

3 LITERATURE REVIEW ON ISD PRACTICE AND LEARNING

3.1 Introduction

This third chapter presents a review of literature on ISD practice as well as learning, which are the two central themes for this research study. Firstly I begin by looking at the historical evolution of ISD globally identifying factors that have influenced those changes over time. This analysis is important so as to inform the (local) historical analysis of ISD practice as suggested by Engeström (2001). The aim is to try and understand local historical changes to practice as set against the global context.

In the second part of the chapter I present a discussion on learning which begins with an examination of Rogers (2003) and Malcolm et al., (2003) heuristic model of learning that distinguishes between ‘conscious’ and ‘unconscious’ learning. I have adopted this heuristic model to analyse retrospectively the effectiveness of learning in current Botswana ISD practice. The section then moves on to look at the situated learning theories of Lave and Wenger (1991) and Engeström (1987). The discussion on these two representative (situated learning) theories leads to a conclusion that Engeström’s expansive learning theory is most suited for this study and is therefore selected for the analysis of learning during the review and redesign of current ISD practice. Two examples from literature where Engeström’s ELT was used in similar research have also been included in this section.

3.2 An Activity based view of Information Systems Development (ISD)

What is information systems development? Goulielmos (2004) who in reacting to IT systems failures states:

*‘... ISD should be seen as more than a technical activity. Rather it should be understood as a **complex social activity** that is influenced by the organisational context in which it takes place...In practice a variety of practitioners are involved in ISD. These people are described by using different terms – including analysts, programmers, developers, consultants, IT practitioners, and ISD professionals(Bold – mine for emphasis).’ (Goulielmos, 2004, p. 14)*

This definition by Goulielmos also emphasises the fact that ISD is not just a technical activity, but rather that it is a socio-technical activity. It further highlights the heterogeneity of the activity as shown by the heterogeneous nature of the social actor's involved.

According to Mathiassen and Puro (2002, p.84), 'Curtis et al (1998), for example, saw the (information systems) development of computer-based systems **as a learning, communication and negotiation process** (boldness included for emphasis), calling for environments to become a medium for communication to help integrate people, tools and information. Waltz et al (1993) recommend active promotion of acquisition, sharing and integration of knowledge between team members'. This definition introduces an interesting element / dimension of learning to the socio-technical nature of ISD.

Korpela et al. (2002), on the other hand, emphasise the process aspect of ISD as well as include the fact that ISD should also be considered as an activity in CHAT terms:

'... the process by which some collective activity is facilitated by new information-technological means through analysis, design, implementation, introduction and sustained support, as well as process management.' (Korpela et al., 2002, p.115)

In summary, these definitions highlight several key elements of ISD, namely, that it is a social (and collective) activity that involves a number of practitioners and social actors i.e. different user groups, analysts, programmers, developers, consultants, IT practitioners and ISD professionals. Furthermore, that is a learning, communication and negotiation process that involves analysis, design, implementation, introduction and sustained support, as well as process management that is intended to integrate people, tools and information within a given organisational context. The learning aspect that the Curtis *et al* (1998) definition (as found in Mathiassen and Puro (2002)) brings into the definition of ISD is particularly relevant to this research, since the focus is on the learning that takes place within ISD projects. I wish to refine the definition of ISD as provided by Korpela et al (2002) and use the refined version for this research i.e. ISD is,

*'... the process by which some collective activity, **with a learning impetus**, is facilitated by new information-technological means through analysis, design, implementation, introduction and sustained support, as well as process management **to integrate people, tools and information within an organisational context.**'*

The application of this definition will become clear in later chapters as a new ISD activity with learning as an objective is designed.

3.2.1 **Historical Evolution of Information System Development Practice in General and in Activity Theoretical Terms**

ISD practice like any other process or activity has evolved over the years. The evolution has been influenced by a number of factors including technology evolution (e.g. from centralised mainframe systems to client-server and now n-tier environments; the ever increasing hardware processing and storage capacities; the change from character based interfaces to GUI and web-based interfaces; the WWW etc) and methodology evolution (since ISDMs are intended to organise and guide the work of systems developers). According to Jayaratana (1995) as quoted by Iivari et al., (2000) there were over one thousand (1,000) such methodologies and tools in the 1990s which were intended to improve practice in one way or the other. The number has since increased.

Table 2 provides a summary of the evolution of ISD practice as obtained from Avison and Fitzgerald (1988, 2003), Lyytinen and Welke (1998), Mathiassen and Puroo (2002), Kautz et al., (2007). The summary is presented using four categories the period / era, ISDMs used, technology used, main features of the ISD practice and the social actors involved in the development process. Furthermore, at Figure 8, I have depicted the evolution of ISD practice in terms of who the social actors were for the different eras.

Global ISD practice has evolved from dependence and reliance on programmers during the 1980s when mainframes were the key technology feature for processing to heterogeneous teams comprising of social actors with varied technical and other business related skills. The major technology driving force in the current scenario is the internet with its potential for developing web-based applications as well as the proliferation of

package based solutions and thus reducing the need for bespoke development. This according to Kautz et al., (2007) has resulted in the development and use of agile methodologies or Rapid Application Development (RAD) methodologies that reduce development time and cost as well as lead to more meaningful learning by users.

In activity system terms, what has changed over time are the tools used, subjects and maybe even the rules, community and division of labour. The changes in tools resulted from the proliferation of methodologies since the early 1970s. And with changes in methodologies there have been changes in the subjects or social actor's involved. From the 1970s onwards there was more emphasis on the role and involvement of users in first of all specifying their requirements and later on in testing the final product. The rules changed as a result of the use of methodologies and the social actors that now needed to be engaged – new rules were introduced in order to provide 'structure' to the ISD process.

In chapter 6 when presenting the historical development of ISD practice in Botswana, I will analyse whether any of the areas as identified here have had the same influence on local practice i.e. looking at how the methodologies used, technology, main features of practice and social actors have changed over time in Botswana and how these changes compare with practice globally!

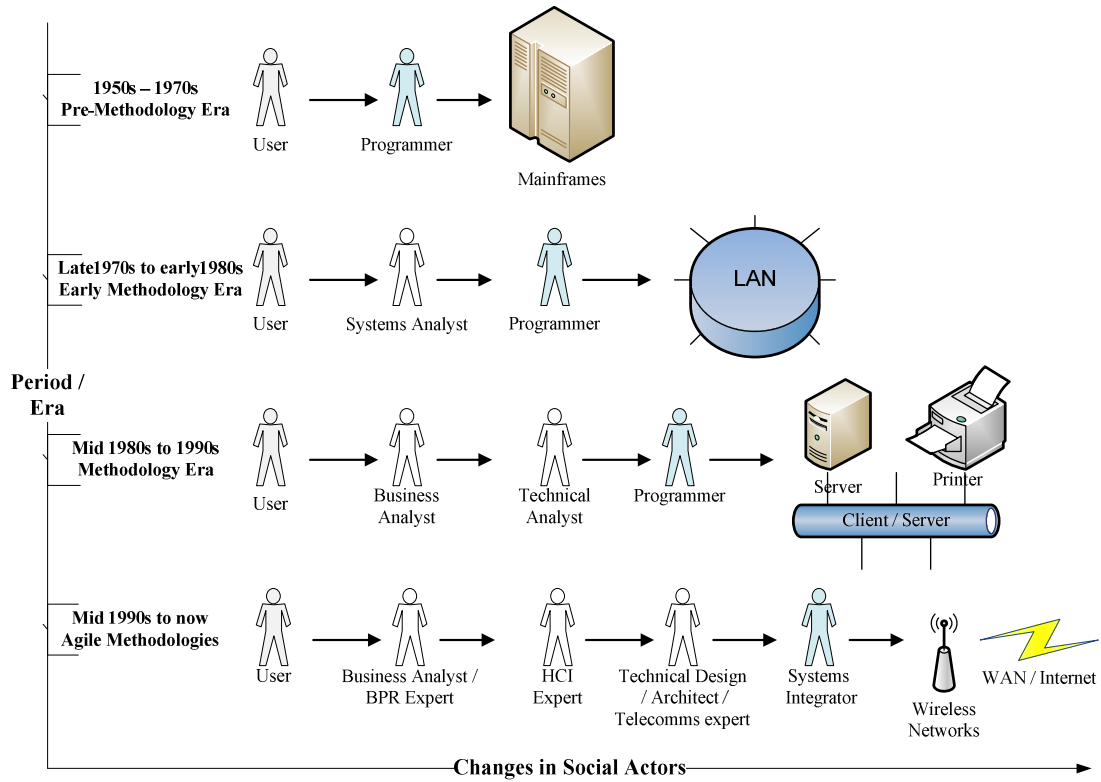


Figure 8: ISD Historical Evolution - Social Actors & Technology Changes (Adapted from Avison and Fitzgerald (1988, p. 11))

Table 2: ISD Practice Evolution by Time Period

ERA	ISDM / Tools	Technology & Types of Applications	ISD Practice	Social Actors / Subjects
1950s to 1970s - Pre Methodology Era	No explicit or formalized methodology in use There were limitations in terms of the tools use to mediate and transform the object	Mainframe-based computing; Batch processing & databases Mainly bespoke operational systems	No user involvement; Programmer driven development; No analysis and specification of user requirements; Little or no documentation; No documentation standards; High reliance on programmers Very little interaction between the programmers activity system and the users	Programmers Very few voices
Late 1970 and early 1980s - Early Methodology Era	Use of the Software Development Life Cycle and Waterfall Model Methodologies now introduced as mediating artefacts	Distribution; PC's; LANs; Graphics; Expert Systems; 4GL New technology now available as additional mediating artefacts	End-user computing and collaboration between professionals Still not much interaction between users and IS professionals but instead more interaction internally within each activity system The use of methodologies also brought about changes to the rules	Users; Systems Analysts; Programmer – with database design skills; Operator More social actors involved with varied skills brings in additional voices and

ERA	ISDM / Tools	Technology & Types of Applications	ISD Practice	Social Actors / Subjects
			and communities involved	perspectives
Mid 1980s to 1990s - Methodology Era	Widespread use of methodologies e.g. Structured, Information Modeling, Sociotechnical, Interactionist approaches etc. Iivari et al (2000) A wider selection of methodologies was now available for selection and use as mediating artefacts	Client-server based architecture	Bespoke development using various ISDMs	User; Business Analyst; Technical Analyst; Programmer; Operator A further expansion of the actors introduces more network of activities and more voices
Mid 1990s to now	More reflection of methodologies used; the use of Agile methodologies as suggested by Kautz et al., (2007); This includes the period that Mathiassen and Puroo (2002c) term the	n-tier based architecture and Internet-based technology platform; Wide-spread availability of package solutions	Customisation of 'off-the-shelf' solutions Integration of multi-media and component based applications; Most parts of the development process is outsourced; Web-based development	User; Business Analyst / BPR Experts / Change Management Experts Technical Analyst / Artists / Telecomms experts; Programmers / System Integrators; Operator

ERA	ISDM / Tools	Technology & Types of Applications	ISD Practice	Social Actors / Subjects
	InterNCA era More methodologies which have been influenced by the emergence of the internet			An even broader expansion of network of activities and social actors

3.3 Learning

'O! this learning, what a thing it is. - W. Shakespeare, The Taming of the Shrew' (Sfard, 1998, p.4)

In this section on learning I provide a theoretical analysis on learning theories and concepts adopted for this study. A review of literature led me to a highly relevant discourse on two types of learning (i.e. formal and informal) that according to theorists (Rogers, 2003; Malcolm et al., 2003) are found in any learning environment or social setting. The interrelationship between the two has a major influence in the nature and effectiveness of learning in any situation (Rogers, 2003; Malcolm et al., 2003). I found the heuristic tool developed by Malcolm et al., 2003 which is based on attributes of the two types of learning useful in analysing the effectiveness of learning in current ISD practice because it does not lean towards any specific learning theory. In the first part of this section I present concepts related to effectiveness of learning that apply to the heuristic tool that I used to assess the extent to which the current Botswana ISD practice provides opportunity for effective learning.

The second aspect of learning that is relevant occurs during the collaborative redesign effort of current practice. In this regard I discuss situated learning theories that have been used in situated learning research similar to this one (Engeström, 2001; Boud and Middleton, 2003; Schulz, 2005; Daniels et al., 2007) i.e. Lave and Wenger's (1991), legitimate participation practice theory (which I will from now on refer to as LPP) and Engeström's (1987) expansive learning theory (which I will now refer to as ELT). I conclude from the discussion of Lave & Wenger's LPP and Engeström's ELT, that Engeström's ELT is not only relevant and appropriate for this study, but that it provides a much detailed and more easily applicable framework of analysis and hence I adopt it for use in this study.

I conclude this section by presenting two examples from literature where Engeström's ELT has been used to analyse learning. The two examples are representative of application of ELT in ISD as well as in a co-design project between government and industry which have similarities to this current study.

3.3.1 A Heuristic Model for Analysing Learning in Current ISD Practice

According to Merriam and Caffarella (1991, p.23), learning is a complex topic that ‘... *defies easy definition and simple theorising*’. It (is a theme that) has fascinated thinkers as far back as Plato (who is associated with rationalism and cognitive psychology) and Aristotle (who is associated with empiricism and behavioural psychology) and much of the research conducted today by psychologists and educators has been influenced by their thinking.

According to Merriam and Caffarella (1991) there are different learning traditions or thinking about learning each of which may include numerous learning theories. The value of these learning theories is, according to Merriam and Caffarella (1999) citing the work by Hill (1977), to 1) provide a vocabulary and conceptual framework for interpreting the examples of learning that we observe; and 2) provide pointers as to where to look for solutions to practical learning. Rogers (2003), on the other hand believes that the reason for the existence of different learning theories is a confirmation that learning involves an interaction of a number of elements i.e. the learner, context, process and the learning task or content of learning. He states:

‘It is this fact – that learning involves a complicated interaction between a number of elements – which accounts for the number of different schools of learning theories such as behaviourist, the cognitive, the humanist, the social learning theories etc. each of them stressing one or at most two of these different components.’ (Rogers, 2003, p.13)

Rogers (2003), who believes that as human beings we learn all the time, argues that there is not just a single learning theory (i.e. behaviourist, cognitive, humanist, social learning) that explains learning, but instead distinguishes between two kinds of learning. He traces the argument for there being two kinds of learning from the works of Dewey as cited by Snook (2001), Freire (1972), the Organisation for Economic Cooperation and Development (OECD), and others. The distinction between his two types of learning is mainly based on the work by Krashen (1982), Vygotsky (1996), Hatch (1978) and others in their study of the development of language skills where two ways of learning a language are identified i.e. ‘acquisition’ (i.e. natural learning as demonstrated in the children’s learning of first language) and ‘learning’ (i.e. formalised learning as exhibited in the learning of a subsequent language in a formal setting such as in school). Adopting this distinction, Rogers (2003), therefore distinguishes between two types of learning, ‘acquisition learning or informal learning’ and ‘formalised learning’ which he calls ‘task-conscious learning’ and ‘learning-conscious learning’ respectively. Malcolm et al., (2003) in their study where they sought to clarify the

meanings and uses of such terms as formal, non-formal, and informal learning found the same distinction being made in the 250 texts that they surveyed.

According to Malcolm et al. (2003), different authors offer a number of different but somewhat similar factors that distinguish formal and informal learning. The distinguishing factors provided by Rogers (2003) are that, acquisition learning is concrete, immediate and confined to a specific activity and therefore highly contextualised. Acquisition learning is also described as unconscious or implicit learning where the learners are not always aware that they are learning anything beyond the task at hand. Instead they are more focused on completion of the task and hence the name 'task-conscious' learning. As a result of its unconscious nature, acquisition learning may result in the accumulation of tacit knowledge or experience because of its subordination to some other activity. Acquisition learning is associated more with practical knowledge rather than theoretical knowledge because of its concern with the immediate and the concrete, and it involves imitation and play as well as exploration and discovery learning

On formalised learning Rogers (2003) states that:

'Formalised learning is very different from acquisition learning. As a learning of a language through formal instruction indicates (Krashen 1982), it is more concerned with general principles, with commonly accepted rules (grammar etc.) – it is decontextualised, applicable across a number of different contexts, and the learning processes also differ'. (Rogers, 2003, p.22)

In formalised learning, learners are conscious of the learning that is that they are engaged in a learning task / activity or the task at hand is learning such as in schools (Davydov, 1999; Rogers, 2003; Malcolm et al., 2003). Formalised learning is facilitated and structured learning where the facilitator's role is to help make conscious the subconscious or task-conscious learning of the acquisition process and thereby enhance the learning. Both, acquisition learning and formalised learning may be found in both formal and informal settings and about this Malcolm et al (2003) state:

'Our analysis strongly suggests that such attributes of formality / informality are present in all learning situations, but that the interrelationship between such formal and informal attributes vary from situation to situation.' (Malcolm et al., 2003, p. 315)

Learning theorists argue that both kinds of learning should be usefully brought together in different mixes in order to facilitate the most effective kind of learning (i.e.in both formal and informal settings) because each has advantages and disadvantages.

Formalised learning assists learners with the externalisation and sharing of tacit knowledge (i.e. making that which is internal external) as well as allowing for generalisation and application of concepts to new and different contexts which therefore forms the foundation for critical analysis. Acquisition learning, on the other hand facilitates the development of tacit knowledge and comprehension which we use to complete tasks. But for this tacit knowledge to be used more purposefully we need formalised knowledge because, according to Rogers (2003, 35) ‘... the knower doesn’t know what they know and therefore cannot express it...’ About this Engeström (2004) states:

‘It is subterranean learning that blazes embodied and lived but unnoticeable cognitive trails that serve as anchors and stabilizing networks that secure the viability and sustainability of new concepts, models and tools, thus making the divided multi-organisational terrains knowable and livable’. (Engeström, 2004, p. 137)

Acquisition knowledge is also considered to be at the core of the development of individually preferred learning styles e.g. to be activists or reflectors, to be theorists or experimenters. It, however, can also create barriers to learning, one of these barriers being the self-horizon syndrome (“I’m not a science person –can’t think in that way”). Furthermore, acquisition learning has been found to be less likely to lead to critical reflection on experience than formalised learning. The conclusion therefore is that a combination provides the benefit of the advantages of both while at the same time compensating for limitations of either. Rogers (2003) makes the point that bringing in formalised learning into acquisition learning should be an objective of learning facilitators. He states:

‘To engage in task-conscious learning through specific activities (tasks) alone without making conscious the conclusions which such exercises demonstrate is to render these activities (despite all the acquisition learning accomplished) less than fully effective.’ (Rogers 2003, p. 36)

I agree with this point completely as it actually fully captures my concerns on the effectiveness of learning in current Botswana ISD practice. The practice should not just be concerned with the end-product, but also the learning that takes place during the development of the product. Furthermore, there should be opportunities provided during the development process for critical reflection on the learning that takes place.

Malcolm et al. (2003), further argue that it is important to be able to recognise and identify these attributes of formality / informality in any learning situation and therefore understand their implications. It is in identifying and knowing them that one is able to ensure the

appropriate balance between them to enhance effective learning. They therefore propose a heuristic model / device categorised into four main areas (i.e. Process, Location and Setting, Purpose and Content) to be able to do so. Their characterisation of these four areas is very similar to that provided by Rogers (2003). Table 3 is a summary of Rogers (2003) and Malcolm et al.'s (2003) ideas on common attributes of acquisition and formalised learning which can be used as a heuristic model for analysing learning in any environment. This also includes what is recommended as the ideal for achieving effective learning, which I support. I use this model in Chapter 5, to analyse learning effectiveness in current ISD practice.

Table 3: Acquisition Learning and Formalised Learning Summary

Aspect	Acquisition Learning	Formalised Learning	Recommended Mix of Acquisition and Formalised Learning
Learning Environment / Location and Setting	All life situations, informal environments - contextualised	Schools, formal learning environments - decontextualised	In both formal and informal environments
Learning objective / Purpose	Unconscious of learning but conscious of the task at hand; Work is the activity and learning is only incidental to the activity	Conscious of learning since learning is the task; Learning is the activity.	Should have both unconscious and conscious learning as objective; Whether in formal school environment, workplace or other where we are engaged in a specific task / activity – we must not only be conscious of the task but also be conscious of the learning as we carry out that task.
Content of learning	Practical – concrete and specific, situated learning	Theoretical – general concepts	Combine practical with theoretical
Type of knowledge created	Tacit Knowledge and experience	Explicit knowledge	Integrate and develop both types of knowledge i.e. tacit and explicit
How its achieved	Achieved through play, exploration, and imagination	Achieved through structured learning events	Combine structured learning with play, exploration, imagination and reflection
Method of evaluation	Self assessment; Is not reflective and is less	Evaluation of application of the general concepts;	Combine self assessment with evaluation of

Aspect	Acquisition Learning	Formalised Learning	Recommended Mix of Acquisition and Formalised Learning
	likely to lead to critical reflection on experience than formalised learning; May tend to assist conformity rather than individuation	Allows for reflection	application of general concepts. Also provide for overall reflection.

3.3.2 The Case for Situated Learning for Analysing the Collaborative Redesign effort

This study is concerned with learning at work or in practice, the practice in this case being ISD. I have therefore chosen to take the social / situated learning view to learning as it affords me the opportunity to study learning as an integral part of what we do when developing systems. My concerns as articulated in the introductory chapter are centred on meanings people make as they are engaged in practice, not divorced from it. This unity in the way in which I conceptualise learning therefore points to the use or adoption of situated learning theories for this study.

Situated practice based learning theories grew out of the desire to address, mainly, the dichotomy presented by traditional theories that separate the mind from human action or behaviour. The major premise for these (situated learning) theories is that it is not possible to separate a person's acting from the social environment of the activity itself (Rogoff and Lave, 1984; Lave, 1988; Brown and Duguid, 1991; Chaiklin and Lave, 1993; Lave, 1996; Schulz, 2005). The concern of situated learning theorists is with everyday activity as a social and historical process. They therefore view relations among person, activity, and situation, as a single encompassing theoretical entity – as the unit of analysis (Lave & Wenger 1991, 1996, Engeström (1990, 2001), Brown and Duguid (1991). They argue that situated activity involves changes in knowledge (or knowing) and action, and this is the cornerstone of learning. When we study and analyse peoples involvement in practical action in the world, as this research study is doing, we therefore analyse learning. Learning is therefore considered as participation in practice (Brown and Duguid, 1991; Lave 1993, 1996).

Common premises among situated theorists are based on their disagreement with four specific positions offered mainly by the most dominant learning theory, i.e. cognitive theory (Lave 1993; Brown and Duguid, 1991; Schulz 2005). The first and main issue, as mentioned earlier, deals with the separation of learning from other forms of activity and thus the distinction between learning and development. The cognitive theorist's epistemology is that learning precedes development and that knowledge is a collection of real entities, located in people's heads, and that learning is a process of internalising those entities. Situated learning theorists find this position very difficult to explain, because it assumes that '... actors' relations with knowledge-in-activity are static and do not change except when subject to special periods of "learning" or

“development” (Lave, 1993, p. 12). Their view is that knowing and learning is engagement in changing processes of human activity – learning cannot be separated from development since they occur together.

The second issue concerns the limited view about learning being transmission or transfer or internalisation of existing knowledge with no reference to how new knowledge is created and what constitutes “knowing” at any given point and in varying environments and situations. If learning is simply a transfer of knowledge then how does one explain knowledge creation during active engagement in activity? There is ample evidence in literature that knowledge is created during activity (Lave, 1993; Engeström, 1993; Keller & Keller, 1993; Suchman and Trigg, 1993). The major idea behind Vygotsky’s (1978) concept of the zone of proximal development is that people can learn to do things beyond their ‘developmental stage’ through assistance or collaborative efforts rather than individual action and that the collaborative ‘doing’ may result in something completely new. As Lave (1999) puts it:

‘... part of what it means to engage in learning activity is extending what one knows beyond the immediate situation, rather than involuting one’s understanding “metacognitively” by thinking about one’s own cognitive processes. Doing and knowing are inventive in another sense: They are open ended processes of improvisation with the social, material, and experiential resources at hand.’ (Lave, 1999, p. 13)

The third issue associated with cognitive theory is the assumption that processes of learning are universal and that both knowledge and those acquiring the knowledge (i.e. the learners) are homogeneous. The basis for disagreement with this position is based on the fact that different actors are engaged in activity together and there can be no two actors who are the same in activity – in fact actors bring their individuality, culture, ‘knowing’, and motives into activity. Therefore there is no homogeneity of knowledge and learners according to situated theorists. The conclusion therefore is that learners and knowledge are heterogeneous and not homogeneous as suggested by cognitive theorists.

The fourth and final issue where situated theorists have a different view on learning is concerned with what is termed the ‘failure to learn’. Traditional theorists attribute the failure to learn to the inability or refusal on the part of an individual to engage in learning. But the view offered by

situated theorists is that failure to learn is normal in social locations and processes because of the nature of the tasks and the environment within which the learning occurs (Lave 1993). In such contexts issues such as communication mismatch between the different voices represented in activity could contribute to non-learning (e.g. between patients and doctors as found by Engeström (1993)), and limitations and access for observing and learning from others as described by Hutchins (1993). The context of learning provides different situations which may contribute towards failure to learn and so it cannot necessarily be attributed to an individual's inability or refusal to engage in learning.

In summary, then, the common position of situated theorists on these four issues is that (1) We learn as we engage in activity – learning cannot be separated from activity; (2) Learning is not simply a matter of knowledge transfer from a 'knowing' individual to those who do not know, but knowledge undergoes construction and transformation in activity; (3) Knowledge and learners are heterogeneous – the different actors engaged in activity bring their different 'knowing' into activity and use that to construct new knowledge; and (4) Learning in activity can best be achieved by a focus on the conditions for learning and not on the learner's refusal to learn or effective learning can be achieved through providing a conducive environment for that learning to occur.

3.3.3 Two representative practice based theories

In this section I provide a brief theoretical discussion on two representative practice based theories i.e. Lave & Wenger's (1991) Legitimate Participation Practice (LPP) model and Engeström's (1987) activity theory based model of expansive learning. The selection is based on the fact that they are the two most prominent in current discourse on practice based learning (Brown and Duguid (1991), Virkkunen and Kuutti (2000), Lave (1996), Engeström (2001), Jarviari & Poikela (2001), (Bould (2001, 2003), Billet, Bould & Solomon (2003), Bould and Middleton (2003), Schulz (2005), Daniel et al., (2007), Hill et al., (2007), Engestrom and Sannino (2010), and that they offer interesting alternatives to studying learning in practice. Furthermore, though both are based on Vygotsky's concept of mediation and agree on the concept of collective as opposed to individual activity, they offer contrasting and interesting views on the unit of analysis i.e. community of practice vs. network of activities.

Engeström (2001) provides useful guiding questions to structure the generic understanding of theories on learning. I have adopted these questions for the theoretical review of the two learning theories i.e. Lave & Wenger's LPP theory and Engeström's expansive learning model. The questions that will guide the discussion are, therefore, as follows:

- (1) What is learning according to the theory?
- (2) Who is learning?
- (3) What triggers the learning – Why are they learning?
- (4) What is learned or what is the content of learning?
- (5) How do they learn - How is learning achieved?

3.3.4 Lave and Wenger's – Legitimate Peripheral Participation

Lave and Wenger (1991) developed their theory on learning as situated practice based on their study of Vai and Gola tailors' apprenticeship in Liberia, West Africa. This was an ethnographic study that was carried out during the period 1973 to 1978. The study was prompted by their disagreement with Scribner and Cole's (1973) two sided model of formal/informal education. The first concern had to do with the common characterisation between formal / informal education where formal "out-of- context" education or learning was viewed to take place in schools or formal settings and informal "context-bound" education was viewed as taking place in informal places (or workplaces), the former being viewed as having positive value or being the hallmark of good learning and the latter being viewed as having negative value.

The second issue of concern, in terms of the position held by cognitive theorists, was that creative activity and production of new "knowledge" could only happen in formal learning environments i.e. schools. Other forms of learning e.g. apprenticeship were said to only reproduce existing practices, with no new "knowledge" being created. After extended periods of observation during the field study, Lave and Wenger (1991), Lave (1993) concluded that the learning that took place during apprenticeship was much more complex than originally thought and conceptualised by cognitive theories. The learning was beyond the reproduction of existing practices with the possibility of new knowledge being created. It included much more than just learning the practice of making trousers. It included, amongst others, the learning of relations among the major social actors i.e. clients, masters, other apprentices; the learning of the different

trouser needs of their clients by social categorisation; and learning how to grow and mature as they became masters in the craft of making trousers.

Legitimate Participation Practice is said to be an analytical tool for,

‘... understanding learning across different methods, different historical periods, and different social and physical environments ... It makes the conditions of learning, rather than just abstract subject matter, central to understanding what is learned’ (Brown and Duguid, 1991, p. 48)

Learning according to this model is from an insider view, as part of participating in a community of practice (CoP). Knowledge is not transferred and learners do not construct abstract, individual knowledge. Instead, learners learn how to function in a community e.g. of tailors, lawyers, information system professionals, information system users, midwives, etc and hence adopt that community’s culture, norms, subjective viewpoint and language (or terminology used in the craft!). The knowledge they acquire relates mainly to the ability to behave as a community.

According to LPP, learning is therefore best understood in terms of community formation and changing personal identities, the central concern being learning how to become a practitioner rather than learning about practice. This is achieved within the community of those that are engaged in that practice. Another key concept in LPP is that of how newcomer’s participation could legitimately grow in from the periphery as a result of developing understanding of the community social relations. Therefore, the most important aspect of learning is to provide the newcomer access to the community so as to legitimate their participation (Brown and Duguid, 1991; Schulz, 2005).

What then are highlighted in terms of Lave & Wenger’s theory by Engeström’s guiding questions posed earlier?

1. What is ‘situated’ / practice learning according to the theory?

Learning is being part of a community of practice and learning how to become a practitioner. Learning is a process that takes place as a result of participation in a

community of practice and not in an individual's mind. Learning in this context is mediated by the different perspective as offered by the different participants.

In ISD, for example, a community of practice could be a group of users or developers. The interests of a group of users could be in learning how to use a specific module or system functionality. Therefore a user would learn through participation in activities that are carried out by that group. The situatedness of the learning would therefore be in participating in the group activities.

Another example would be that of the ATIG (Activity Theory Interest Group) who are a community of practice whose interest is in sharing knowledge about activity theory and its application. The learning that takes place within the ATIG is therefore situated and is specific to a particular subject, in this case activity theory. Participants learn by belonging to the ATIG and not outside it.

2. Who is learning?

'It seems that the tailors and law participants, as subjects, and the world with which they were engaged, mutually constituted each other.' (Lave, 1996, p. 157)

Learning is by the community (i.e. the tailors, their masters, and clients) and not just the individual participant and as such the learning is distributed among coparticipants. In an apprenticeship, for example, the community of practice may comprise of apprentices, young masters who themselves have apprentices, and masters who may have apprentices that have become masters. Participation in practice takes greater supremacy than individual transformation, for it is in participation that the learning occurs. Though the individual participants are also transformed, the community of practice reproduces itself through the formation of apprentices and is thus also transformed (Lave and Wenger, 1991). In LPP, knowledge resides in the community of practice and thus it is the CoP that learns.

According to the LPP theory then, in a school context, learning would be distributed amongst all the colearners which in this case would be a group of students studying the same subject. But this learning can only occur if the teachers, students and other participants participate fully in the learning activity. In a work / organisational setting, learning would be by all those that participate in a specific work activity / process and again the learning would occur with increased participation by individual participants. In a workplace those that learn would be those informal groups that are bound together by a shared expertise and passion for a joint enterprise e.g. engineers engaged in deep water drilling, consultants who specialise in management of IT project, or receipting clerks in a large water utility. These groups would therefore learn from the sharing of knowledge and experiences e.g. for the managers of IT projects they could share on how to ensure comprehensiveness in user acceptance testing. Through this sharing members of this community would learn about how to improve on their skills of managing IT projects.

3. What triggers the learning and why are they learning?

'The telos of tailors apprenticeship in Liberia and the legal learning in Egypt was not learning to sew or learning texts, not moving towards more abstract knowledge of the law or separation from everyday life into specialisation of production skills or special generalisation of tailoring knowledge. Instead, the telos, might be described as becoming a respected, practicing participant among other tailors and lawyers, becoming so imbued with the practice that masters become part of the everyday life of the Alley or the mosque for other participants and others in turn become part of their practice. This might even be a reasonable definition of what it means to construct "identities in practice".' (Lave, 1996, p. 157)

Learning is part of a social process of crafting the learner's identities (i.e. of who they are as actors, tailors, lawyers, users, IS professionals etc and becoming more knowledgeably skilled). Learning is triggered, for the apprentice, by the desire to attain or learn some sort of skill or trade e.g. becoming a tailor, lawyer, system user, IS professional and thereby craft their own identity in the community of practice.

In an organisational context what triggers the learning is the desire to do well in a specific skill or trade e.g. user learning would be triggered by their desire to master the use of a specific application.

4. What is learned?

Knowledge in the CoP is not just the technical knowledge of say tailoring or becoming a lawyer, it is also knowledge about relationships amongst participants, the activity itself and other activities that interact with that CoP. Therefore, even though what is learned according to LPP is mainly how to become a practitioner, there is also learning about practice. The contents of learning or the curriculum unfolds as one is engaged in practice and in the case of apprentices they learn more from other apprentices (or their peers) than from their masters because of the distant relationship that may exist between an apprentice and his / her master.

In school what is learnt is not just the specific subject area, but also stuff around the teaching and the learning. Students learn about how the school is run, the relationship between teachers and students, teachers and school management, students and school management. All of these are learned as students are provided the right conditions to learn about what it means to be in a school and to participate in learning.

In an organisational setting participants in a CoP would not just learn a specific skill or trade, but, depending on the learning conditions, they would also learn about the processes involved e.g. in ISD the learners would learn about the ISD process, in addition to learning how to use specific aspects of the system.

5. How is learning achieved? How do they learn?

Learning is achieved through participation in a CoP, and an individual learner moving from the periphery to the centre of the CoP as one begins to understand the social relations and culture of the practice. Being a legitimate participant in a CoP for an extended period of time provides learners with opportunities to make the culture of practice theirs. This provides a learner with an understanding of,

'... who is involved; what they do; what everyday life is like in the CoP; how masters talk, walk, work, and generally conduct their lives; how people who are not part of the community of practice interact with it, what other learners are doing; and what learners need to learn to become full practitioners. It includes an increasing understanding of how, when, and about what old-timers collaborate, collude, and collide, and what they enjoy, dislike, respect, and admire. In particular, it offers exemplars (which are grounds and motivation for learning activity), including masters, finished products and more advanced apprentices in the process of becoming full practitioners.'
(Lave & Wenger, 1991, p 95)

The sense of belonging as one moves from the periphery to the centre is what enhances the learning. Mastery of knowledge and skills is therefore attained by the learner or apprentice as they move toward full participation in the sociocultural practices of a community.

A community of practice e.g. of nuclear physicists, cabinet makers, high school classmates, IS professionals, users etc learns through greater participation in whatever activity they are engaged in. It is therefore important that the right conditions for learning should be provided in order for learning to occur i.e. conditions that allow learners to become 'insiders' and to function in a community of learners. The conditions of learning should be such that learners learn how to become say nuclear physicist's as opposed to abstract knowledge about nuclear physics. So more practical activities about that as well as situated / contextual learning seems to be what LPP is advocating for.

3.3.5 Engeström's Expansive Learning Theory

I now turn to the expansive learning theory which was developed by Engeström in 1987. The theory draws its roots from the CHAT concepts already discussed in Chapter 2 which are based on the foundational work of Vygotsky (i.e. his concepts of mediation and the zone of proximal development), Leontiev (i.e. the concept of collective activity and the hierarchical nature of activity), Il'enkov (i.e. the dialectical concept of contradictions in activity) and Davydov, who were key figures in the Russian school of CHAT (Daniels et al, 2007; Engeström and Sannino, 2010). Davydov's contribution is identified with his development of a theory of learning activity based on the dialectical method of ascending from the abstract to the concrete. According to

Davydov's theory, ascending from the abstract to the concrete is achieved through six (6) ideal-typical epistemic or learning actions. The first action is transformation of task conditions so as to reveal the universal relationship of the object under study. This is followed by modelling the identified relationship using material, graphic or literal representation. The third learning action in Davydov's theory is transformation and study of the properties of the relationship in their pure form, which is then followed by the construction of a system of particular tasks that are resolved by a general mode. The last two learning actions are the monitoring of the performance of the preceding actions and evaluation of the assimilation of the learning task. Engeström's theory of expansive learning proposes similar ideal-typical learning actions for achieving learning, albeit addressing learning outside the school and classroom environment.

The theory of expansive learning also draws on Bateson's (1972) conceptualisation of levels of learning, particularly the notion of *Learning III* and the associated concept of *double bind* or dilemmas which cannot be resolved through individual action but through joint activity. The engagement in joint activity could then result in the emergence of a completely new activity. Another theorist who has contributed towards the development of expansive learning theory is Bakhtin (1982), who is identified with the concept of multivoicedness. Expansive learning is viewed as a multi-voiced process of debate, negotiation and orchestration resulting from the heterogeneous nature of the social actors.

ELT as stated previously rejects the acquisition metaphor of learning as suggested by cognitive theory, but it also rejects the participation metaphor as presented by Lave and Wenger (1991) which does not deal adequately with the formation of theoretical concepts during activity (Engeström and Sannino, 2010). The theory of expansive learning introduces the major concept of expansion during participation in activity (Virkkunen and Kuutti, 2000; Daniels et al., 2007; Engeström and Sannino, 2010). According to Daniels et al (2007):

'By expansive learning we mean the capacity of participants in an activity to interpret and expand the definition of the object of activity and respond to it in increasingly enriched ways... Expansive learning involves the creation of new knowledge and new practices for a newly emerging activity: that is, learning embedded in and constitutive of qualitative transformation of the entire activity system... This type of learning may be seen as distinct from that which takes place when existing knowledge and skills embedded

in an established activity are gradually acquired and internalised, as in apprenticeship models, or when existing knowledge is deployed in new activity settings or even when the new knowledge is constructed through experimentation within an established activity. All three types of learning may take place within expansive learning but these gain a different meaning, motive and perspective as parts of the expansive process.’ (Daniels et al., 2007, p. 523)

Engeström (2001) concretised his ideas on expansive learning by using a medical care intervention example from a case study in Helsinki, Finland. The issue of concern identified by the approximately sixty (60) physicians, nurses, other staff and management from primary care health centres and hospitals responsible for children’s health in the area, was mainly that of lack of coordination and communication between the different care providers. Through the assistance of a group of researchers the Children’s Hospital decided to initiate a collaborative redesign effort that would result in more collaborative working between the different care givers. The collaborative exercise was carried out through ten (10) Boundary Crossing Laboratory (BCL) sessions which were completed in February 1998, and the environment was setup such that all subjects of learning participated and therefore the voices of all the social actors were heard i.e. parents, practitioners etc. The analysis of the contradictions and double binds during these BCL sessions resulted in the collaborative development of a new concept of a ‘care agreement’ which was aimed at resolving the contradictions. This represented an expansion in the object which resulted in the creation of new knowledge and a new practice i.e. a practice that would now involve the use of the ‘care agreement’.

Expansive learning is said to occur in multiple dimensions (Engeström, 2000; Hasu, 2000; Hasu & Engeström (2000); Engeström & Sannino, 2010). Engeström (2000) and Hasu (2000) have identified four such dimensions i.e. the social spatial dimensions where the interest becomes “who else should be included?”, the anticipatory-temporal dimension where the questioning relates to “what previous and forthcoming steps should be considered?”, the moral-ideological dimension addresses the question “who is responsible and who decides?”, and the fourth dimension is the systemic-developmental where the questioning and learning is on “how does this shape the future of the activity?”. In order to assess the expansion of the object the dimensions of expansion need to be specified i.e. whether the assessment will be based on the social spatial dimension or the moral-ideological or even all four dimensions as identified by Engeström (2000) and Hasu (2000).

Two other concepts associated with expansive learning are those of boundary crossing and knotworking. These relate to the occurrence of expansive learning within a constellation or network of activities. Boundary crossing occurs where social actors, as part of a creative endeavour, must move across boundaries to seek or give help. An example is that of a social actor having to act as a change agent, carrying, translating and helping to implement new ideas between one setting and other. In the medical care example, where the ‘care agreement’ solution resulted from a BCL intervention, negotiated knotworking was observed whereby the social actors (i.e. patients, and practitioners from different care organisations) had to work together in a collaborative way in order to plan and monitor a patient’s trajectory of care. The social actors took joint responsibility for the patients overall progress and according to Engeström and Sannino (2010), knotworking refers to the,

*‘... rapidly pulsating, distributed and partially improvised orchestration of collaborative performance between otherwise loosely connected actors and activity systems (...) **Knotworking is characterised by a pulsating movement of tying, untying and retying together otherwise separate threads of activity. The tying and dissolution of a know of collaborative work is not reducible to any specific individual of fixed organisational entity as the centre of control. The centre does not hold.**’ (Engeström and Sannino, 2010, p. 13)*

In these knotworking situations, the unstable knot needs to be made the focus of analysis.

What then are highlighted about Engeström’s theory in terms of the guiding questions posed earlier as a guide to this theoretical review?

1. **What is (situated / practice) learning according to the theory?**

‘The theory of expansive learning puts primacy on communities as learners, on transformation and creation of culture, on horizontal movement and hybridisation, and on the formation of theoretical concepts.’ (Engeström and Sannino, 2010, p. 2)

‘Traditionally we expect that learning is manifested as changes in the subject, i.e. in the behaviour and cognition of the learners. Expansive learning is manifested primarily as changes in the object of the collective activity. In successful expansive learning, this eventually leads to a qualitative transformation of all components of the activity system.’ (Engeström and Sannino, 2010, p. 8)

Learning is the expansion of the object during engagement by social actors in an activity. Learning by social actors during this expansion of the object may occur vertically in terms of the creation of new knowledge and theoretical concepts as well as horizontally as they learn something that is not yet there but which they construct and implement during collective activity.

In terms of the ISD activity learning would be expansion or an improvement to that activity during engagement by social actors e.g. users and developers.

2. Who is learning?

According to expansive learning theory the subjects of learning are interconnected activity systems which are energised by their own inner contradictions to change and learn. However there may also be individual agency by the different social actors engaged in those activity systems when different individuals speaking in different voices take the leading subject position in the activity at different times (Virkkunen and Kuutti, 2000; Engeström, 2001; Engeström and Sannino, 2010). The users, developers at an individual level as well as the network of interacting activities of users and developers would be the learners in an ISD context.

3. What triggers the learning or why do they learn?

On the question of ‘Why do they learn?’ and – ‘What makes them make the effort?’, Engeström (2001) surmises that social actors learn not only because of their participation in a culturally valued collaborative practice which may produce something useful that could improve their current practice, but also because of the contradictions between and within activity systems. It is a key principle of activity theory that contradictions or tensions within and between activity systems brings about change and development and hence learning.

Contradictions or tensions in the ISD activity system are what trigger the learning.

4. What are they learning?

What they are learning will depend on the nature of the contradictions – but the principle learning outcome is a new pattern of activity based on the solutions that have been derived / designed to resolve the identified tensions and contradictions. As the new pattern of work is implemented, the subjects may also learn about the historical layering and co-existence of old and new concepts as well as the struggle between the old and new concepts (i.e. tertiary contradictions as the new pattern of work is implemented – an example of this could be resistance from some quarters of implementing the new concept). The subjects also now learn about the expansion of the object from the old object to the new object.

5. How do they learn, How is learning achieved?

Learning is achieved through learning actions as depicted at Figure 9. According to Engeström and Sannino (2010):

‘The cycle of expansive learning is not a universal formula of phases or stages. In fact, one probably never finds a concrete collective learning process which would cleanly follow the ideal-typical model. The model is a heuristic conceptual device derived from the logic of ascending from the abstract to the concrete. Every time one examines or facilitates a potentially expansive learning process with the help of the model, one tests, criticises and hopefully enriches the theoretical ideas of the model.’ (Engeström and Sannino, 2010, p. 7)

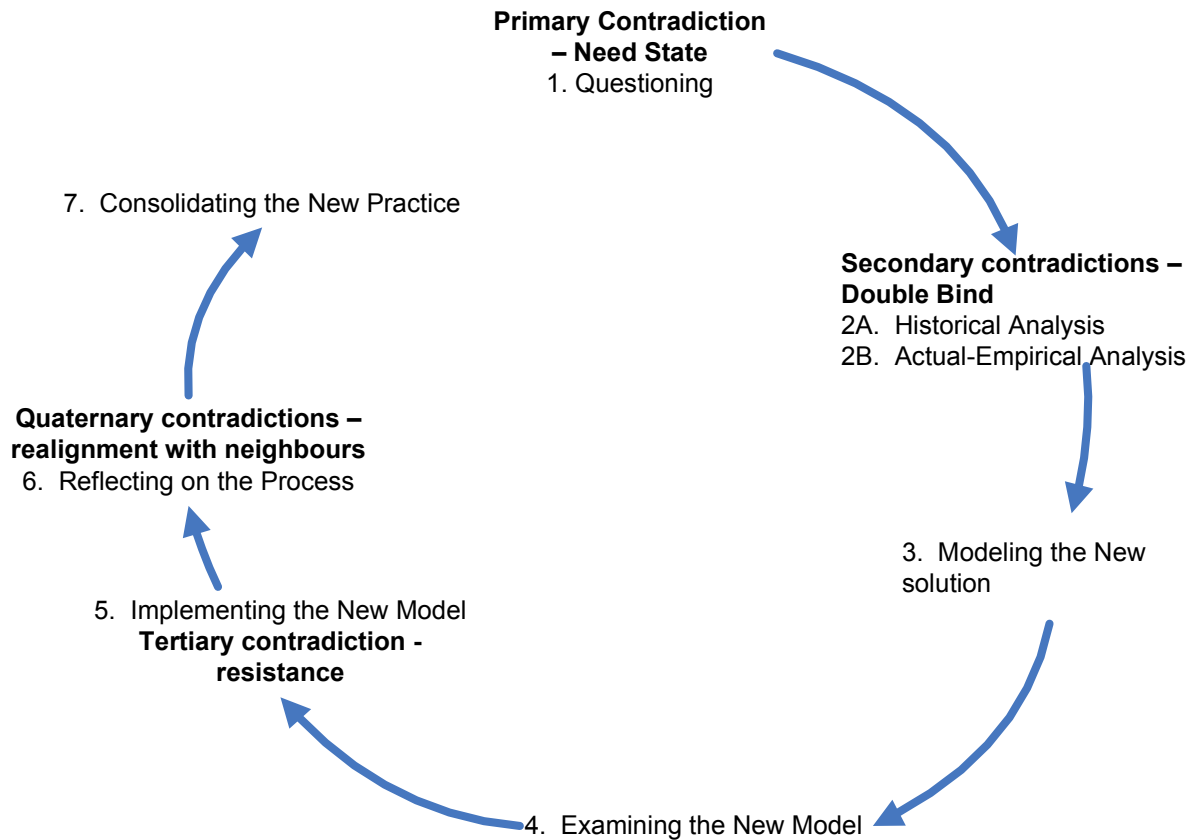


Figure 9: Strategic learning actions and corresponding contradictions in the cycle of expansive learning (Engeström 2001, p. 152)

In this ideal-typical expansive learning cycle the first action is the questioning of the current practice where there may be conflicting views / voices. This then leads to the second action which is the analysis of the secondary contradictions between the components of an activity system through a) historical analysis and b) actual-empirical analysis. The purpose of the historical analysis is to gain an understanding of the qualitative changes that have taken place in the activity system over time as well as to analyse and determine previous and current concepts that have shaped the activity. The actual-empirical analysis on the other hand is meant to reveal and describe in more detail the forms of actions and processes involved in the transformation of the object. Furthermore to analyse more specifically the extent to which specific tools, rules, actions and processes are involved in the transformation of the objects of the activity. This

should extend to how specific tools, rules and types of division of labour actually mediate the activity, and what types of disturbances or contradictions occur in current practice.

This analysis then leads to the modelling, development and implementation of a new practice model / activity system that addresses the secondary contradictions identified in the previous learning process stage. The implementation of the new model may result in tertiary contradictions which in themselves may be a source of even more learning and development. The final two stages in the expansive learning cycle are the reflection on the process as well consolidation of the new practice. Quaternary contradictions resulting from the realignment of the new practice / activity with its neighbour activities may also contribute to the learning as further solutions are found to ensure realignment in the network of activities. Engeström and Sannino (2010) therefore suggest that expansive learning should be viewed as construction and resolution of successively evolving contradictions as demonstrated by these learning actions. The resolution of contradictions at any stage of the process results in learning and development of the activity system.

The expansive cycle of learning actions has been used as a framework of interpretation in studies of relatively large-scale and lengthy processes of transformation (Engeström and Sannino, 2010), change laboratory interventions which occur over a series of several meetings (e.g. Engeström, 2001; Hill et al. 2007), as well as small-scale (e.g. in a single meeting) and short processes of transformation (e.g. Engeström, 1999).

3.3.6 Expansive Learning Studies from Literature

Expansive learning theory has been used in a wide variety of studies and interventions ranging from education, workplace learning, product development, and across multiple heterogeneous organisations (Miettinen, 1998; Engeström 2010). In this section I will provide only two relevant examples of its application. The first study is by Bødker & Grønbeck (1996) who studied learning in the context of information systems development, and the second example is by Hill et al., (2007) who studied collaboration between government and industry to resolve complex problems in the industry.

1) Expansive Learning in Information Systems Development

Bødker & Grønbeck (1996) applied activity theory concepts in analysing learning (opportunities) within a cooperative prototyping design approach. They state, ‘Our approach to understanding these prototyping situations is inspired by activity theory, in particular the work of Engeström, wherein learning is seen as an expansion of work practice’ (Bødker and Grønbeck (1996), p 130). The selection of this work is based on the fact that not only does it look at (expansive) learning, but also prototyping, which was the design approach used in our selected case study.

Bødker & Grønbeck’s (1996) primary interest was in developing tools and techniques for cooperative prototyping but in the process they decided to also analyse the learning situations through an analysis of the roles of users and designers of prototypes using sample data obtained in and between prototyping sessions. The data collection was via notes, video and audio tapes and interaction analysis techniques were used to analyse the video data. On the basis of this, they identified four learning situations that their cooperative prototyping approach presented i.e.

1. Learning situations presented by the simulation of work-like actions using the prototype i.e. learning about how the future work practice will look like using the prototype
2. Learning situations presented by brainstorming and idea generation to improve the design of the prototype. In this case both the users and designers (as subjects) were using the prototype as the tool / instrument for changing the object (current version of the prototype)
3. Learning as users used the prototype as an instrument to trigger further investigation of the current work practice or as the designers gained a better understanding of the work practice. This represented, mostly, learning by the designers as they were ‘... listening to understand the work task, to ask questions, and to introduce relevant parts of the prototype... Focus shifts or breakdowns typically occurred when contradictions in the caseworkers’ and the designers’ understanding of the frame task occurred.’ (Bødker and Grønbeck (1996, p148)
4. Learning situations that improved the designers understanding of how to prepare prototypes and improve prototyping tools. This resulted from breakdowns that turned the participants focus and attention towards the actual conduct of the session, the prototype or the prototyping tool (software).

The identification of these learning situations by Bødker & Grønbeck (1996), is in a way a confirmation that 1) ISD presents opportunities for learning 2) activity systems are learning ‘sites’ or systems 3) we can indeed ‘learn as we do’ as suggested by Rogers and other situated learning theorists. Though Bødker and Grønbeck identify these learning situations they do not report on any attempt to actually evaluate the learning and determine its effectiveness. This to me is a key aspect of getting the right mix between conscious and unconscious learning – the users and the designers would know which areas to focus on in terms of learning when they move on to the next stage of development. This has been pursued in this research study.

2) Expansive learning in collaborative design between government and industry

The paper by Hill et al. (2007) describes a study conducted by a New Zealand research team who during the period 2004-2006 experimented with the ‘change lab’ learning process to create a new method of government policy development and implementation, referred to as “practice-making”. The study, which was carried out in an apple industry located in Hawke’s Bay New Zealand describes an emerging process of collective sense making among industry, government and research participants, where at the time there was tension around the scarcity of seasonal labour, amid growing concerns about the possible collapse of the industry.

The study was carried out in three main research stages i.e. i) initial scoping and fieldwork, ii) laboratory sessions, and iii) pilot. This paper only reports on the first two stages since the piloting was to be done at a later stage. The objective of the initial scoping and fieldwork was to ground the co-design lab in real-world regulatory and industry activity, and to secure participants interest and commitment to the process. And as such, during this period visits were made to local orchards, warehouses and government offices. At the end of the fieldwork, the research team wrote up a resource briefing paper that was used as a stimulus for discussions during early laboratory sessions.

The second stage of the research study comprised of 12 half-day CL sessions, which were attended by about 18-24 people, in a central location in Hawke's Bay. These sessions were followed by a further period of fieldwork. Participants for the lab sessions were drawn from a cross-section of those involved in the apple industry i.e. growers, contractors, warehouse operators, exporters, quality controllers, horticultural consultants and government officials from central and regional agencies. The key in the selection of participants was to ensure representation of a wide range of activities, perspectives, knowledge and skills and also to make sure that all parts of the industry had a voice at the table.

During the lab sessions, participants were able to identify current problems and contradictions within their activity system which made it difficult for their network of activities from working towards a common purpose or goal. The researchers also facilitated the modelling by participants of the cultural and historical roots of the identified problems and contradictions, and together co-designed and tested ways of transforming their industry through finding solution to the current problems. Through this process an expanded understanding of the industry and its regulatory systems was achieved.

The lab sessions also involved the mapping of contradictions within and between elements. This was initially done using a table that the research team had developed using data from fieldwork records, videotape and team records of the sessions, white board material and participant recall. This initial approach was, however, abandoned in preference for an approach which, according to Hill et al., (2007) ensured that:

'...contradictions emerged from the participant's dialogue and analysis, not from "clever" facilitators, since the psychological and cognitive power of confronting contradictions is required to create expansive transformation and the collectively generated motivation (new object)'. (Hill et al., 2007, p. 368)

This new approach involved the use of what came to be known as the 'Quality Table', which showed the quality and productivity focus that the co-design group had identified as crucial to their practice. The development of this table, using data from the lab sessions, and its placement before the participants is said to have had a significant impact on their expansive learning process in that it stimulated new ideas and innovative thinking about new possibilities.

The outcome of the co-design process was suggested innovations in four specific areas i.e. 1) a draft training strategy; 2) a path to research and development around production and labour practices, not just new apple varieties; 3) a new contractor / grower relationship, including a new division of labour; 4) a labour sourcing, supply, deployment and retention strategy including immigration policy that also included the use of ICT tools for the efficient tracking and deployment of available labour in order to minimise illegal labour practices.

Hill et al. (2007), conclude that the implication for their study was that the expansive learning approach provided a better approach to the traditional policy development approach in that the focus moved away from a linear, mechanistic process to a systemic process of discovery, creation and sharing of new knowledge. Through the expansive learning approach, the focus also shifted from the behaviour of individuals, or individual groups and institutions, to learning and development within a network of activity systems.

They further observed that participants in the study tended not to be positional when they focused on their collective motivation for the activity. They were not concerned about their power or position, but were rather more interested in sharing their knowledge and experience of different aspects of the overall activity. It will be interesting to see whether I will come to the same conclusion about participants in this current study.

During the course of the project there were a number of significant disturbances that had an impact on the co-design process. For example they did not get full participation by the senior policy bureaucrats as originally anticipated and they also had to continuously pay attention to how they managed the communication and accountability lines of the project given that there was restructuring going on at the department that was the main sponsor of their project. But despite these the project continued due to mainly the commitment of the participants to the process. Again it would be interesting during the course of this study to identify any disturbances that may occur and their impact on the process. Commitment to the process seems to have been critical to the success of this study and so one needs to ensure that it exists upfront.

The co-design project by Hill et al. (2007) had a broader impact far beyond the initial project. Many of the ideas from the project are said to have found their way into government and industry policy making. The example cited is that of a working group that was established to develop a Horticulture / Viticulture Seasonal Labour Strategy (the Strategy) which adopted some of the ideas from the co-design sessions.

Hill et al. (2007, p.374) further conclude that their study, in addition to building on existing work on activity theory and the developmental work research world-wide (e.g. New Zealand, Helsinki, UK etc) also expands the focus to address the whole relationship between business and government in a modern Western democracy.

In the current study I reviewed the case project, which was based on RAD, to identify whether learning situations as identified by Bødker and Grönbeck (1986) were evident. This was useful in building my argument that current ISD practice provides limited opportunity for learning. I also adopt the DWR and change laboratory methods that were used in the Hill et al. (2007) study, the specific interest being to facilitate a co-design process between business and government.

3.3.7 Expansive Learning Theory as a framework for analysing learning during collaborative design of a new ISD practice for Botswana

In the preceding sections I have presented a brief theoretical review of Lave and Wenger's (1991) LPP and Engeström's (1987) ELT. The two are both classified as situated or social learning theories as they postulate that learning cannot be divorced from social activity. According to these theorists, learning is not just knowledge transfer, and the learners and knowledge are heterogeneous because learning in a social setting involves multiple actors with varied knowledge and views. In the analysis using the five questions as guidelines it is clear that there are differences between them which include differences in the subjects of learning i.e. in LPP it is communities of practice, whereas in ELT it is network of activity systems as well as individuals. ELT unlike LPP provides a framework that can be easily applied to analyse learning in any setting and it also emphasises the need to understand the historical aspect of a learning activity, because transformation from current to future state of an activity requires an understanding of its history (Virkkunen and Kuutti, 2000; Daniels et al., 2007).

In this study, I will use Engeström's ELT to study learning during the design of new ISD practice because the social actors are made up of three distinct groups (i.e. three distinct communities of practice) i.e. users, IS professionals (External to government) and IS professionals (Internal to government). ELT is not restricted to a community of practice, but allows the study of learning among peers or a group of actors engaged in problem solving as they seek to find solutions to current problems and contradictions. Learning that occurs in such settings may involve boundary crossing and knotworking as described earlier and this cannot be understood through the well bounded concept of communities of practice (Bould & Middleton, 2003).

About the strengths that support the use of ELT in learning studies of this nature, Hyysalo (2009) makes three important observations i.e. that (i) the object in ELT plays an important role as a mediator as well as the collective motive of engaging in a particular activity; (ii) ELT is precise in terms of locating the action and learning in question depending on whether it is at activity, action or operation level or even at the individual or collective level. LPP does not offer the same precision. And (iii) it deals adequately with learning across boundaries e.g. between users and developers as this is considered as '... expanding capacity to transform objects and related contradictions in and between the participating activity systems' (Hyysalo, 2009, p. 732). This clarity does not exist within the LPP model.

ELT is also useful in its application to both long and short cycles of learning and development – in this study we will be looking at a short cycle, which took place in two change lab sessions.

3.4 Conclusion

In this chapter I have discussed ISD practice by looking at its historical development from the early 1960s to now. The understanding of ISD practice development globally provides a basis for studying historicity in the local practice. On the subject of learning, two models / frameworks that will be used to analyse learning have been presented. The first model is based on the work by Rogers (2003) and others who distinguish between two types of learning i.e. task conscious learning and learning conscious learning. This first model is used to analyse learning in current ISD practice retrospectively.

The second model adopted is Engeström's (1987) expansive learning model, which will be used to analyse learning cycles during the collaborative ISD practice redesign effort. The choice of this model over the LPP model is based on its detailed framework and applicability to this research study. I have also provided two examples from literature where the expansive learning model was used and the objective of this research will be to draw on this literature to study learning during a collaborative effort between government and industry to redesign current ISD practice.