An investigation into the nature of verbal interactions during the practical training of medical technology students

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Abstract

Various ideas have been propagated regarding the way people come to know in apprenticeship situations. The particular set of social practice theory that informs this study is that related to old-timers and newcomers. The newcomer comes to know by constant engagement in the activities of the community of experts. This study shows that being around the old-timer does not necessarily gibe rise to learning if the contact between these two agents does not occur as a shared practice. This shared practice will facilitate the curriculum that must exist between them. This curriculum be it a learning curriculum and/or a teaching curriculum can only be successful if the shared practice is transparent to the newcomer, and the newcomer is accepted as a legitimate peripheral participant. The participation of the newcomer in the activities of the old-timer ensures learning to occur. As long as the old-timer prevents the newcomer from engaging in the authentic tasks of medical technology, the newcomer will fail to develop a sense of the 'whole' of the trade and learning will be impaired. The old-timer provides a bridge between the development of knowledgeable skill and identity, and the production and reproduction of a community of experts.

The author's own experience in Medical Technology training and the increasing challengers to empower learners generated questions around the training of medical technology students. It is argued that learners make sense of theoretical ideas by 'doing' that what is learned in the theory. This necessitates the use of the tools of the trade. During this engagement with the tools various phases can be operated in. These phases include the 'way-in' phase and the 'practice phase'. Medical technology practice i.e. the way medical technologist engages in the trade allows for the

development of a community of experts. This however also requires the development of certain skills. These skills can be cognitive- and/or practical skills. This study put emphasis on the nature of verbal interactions during the practical training of medical technology students. The study further provides evidence that apprenticeship training of medical technology students takes the form of imitation, i.e. it is unsystematic and unsupported. The emphasis of the training is on service delivery rather than on teaching. There is visible between learning in the formal academic setting (Site A) and learning in the apprenticeship learning situation (Site B).

DACLARATION

I declare that this mini-thesis is my own work and that all sources used or quoted have been indicated and acknowledged by means of complete references.

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Moira Catherina Paulsen

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Chapter 1

Introduction

1.1 Motivation and purpose

Over the past years very little research was done on medical technology training. My own experience as a medical technology student and my increasing interest in the world of education generated questions around the practical training of medical technology students. Trying to locate the practical training of these students within a theoretical framework proved to be cumbersome. As my search through the literature developed, it became clear that medical technology training fitted the notions around apprenticeship training. To illustrate this I will give a broad overview on the practical training procedures for these students: The students receive their normal theoretical training at a tertiary medical institutions after which they have to go to a qualified tertiary medical institution, such as a hospital, to undergo their practical training. During the time of their practical training these students work very closely with a qualified technologist. The technologist literally 'adopts' the student. Wherever the technologist goes, the student goes, at least out of my own experience. The qualified medical technologist is then responsible for the practical training of the student medical technologist.

My own experience indicated that the educational information shared with the student was determined by the routine laboratory tests that were done in the particular department. Very seldom during training periods were textbooks referred to so as to establish links with the theory embedded in the practical. Interactions between the technologist and the student were characterized by information from the technologist's own experience or from the information

thus full of statements without much, if any, motivations guiding the statement. Although the entire theoretical course of medical technology involves an analysis of the components of the human body, it was often presented in fragments. As a student I often struggled to make connections between these fragmented components as they were presented. This was because the information was not presented as a whole, but compartmentalized instead. As I became increasingly involved in the study of the social sciences a need developed to research the training of the medical technology students. The main focus, however, would not be on the students being trained, but on the technologists training the students, i.e. how the qualified medical technologist use (or do not use) theoretical concepts to assist medical technology students during their practical training, i.e. what training style do they use to assist them (the technologist) in their training of the medical technology students.

With this information in mind I discussed the notion of apprenticeship learning with a few lecturers at the tertiary medical institutions. There appeared to be a negative disposition to the classification of the medical technology training under the notion of apprenticeship training. Chapter two specifically tries to locate this study within social practice theory, where it is argued that activity, knowledge and setting cannot be unproblematically separated. The task at hand is thus to present to the reader that apprenticeship learning does not refer to those areas involved with trades only, but refers to any situation where there is a old timer – newcomer relationship be it in the study of medicine, midwifery, business or mechanics.

1.2 Focus of the study

The objectives which drove this study, were to:

1. Analyze the training style, which drove the observed activities.
2. Provide an exemplar of research which could be useful to communities involved in the re-/structuring of the curricula for medical technology students.
3. These activities to the scientific community for scrutiny and inset.

1.3 Summary

Chapter two tries to present to the reader the idea that in any learning situation there are different forces that influence the learning outcome. These forces i.e. activity, knowledge and setting form the boundaries in which this particular study evolved.

The particular set of concepts of social practice theory that informs this study is that related to old-timers and newcomers. The notions around apprenticeship learning, as presented by Jean Lave (1989,1991,1992) served as theoretical framework for this study. Chapter two thus covers the theoretical concepts that form the foundation on which the research is based. The various concepts, which inform apprenticeship learning, are discussed. Issues such as educational discourse versus educated discourse are dealt with and a link between these concepts and apprenticeship learning is established. The role of the two agents namely the old-timer and the newcomer within these two notions of educational- and educated discourse is highlighted.

Chapter three draws the attention to the pilot study that was performed at four different sites. The sites used were those institutions(for example hospitals, clinics and private practices) used by the tertiary education institutions to assist the students with their practical training courses. A justification for the method used for the pilot study is given and the assumptions

that underpinned the study is highlighted. An account is given of the observations at the four sites, which guided the development of the observation instrument. This observation instrument was developed after the data from the pilot study were analyzed and it served as a tool during the main phase of the study as discussed in chapter four.

In chapter four the final study process and results are presented. The instrument developed during the pilot study was implemented and the data collected are presented, analyzed and discussed. A day-by-day description of the observations is also given.

Chapter five entails the discussion of the research findings and how it links to the theoretical perspectives in chapter two. The main theoretical perspective that underwrites this thesis is revisited. The problems and shortcomings of the study are highlighted and future research possibilities are suggested.

Chapter six summarizes the main conclusions of the thesis. The perceptions around apprenticeship training are brought into context. Relationships between learning and practice are discussed. A retrospective account of the study is done and the consequences of the study are examined.

Chapter 2

Literature review and theoretical framework

2.1 Introduction

Various ideas have been propagated regarding the way people come to know in apprenticeship situations. Recently these ideas have been considered around the notion of social practice theory and the literature discussed here, pertains particularly to this theoretical perspective.

In this chapter a discussion of apprenticeship learning is thus done and a preliminary theoretical framework to guide this study is constructed.

2.2 Literature review and theoretical framework

2.2.1 Description and discussion of the major concepts

The major concepts that will inform this study are educational discourse versus educated discourse; didactic learning versus apprenticeship learning; 'way-in' and 'practice' and 'talking with-in' versus 'talking about'.

Medical Technology training traditionally depends on didactic learning and practice-based learning. By didactic learning is understood learning driven by pedagogic interests concerned with verbal and abstract knowledge, i.e. how to talk about something. Didactic learning is thus concerned with educational discourse. Practice based learning (also called apprenticeship

learning) is driven by requirements of the work situation. It is about the practice and the use of the language of the trade (Adler:1996, 237). Apprenticeship learning is concerned with the acquisition of operative and knowledge skills and it involves the ability to do something. Flexible articulation with-in the learning environment is dependent on whether it is a formal schooling context or an apprenticeship training situation. Apprenticeship learning specifically is situated in the experienced lived-in world and is therefore an overall social phenomenon (Lave 1992:18). Apprenticeship learning subsequently offers an alternative cultural point of view on the social processes of learning. Anthropological studies on apprenticeship learning give examples of such an alternative point of view on apprenticeship learning. Lave and Wenger (1991:109) argue that in apprenticeship learning, educational discourse and educated discourse occurs simultaneously. They argue that -:

> It is necessary to refine our distinction between talking about and talking within a practice. Talking within itself includes both *talking within* (e.g. Exchanging information necessary to the progress of ongoing activities) and *talking about* (e.g. Stories and community lore). Inside the shared practice, both forms of talk fulfill specific functions: engaging, focussing, and shifting attention, bringing about co-ordination, etc. on the one hand; and supporting communal forms of memory and reflection, as well as signaling membership, on the other (Lave and Wenger 1991:109).

Educational discourse (or didactic learning) thus refers to the activity of talking about a practice. This activity thus involves the theoretical component of training. Educated discourse (or apprenticeship learning) refers to the 'talking within' a practice. It refers to the practical training accompanied by a 'motivational aspect'. This shared practice thus refers to apprenticeship learning or educated discourse. They further argue that in a situation where these two activities occur as a shared practice, learning will take place. For Adler (1996) this is equally true for learning to take place, which implies that educational discourse and educated discourse can occur simultaneously in formal and informal-schooling. Adler states that

> While engaged in tasks, pupils could be said to have the opportunity for talking *within* their mathematical practice. Then, either to the teacher, or to other pupils, or both, they talk *about* their mathematical ideas. (Adler 1996 : 237).

This ties in with the notion held by Lave that definite functions are fulfilled during these shared practices. These shared practices occur in definite sites. For the purpose of this study, I will use the term site A which will be used to indicate the environment where educational discourses takes place. It is the site where the formal theoretical training of the prospective medical technologist takes place. The prospective medical technologist will be called a newcomer to the practice of medical technology.

Site B will subsequently refer to the environment where the practical training of the prospective medical technologist takes place i.e. the environment where educated discourse takes place in. An example of this environment will be that of hospitals.

The learning that occurs in site A can also occur in site B. There is however a definite distinction between the learning in site A and that in site B. Learning in site B involves the process of becoming a member of a community of experts, whilst learning in site A involves mostly educational discourse.

The expert is often referred to as the master, mentor, or old-timer (Lave 1992:14). For the convenience of this study, the term old-timer is used.

Learning in general is not entirely subjectively constructed as the radical constructivists tends to claim, but is deeply constructed with-in a social phenomenon and cannot be treated separately from the social lived-in world. The general perception is that learning is a process that occur only in the mind and not in the operation of the lived-in world. According to Lave (1992:5) learning is a change in knowledge and action i.e. a changing of understanding in practice. Jordan however argues that -:

> The enterprise of teaching and learning, whether it involves midwifes, school children, or an industrial work force, is always an enterprise in the service of multiple agendas. Although it is ostensibly about the transmission of knowledge and skills, in a hierarchically organized society it is always about imposition, extension and reproduction of lines of power and authority. The mechanism through which this process is carried out is the control and, indeed, definition of what

> constitutes 'authoritative knowledge' that is seen as important, relevant and consequential for decision making. (Jordan 1989:925).

Authoritative knowledge is thus context-dependant. This authoritative disposition of the context, within which apprenticeship learning occurs, allows for the newcomers and old-timers to develop their own curriculum. However two forms of curriculum may develop i.e. a learning curriculum and a teaching curriculum. A learning curriculum is all those activities present in the learning context *from the perception of the learner*. The teaching curriculum would include all those learning activities geared towards the *instruction* of newcomers. It is thus evident that a teaching curriculum has the possibility of impairing learning, because it is geared towards what Hargreave (1996:342) calls service delivery. In the apprenticeship situation the possibilities for the development of a learning curriculum is very great. The service delivery is closely linked to the authoritative agenda of the context and the final product that must be presented at the end of an activity. The teaching curriculum however represents the culture of the community of experts. The belief system and values of the community of experts that are experienced and met in the learning context will form the basis of the teaching curriculum.

There is an interrelationship between the 'agent and world, activity, meaning, cognition, learning, and knowing.' (Lave and Wenger 1991: 50). Lave view it as 'legitimate peripheral participation in a community of experts'. She states that-:

> Differences in the social location of actors are inherent in political-economic structures, and elaborated in specific sociocultural practices. Differences of power, interests, and possible action are ubiquitous. Any particular action is socially constituted, given by its location in societal, historically generated systems of activity.
>
> …Learners inevitably participate in communities of practitioners and that the mastery of knowledge and skill requires newcomers to move toward full participation in the socio-cultural practices of a community. (Lave 1992:18).

The movement form peripheral to full participation thus allows the development of knowledgeable skill and learning to take place. Lave in her writing experience difficulty in the use of the term 'peripheral participation', and although the concept of 'peripheral participation' forms a very central part to the notion of Lave and Wenger on situated learning, the entire argument around the movement from 'peripheral- to full participant' goes beyond the scope of this review article and will not be reviewed here.

A brief overview will now follow on the notion of a community of experts.

2.2.2 Community of experts.

The newcomer is dependent on the master to firstly shape his/her identity and to give structure

and meaning to knowledgeable skill. The old-timer and the newcomer are also dependent on each other because the newcomer needs to learn whilst the old-timer needs to carry on the community of practice. For example, the community of practice of medical technology encompass the completion of tests, interpersonal relationship between the technologist and the pathologist and the relationships with the rest of the medical community and with the world as a whole. It represents the -:

> Social structures of the practice, power relations and its conditions for legitimacy which define possibilities for learning. (Lave and Wenger 1991: 98).

The community of experts therefore provides a bridge between the development of knowledgeable skill and identity, and the production and reproduction of communities of experts.

2.2.3 **Learning in Practice** (Apprenticeship learning)

Learning in practice (apprenticeship learning) traditionally referred to activities where learning takes place on site. The sites referred to were those identified as trades. Recently the emphasis moved from apprenticeship learning to situated learning. It is an ongoing activity characterised by little praise or blame. External tests are not given and real progress is visible only to the apprentice and those in the process of work themselves. The newcomer has the opportunity to

see the community of experts in action in its whole complexity right from the beginning. The newcomer can thus develop a broad idea of what the occupation is all about. Situated learning (learning in site B) provides the apprentice with an individualised and realistic learning situation. Learning in site B is therefore not an unstructured process or a process of osmosis, i.e. learning by being around the old-timer, but is rather an activity planned in a definite sequence, monitored and followed up. David Hargreave calls it 'apprenticeship by coaching model':

> True apprenticeship includes more then osmosis, for there is planned, systematic and deliberate teaching. One important aspect is the modeling of a skill by the master's eye, imitate the behaviour until, through practice, it is fully acquired. If the modeling by the consultant is structured, i.e. intentional, planned in a sequence, monitored and followed up, it is the apprenticeship by coaching model. When apprenticeship by osmosis is adopted learning becomes unsystematic and unsupported. When learning-by-osmosis occur there is little conceptualisation – learning and doing becomes two separate entities (Hargreave 1996:343).

So although there is a broad exposure to ongoing practice, it is influenced by the mode of transmission of knowledge. The transmission of knowledge is however determined by the level of generality of what the old-timer understands within the learning-context. The generality of what the old-timer understands (i.e. the teaching curriculum) often causes apprenticeship

training to be flawed, because little resources are available on the training of apprentices. Consequent will the knowledge-base of the old-timer is a determinant of the success of the learning (i.e. competence). This imply that an old-timer with 'less knowledge' will provide less successful training than an old-timer with 'more knowledge'. The knowledge and skills developed by the apprentice results from becoming like the old-timer practitioner and completion of the tasks eventually leads to technical competence.

2.2.4 'Talking within' and 'talking about'

'Talking within' and 'talking about' refer specifically to the 'language of the trade'. The newcomer gradually learns to talk in the language of the trade as they become exposed and accustomed to the ideology of the practice. Lave (1991:71) however argues that it is more important to understand the technology of the practice then it is to merely learn how to use the tools. This way the newcomer learns to connect with the history of the practice and to participate more directly in its cultural life through explanations and imitations the newcomer is enlightened into the life and activities of the old-timer. As Lave asserts-:

> …The transparency of any technology exists with respect to some purpose and is intricately tied to the cultural practice and social organisation within which the technology fulfils a mediating function. It cannot be viewed as a feature of an artefact in itself but as a process that involves specific forms of participation, in which the technology fulfills a mediating function.

> …The term transparency when used here referring to technology, to the way in which using artefacts and understanding their significance interact to become one learning process, combines the two characteristics of invisibility and visibility: invisibility in the form of unproblematic interpretation and integration into activity, and visibility in the form of extended access to information (Lave 1991:102-103).

'Verbal instruction', however, is viewed to have a broader effect then 'learning and imitation'. Lave (1991:105). Learning and imitation often occurs in apprenticeship situations where the old-timer talk within a practice and/or talk about a practice (Adler 1996:237). There is a difference between talking about a practice (Site A) and talking within a practice (Site B). Talking about a practice refers to the theoretical aspects of training whilst talking within a practice refers to the practical aspects of training. In apprenticeship training, 'talking about' a practice occurs mainly in the way-in phase. 'Way-in' refers to the process whereby the newcomer is taught in fragments how to complete a task. Through 'way-in', a systematic teaching approach is followed rather then teaching the task as a whole. 'Talking within' a practice includes the 'talking about' and the 'talking within' a practice. Talking within entails exchanging information necessary to the progress of ongoing activities and talking about. Talking about is the process whereby incidences (stories) are shared with the newcomer. During the 'talking within' teaching approach style the newcomer is taught not to learn from the talking, but instead to learn the language of the trade. A cognitive understanding of the terminology is not guaranteed instead, an ability to use terminology at the correct occasions is

guaranteed (how to master the language of the trade). During this process technical skills are developed without a true connection between theory and practice(i.e. no clear connection between the information of site A and that of Site B) For Lave and Wagner (1991) to become knowledgeable about a practice "...is the fashioning of identity in, and as part of, a community of practice"(pp.50 -51). Becoming knowledgeable means becoming a full participant in the practice. That is to become knowledgeable about the trade and to master the skills and the language of the trade.

Lave and Wenger further argue that learning to use the language of the trade includes both talking within and talking about a practice. They state that

> … In participatory-inquiry approaches...students often work on tasks together and then report on their working to others in the class and to the teacher. While engaged in tasks, pupils have to the opportunity to talking within their …practice (Lave and Wenger 1991:109).

Newcomers' entry into- and movement to full participation in a practice (that is, their learning in the practice) is unmistakably tied to the structure of the practice(i.e. how newcomers are taught), and not to any instructional program (i.e. what newcomers are taught) (Adler: 237). Meaning that the 'what ' that is being taught is more likely to determine the knowledge ability about the practice then 'how' the program is presented.

Ritchie (1995:812) argues that the working place builds very little on the interest of the student. Little account is taken of prior experience, and extended and/or tacit knowledge the apprentice posses. Service deliverance and teaching rather are combined. Hargreaves calls this "frame fusion" - the process whereby training and service delivery are combined:

> ...They insert training into service delivery, which is thus not combined with teaching. By modeling, demonstrating or asking concurrent questions, frame fusion promotes learning but does not magnificently impede service delivery (Hargreaves 1996:343).

According to Hargreave the work place (i.e. the apprenticeship situation) has thus little interest in what is needed for the newcomer to become knowledgeable, but rather how the newcomer get to know as quickly as possible. The gap between site A and Site B produces a visible and/or invisible division in a specific occupation. The newcomers do not learn in a predetermined sequence from beginning to end, instead the newcomer falls back on the old-timer all the time until the newcomer becomes competent. The theoretical aspects learned in formal schooling are never related to during the apprenticeship learning. Technical competence is judged by the old-timer on a one-to-one basis and is therefor not only subjective, because "knowledge given by a human expert is often uncertain or imprecise" but it is dependent on the specific training institute and the old-timers own subjective knowledge, which makes learning and assessment even more subjective. Hamilton(1966) argues that training should be restricted to institutions that are competent to train in breadth rather then depth. This will prevent narrow training of the

apprentice, avoiding the possibility of exploitation of the apprentice as cheap labour, which will limit their value to competitors.

> A major feature of apprenticeship learning, then, is that knowledge acquisition occurs, for the most part without active teacher intervention; apprenticeship learning is coincidental, rather then teacher-driven. It suspects that this feature will turn out to be central to understanding of the differences between apprenticeship and didactic learning (Jordan 1989:934).

2.3 Conclusion

In this chapter the various concepts around apprenticeship training has been discussed. These concepts have been considered around the notion of social practice theory. Attention was given to concepts such as educated discourse and educational discourse. Educated discourse pertains specifically to the practice-based learning or apprenticeship training i.e. talking within a practice. Educational discourse refers to didactic learning particularly i.e. the process where there is the verbal communication *about* the subject matter.

In apprenticeship learning situations two ways of training can occur, i.e. through way-in and through talking about and talking within a practice. Talking about and talking within a practice are often combined in a process of frame fusion. Frame fusion refers to the process whereby training and service delivery are combined.

The learning process during educated discourse involves two agents i.e. the old-timer and the newcomer. The relationship between these two agents is interdependent, but is by no means detached from the social and lived-in world. The influence of the agent, social world and live-in world is what influence the learning outcome.

One can thus summarise the arguments around the notion of apprenticeship learning as follows:

1. Apprenticeship is based on imitation and behavioural matching.
2. Learning can be enhanced when authentic situations are created during learning that are similar to the situations in which the knowledge will ultimately be applied. The closer the match between the learning situation and the ultimate workplace situation, the easier this transfer will be." (Sarah L.S Duncan 1996:67)

The next chapter will now concentrate specifically on the methodology and pilot study that were guided by these theoretical perspectives.

Chapter 3

Methodology

3.1 Introduction

In this chapter the methodology is discussed. A pilot study was conducted with the purpose of developing an observation instrument. An exposition of the pilot study and the development of this observation instrument are given. As mentioned in the introduction the research objectives were to -:

1. Analyse the training style, which drove the observed activities.
2. Provide an exemplar of research which could be useful to communities involved in the re-/structuring of the curricula for medical technology students.
3. Describe these activities to the scientific community for scrutiny and inset.

3.2 Justification for the methodology

In this study the interest was in the way qualified medical technologists do (or do not) use the theoretical terminology when they are apprenticing medical-technologists-to-be. This necessarily required that data had to be gathered in real-time at the site of use, The ways open for gathering data in this kind of environment are either self-reports by the participants or observations by non-participants. I opted for the latter because I was a researcher-in-training and was convinced that controlled non- participant observation would allow me more control over the collection of data.

The narrative of the aforementioned clearly indicates that a qualitative methodology was the opportune one for this study and was thus adopted.

As an aside it should be noted that most studies on apprenticeship learning were and presumably still are using qualitative methodologies. Examples include writings of Lave et al (1989, 1991, 1996) and LeCompte et al (1993). This may be as a result of wanting to capture issues in use at the site. The adoption of a qualitative approach was also driven by this observation.

Qualitative studies have at its core the related processes of describing phenomena, classifying it and seeing how those concepts interconnect. Thorough and comprehensive descriptions of the phenomena under study can thus be developed (i.e. thick descriptions). Through these thick descriptions meaning can thus be developed. Meaning, however, often vary from one context to another. This variation causes meaning to be context- dependent and is inevitably related to the position and perspective of different observers. But if the observer is familiar with the relevant contexts, he or she will be able to provide an objective description of the meaning in those contexts.

Qualitative techniques give the researcher an opportunity to question the research group on definitions, meanings and the motives that govern their actions. So although the researcher may have his/her own concepts for analyzing the actions, it still ensures that they relate to the intentions of the 'actors'. It is true however that social forces play a distinct role in people's behaviour, causing interpretations to be inherently contestable, but meaning can always be

negotiated. By summarizing the data it is stripped of unnecessary detail and delineates more clearly the central and salient characteristics of the phenomena.

By being a non-participant observer the researcher is given the opportunity to be involved in the activity as an insider, but detached enough to allow reflection as an outsider.

The researcher is thus able to -:

1. Explain and interpret the data in the specific context and,
2. Explain the researcher's experience in terms of the culture of the intellectual science education community.

3.3 Assumptions

The following assumptions underpinned this study-:

1. The terms newcomer and apprentice as they are used in this research context is not meant to substitute teacher and pupil relations.
2. Apprenticeship occurs in a variety of forms of production and does not refer to specific occupations only.
3. Learning in any setting is a complex process involving irreducibly contradictory interests of the participants. This means that the interest of the learners and the trainers are not always the same. These interest may often contradict one another The learners might just want to finish their training and learning career, whilst the trainers might want to develop and improve the quality and quantity of the learning process of the learners.

3.4 Pilot study

3.4.1 Introduction

This mini-thesis is a study into the nature of verbal interactions during the practical training of medical technology students. Qualitative and ethnographic researchers know that human life is complex and diverse and this inevitably effects the data collected. Detailed descriptions are thus used to analyze and interpret data and as Le Compte (1993:238) reminds us:

> Many of the strategies ethnographers and other qualitative researchers use depend on the feedback from the field: this redefines research questions as the researcher gains deepened understanding of the culture under study and learns the meanings participants attach to things (Le Compte 1993:238).

In this section a description of a pilot study is presented to obtain 'feedback from the field' in order to construct an observation instrument. The pilot study made use of less-structured observations. The aim of less-structured observations is to produce qualitative data on behaviour as part of a rounded description of the culture of a particular group of people. The emphasis is on flexibility and on recording behaviour in their wholeness - that is, taking full account of the social and cultural context in which they occur, and examining the perspectives and interpretations of participants.

3.4.2 Sites and sampling

In this study four different sites were used. These sites were all laboratories earmarked for the practical training of medical technology students. The sites were the four academic tertiary

medical institutions recommended for the practical training in medical technology by the Technikons in the Cape Peninsula, South Africa. The sites were thus opportunistic sites, which subsequently meant that the samples were opportunistic samples.

In order to understand some of the "nuances" of the field of medical technology and to develop a global picture of the field a brief description of what is done in one of these laboratories i.e. the microbiology laboratory, is given: The specimen arrives at the laboratory via the porters upon which the technologists or the clerks register the specimen on the computer. The specimen gets a laboratory number and the forms on which the result must be written are given the same number as the specimen. After that, depending on the laboratory test requested and the type of specimen received, the specimen is then spread over a growth media, which can be amongst other media, a mcconkey plate. This plate is then incubated overnight at a set temperature. The bacterial growth of the specimens of the previous day is identified, classified and the result is written on the corresponding form. These results are then entered into the computer and the result is send to the doctors. Bacteria also have definite sensitivity patterns. Corresponding sensitivity tests are done to identify and confirm the bacteria for example; staphylococcus aurues is sensitive to augmentim. An augmentim sensitivity disk will be incubated with the bacteria isolated from the patient's specimen to determine the degree of sensitivity. Biochemical tests are also done to further identify and confirm the bacteria. An example of a biochemical test is a coagulase test. The coagulase test is done on the patient's cultured organism to demonstrate the presence of the enzyme coagulase. The presence of the enzyme coagulase is indicative of a staphylococcus aureus infection. The handling of the same day's and the previous day's work often run together. So although the procedure of handling these tests may look confusing to an onlooker, the technologist (old-timer) knows exactly what to do after a stage of handling a specimen, is completed.

3.4.3 Gaining access into the research field

At the four sites for the trial study the consent or the technologists in charge of that department of the trial study was obtained verbally. I explained to them the aim of the study as well as the method that I wished to use. A time and date was set for each trial observation. Each observation was scheduled to last about one hour.

3.4.4 Data collection techniques

I used a tape recorder to record the conversation between the trainer and the trainees. Fieldnotes were also made by me to pin down any other non-verbal communications that occurred.

In the next section narrative accounts of the observations are given.

3.5 Observations at the sites

3.5.1 Observation at site one

The first observation was done at South African Institute for Medical Research (SAIMR). I was welcomed by the chief medical technologist and taken to the bench where a qualified technologist was busy training a student technologist (who was in her third year of study). The technologist had three years of experience in the field of medical technology. She was English-speaking whilst the student was Afrikaans-speaking. The technologist was training the student in the field of microbiology, specifically in identifying and classifying bacteria from one of the plates with growth media in, that is an agar plate. I positioned myself and the tape-recorder next to the student.

The technologist identified and classified the organisms on the agar plate, and filled the name of the organisms in on the form. She also sorted out the plates for further testing. Long periods of

silence occurred between the two individuals (that is the old-timer and the newcomer), with the student being inactive. The technologist only spoke when she wanted to draw the attention of the student to something, for example when she showed the student how to do a `gram stain' i.e. a staining technique that identify the presence of acid-fast bacilli found in tuberculosis infections for example. The technologist prepared the slides whilst the student looked on. She explained to the student how to prepare the bloodculture tubes. The technologist spoke very soft and it was often difficult to hear what it was she was saying to the student. The following transcript serve as an example of a conversation between a technologist and a student:

Technologist: "You know how to do a gram stain"?!

Student nods her head.

Technologist: "Here it is a bit different. You must clean the bottle with alcohol. Then you have needles, specific needles. You turn the needles like this, you turn it and then you push it through … and then on the other side… we can first get…. you can dry the slides in the mean time".

During this conversation the technologist demonstrated the entire process whilst the student was watching. At the completion of the aforementioned activity, the technologist and the student moved to another bench where she showed the student how to prepare anaerobic and aerobic bottles and how to complete the forms that accompany the test bottles. She demonstrated the handling of the first bottle, after which the student was asked to do the next bottle. The student forgot to take the barcode of the bottle. The technologist reacted by saying: "You must still do something." "O yes" the student reacted while she pulled off the barcode. "There is still a piece of plastic, you can pull it off with the plastic". After the fifth attempt the student could do the preparation of the bottles with ease. The researcher asked the technologist how she trains the

students. "I teach them the way I was taught. If you've developed an easier method through the years then you tell them about it".

The technologist continued by teaching the student step-by-step how to use the computer. The following example illustrate this:

Technologist: "This is your last four numbers of your label (accession number). Now you can put the form down there. Now you scan your barcode. Let me show you, like this. At another computer you F10, but here you F9.

Student: "Okay, okay".

The student continued to do the computer entries while the technologist kept a watchful eye on the students activities. After four entries the student did the entries with ease. "Remember to work in numerical order, otherwise you will get confused", the technologist reminded the trainee. Silence occurred. Suddenly the computer rejects an entry from the student. "See you've typed in the wrong specimen, now we have to call Anthea". The technologist called Anthea. "What did you do now?" Anthea asked. The technologist explained to her chief that the student changed two bottles around. "Anthea knows more about the machine than me", explained the technologist to the student. With that the one-hour observation came to an end.

3.5.2 Observation at site two

Grootte Schuur Hospital was the second observation site. The Chief Technologist met me in one of the laboratories and invited me for tea. We sat separately from the rest of the personnel while we discussed my research and training in general. She explained that the students did mostly benchwork up till now and that she normally gives the students a lecture after the students completed their practical training. After tea she introduced me to two students in their

third year of study. We walked to a lecture room. It was fully equipped with an overhead projector and a chalkboard. The desks were arranged in traditional lecture room format. I talked to the students while we waited for the technologist to get all her notes ready. I positioned my tape recorder in front close to the technologist. She started her lecture by putting up a transparency. The lecture was characterized by the use of histology terminology with the definitions of the terminology used, on the transparencies. She often asked the students for the definition of certain concepts. The answers of the questions was on the transparencies. They would give the correct answer, reading it from the transparency. The technologist would then praise the students for the 'correct answer'.

Upon completion of the lecture the researcher had a conversation with the technologist. She identified one of their biggest problems was the fact that they have very little staff due to the resignation of technologists and the increased workload which made it difficult to spend a lot of time with the students. The technologist was very anxious to know how she fared in her lecture.

3.5.3 Observation at site three

Red Cross Children's Hospital was the third observation site. The Chief Technologist took me to the chemistry department. I used to work with the technologist who was in charge of the laboratory. She was very surprised to see me and took me to her office. She kept me in her office telling me about all the encounters she had at her previous workplace. After about a half an hour I reminded her that we have to carry on with our research work. She called the student working with her and started to explain how a Cx5 automatic chemistry analyzer works. She rushed through the entire procedure, although she tried to cover the procedure step-by-step, which is the handling of the instruments and the computer. The student did not participate at

any stage of the training procedure. This training session was completed in less then the scheduled hour.

3.5.4 Observation at site four

The fourth observation site was Tygerberg Hospital at the Department of Cytology. One technologist is specifically assigned to the train the students. The departmental head of cytology at Tygerberg Hospital is also responsible for the theoretical training of the trainees at the technikon. The students were quite at ease with the trainer. They communicated very easily and were very spontaneous in their questioning. Two students were involved in the training session. One was Afrikaans-speaking and the other English-speaking. The trainer was English-speaking. The English-speaking student was more spontaneous in his questioning than the Afrikaans student. The Afrikaans–speaking student hardly spoke unless the trainer asked her specific questions. She would however give the correct answer to a specific question.

During the training session the four of us were situated at a four-head microscope so I could follow exactly what they were talking about. They were busy with routine work, which involved the students looking at cytology slides, identifying specific organisms and writing the result down. The students had to identify the organisms by themselves. The day of the trial study the identification of the organisms were thus completed. The technologist now only had to evaluate their work, before the final result was send out to the wards.

For this specific site the two students were exposed to the same lecture twice, i.e. one at the technikon (Site A) and one at the hospital (Site B). The two lectures were both given by the same

lecturer. The lecturer thus performed two duties: that of lecturer and that of an old-timer. These lectures are presented as a set procedure by the department.

During the study process the students interpreted most of the slides correctly. Very little guidance was needed from the trainer because the students communicated their thoughts all the time, specifically the English-speaking student. The trainer reinforced the information by constantly identifying specific organisms on the slide and motivating the reason for their presence.

3.6 Discussion on the development of the observation instrument

After these observations I presented a seminar at the University of Western Cape to open my technique for scrutiny. A number of errors were identified namely the fact that I -

1. Did not keep my tape recorder in a more strategic place, but situated it openly where the old- timer and the newcomer could see it very clearly. This could threaten the validity of the study, because the possibility of reactivity specifically procedural reactivity could occur.

   My actual study procedures could be accurate, but the subjects might not have behaved in the way they normally do, because they knew they were being observed. They could have changed their behaviour in response to the procedures involved in the process of observation,

2. Was unknown to most of the people involved in the trial observation: This could lead to personal reactivity because they weren't familiar to my personal characteristics or behavior.

   I belonged to a different cultural group as the technologists, so I cannot account for the possible influence my presence could have had on them,

3. Did an observation only once at an observation site: These observations were not pre-structured and it would have been difficult for any other researcher to reproduce the research in the same way. The subjects and the setting might be different. These factors can all contribute to an unnatural performance of the subjects, preventing me to be sure that what I observed was in fact a natural setting and not fabricated performances.

It is evident that the results from the preliminary study cannot be used unproblematically, but it did provide me with an opportunity to develop categories for more structured observations during the main phase of the research. The need for less-cluttered data on the training methods of medical technologists, led to the development of an observation instrument to make the consistency of observations more reliable and valid. The absence of accidental errors can be ensured by continuous observation over a few days of the same subjects with the same group of students. Validity can be obtained by triangulation - this is a direct check on the validity of observations by cross-checking the data with the subjects.

3.7 The final instrument

From the trial study performed at the four sites an observation instrument was developed. The data collected at these sites were analyzed and eight broad categories were developed.

These categories were-:

1. Demonstrative explanations

This category refers to the process where the technologist demonstrates and tells the student what to do for example:

"The drop mustn't be to big or to small", she says while she is putting a drop of blood on the slide to make a smear.

2. Academic explanations

The technologist relates the action to the information presented during the lectures of the academic component of the course.

"The mean cell volume - that is the size of the red cell"

"Anicocytosis with iron deficiency, when the cells are smaller."

3. Supportive feedback

The technologist justify a specific statement or action:

"Look at the age and the cellularity. Look at the amount of cells... there are many fat spaces."

4. Unsupportive feedback

This category refers to those actions where a specific statement or action is not motivated/justified for example:

"This is your spreader" or, "This patients platelet count is a bit high, you see."

5. Supervision present

Whilst the student is busy with a test procedure the technologist assists her.

6. Supervision absent

The student is left alone to carry out the test procedure.

7. Active participation of the student

While the technologist is busy with a test procedure the student is doing the same procedure simultaneously.

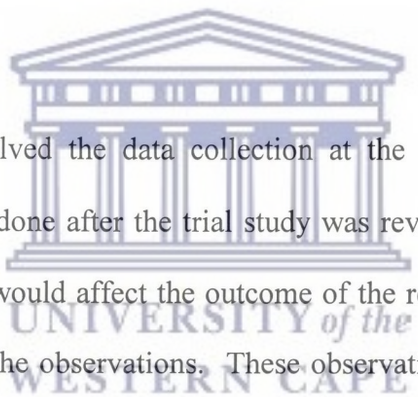
8. Passive participation of the student:

The students are just watching what the technologist is doing.

3. 8 Data gathering using the observation instrument

3.8.1 The main phase

3.8.1.1 Methodology



This phase of the study involved the data collection at the Department of Haematology, Tygerberg Hospital. This was done after the trial study was reviewed and a number of errors were identified. These errors would affect the outcome of the research. It was recommended that only one site be used for the observations. These observations would then be performed over a certain period, using the same participants for that time. Two students, who have completed their studies, were involved. Three qualified medical technologists supervised them. All three of them have been working with me in the department for more then two years. The students came to the bone marrow laboratory for the first time, to do their practical training.

The methodology involved observations done during the training of the students. The observation instrument that resulted from the pilot study was used for data collection. As an introduction to my research work I gave a brief introductory talk to the entire departmental staff on the study that I was involved with. I acquired the verbal consent of the Departmental Head

to conduct the research in the Department. The consent of both the research group and students were then received verbally.

I was working in the bone marrow laboratory at the particular time the study was conducted. It was thus ideal to request that the students be placed in the same laboratory as me for their first session of practical training. They would stay there for two weeks during which time they will have to complete a particular section of their work as described in the practical manual. This work involved bone marrow investigations. After that they had to proceed to the next laboratory on the rotation list. This rotation program was pre-established by the different laboratory departments.

The students were going to be in the bone marrow laboratory for two weeks only. During this time the normal routine work of the technologists must be completed. This forced the qualified medical technologists to carry on with their daily routine work. They also had to keep on training the students in order to keep track with the time schedule of the students. These two processes thus occurred simultaneously i.e. the routine working process and the student training process(i.e. the process of frame fusion).

I did however asked the students not to involve me for the first week of their training session with any questions relating to work, but to direct their questions towards my three colleagues. This was done to maintain my position as a non-participant observer. The technologists were not aware of my arrangement with the students, mainly to ensure that the everyday behaviour of the technologists towards the context remain unchanged (i.e. to minimize fabricated

performances on the side of the technologists). The students were very clear on their role during the observation periods, i.e. they were not under study, but merely served as a means to study the process of training they underwent. Despite the fact that the study was dealing with the way the technologist trained would-be-medical technologist, the students still had to gather all the information needed for their work manual. The students therefore had to carry on with their scheduled training program. Thus during the two weeks stay in the bone marrow laboratory the students had to co-operate as normally in order to obtain the information they needed for the completion of their workbook.

There is a however a definite procedural activity in the daily routine of the laboratory and the researcher could subsequently work out her process for the observations. The physical distance between the researcher and the technologists was very small, so when the technologist trained the students, I could hear them clearly and observe the demonstration of the different procedures. My mere presence was normal in our daily work setup.

The data gathering tools mainly involved the observation instrument, but I also took observation notes. Validity would be achieved through triangulation.

One hundred and fifty minutes were spent in total on the observations (i.e. thirty minutes per day for five days). To ensure the absence of accidental errors, which might possibly occur during the recordings, continuous observations were performed over five days. This was achieved by observing the same technologists training the same students in the same environment/setting, in this case the laboratory. During this period the tally-scoring system

was used to quantify the occurrence of the activities according to the instrument. Intersubjective agreement amongst the technologist and the researcher was obtained. This was done when I discussed the results and the correctness of the findings with the technologists to determine if they agree with the recordings of their verbal and non-verbal actions, also to give validity to the research findings.

Under normal circumstances nobody is informed on how to train the students in specific activities. I didn't alter this tendency. The students and (or) the technologist solely determined the degree and intensity of the training. As is evident from the above, a change in methodology from the trial study occurred. In the next section the methodological growth will be discussed.

3. 9 Conclusion

In this chapter the methodology that was employed was presented and motivated. In addition, the pilot study, which was conducted, was dealt with. Four different sites were used for data collection and the data collected were presented and discussed. The analysis of the data led to the development of a structured observation instrument. In the next chapter the implementation of the main phase of the study in which this structured observation instrument was used, is presented and discussed.

Chapter 4

4.1 Introduction

In this chapter the results of the study is presented. The day-to-day description of the observations are discussed and the results presented.

In the next section extracts of the day-to-day description of the observations conducted, is given.

4.2 Daily descriptions

4.2.1 Day One

The students enter the laboratory. They stand around, looking lost. One student spotted a chair and go sit on it. The chair is situated between a table and a bench. It is a very neutral out of the way place the chair is situated. The technologist has their weekly departmental meeting. Everyone left except for the two students and the researcher. The researcher is busy sorting out her notes, pretending not to take to much notice of the students or the technologists to return.

When the meeting was finished, technologist one asks the students to go with her to the bone marrow room. I positioned myself behind the door in the bone marrow room. No one can see me, but I can see their reflection in a glass cupboard and I can hear their conversation they had. The technologist and the pathologist are talking. The students observe. The technologist

explains to the students how the smears are prepared. The students still observe. They write the information they hear on worksheets. Conversation between pathologist and technologist continue. Mainly casual talk. After the bone marrow procedure was completed, the technologist went back to the laboratory. The students ask the pathologist to explain to them why a bone marrow is done. She explains to them carefully. They write the information down.

4.2.2 Day Two

Technologist number two is going to show the students how to make a blood smear. The researcher is working on the opposite bench facing them. One student was not present, but they proceeded. The technologist runs blood into a capillary tube.

T: "The drop must not be too big or too small (while placing a drop of blood on a glass slide). She made the smear. She asks the students to try to make a smear.

When she made the smear the technologist said aloud: 'do not lift up your spreader, you must not lift it up hey"

The student attempt to do another smear.

T: "You must never stop anywhere".

The other student now walked into the laboratory.

T: "You must teach her how"

Student one now teaches student two how to make a smear.

Another technologist walks in. He saw they do not clean the slide before making a smear.

T2: " You must clean the slide before making a smear (He make a smear). The smaller the drop the better".

S1: Okay

4.2..3 Day Three

Technologist number three train the students on the embedding and cutting of trephine biopsies.

The students stand behind the technologist. She (the technologist) embeds the trephines. No communication is taking place between the technologist and the students. The students talk to each other.

T: "The trephine is busy getting cold."

Students observe. No communication takes place.

T: "I'm only trimming first"

The technologist trims the trephine. She carries on with the cutting process.

Student number two leaves the laboratory. Student number one stares in front of her. Student number two comes back into the laboratory. The casual talk between the two students continue whilst the technologist carry on with her cutting process.

The students leave the laboratory.

T: "Ek is bly hulle loop. Ek hou nie daarvan as iemand oor my skouer loer nie" (translated meaning that she is glad the students left, because she don't like people staring over her shoulder when she is working).

4.2.4 Day Four

Students examine a bone marrow smear under supervision. Students ask the technologist

4.3 Results

Categories	Time in minutes						Total Scores
	0-5	5-10	10-15	15-20	20-25	25-30	
Demonstrative Explanations	6	2	1	2	2	3	16
Academic Explanations	1	1	1	2			5
Supportive Feedback	3	3	2	1	1	3	13
Unsupportive Feedback	3	2	3	5	3	1	18
Supervision Present	2	1	1	1	1	1	7
Supervision Absent	1	2	1	1		3	5
Active Participation	3	2	3	2	3	1	14
Passive Participation	3	2	2		1	1	9

Table 1: Tally scores for observed categories

If they are unsure on the identity of a cell.

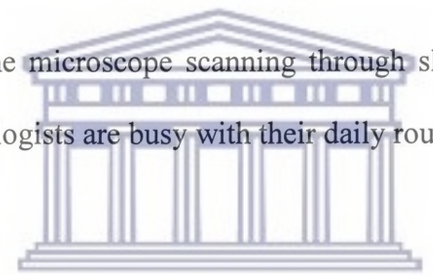
Student number one: ' What is that?'

Technologist number one: 'It is a metamyelocyte'.

Silence occurs. Both the students and the technologist are looking through the microscope. The students are observing whilst the technologist are scanning through the bone marrow slide.

4.2.5 Day Five

The students are sitting at the microscope scanning through slides without any technologist supervising them. The technologists are busy with their daily routine work.



The results obtained by tallying the occurrences of the various actions identified during the pilot study are given in table 1. These results are discussed in the next chapter.

Categories	Time in minutes						Total Scores
	0-5	5-10	10-15	15-20	20-25	25-30	
Demonstrative Explanations	6	2	1	2	2	3	**16**
Academic Explanations	1	1	1	2			**5**
Supportive Feedback	3	3	2	1	1	3	**13**
Unsupportive Feedback	3	2	3	5	3	1	**18**
Supervision Present	2	1	1	1	1	1	**7**
Supervision Absent	1	2	1	1		3	**5**
Active Participation	3	2	3	2	3	1	**14**
Passive Participation	3	2	2		1	1	**9**

Table 1: Tally scores for observed categories

Chapter 5

Discussion

5.1 Introduction

In this chapter I explain how the results of the study findings link with the theoretical framework discussed in chapter two.

5.2 Data analysis

Having a structured observation instrument prove to be very useful although there were issues that could have effected the outcome of the research. Firstly, there was the issue of language that could have a major effect on the outcome of the research. Both students' first language is Xhosa and English their second language. The old-timers' first language is Afrikaans and the second language is English. So both parties communicated in their second language. This could have had an affect on the mode of communication. But the fact that they were both speaking in their second language levelled the playing field for both groups.

Secondly, the cultural groups differed. During the duration of this research project, the 'traditional white Afrikaners' dominated the medical technology profession. Their culture and beliefs system dominated the modus operandi of the qualified technologists. Reaching over these cultural barriers might have had an influence on the outcome of the research conducted. However the categories initially developed in the trial research came from a mixed ethnic student group. The categories used for the observation occurred thus irrespective of the ethnic group of the students.

5.3 Discussion

The study data as it is presented in chapter four suggest that the 'production steps are reversed...'Lave (1991:72). This implies that the attention of the newcomer is first focussed on the final stages of a process, which will not have a significant effect on the final product, should any mistakes occur. The 'expert' thus requires of the newcomer to start with the finishing stages of the task, instead of learning the early stages of the process of production. From the tally scores the category unsupportive feedback, which received a score of eighteen (18) and the category 'demonstrative explanations(which received a score of sixteen (16) confirm this notion. This focuses the attention of the apprentice on the broader item before he/she is introduced to the specifics of the process. This ties in with the notion held by Jean Lave (1991) that during the apprenticeship training the focus is on training of the broader item before the student is introduced to the specifics of the process:

> Reversing production steps has the effect of focussing the 'apprentice attention first on the broad outlines... Next, sewing turns their attention to the logic (order, orientation) ...Each step offers the opportunity to consider how the previous step contributes to the present one. In addition, this ordering minimises unseated experiences of failure and especially of serious failure (Lave 1991:72).

Participation in the lived-in world of the old-timer therefore goes through the process of 'way in' and 'practice'. This implies that the newcomer can observe the process in its fullness, but 'participation' are allowed only in fragments. The process of active participation involves only those activities that will not have a major impact on the normal activities of the laboratory.

Some of these activities include making smears, watching a bone marrow biopsy taken, looking through the microscope. These activities are essential in the training of the newcomer but will not affect the final-result of the testing procedures. This process of partial participation thus follows a definite procedure, according to Lave: "The development cycle into the community of experts has a definite pattern it adheres to" (Lave 1991:121). The demonstration element in addition to unsupportive comments had a high frequency, which confirms this statement. Lave calls it the way-in phase.

> The learning of each operation is subdivided into phases I have dubbed "way-in" and "practice". "Way-in" refers to the period of observation and attempts to construct a first approximation of the garment...(Lave 1991:72).

The supervision absent or present frequency confirms this. It received a value of five and seven respectively. Very little individual activities were given to the newcomer. The emphasis was on demonstrative explanations and together with unsupportive feedback received a total score of thirty-one. Although 'way in' refers to the first attempts of the apprentice to construct a product, the information was mostly presented by the old-timer to the newcomer. Even during this process of learning the language of the trade, the way-in phase is dominant. Flexible articulation between the old-timer and newcomer thus remains low, because the communication remains on the side of the old-timer with the newcomer still copying. The learning therefore takes on a definite sequence i.e. it is monitored viz-a-viz active participation (a score of fouteen-14) and followed by passive participation (a score of nine-9). Therefore, although the process of training is not completely unstructured or unsystematic one cannot categorize the

training successfully according to Hargreaves coaching model, because of the low frequency on supervision that was achieved.

The second phase namely the 'practice phase' comes into play at much later stage.
The practice phase is carried out in a particular way: apprentices reproduce a production segment from beginning to end, though they might be more skilled at carrying out some parts of the process than others (Lave 1991 :72).

In the data this is confirmed by the low score of the the category 'supervision present' and 'supervision absent'. This is the process whereby the apprentice attempts a task from beginning to end. Lave refers to this as the 'practice' phase. From the data it is evident that the 'practice phase received a very low score i.e. a score of five and seven respectively. It is clear from the data that the score of fourteen received by the category 'passive participation' together with a score of sixteen allocated to the category demonstrative explanations was overwhelming. The 'way in' phase dominated the process of apprenticeship learning by the technologist.

According to Lave the old-timer tries to induct the learner into the culture of experts, by allowing them peripheral participant status, i.e. not allowing them to operate without supervision/observation. This study indicates that not much time was allowed for the newcomer to become part of the community of experts. This can be due to the nature of the training – the newcomers are apprentices in a different sense from the social practice situation. In the social practice situation the newcomer wants to become like the old-timer. And the old-timer except this. In training would-be-medical-technologist this is not necessarily the case. This is suggested by the low score received by supervision absent (a score of five) and supervision present (a score of seven). The study findings suggest that very little time was allowed for the

newcomer to complete a task without the full presence of the old-timer viz-a-viz a score of score of fourteen allocated to passive participation of the students).

Lave holds the notion that apprenticeship learning is more content-driven then work-driven. And although this notion coincides with the notion of way in and practice, Lave suggest that apprenticeship learning concentrates less on the ordering of the learning rather then the process of work that occur on a routine basis:

> Apprenticeship learning is not "work-driven" in the way stereotypes of informal learning have suggested; the ordering of learning and of everyday practice does not coincide. Production activity-segments must be learned in different sequences than those in which a production process commonly unfold, if peripheral, less intense, less complex, less vital tasks are learned before more central aspects of practice. (Lave 1991:96).

So although the activities in the laboratory where the study was performed had a definite sequence of daily activities, the training of the newcomers occurred according to the availability of the old-timer. For example if one look for a moment at the masters degree students learning the skill to do quantitative research. We were not given the research data and expected to complete the entire analysis of the data. Rather we were taught step-by-step from the basic processes of calculations of the data up to the stage where we were expected to do a mini-thesis of which this study is an example.

The data thus confirm that the apprenticeship learning of medical technology students is more content-driven than work driven. This is evident from the high frequency of unsupportive feedback and demonstrative explanations. This data further suggests that what is done is the rule and no motivation is needed for that. Hargreaves calls it 'frame fusion' (1996:343): the process whereby training and service deliveries are combined. Although there is a marked degree of educated discourse (suggested by a score of 13 for supportive feedback) there is a stronger tendency towards service delivery (suggested by a score of 16 for demonstrative explanations and a score of 18 for unsupportive feedback).

However the data also suggest that learning about the practice, that is trying to connect the theory to the practice represented by academic explanations, received one of the lowest scores (a score of five), although talking within a practice i.e. supportive feedback received a higher score of thirteen. However, through the process of this study the students were not really offered an opportunity to develop the language of the trade, but rather to observe and imitate.

The research does have a few limitations; i.e. a very small sample was used for the study. Generalizations are therefore not possible. The research does however provide one with a background on how the apprenticeship training of medical technology students perform in compare to other studies already done on this issue. Although in every qualitative study every situation is a natural setting and replication can thus only be proximal, the qualitative method used in my study served as a guideline how to go about presenting the study with 'honesty' and 'integrity', enabling the reader to judge the 'believability of my work' (Tiller et al:1995:33).

5.4 Summary

In this section I have explained how the findings of the study links with the theoretical framework which guided this study.

From the study findings it is evident that the apprenticeship training of the medical technology students ties in with the notion held by Jean Lave which highlights three issues:
Firstly, apprenticeship training can be categorized in two phase's i.e. the way in phase and the practice phase. Way in refers to the process whereby the newcomer is exposed to the fragmented components of a task. The practice phase refers to that part of apprenticeship training where the newcomer is allowed to complete a task from beginning to end. In medical technology training the way in phase is more dominant then the practice phase.

Secondly, learning about a practice and learning within a practice characterize apprentice learning. Learning about a practice refers to the educational discourse, which traditionally occur in site A. Learning within a practice refers to educated discourse or apprenticeship training which occur in site B. Medical technology training is characterized by a low frequency of educational discourse. This means that very little motivation is given for procedures during the completion of a task.

Thirdly and lastly, apprenticeship learning is characterized by the process of the old-timer trying to make the newcomer part of a community of experts. This study suggest that the old-timers that took part in this study are not overtly concerned to make the newcomers part of the community of experts.

Chapter 6

Conclusion

6.1 Introduction

The experience of the past years about the apprenticeship training of Medical Technology in the Cape Peninsula has highlighted a number of problems. These problems do not at all include those which are so characteristic in formal schooling set-ups i.e. lack of adequate books, reading difficulty of the books, lack of funds to purchase equipment, overcrowded classrooms, -laboratories, -time-tables, lack of cooperation by school administrators and the pressure of external certificates examinations. It involved the relationships between the old-timer and newcomer. This relationship does not occur within set prescribed rules and regulations, but are rather situated within a specific context. This context is dependent on the persons, activities, knowing and the world. The interconnections between these context-dependencies allow meaning to develop. The newcomer, who strives to become like the old-timer, also the old-timer who endeavors to train the newcomer in order to continue the community of experts represents the person. Meaning for both these two persons has thus different definitions. The old-timer follows a 'fragmented-approach' to train the newcomer i.e. a specific task is broken up into smaller fragments and then taught to the newcomer. For example when the old-timer taught the newcomer how to do a differential count the students is first taught how to make a peripheral blood smear, then how to stain the smear, then the newcomer can first observe how the differential count is done before the newcomer is eventually given an opportunity to perform a 'differential white cell count'. Only after all these fragments are completed accurately and with precision does the old-timer allow the newcomer to complete the task as a whole. The entire learning process can thus only have meaning to the newcomer once they have

reach that stage where they (the newcomer) can complete the entire task as a whole. The old-timer can however deny the newcomer the process of learning by denying them to become 'full participants' of the process. So although the newcomer has specific tasks to complete as is prescribed by the learning in Site A, it does not form a whole and the degree of learning is inevitably questioned. Should there be any misunderstandings of exactly what it is that need to be learned in Site B, learning becomes even more 'extinct', that is the newcomer will observe and copy the old-timer without any insight developing during the training process. This world of the old-timer that ultimately involves the production and reproduction of tasks and processes can thus become an area where skills are developed through the completion of tests, without learning necessarily taking place. What it entails to be part of a community of experts therefor looses its meaning. To be engaged in a task offers more learning opportunity then to be the object under study, as I have experienced in my attempt to become a member of a community of experts.

6.2 Perceptions around apprenticeship learning

The research was not aimed towards generalizations on a national level; it was done in an attempt to categorize the training of the medical technologist. One lecturer at one of the institution of site A bluntly refused to have the course being categorized in the realm of apprenticeship training. This proved to me that a great degree of ignorance still existed around the notion of apprenticeship training. Through the research I hope to discard the notion that apprenticeship training refers only to trades such as dressmaking, building, mechanic's etc. It refers to any learning activity where there is an old-timer/expert and a newcomer/student involved. The degree of elitism a society ascribe to a career has no influence on whether there

is an old-timer and newcomer involved during the learning process. This study offers an opportunity to raise the training of Medical technology students to the level where articulation and discussions can occur; a level where everyone has a mutual understanding when there is reference to certain issues of the training process.

6.3 The relationships between learning discourse and practice

In apprenticeship learning, the newcomer is taught amongst other things, to use the language of the trade. Talking about a practice in an apprenticeship learning situation is linked to the activities taking place in site A. If the old-timer does not talk within a practice the student is bound to be less knowledgeable, especially if they are taught by imitation rather then active involvement. They are thus left to develop their own meaning of the context. This allows for the development of misconceptions.

6.4 Evaluation processes

The research did not look specifically at the interrelationship between the existing knowledge of the student (i.e. knowledge generated in site A) and those knowledge generated in site B. The fact remains that the old-timer does not have the curricular freedom to attempt any project on a large scale to assist students during there training process. This is due to the context-dependency in which apprenticeship training occurs. In particular this situation where the specimens used were not 'examples', but actual samples and the results obtained where used in actual situations. There is a definite end product that needs to be met and that is the main route taken during the training process. This route involves a fragmented process of learning for the newcomer. Pieces of the whole are taught until the newcomer can eventually perform the task

with accuracy and confidence. Even the evaluation process is not predetermined by the system, but is dependent on the old-timers own evaluation system. The period the newcomer spent with the old-timer during this study was not long enough to allow the newcomer to become part of the community of experts (approximately 2-3 weeks/laboratory section in the research laboratory). This process thus occurs only after the newcomer completes the entire theoretical training (that in site A) and practical training (that in site B). This qualitative research however focuses on how "the things look and feel down under. It offers an opportunity to bring disparate and often unsought points of view out in the open"(Bogdan 1982:214).

6.5 Methodological growth

This research was my first interaction with qualitative research. I was unsure if I should first conduct my study and then try to fit it into a theoretical perspective, as was the case with other graduates students I have spoken to. However I was honoured to have a supervisor who is an expert on qualitative research. He saved me on long nights of agony and frustration, by suggesting that I first do my literature review and then evaluate how my research fits into existing notions.

During the observation process I was always seated outside the reach of the old-timers and the newcomers. I tried not to become involved in any discussions and pretended to be busy with routine laboratory work or with the theory underpinning my study. My belief that a non-participant approach would prove to be best, but at times I wished I had adopted a more active-involvement approach. I tried to listen to the shared information between the old-timer and the newcomer as objectively as possible. There were times when I did feel to ask the old-timer to

elaborate more on the information they're sharing with the newcomer. Consequently I started to doubt the objectivity of my transcripts. The transcripts were stripped of so much information that could be given through to the students. The inter-subjective agreements, however proved what I heard and saw were the reality.

The events of day three were the height of extreme disappointment. The lack of communication from the old-timer's side left me distressed and worried. That kind of attitude was a reminder of the days when I was still a newcomer. I wonder if the responses of both the old-timer and newcomer would have better if the communication channels were more open.

The old-timers often tried to get a glimpse at my observation sheets. On day three the old-timer did get to look at the tally scores allocated (that was without my permission). Although she did try to improve on her communication with the students she weren't very successful.

The data-analysis will now be dealt with in the next section. These data were obtained by using a structured observation instrument. A tally scoring system were used. The total time spend per activity was half an hour.

6. 6 The researcher's experience as a newcomer

During the research process, I found myself to be in an apprenticeship situation with my supervisor. His role being that of an old-timer and me the newcomer. Whilst I am examining another apprenticeship situation, I was an apprentice myself. Through my research process I can actually identify the process of coaching described by Hargreaves (1996). The old-timer

(in this case my research supervisor) would teach me and give me guidelines on the processes of research. I would then go and attempt the processes by myself. The old-timer will then assess the process, recommend new- or improve on ideas. I would go back and make the necessary alterations, until towards the end of the research writing process I felt confident enough to attempt a chapter without full supervision of my supervisor. Even in the process of becoming part of a community of experts was introduced by allowing me to present this study at their weekly seminars.

6.7 Consequences of the research

There are undoubtedly political consequences to the findings emanating from any qualitative research study. Whether the educators in site A feels that the apprenticeship training is good or not so good, or whether the newcomers feel satisfied or dissatisfied with their apprenticeship training, or the old-timers feel that they are doing a good job or not such a good job is not the concern of this research study. The main concern of the research was to gather data and to present the findings as accurately and objectively as humanly possible and to present the reader, the scientific community and educators with a background against which apprenticeship training of medical technology students can be evaluated.

I used 'existing theories and studies' as support for explaining the results of my own work in a 'wider, more abstract social context' (LeCompte 1993:273). This was done mainly because other issues such as cultural differences and differences in academic institutions are but some of the issues which could influence the findings of the research. The findings of this study coincide with that of existing findings (Lave and Wenger 1991, Adler 1996,1997, Lave 1989).

This list is by no means exhaustive. So although the sample was not a big one, the similarities in the research findings allow for greater generalizability. In any apprenticeship learning, there is the constant movement between peripheral participation and full participation. This makes the newcomers prone for developing 'constructively naïve' (Lave1991) ideas, which should at all times be exploited by the old-timers. Failure to do so allows for great opportunities for learning to be lost. In addition, the acknowledgement that the newcomer has existing knowledge should be taken into account. So despite the fact that a teaching curriculum is not available to the old-timer there is always the opportunity for a learning curriculum to unfold during the process of active involvement of the newcomer in a task.

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