and learning together.

5. Innovation and Learning

This chapter is an attempt at giving a description of some of the theoretical work done on innovation and learning in concert. A discussion of learning and innovation in terms of each other is offered. Though the overall theoretical sources on the areas of innovation and learning, respectively, are massive, the contrary has been evident in terms of theoretical discussions on the areas taken in concert. In spite of this, some important conclusions can be drawn, laying further ground for the final comparison and discussion in the following chapter.

5.1 Innovation and learning in concert - learning processes in innovation

Sundbo, (1998a;b) holds that innovation as a learning process, and the central role of learning as a facilitator of the innovation process, are topics that have not been given much attention in literature. This is especially the case if the learning involved in the innovation process is perceived as the deuterolearning described by Argyris and Schön (cf. 1996).

The optimal learning situation in relation to innovation, according to Sundbo (1998a) includes an institutional and management controlled learning process, and a certain open intrapreneurial behaviour. *Optimal* in this case refers to what, in relative terms, can be construed as the most innovation-oriented organisation. The optimal situation also demands a careful balance between management control of learning in the organisation, and the open intrapreneurial system. It is thus important for management to strive to keep the intrapreneurial system active and open, whilst at the same time limiting it so that it exists and is contained within the overall strategy of the organisation.

One way of ensuring an open and active intrapreneurial system, is to create some form of parallel organisational structures in which co-workers can get the chance to experiment with new and novel ideas in order to learn and develop knowledge that is beneficiary to the organisation as well as the individual (eg. Dilschmann, 1996, *see 5.2 below*).

Sundbo (1998a) further argues that learning processes in organisations, both mean learning the actual innovations, and learning as an organisation how to learn (cf. Argyris & Schön, 1996). The latter, organisational deuterolearning, may be a question of developing routines that capture the knowledge of how to learn, but it may also be a knowledge that is accumulated by the individuals in the organisation, which makes it somewhat more difficult for the organisation to obtain the same knowledge. The criteria for organisational learning (*compare section 4.8*) will therefore be a) that the organisation is attempting to learn, and b) that the knowledge settles/is institutionalised in the organisation, and not remains an individual learning process and product.

5.2 Parallel learning structures - facilitating innovation and learning within the organisation

Dilschmann (1996) holds that, as a result of ever increasing internal and external demands on modern organisations, the use of *parallel learning structures* (*transl.*) becomes more and more common. By parallel learning structures is referred to groups of personnel specifically created and organised for learning, innovation, and development. As such, these groups may

be temporary constellations designed to solve a specific problem, or they may be more permanently organised groups, working parallel to the regular operations of the organisation. The basic idea behind is illustrated in figure 5.1.

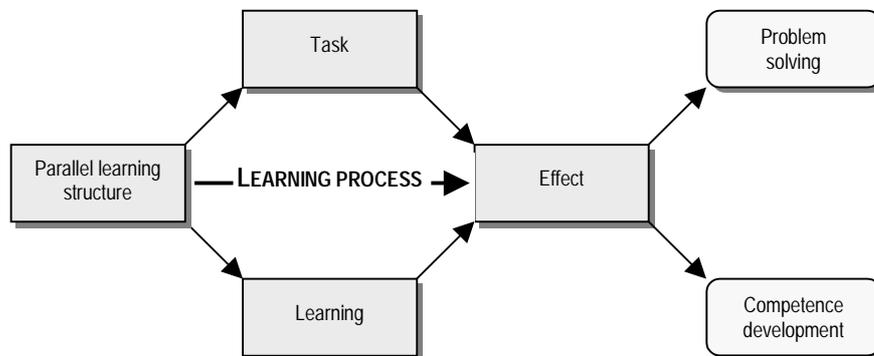


Figure 5.1. The principal of the organisation of the parallel learning structure and its two, equally prioritised purposes (Dilschmann, 1996, p.10).

The main point to this way of organising for learning, innovation, and development, is that it to a great extent allows for the development of ideas, and solutions to problems, that might not get the chance to surface in the normal day-to-day operations of the organisation. The work in parallel learning structures is often conducted in the form of project-work or projects. One of the principal thoughts behind parallel learning structures, in the case in which this is a permanent organisational fixture, is that the co-workers concerned should be changed regularly. The members of the parallel learning structure should not be permanent, basically because the parallel structure should not compete with ordinary operations. Also, should members be permanent, they would loose contact with the day-to-day operations, the source of the problems the structure is designed to solve, and of course there is the apparent risk of running out of ideas (Dilschmann, 1996).

The parallel learning structure is designed to give the co-worker a chance to get *time* and *space* to *try out/experiment* with ideas in relation to the organisational activities. In ordinary operations, this may be a somewhat problematic notion, since it may be hard to accomplish the tasks of production, while at the same time trying to do developmental work. Because of this, work in the parallel learning structure should be fairly free from demands on results. In the ideal situation, the individual's work in the parallel learning structure, should provide the opportunity and facilities for the individual to learn, and develop competence-wise and personally. At the same time, this work also constitutes a source of innovation and learning on an organisational level. The result of course, is a situation in which learning can be seen as both means and ends, whilst it allows for organisational development as well as catering for individual development and growth (Dilschmann, 1996).

The parallel learning structure can be seen as a way of facilitating learning and innovation *within* a particular organisation. Though this is a good idea, the "need for speed" in relation to knowledge acquisition and development, that is the result of societal and technological developments of later years, also requires the organisation to look outside itself for assistance. This

can be done by establishing networks that are specifically designed for intra- and inter-organisational knowledge acquisition and development (cf. Mitra, 2000; Jackson, 1999).

5.3 Systems of innovation and learning - facilitating innovation and learning by external contacts and networks

Much of the discussion on innovation and learning taken in concert revolves around the notion of networking, or systems of innovation and learning. Jackson (1999) holds that, in the modern organisational arena, through increasing inter-enterprise networking, i.e. virtual organisations, learning and innovation do not only occur within organisations. Rather, through different forms of collaborations in the shape of exchanges of ideas and joint ventures, learning as well as innovation has now become a global endeavour. Dodgson agrees with this notion and argues that: “*Analysis of the innovation process has...*”, “*...progressed from seeing innovation as an activity which occurs within the boundaries of individual firms to understanding that numerous organisations acting in concert contribute to the generation and success of new products, processes and services...*”; “*Analyses of the contemporary innovation process show that the major transformations occurring within firms as they move towards becoming creative, process-based “learning” firms need to be complemented with those external alliances with suppliers, customers and joint venture partners, and directly by increasingly effective and well articulated technology strategies.*” (as cited in Matthews & Candy, 1999, p. 57).

5.3.1 Systems of innovation

Societal aspects of late, basic tendencies towards a global economy, facilitated by amongst other things the developments in the field of ICT (Information and Communication Technology), has or could with some certainty lead to an increased inter-dependence of organisations. Thus, when contemplating the innovation process, it would be somewhat erroneous not to take into account the influence that different organisations have or can have on each other, and the subsequent consequences this will have on the innovation process (cf. Archibugi, Howells & Michie, 1999).

Fisher (2001) concludes that innovation is an interactive process, that in essence depends on the accumulation and development of relevant knowledge in a wide variety. As a result of an increasing complexity of markets, and an ever increasing demand for speedy solutions to problems that arise in organisations, individuals respectively organisations have come to develop co-operative networks, that in scientific literature is labelled *systems of innovation*. The systems of innovation have been studied quite extensively during later years, mainly focusing on how these systems can contribute to the developmental picture of regions or nations. The main thoughts behind the systems of innovation approach though, is one that can be adapted to any situation where innovation is concerned. A system of innovation is a collection of actors, for example individuals, companies, other organisations, or institutions (here broadly interpreted to include common habits, routines, established practices - all that regulates the relations and interactions between individuals as well as between and outside an organisation), that come together and co-operate in the generation, diffusion, and utilisation of *new* and economically useful knowledge in what, widely interpreted may be seen as the production process. The thought behind the systems of innovation approach is that, through interaction and feedback created through this process, different pieces of knowledge are diffused and subsequently combined in new ways - new knowledge is created.

5.3.2 Learning systems, Learning networks

Drawing on Hommen (1997), learning is one of the basic requirements of the innovation process, in that it forms the conditions supporting innovation as a process of knowledge creation and skill development.

On the same notion, according to Gómez Arias (1995), networks can be a powerful tool in companies and industry-wide. From an individual organisation's perspective, the network should to be seen as a strategic asset. Further, to innovate often means to gain the ability to see something from a different angle or by a different perspective. The network of an organisation can therefore be a source of learning that facilitates this kind of shift in perspective.

On the issue of networking and the importance for organisations to look outside themselves for knowledge advancement, Mitra (2000) discusses learning systems and the importance these may have for innovation. Learning for innovation is described as:

- The creation, adaptation and fusion of new ideas among firms and across the region (generation and competency building);
- re-use and reference of knowledge through continuous learning (codification and competency leveraging);
- Moving knowledge from one firm to another or between institutions and firms (transfer and co-ordination, and the transfer from firm-specific to firm-addressable assets).

Thus, the notion of learning systems involves networking between different organisations in order to acquire knowledge, and ultimately learn from the experiences of others, in order to develop the means necessary to innovate. Drawing on this, it is conceivable to view learning systems in the same way as the systems of innovation approach, the basic idea being the same.

Deriving from empirical studies by Henderson and Lenz (1996), and Lynn and Mazzuca (1998), it can be argued that innovation can be seen as a process that is secondary to the process of learning. Innovation is then seen as the by-product of a strong focus on learning in organisations, i.e. if an organisation focuses its resources on learning, innovation will follow.

Radosevic (1998) also recognises the importance of learning in relation to innovation, in that innovation depends partly on the amount of R&D-work conducted, and partly on inter-organisational learning processes.

From this discussion on systems of innovation, and what has been labelled learning systems or learning networks, it is conceivable to deduct that the function and structure of these system are basically the same. In fact, systems of innovation and learning systems both appear to have the principal goal of knowledge acquisition in order to facilitate knowledge creation. The main rationale for both network-notions is that, since the individual organisation cannot cope with developing new knowledge as fast as is needed in the modern economy, co-operation is needed and warranted.

6. Discussion

This, the final chapter, offers an analysis of the inter-conceptual relationship between innovation and learning, based on the different theoretical notions that have been discussed in earlier chapters. It also offers a discussion of what implications viewing innovation and learning in concert may have. Finally, the method of enquiry is critically discussed and some suggestions are put forth, encouraging further research of the area.

6.1 On analysis of the relationship between innovation and learning

Deriving from the stated purpose of this study, the aim of this study has been an attempt to determine, analyse and discuss the conceptual relationship between learning and innovation, based on a thorough theoretical review. In this, some effort has also been directed at identifying learning aspects of the innovation process and aspects of innovation in the learning process. This means that the purpose in reality is dividable into two strands, where one has been to clarify an assumed relationship between innovation and learning, and the other to try to make the concepts understandable in terms of each other. In the attempt to do this, two questions were formulated to help investigate the respective theoretical areas, and subsequently analyse the areas in concert:

- What is the relationship between innovation and learning, on a conceptual level?
- How can, or to what extent can, the concepts of innovation and learning be discussed in terms of each other?

Thus, the aim of this study has not been to prove or falsify some theory, nor to produce new theory. Rather, my core intent has been to form a theoretical framework for a further discussion of innovation and learning in concert. It could be argued that this kind of analytical comparison could/should be somewhat problematic, since as we have seen the concept of innovation has its origins in the economic theoretical tradition, while learning is a behavioural science notion. Still, and as will be further discussed here, it appears that innovation and learning in fact can be seen as reciprocal or interdependent concepts. That is, innovation requires learning to occur, whilst learning or at least what has been construed as higher forms of learning, is dependent on some aspects of innovation.

As described by Chaharbaghi and Newman (1996) a multitude of theories concerning the concept of innovation are readily available, though no one theory offers a description that covers all aspects of the concept. As we have seen, a similar statement should be valid for the concept of learning. To analyse the respective areas and the areas in concert, therefore requires somewhat of a birds-eye view of the theoretical offerings, in other words, an aggregate model of the general problem area must be produced. This model in itself, should also be able to answer the second of the research questions, that of *if* and *how* the concepts of innovation and learning can be discussed in terms of each other.

Drawing on the theoretical deliberations in chapters 3, 4, and 5, there are three main contexts in which the concepts of innovation and learning can be viewed.:

- The context of the *Individual*
- The context of the *Group/Collective*
- The context of the *Organisation*

These contexts, helping to make up a more whole picture of the respective areas, are to be construed as “common denominators”, in that they help to structure the discussion to follow.

It should be noted that the theories that make up the basis for this discussion, not always are as clear-cut, in that they may deal with one or more of these contexts. However, as a tool for analysis, this contextual division should suit its purpose. As has been touched on in chapter 5 (cf. Fisher, 2001) a fourth context could also have been discussed further, that of a *system level context*. I have however chosen to limit this to discuss only the implications system level co-operation, in terms of innovation and learning, may have for some of its partaking units, in this case organisations. The reason for this delimitation is one of space. A further discussion of the examined concepts on national or regional levels, is in my opinion a topic that requires a separate, in-depth study on its own.

In addition to the chosen contexts of analysis that stood out quite naturally in the chosen literature, a number of sub-dimensions could be identified, again as inter-conceptual “common denominators” of innovation and learning, further allowing for a pregnant inter-conceptual comparison and discussion:

- The dimension of *Concept*
- The dimension of *Action/Behaviour*
- The dimension of *Process*

Figure 6.1 depicts a model displaying the concepts, contexts of analysis, and sub-dimensions, which may be useful in the analysis of the relationship between innovation and learning. It should be noted that there is no particular relationship between the sub-dimensions and the different contexts. The sub-dimensions are evident in greater or lesser degree in innovation and learning notions, in all of the identified contexts.

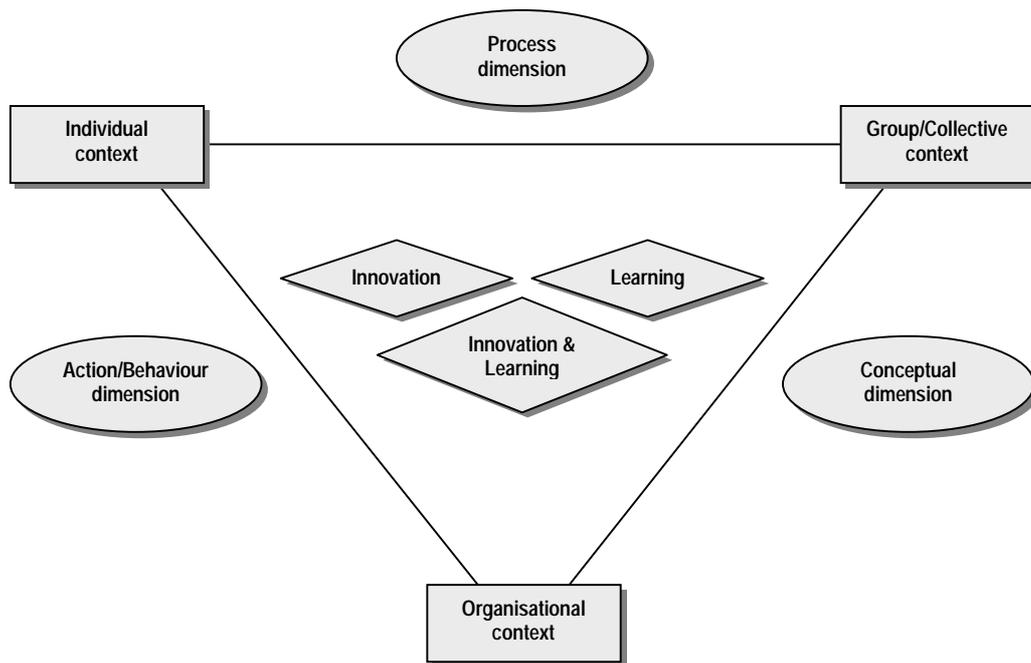


Figure 6.1. Map of orientation for the analysis of the relationship between innovation and learning.

Below, the different contexts will be discussed, one by one, focusing on the respective concepts and the concepts in concert. Because the different sub-dimensions sometimes overlap or is only touched on in literature they will be discussed only implicitly, primarily because they principally are constructs used in the analysis of the literature. I have concluded that there is no use repeating the theoretical discussion already made. Therefore, this discussion focuses

on the parts of the different theories that further the possibilities of fulfilling the stated purpose and answering the first research question: What is the relationship between innovation and learning on a conceptual level?

The rationale for designing the discussion in this way, is that through my foreknowledge and the hermeneutic approach to this study, the choice of theory and the subsequent presentation of the same, can be seen as a form of argumentation, which means that in practice much of the analysis has already been made, in the form of choice and analysis of the literature chosen. Thus it is warranted to start off the discussion in the analytical-comparative stage, rather than by a recapitulation of all theory discussed earlier. Also, what notions may be interesting in the discussion of innovation or learning respectively, may not be of direct interest when discussing the concepts in concert. Having said this, to stress the theoretical notions that are important to the theoretical framework of innovation and learning, some repetition is warranted and given. The following discussion will therefore focus on the different theoretical deliberations that have an impact on the comparison of the two concepts. The reader is therefore referred back to chapters 3 through 5 for the theoretical descriptions in detail.

6.2 Innovation and Learning - Context of the Individual

6.2.1 Innovation

As could be seen from the definitions and explanations of innovation, and as was established by Johannessen, Olsen and Lumpkin (2001) the bulk of definitions of the innovation concept, rests on the notion of *newness*. In order for innovation to have taken place, something new has to have been introduced, a *change* must necessarily have occurred.

It can be held that the notion of innovation rests on the mental capabilities of the individual, through what has been described as the integral cornerstones of innovation. First and foremost, there is the individually conceived *idea*, as discussed by Gurteen (1998) and SOU 1993:84, which basically entails that some notion is conceived as a possible solution to a problem or as an option in general in relation to what is. The basis for the idea or generation of ideas is what Gurteen (1998) described as *creativity*. As a concept, creativity on the one side requires divergent thinking by the individual, in order to be able to stray from existing notions of what can be done (generate ideas), on the other side, creativity requires convergent thinking in order to convert the ideas from conception to action (innovation). This, the putting of ideas into action, according to Sundbo (1998a) and Bruyat and Julien (2000), depends on the individual *entrepreneur*, or *intrapreneur*, to do so. Innovation is not a fact until it has been implemented successfully and perceived as new by whatever unit of adoption it is intended for (Rogers, 1995; Cumming, 1998). Thus, as described by Bruyat and Julien (2000) entrepreneurship (or intrapreneurship) is dependent on the entrepreneur to take action on a conceived idea or to generate ideas and take action on these, based on the seven sources of innovation described by Drucker (1985). In this way, entrepreneurship can be seen as the entrepreneur acting on knowledge he/she acquires.

The process of innovation then, is dependent on the individual. Each innovation process must build upon the ideas conceived by an individual. This individual or some other, can continue to develop and act on this idea, taking the role of the entrepreneur, and subsequently implement the idea, thus possibly create an innovation (cf. Huiban & Bousina, 1998; Sundbo, 1998a).

The degree of newness/change embodied in the innovation, and therefore the degree of divergent thinking involved in the creative process, is described by labelling the innovation either *radical* or *incremental*. The radical innovation, as described by Fairtlough (1994), represents a radical shift forward in that it can be seen as clearly diverting from the products or processes that exist at the time of introduction of the new innovation. As Sundbo (1998a); Schumpeter (1994) and Drucker (1985) argues, the second degree of innovation, incremental, is a somewhat difficult notion to determine, in that it has to be separated from mere change. Incremental innovation, as Sundbo (1998a) argues, therefore also must encompass some form of qualitative shift or leap. Products or processes must be made better, and the reason for it cannot be social and/or economic change that naturally occurs over time.

6.2.2 Learning

Learning, as well as innovation involves some form of change. As was described in the chapter on learning, different perspectives on what learning is can be taken. The conclusion made was that in order to give a somewhat holistic picture of learning, the totality of perspectives should be incorporated in the analysis. Different ways of doing this was discussed. Ellström (1992) suggested competence as an over-bridging concept, embracing relatively permanent changes in an individual's knowledge, intellectual- and manual skills, and attitudes, social skills and traits related to personality. Learning therefore, can be seen as the results of mental processing as well as the individual's inter-play with his/her environment.

Learning can also assume different levels, which as Entwistle and Marton (1986) concluded, all have their use. Ellström (1997; 1996; 1992) defined two basic levels of learning, based on the degree of freedom that the individual has in defining the task, method of conduct, and preferred end-results. These levels were labelled *lower order learning/adaptive-oriented learning*, encompassing different levels of control imposed on the individual's possibilities of defining the situation, and *higher order learning/development-oriented learning*, in which the individual is free to define the situation as he/she sees fit. The latter also corresponds to what was defined by Ellström (1997; 1996; 1992) as *creative learning*, which was described as being the relatively most pregnant situation for individual learning. The central issue in the individual's possibilities to define the situation and act on that definition, is the notion of *space of action*. This as defined by Ellström (1997; 1996; 1992) and Lundmark (1998), involves the individual's actual, perceived and potential possibilities of action, which subsequently will have great impact on what is done and thereby what is learned.

The issue of perception is as noted, central to the notion of learning. The process of learning as described by Kolb (1984), Wolfe & Kolb (1984) and Forsberg et al (1984) is inextricably connected to the context in which the individual learns, and how this is experienced by the individual. In this the individual's past experiences, motivation, interests etc, and contextual factors such as the social- and physical environment, should be taken into account in the assessment of what is learned and why.

The process of learning then, was defined by Kolb (1984) as basically involving the individual's experience resulting in observations and reflections, that subsequently is transformed into abstract concepts and generalisations, which in turn form the basis for active experimentation with the concepts in new situations, which then produces new experience, and the process starts over again (as depicted in figure 4.2). By these steps, which also can be seen as separate abilities of the individual, learning was defined as the process by which knowledge was created by transformation of the experiences of the individual, experience in this case, as

defined by Miller and Boud (1996), involving all the input of the context that is perceived as meaningful by the individual.

As noted by Miller and Boud (1996), this approach to learning allows for a view of learning that encompasses changes in actions, or how the individual views the world, that is, interprets his/her environment or the context in which he/she finds him/herself. Thus, as Kolb (1984) noted, the experiential view on learning takes into account different perspectives on learning, that in essence focuses on experience, perception, understanding and behaviour.

Kolb (1984) and Wolfe and Kolb (1984) defined a number of different learning styles, that usually is developed by individuals, as a result of past experiences, their hereditary equipment, and the demands of the environment (paragraph 4.4.2.2). Depending on which learning style a particular individual develops, he/she will excel at different stages in the learning process (described in figure 4.3), which in turn means that he/she is more or less declined/suited to developing a certain type of knowledge.

As a critique of the model of learning described by Kolb (1984), Ellström (1997; 1996) argued that learning in context and the actions that it produces, may not involve active reflection by the individual at all times, rather the process of learning can be seen as a dynamic between routine and reflection. This dynamic was described as different levels of cognitive awareness. In this hierarchy, the lower levels of action to a great extent were routine based, and the higher levels were based on a high degree of active reflection. Thus, human actions are, as a result of the context in which they take place, sometimes and to a varying degree based on routine or intuition. The different levels of action were further described as being of equal value, and useful in different situations, depending on what the situation requires of the individual.

6.2.3 Innovation and Learning

As we have seen, the notions of innovation and learning respectively are based on some form of change being brought to occur by individuals. In the case of innovation this change is largely dependent on being explicit, that is, in the terms of Rogers (1995), diffused. Learning on the other hand, can take more implicit forms, as described by Müllern and Östergren (1995), in that it may or may not be visible through a change in behaviour or action by the individual. The results of learning can, as pointed out by Miller and Boud (1996), encompass changes in the beliefs or values of the individual, and therefore not be visible to others, although these changes may change behaviour, they do not have to do so.

When comparing what has been said about innovation, the process of innovation, and its integral parts, with what has been said of the learning and the learning process, it can be argued that the innovation process could be seen as a process heavily dependent on learning. Drawing on what Gurteen (1998) said about creativity, and Kolb's (1984) reasoning on individual learning styles, it is conceivable to argue that different individuals will have different success at innovation. Having the aptitude for divergent thinking suggests creative thinking in terms of idea generation, whilst convergent thinking is needed to realise this/these idea/-s. It could therefore be argued that the entrepreneur should preferably be a combination of the learning styles Kolb labelled *The Diverger* and *The Converger*. Thus, in order to be successful at innovation, a combination of specific learning abilities seems to be needed.

Drawing on the need for divergent thinking, the basic notion of learning for innovation is what Ellström (1997; 1996; 1992) labelled higher order learning/development-oriented learning, which can take place in a work situation in which the task, method, and expected results are not given and not apprehended as given by the individual, thus a situation in which the space of action is great. Hence for entrepreneurship (and intrapreneurship), space of action is of central importance, since it in essence will decide what ideas are conceived and if/how these are developed, and thus transformed into innovation.

Closely related to space of action is the organisation of work. In terms of innovation and learning, drawing on Ellström (1997; 1996), a situation is needed that allows for creative learning and reflective action, thus the degrees of freedom for the individual to act must be great.

To try to depict the relationship between innovation and learning in the context of the individual, figure 6.2 suggests a model of learning and innovation that takes into account both concepts.

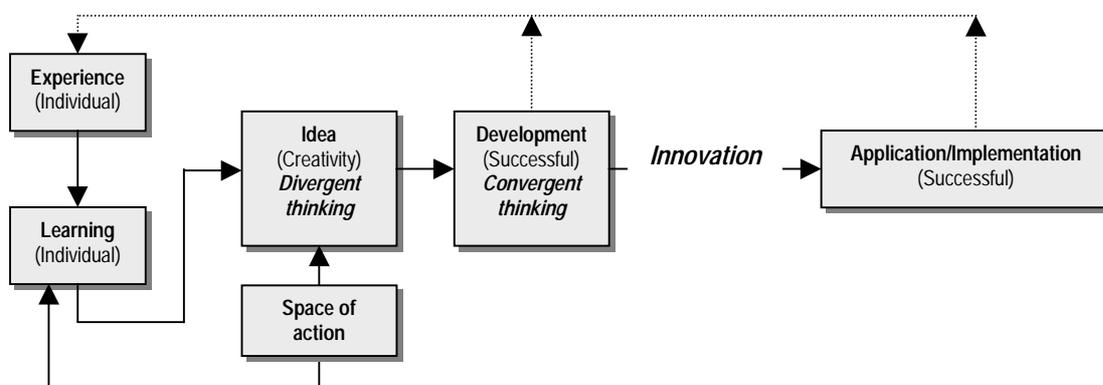


Figure 6.2. A model of innovation and learning in the context of the individual.

In figure 6.2, learning builds upon the experience of the individual, and is influenced by the space of action available, potentially available, and perceived available by the individual. The individual, through divergent thinking conceives an idea (what can be conceived here is also influenced by space of action available), which then is developed for implementation, by ways of convergent thinking. Through successful implementation an innovation has then been accomplished. Since experience is not a static occurrence, the development and implementation phases are producing new experience that allows the individual to learn further and hence conceive new ideas that may (or not) be developed into innovations.

It can, following this discussion, be concluded that individual learning is a vital part of innovation, and that the space of action the individual has in the situation he/she finds him/herself will greatly affect what is learned and consequently the possibilities of innovation.

6.3 Innovation and Learning - Context of the Group/Collective

6.3.1 Innovation

In terms of innovation, not very much is said in literature on the subject of the group/collective. I have the notion that this is directly connected to the fact that in the context

of the group/collective, the individual is still the principal actor. Therefore, what has been discussed as valid for the context of the individual is also valid for the context of the group/collective. Having said this, in relation to what we have discussed thus far, a social dimension is added in the group/collective context, which as suggested by Ahmed (1998) adds *culture* as a determinant of innovation. The beliefs, norms etc that guide behaviour in the social setting, will also have an effect on innovation. As Hurley and Hult (1998) pointed out, aspects of culture affect the openness to new ideas, and thus the possibilities of innovation.

6.3.2 Learning

As for learning in the group/collective context, some interesting points have been made. As Mattson (1995) concluded, individual, subjectively constructed knowledge can be viewed as not having any direct value until it has been validated in the collective environment. If the knowledge of the individual cannot be communicated and understood by others, it will remain solely individual knowledge and of little value in the social setting. If on the other hand the individuals' subjectively constructed knowledge *can* be communicated and unilaterally understood, then, as Hunter, Bailey and Taylor (1999) point to, the individuals gain the opportunity to learn together and from each other. Individual learning in groups may also, as Harris (1996) argues, be hindered by factors internal or external to the group.

It can be argued that, as Argyris, and Argyris and Schön (e.g. section 4.7) do, individuals do not always do as they say they do. What they say they do is to be construed as the *espoused theory* of the individual. What individuals actually are doing can be described as their *theories-in-use*. As noted there may be a *discrepancy* between the espoused theory and the theories-in-use. This is often a fact unconscious to the individual and the theories-in-use are in reality cognitive defence routines developed by the individual in the confrontation of their espoused theory and reality, between what the individual apprehends should be done, and what is possible to do. As Argyris points out, the theories-in-use, being our general ideas of the conditions under which we live, always result in *theories of actions*. These theories of actions are, based on our theories-in use, our conceptions of why someone else in our environment acts as he/she/they do. The theories-in-use result in a learning situation, in which the individuals believe they have the correct opinions of the reasons of the actions of others. The problem with this notion is that the individuals, on account of the cultural norms and rules of the situation cannot verify their assumptions of each other through open dialogue.

The result of this situation is what Argyris and Schön (e.g. section 4.7) label *single-loop learning*, which entails a situation in which what is learned is guided by the theories-in-use and theories of actions of the individuals. Through the absence of open communication, what is learned is also constrained to correction of errors, or adaptive measures in relation to the existing circumstances. In this situation, the individuals do not question the overall assumptions of what is being done and why, and therefore cannot work proactively in relation to the tasks or problems faced. This type of theories-in-use are *Model I theories-in-use*, and as such they are based upon four different kinds of governing variables, which basically describe individuals as acting solely in rational self-interest. On the issue of the group (or organisation) this type of behaviour results in what Argyris and Schön label Model O-I, which essentially describes a group rendered ineffective in terms of problem-solving and learning, by the Model I theories-in-use, which continuously reproduces the defensive routines of the individuals and consequently the group.

A qualitatively opposing situation to that of single-loop learning, is described by Argyris and Schön (e.g. section 4.7) as *double-loop learning*. This situation is accomplished by the individuals and subsequently the group (or organisation) changing their governing variables, which produces new theories-in-use, more compatible with the espoused theories of the individuals. This requires open and trustful communication between the group members on issues of apprehension of each other, individual goals, actions expected of each other, and the prospect of common action. Actions in this situation is based on what Argyris and Schön label *Model II*, thus producing *Model II Theories-in-use*. The governing variables guiding behaviour in this situation are essentially focused on any action to be well-informed, choices to be free and informed, and the individuals to be committed to working together. The group behaviour displayed in this situation is labelled *Model O-II*, which describes active advocacy and inquiry between the individuals through open communication, and allows for both single- and double-loop learning.

Argyris and Schön (e.g. section 4.7) also speak of deuterolearning as the second order learning that facilitates the transition from Model I behaviour to Model II behaviour. In essence this process meant to “learn how to learn”.

Thus, the theoretical apparatus of Argyris and Schön describes problems that can occur in the learning situation, which may hinder or limit the learning of the individuals, and thereby pose a handicap to the function of the group as a whole. Implied in this kind of reasoning is a notion of group culture as an important determinant of group performance, and in this case learning. By accomplishing a change in the governing variables of the individuals, the group (or organisation) can be made to function more effectively and learning be made more productive, enabling the group to work pro-actively with the tasks it is assigned.

6.3.3 Innovation and learning

As can be concluded, innovation and learning alike, can occur in groups/collectives as well as on the solely individual level. It is still the individual who innovates or learns, thus making the individual the principal actor, but adding a social context to the equation suggests that individuals under favourable conditions can contribute to each other’s innovation or learning, thus creating something more than the individual is capable of.

A key factor for innovation and learning, affecting every step of the respective processes, is that of culture. The culture of a given group/collective can be a constraining factor that hinders innovation as well as learning, ultimately affecting the efficiency of the group. Culture may stimulate self-advocacy and thus affect open communication, which leads to a situation in which the group (and the individuals in it) cannot achieve other learning than single-loop, which in essence is constrained to error correction. Having concluded that learning is the basis for innovation, something can be done about changing the culture of the group. In the terms of Argyris and Schön (e.g. section 4.7) the governing variables of the group need to be changed, which can be facilitated by deuterolearning, which entails the group learning about how they learn, thus seeing the erroneous aspects of the situation. If this is done successfully, a situation in which double loop-learning is possible is created. The double loop-learning involves open enquiry into the governing variables of what is being done, that is the actions of the group members, and is facilitated by an open communication between group members.

In terms of innovation, deuterolearning (or what might be construed as deuteroinnovation) means to learn how to innovate, thus making this a parallel process to that of learning how to

learn in general. Hence, to facilitate innovation in the group/collective context, as touched on by Ahmed (1998) and Hurley and Hult (1998), means to strive to change the culture of the group/collective in such a way that it allows for a high degree of space of action, open communication between group members, and openness to new ideas in general. This can be done by the same process as suggested by Argyris and Schön (e.g. section 4.7) described above. Figure 6.3 describes the innovation and learning in the group/collective context.

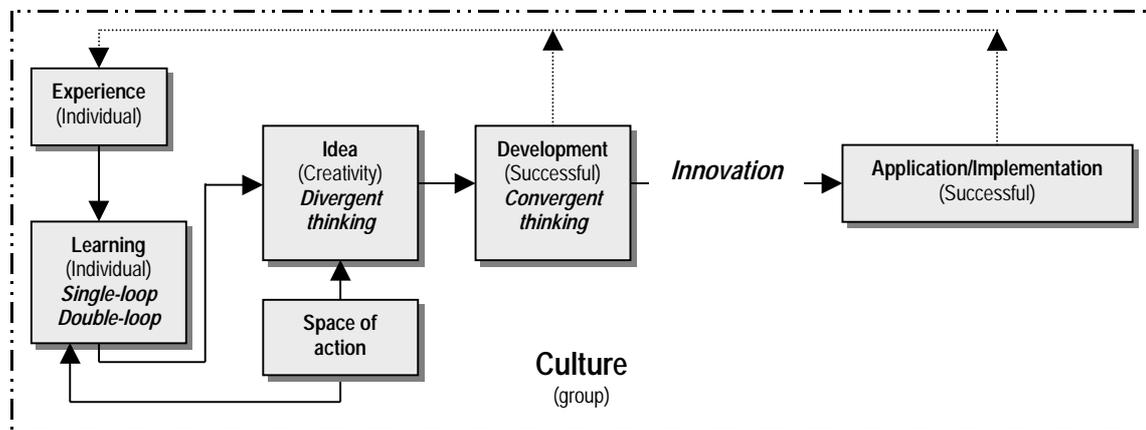


Figure 6.3. A model of innovation and learning in the context of the group/collective.

Added to the picture of innovation and learning in figure 6.3, is the notion of culture, as described above. Also, the notion of single-, and double-loop learning is added as specifying the level of learning. I consider it conceivable for the single-, and double-loop learning to be graded *within* the respective level of learning. Hence, single-loop learning is included in the model as a source for innovation, and should so be, provided it can be defined as leading to an innovation qualitatively different from mere change, that is, an incremental innovation.

6.4 Innovation and Learning - Context of the Organisation

6.4.1 Innovation

The organisational ability to innovate, and thereby renew itself and gain competitive advantages, as commented on by Drucker (1985), were some of the notions pondered in the introduction of this text. As concluded by Chaharbaghi and Newman (1996), Qvale (1995), and Drucker (1985), innovation necessarily needs to be seen as a natural part of the organisational activities, and not be construed as on-off occurrences. What are the specifics of innovation in the organisational context? Deriving from Sundbo (1998a), the doings of the entrepreneur/intrapreneur (discussed in paragraph 3.3.1.4 and 6.2), are still the hub around which the possibilities of innovation revolve. In this respect, it can be concluded that for innovation, including idea-generation, idea-development, and innovation-implementation, there is little difference between the different contexts used in the present analysis. The difference seems to lie at what can be done to facilitate innovation in the separate contexts. It seems that, in the organisational setting, the same things that may facilitate innovation, may also hinder it.

As suggested by Cumming (1998), Hurley and Hult (1998), and Ford and Gioia (1995), there are numerous factors that act as influences on the process of innovation. Primary sources that affect the innovation process and its parts, are *culture* as discussed by Ahmed (1998), and

structure, as discussed by Roffe (1999) and Fairtlough (1994). To create an organisational culture that facilitates innovation involves striving for openness towards new ideas (Hurley & Hult, 1998) and focus on inter-personal aspects in the organisation, and not just focus efforts on production. An organisational structure that promotes innovation, as described by Roffe (1999) and Fairtlough (1994), involves the creation of an organisational structure which is characterised by being non-authoritarian, informally organised with a low degree of management control of and over employee activities. At the same time, given the informal structure, arrangements ought to be made for a high degree of co-ordination of the in-organisational information-flow.

6.4.2 Learning

As we have seen, different notions hold that organisations as such can learn (cf. Millak, 1998; Axelsson, 1996; Fiol & Lyles, 1985; Hedberg, 1981). What this learning entails is different forms of information- and knowledge-storage, that are outcomes of the individual learning in the organisation. This is one side of organisational learning. The other is that pointed out by Handy (1995) also supported by Fiol and Lyles (1985), that the learning organisation also can be the organisation that strives for improving the learning of its members, and by this improving performance. As Denton (1998) argues, the individual learning in the organisation, will gradually add to the organisational memory, thereby facilitating learning by the organisation as such.

Denton (1998) also describes a number of organisational factors that aid organisational learning, such as a strategy for the learning within- and diffusion of knowledge throughout the organisation. A flexible structure is also advocated, in which teams and networking are used to promote organisational learning. Further a blame-free culture, in which experimentation and learning is encouraged. A clear vision should be developed that is shared by all members of the organisation, thus making sure that everyone is working towards the same goal. Finally, the organisation should be focused on monitoring its environment, as a way of learning by the actions of others, whilst at the same time making sure that the organisation is in sync with what developments its environment is going through.

Ellström (1992), giving advice on a similar notion focuses more on the individual and its tasks in the work situation, thus advocating some further notions to consider in the strife for organisational learning. Hence, Ellström argues the importance of goal-setting, which involves the co-workers accepting, partaking in the formulation of, and subsequent reflection and critical appraisal of these goals. Furthermore, work-tasks with high learning potential, integrated work-related in-formal learning and planned educational activities, and the necessity of organising for both production and learning, are advocated. Finally Ellström points to the importance of striving to develop an organisational culture that supports learning.

As can be seen from Denton (1998) and Ellström (1992), there are two principal notions that cover the advocated factors to facilitate organisational learning:

- *Culture*, as touched on in the group/collective context, and as described by Lundberg (1996) and Alvesson (1993), has great impact on the learning in the organisation and organisational learning.
- *Structure*, as discussed by Rohlin, Skärvad and Nilsson (1994), through its consequences in terms of the organisation of work in general, will affect learning in ways, drawing on Argyris and Schön (e.g. section 4.7), where more rigid, hierarchical organisational structures (e.g. the mechanic organisational structure) most probably will produce Model I be-

haviour. As an opposite notion organisational structures based on the super-ordinate goals, values and ideologies of the organisation, networking, co-worker dialogue, and low management control, will produce Model II behaviour. The latter will likely facilitate learning in the organisation, and as a result of that, organisational learning.

6.4.3 Innovation and Learning

Deriving from Sundbo (1998a), learning in organisations in terms of innovation, entails learning the actual innovations (conception, development) *and* learning as an organisation how to learn. This organisational deuterolearning, can be a matter for the organisation to solve by developing routines for capturing the knowledge of how to learn, as a built-in process in the day-to-day operations, that is, routines for making the knowledge produced explicit by automatism. The knowledge of how to learn may also come to be the property of the individuals in the organisation, thus making the knowledge implicit, and therefore somewhat harder for the organisation to gain. As Sundbo argues, besides the fact that the organisation must have learning as a goal, it must also, in order to become a learning organisation, seek possibilities for seeing to it that the implicit knowledge is institutionalised in the organisation and not remain the property of individuals. Figure 6.4 depicts the notion of organisational deuterolearning.

Transfer of knowledge can be done, as mentioned, by developing routines for organisational knowledge acquisition. Drawing on Argyris and Schön (e.g. section 4.7), this can also be done by accomplishing an alteration in the way individuals in the organisation act. The situation where knowledge remains individual property at all times, reminds of the Model I behaviour described. Managing deuterolearning in the present case would entail moving from Model I behaviour to Model II behaviour, thus facilitating open communication and knowledge sharing, which then easier can be absorbed by the organisation, than would be that case in a situation characterised by individual self-advocacy.

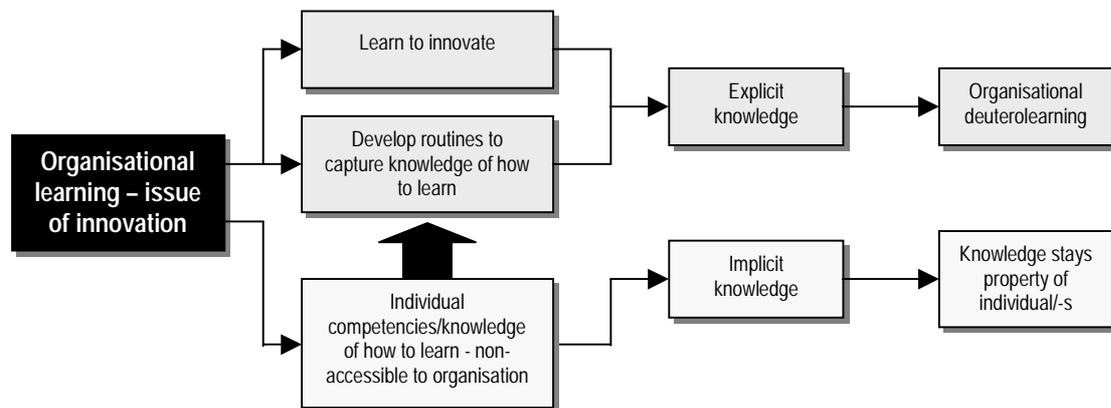


Figure 6.4. The notion of organisational deuterolearning.

As can be seen from paragraphs 6.4.1-2, culture and structure are important aspects of the organisation, not the least concerning the facilitation (or hindering) of innovation as well as learning. It is therefore pivotal for the organisation to work actively with questions pertaining to how organisational culture and structure can be shaped.

Parallel to working with culture and structure, the organisation has the possibility to create opportunities for innovation and learning. One way of doing this was discussed by

Dilschmann (1996) who advocated the creation of *parallel learning structures* (paragraph 5.2), which in essence means the creation of a parallel organisation in which members of the original organisation can experiment with ideas that they have and that they cannot test in the day-to-day operations. To use the concepts just discussed, culture and structure of this parallel learning structure should be designed in an optimal way, creating the opportunities for innovation and learning that perhaps are not possible in the rest of the organisation, given the nature of operations in general. The parallel learning structure can in this way be viewed as an in-organisational attempt to stimulate knowledge creation, innovation and learning.

Knowledge creation, and hence innovation and learning can also be created by the organisation and its members turning to the outside world for assistance. Thus, because the organisations of the modern world cannot develop all the knowledge they need to develop and survive by themselves, they turn to each other for help (cf. Archibugi, Howells and Michie, 1999). This co-operation, as pointed to by Gómez Arias (1995) takes the shape of different kinds of networks, which should be seen as an important strategic asset of and by the organisation. Networks designed to further innovation were described by Fisher (2001) as Systems of innovation, and Learning networks were discussed by Mitra (2000). In reality these notions can be seen as synonymous, in that they both aim at co-operation between different actors, in the creation and diffusion of knowledge, which in turn may lead to the creation of new knowledge or new combinations of existing knowledge. The end results of these processes – innovation and/or learning.

Drawing on what has been discussed in the last paragraphs (6.4.1-3), the now familiar model of innovation and learning (figure 6.5) has been supplemented with the factors discussed as affecting the process/-es in the context of the organisation. Culture, was present at the context of the group/collective, but has now been added the dimension of organisational culture. The organisational structure affects, as we have seen, the culture and the overall operational processes, as well as the processes of innovation and learning. Finally, the intra- and inter-organisational networks in the shape of Systems of innovation and Learning networks, may have an impact on the overall knowledge-creation of the organisation.

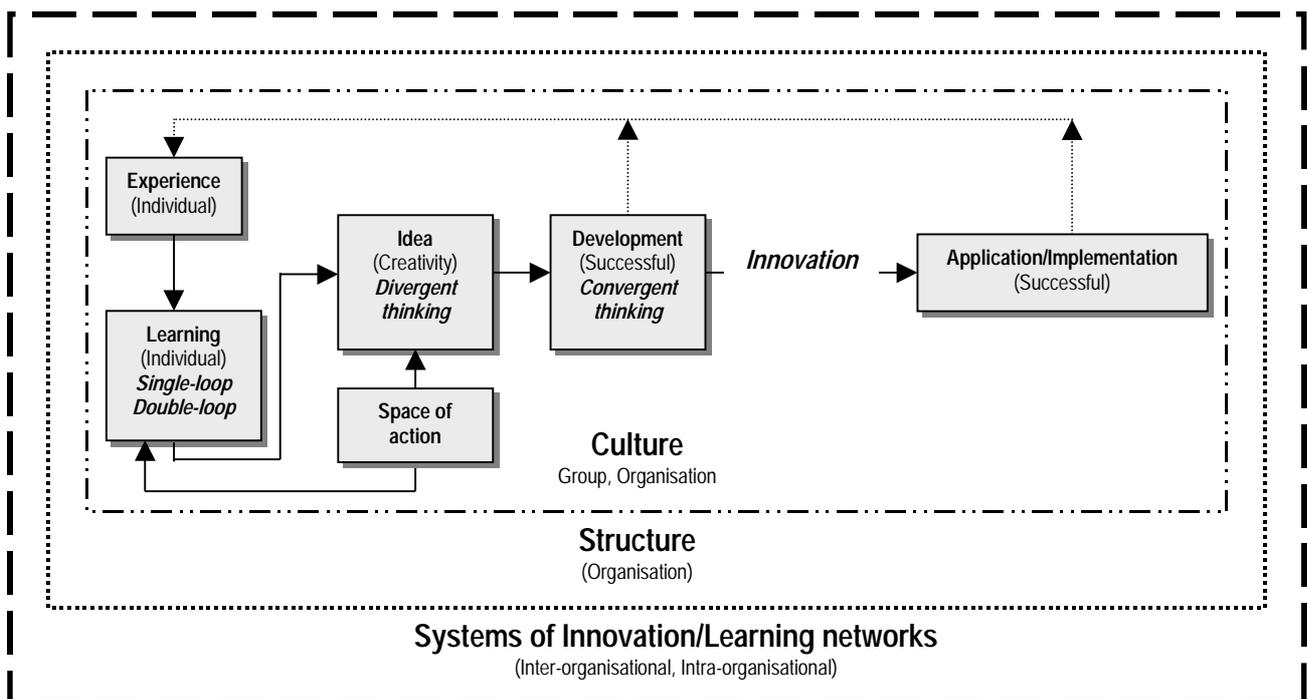


Figure 6.5. A model of innovation and learning in the context of the organisation.

6.5 Conclusions pertaining to the relationship between Innovation and Learning

The following deliberation is to be seen as a brief summary of the main discussion made in sections 6.2-6.4, emphasising some of the principal conclusions, and adding some further notions of the relationship between innovation and learning. This discussion also reconnects to the discussion in the introductory chapter, on competitive advantages.

6.5.1 Comparing concepts

Initially, it should be said that the comparison between innovation and learning is one that I have found difficult to do. It is evident that there are some obvious connections between the two concepts, however these connections are not all that well described in literature. The overall comparison also suffers from the fact that the two concepts describe somewhat related phenomena that have been developed in disparate scientific disciplines. The reason for this making the comparison more complicated is, in my opinion anyway, that in the literature available, somewhat qualitatively different notions are being explained. Learning theorists on the one hand are trying to explain notions of, for example human action, whilst innovation theorists in general on the other hand are attempting to explain development from an economic perspective. Having said this much, the concepts are reciprocally connected, and therefore I still feel that some important conclusions have, and can be drawn, primarily in terms of the process relationship between the two concepts.

Then, what can be said of the relationship between innovation and learning? What parallels and conclusions can be drawn?

6.5.2 Hierarchy of contexts – hierarchy of information

It can be concluded, not surprisingly, since they are all part of the same general situation, that the contexts used to analyse the concepts are interdependent, and overlap each other in literature. The contexts can further be seen as a hierarchy of information, each adding pieces of information to make up the whole that is the relationship between innovation and learning. It is my opinion therefore, that to arrive at conclusions in relation to, for example innovation or learning in the organisational setting, one must examine the problem area on the individual and group levels as well as the organisational level.

6.5.3 Principal contributions of the respective contexts

6.5.3.1 The context of the Individual

As has been concluded, no matter the context, the individual is the principal actor in innovation as well as learning, it is the individual that innovates and/or learns.

Having determined that the innovation process relies heavily on learning as a pre-requisite, and that for the individual to be successful at innovation, a certain set of learning abilities is needed. It was further argued that in the individual context, space of action is one of the most important determinants of innovation by way of learning. Space of action affects learning through the degrees of freedom the individual has to define the task, method, and end-results. At the same time, space of action also affects innovation by the fact that creativity is furthered through the facilitation of divergent thinking.

6.5.3.2 *The context of the Group/Collective*

The major contribution of the group/collective context was, besides adding a social dimension to the concepts, shedding light on group culture as a determinant of innovation, and group culture in the shape of the governing variables, discussed by Argyris and Schön, as determinants of learning in the group setting.

6.5.3.3 *The context of the Organisation*

The context of the organisation added to the discussion the notion of structure, as taken in concert with culture and space of action, acts as principal determinant of innovation and learning. Also, the need for organisations to learn-to-learn, deuterolearning, was discussed. Deriving from this, the principal determinant of organisational learning is its possibility to institutionalise the implicit knowledge of its members, and thus making the knowledge explicit by way of institutionalisation. Table 6.1 shows the different determinants of learning and the different contexts in which they apply.

Level/Context	Determinants of learning
Individual	Experience
Group/Collective	Shared values
Organisation	Institutionalisation

Table 6.1. Determinants of learning in different contexts.

6.5.4 General conclusions on the relationship between innovation and learning

It can be argued that from a learning perspective, innovation is the result of successful learning, whilst from an innovation perspective, learning is one of the pre-requisites of successful innovation.

Deriving from Henderson and Lenz (1996) and Lynn and Mazzuca (1998), innovation can be construed as a process secondary to the process of learning. Hence, innovation in the organisational setting, can be seen as a by-product of focusing on learning in organisations.

As innovation and learning have been described in this thesis, a notion of the secondary nature of innovation to learning, can be seen as being accurate. Even though this is not particularly evident in innovation literature, the innovation process is necessarily preceded by an individual learning process. Learning as a concept, is also a somewhat broader notion than is innovation. Innovation, to be a fact, requires a certain kind of learning, which stimulates the divergent thinking required to generate/conceive ideas.

In terms of innovation, it was concluded that innovation can take two forms or levels, incremental and radical, depending on the degree of novelty the innovation entails. As we also saw, learning can be construed as being accomplished to different levels. Table 6.2 attempts a depiction of the relationships between these different forms/levels of innovation and learning.

Form of innovation	Level of learning and behaviour
Incremental	Lower order learning/Adaptive-oriented learning; Single-loop learning, Model I/Model O-I behaviour
Radical	Higher order learning/Development-oriented learning; Double-loop learning, Model II/Model O-II behaviour

Table 6.2. Relationship between form of innovation and levels of learning and behaviour.

Having made this division, it should be noted that I consider it reasonable to assume that both single-, and double-loop learning can take place displaying different levels, thus single loop-learning could be either mere change/correction of errors, or an incremental innovation, and double-loop learning, can be a radical- or an incremental innovation, depending on the degree of change the altered governing variables take.

To finish off the discussion on the relationship between innovation and learning, and to connect back to the introductory chapter, competitive advantages by learning or innovation, deriving from what has been concluded, appears to require great proficiency in the arts of innovation and learning respectively. In addition, to facilitate the processes of innovation and/or learning, skilful operation of the organisation and factors pertaining to it is also necessary. The relationship between competitive advantages, organisation, innovation and learning, is shown in figure 6.6.

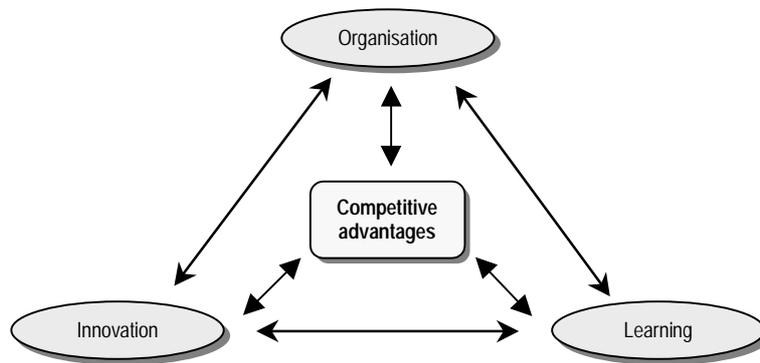


Figure 6.6. The reciprocal relationship between competitive advantage, organisation, innovation, and learning.

In relation to figure 6.6, and as have been concluded earlier, the *organisation* (as such and as organisation of work in a wide understanding, including organisational culture and structure), *innovation*, and *learning* are closely interrelated. To be able to succeed in one requires the mastery of the others.

6.6 Some thoughts on practical implications and consequences

6.6.1 Possibilities for a consequential discussion

The theoretical nature of this study conveys that conclusions drawn in relation to what might be construed as practice will be somewhat limited in terms of validity. In general terms, it would probably be rather naïve to suggest that theory and practice correlate perfectly with

each other. Having said this, as a result of the deliberation thus far, some *tentative* conclusions can however be drawn.

One of the conclusions that can be made from the discussion of innovation and learning, as was touched on in the introductory chapter, is the fact that both innovation and learning are some of the basic building-blocks of change, and that they in this are both facilitators and catalysts.

6.6.2 Innovation and Learning in concert

Another conclusion based on what has been said here, is that it is not only *possible* in the organisational context/setting to discuss innovation and learning in concert. The concepts are inter-related, and are connected to each other in a way that they in different situations act as pre-requisites of one another. Both innovation and learning, can be construed as being processes as well as end-results, means as well as ends, and therefore should be planned for strategically as well as operatively. Thus, when decisions are to be made or strategies formulated, the concepts *should* be discussed in concert.

6.6.3 Entrepreneurial learning?

As we have seen, because of the inter-relatedness of innovation and learning, and that learning is a pre-requisite of innovation, it might be a good idea to reconstruct the classical models of the innovation process (cf. Rogers, 1995; Cummings, 1998), by adding learning as an initial point of departure. Even though this is a theoretical reconstruction, it might be somewhat more in sync with what is to be construed as practice. To sum up the discussion on innovation and learning in concert, it might be pregnant to talk of *entrepreneurial learning*. This concept should hold the notion of learning as a pre-requisite of innovation, thus making learning the basis for the creation of new value, subsequently adding to the competitive powers of an organisation.

The issue of entrepreneurial learning would not just be a way of more accurately describing the innovation process. It would also be a way of describing a certain learning process, learning for innovation, which in particular focuses in on the notion of divergent thinking.

Hence, the processes of learning and innovation could, at least in this respect, be seen as *one* process. This is a notion that requires some more thought, but as it stands it could be a one of the viable solutions to the fuzzy boundaries between the concepts of innovation and learning in colloquial language.

The use, or misuse of these concepts in everyday life, which I have touched on a few times in the course of this text, may seem like a matter of little concern in terms of consequences. However, connecting back to what was said in the introductory chapter of the need for renewal and change, and the organisational strife for competitive advantages, much work and resources are put into facilitating innovation as well as learning. My opinion is that, to invest time and capital in these processes, it is of some importance to initially determine what is actually invested in, and in the case of the concepts discussed here, what do they *actually* entail and what is the relationship between them.

In the ideal situation, the diffused knowledge about the concepts of innovation and learning in concert and their interdependence, could come to ameliorate the use of the concepts as such, and thereby facilitate better planning for the execution of these processes, or *process*.

6.7 Some final notes on choice of method and further research

6.7.1 The chosen method of enquiry

As I look back at the *modus operandi* used to conduct this study, I consider it hard to find an alternate way of doing things, that would better serve to fulfil the purpose of enquiry and attempt to offer answers to the stipulated research questions. I base this stance on the fact that what I set out to study were theoretical relationships, rather than concepts in practice. The study therefore had to concern itself with literary sources, and not empirical manifestations of the respective concepts.

When conceiving the idea of conducting a study like the present, my original notion of what the study should encompass, was the perhaps somewhat more philosophical aspects of the respective concepts, focusing solely on knowledge as a common denominator of the two areas. Due to the nature of the literature available, and in order to offer a somewhat comprehensive discussion of innovation and learning, respectively and in concert, I have had to stray somewhat from this initial intent (as described in 3.1). In order to discuss the relationship between innovation and learning in some detail, I have found the contexts discussed here to offer the most structured and rich view of what innovation and learning, and the relationship between them entails.

As may be evident by now, with respect to theories, in my mind there are basically two ways of conducting a *theoretical review* and subsequent analysis. One is to scrutinise *singular* theories and discuss their internal pros and cons. The other, to which I like to adhere my efforts, is one where the singular theory is of subordinated importance. Rather, the connections and correspondence between *different* theories, is what is truly interesting, if possible between theories *spanning the boundaries* of academic disciplines. Also, and I think this is an important point to make, of great importance is the presumptive practical uses of such inter-disciplinary investigations. Personally, I consider this to be an important source of “new” information, and possibly a well from which new knowledge can spring.

As was touched on in the introductory chapter, some aspects of the different theoretical notions described in this thesis, may have come to be overly simplified, whilst others may have come to be described to an extent that might seem excessive. The reason for this, amongst other things, will also have to be attributed my foreknowledge and subsequent interpretation of the area, shaping what will be dealt with and how it will be dealt with. That is, what is described in this text is my interpretation of the area, which reflects my apprehension, my values, and my foreknowledge of the area, which then in turn has been reinforced or weakened in different areas, as the study has progressed.

The use of theoretical/literary sources poses some particular problems. One problem is the fact that in attempting to make an analytical comparison like the one in the present study, the deliberation will at times suffer from the fact that different aspects of the theoretical area are more or less undeveloped, which has been evident in the present case.

What complicates the process somewhat, and adds to the amount of work required, is partly that the dialectical process induced by the hermeneutic approach, becomes somewhat complicated by the enormous amount of sources that need to be examined. The dialectical process in itself, also becomes a bit strenuous by the fact that, in this case, two rather well researched areas of sciences must be compared. This of course adds to the total workload, while it at the same time adds a certain stringency to the dialectical process, since it requires the creation of meaning in two “directions”, partly intra-conceptually, and partly inter-conceptually.

Also, to gain some stringency in the discussion of some of the different theoretical notions, I have had to lean quite heavily on a limited number of authors, which might pose a problem in terms of the deliberation offering a fairly one-sided picture of the theoretical area. I have found this to be the case, foremost in the area of learning, which has come to have a quite evident focus on the actor (leading to an agency perspective), through the theoretical offerings of primarily Argyris and Ellström respectively. The rationale for utilising the theories of these authors as extensively as has been done is, as mentioned to attach stringency and depth to the discussion, and is therefore warranted in my opinion.

Further, the utilisation of a hermeneutic approach involves the risk of me misinterpreting the authors’ intents. It also encompasses the risk of the texts used having faults of one kind or another attached to them. In addition to the risks attached to the interpretation of the intention and meanings of the texts themselves, there is also the issue of translation to consider. In using Swedish as well as literature in English, some problems in terms of translation must be considered, or at least kept in mind. *Firstly*, since my mother-tongue is Swedish, some parts of what has been read in English, inevitably has been translated into Swedish for comprehension, and then back into English. Some notions may get lost in this process. *Secondly*, There is the issue of Swedish authors, using English speaking sources, and translating them into Swedish. Intents and meanings may get lost here, resulting in me getting a less than complete picture of the area, whilst using these Swedish sources in my own work. These are aspects that I have tried to control by minimising the translation back and forth between English and Swedish, instead using English as the primary language at all stages in the work with my thesis. Also, as far as possible and whenever deemed needed, I have tried to corroborate what has been said in books by Swedish authors, by also taking in the English speaking sources.

As a design note: The division between the different chapters, in terms of the number of pages allocated to each, might be seen or apprehended as somewhat askew, indicating that different weight has been attributed the respective theoretical areas. This is not the case though, the reason for the different number of pages allocated to the separate theoretical areas having its basis in the characteristics/nature of the areas themselves. Not to simplify, but to clarify, it is my opinion that the community of researchers on the concept of innovation have a somewhat more homogenous view on what innovation entails, than do the researchers in the field of learning. In other words, the concept of learning in theoretical terms, is a concept that is interpreted somewhat more disparately by its society of researchers, than is the case with innovation. Therefore, to describe the respective areas with some stringency, learning theory requires more space. Also, the study at hand is a thesis written sporting a pedagogical purpose, the overarching focus of the study being on pedagogic aspects, which would warrant additional effort being given to the notion of learning.

6.7.2 Suggestions for further research

In my opinion the area of research concerning innovation and learning in concert has only been touched on in literature. Even though some studies have been conducted, much work is still needed. Personally, I agree with Sundbo (1998a;b), in the opinion that the theoretical apparatus of the area is weak, not to say very weak. Suggestions for further research necessarily therefore entail some basic empirical research and theory development.

An integrated theory of innovation and learning is needed, taking into account individual, group, as well as organisational aspects. This theory should also further examine and explain the concepts of innovation and learning – as concepts. It should also further develop a discussion of the concepts on the dimensions of means – ends, and process – product, since this can have great implications for practice in the organisational arena. The point being, that organisations may use any conclusions made to further strategic and operational aspects of their operations by being able to work proactively with issues of innovation and learning. Since one of the principal goals of an organisation is to develop competitive advantages, this should be of great interest and use.

How this can be done is a somewhat problematic question. My suggestion would be to empirically study, for an example project teams, and in doing this, focus on individual and group learning, and subsequently study the consequences this has on the organisational level. Determining the level of learning, can then lead to a possibility of deciding whether innovation has been accomplished, which could point out the direction for further studies of the sources and nature of the relationship between innovation and learning, and how these can be facilitated.

Another way to conduct a study of this area, would be to limit the focus of what is being studied, and thus focus solely on *one* of the contextual areas/levels discussed in the present study, the individual, the group/collective, or the organisation. Hence, imposing further delimitations might contribute to a somewhat more narrow view of the area, but might also give more depth to the deliberation.

As a parting remark, my intention here has not been to “*write the last text ever needed on innovation and learning*”, rather my intention was to create a theoretical framework for a further discussion of the problem area. It could be argued that the utilisation of a hermeneutic approach also implies that the results of this study describe the first part of the acronym “*This is my truth - tell me yours.*” Since the writing of a text like this thesis necessarily involves one-way communication, it can only be my hope that the second part of the acronym will be fulfilled by this thesis inspiring the presumptive reader to contemplate and perhaps further investigate the problem area. Thus, it is my hope that I have been able to add something to the discussion on the concepts of innovation and learning in concert. It is also my opinion that this discussion needs to continue, on theoretical as well as practical levels.

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